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SECOND DRAFT

AGRICULTURAL SECTOR ASSESSMENT STUDY

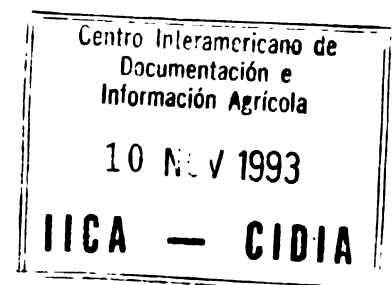
- ST. KITTS AND NEVIS -

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FOREWORD



The Federation of St. Kitts and Nevis is the newest Member State of IICA having signed the Institute's Convention at the OAS Headquarters, Washington on March 12, 1990. On the basis of discussions between Reginald Pierre, Director of Operations for the Caribbean, the Honorable Hugh Heyliger, Minister of Agriculture and the senior administrative personnel of the Ministry of Agriculture in August of 1990, the decision was taken to implement a rapid assessment of the agricultural sector with a view to the formulation of an action strategy that would guide IICA's technical cooperation actions in St. Kitts/Nevis. This sector assessment was to be carried out through the use of a multidisciplinary team of professionals from IICA and CARDI in collaboration with professionals and technicians available to the Ministry of Agriculture.

This sector assessment is therefore an important step towards developing a strategy to support the process of reactivation and modernization of the agricultural sector of St. Kitts and Nevis. Apart from establishing casual relationships among policies, public institutions, agricultural investments and the performance of the agricultural sector, it will make it possible to identify more clearly policy options, institutional reform programmes and the level of investments needed for sectoral growth. Additionally it could serve as an important support document/instrument for St. Kitts and Nevis in the country's negotiation with international funding agencies.

The exercise was conducted within the framework of IICA's Short Term Action facility. Invaluable assistance was provided by the Director, Mr. Kenneth Parker and staff of the OAS office in St. Kitts and Nevis. Sincere appreciation is extended to Messrs Valdemar Warner and Elmo Liburd, Permanent Secretaries in the Ministries of Agriculture for their support, guidance, hospitality, and patience.

The Ministry of Agriculture's team was led by Dr. Ketih Archibald and Mr. Augustine Merchant, Directors of Agriculture of St. Kitts, and of Nevis respectively, both of whom worked very hard in support of the short-term mission. Several Heads of Divisions, Ministry of Agriculture counterpart staff, as well as many farmers and persons associated with the sector in the twin island state contributed tremendously to this exercise. Ms. Beverly Harris in particular has to be mentioned specially for the provision of data.

The Regional Project Unit under Vincent Little, Project Specialist, coordinated IICA's effort and put together the document which included input from:

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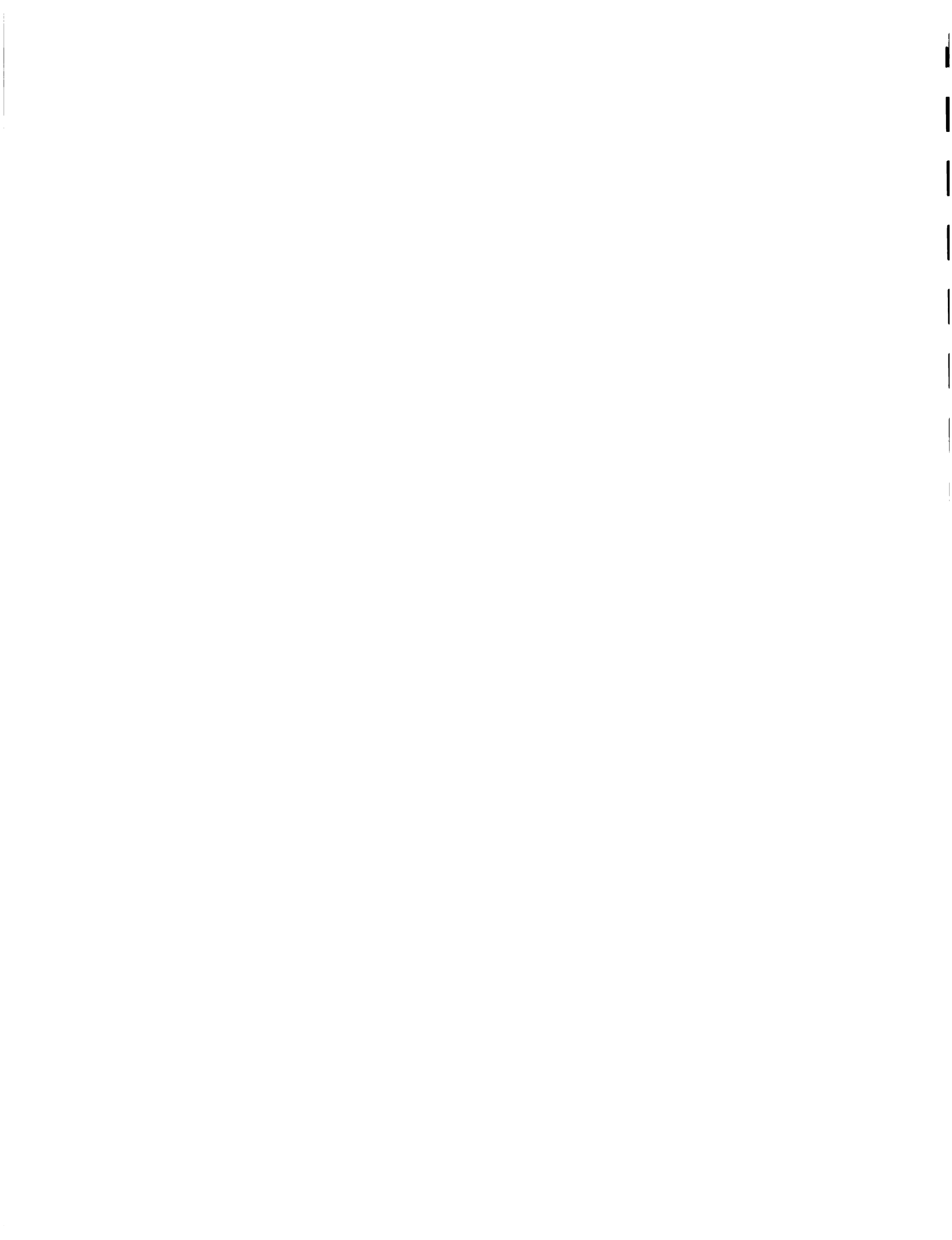
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It is impossible to acknowledge all the other individuals who have helped but special words of thanks must be extended to Mr. Terrence Beddoe (FAO Consultant), and Sherman Weekes and Harold Patterson (CARDI) and their staff for the inputs provided in this document.

Special appreciation must be expressed to the secretarial staff of IICA Barbados Office for typing and preparation of the document.

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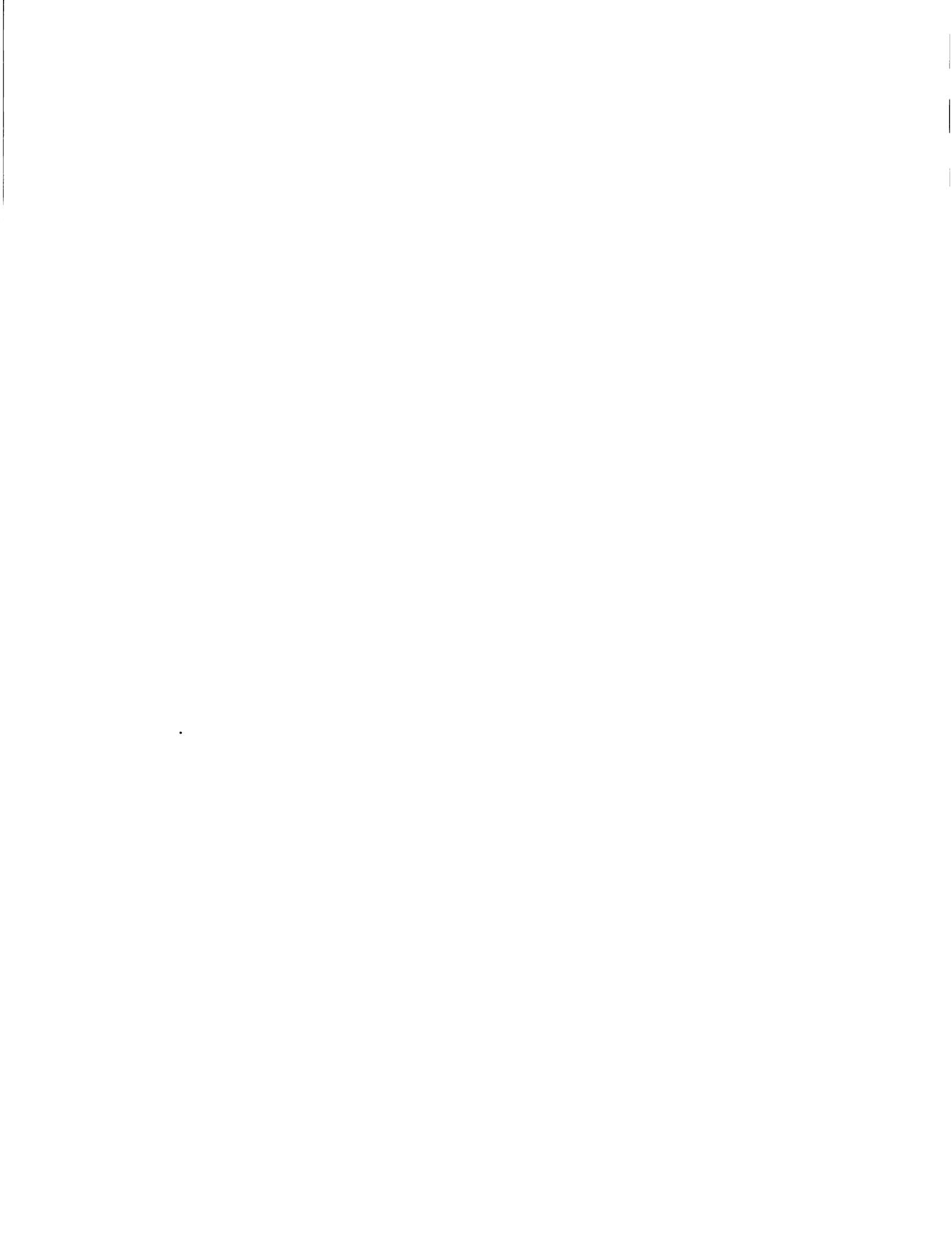
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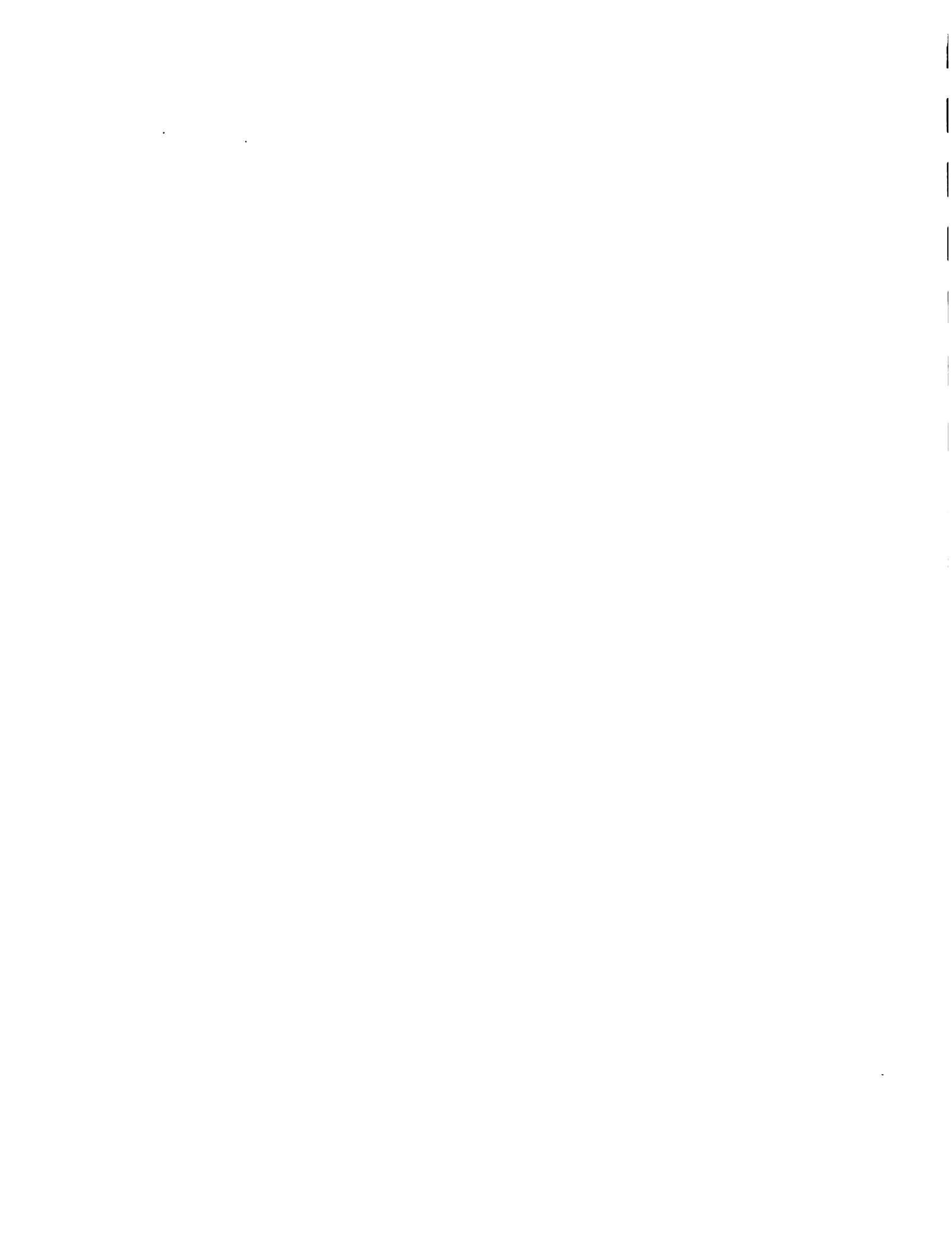


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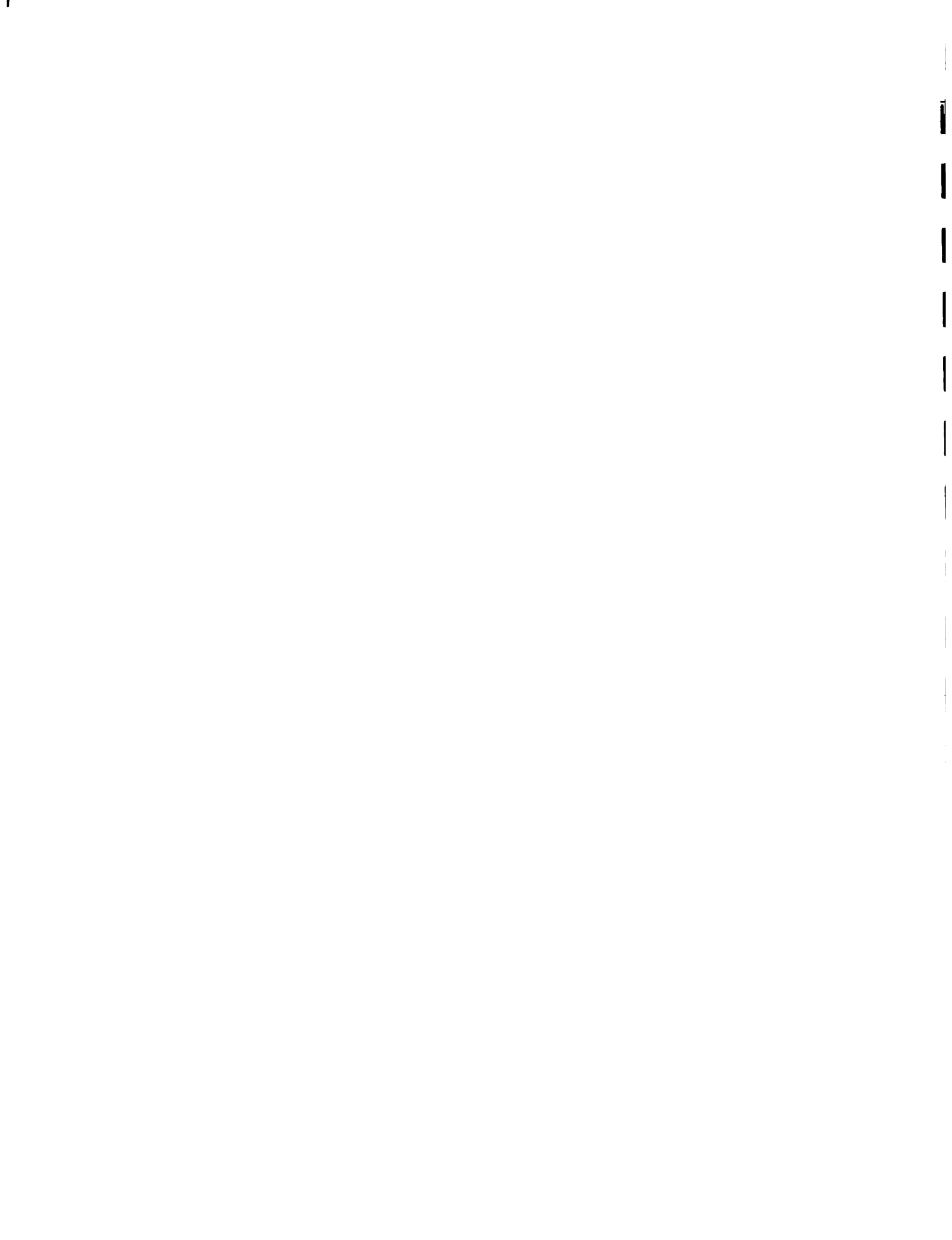
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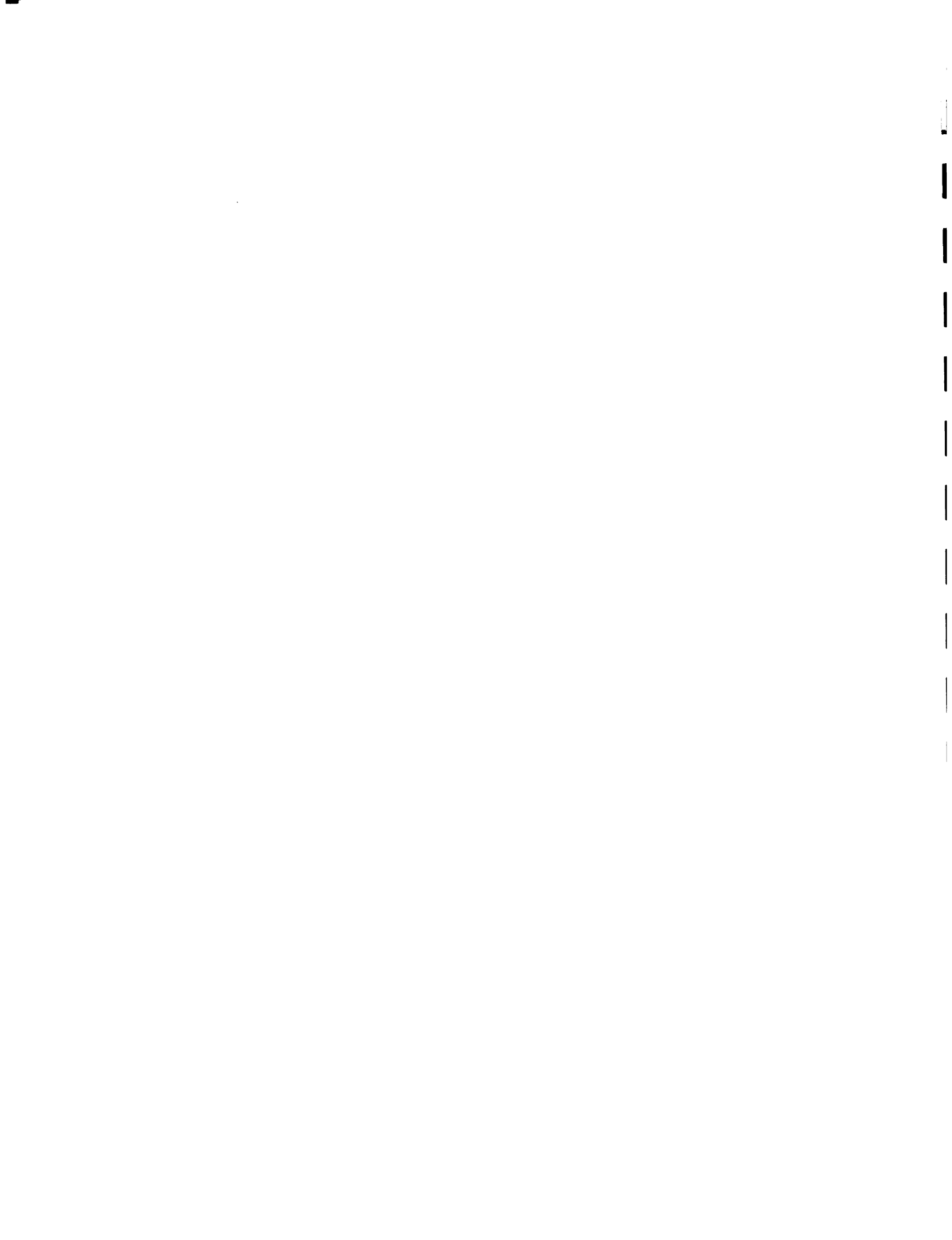
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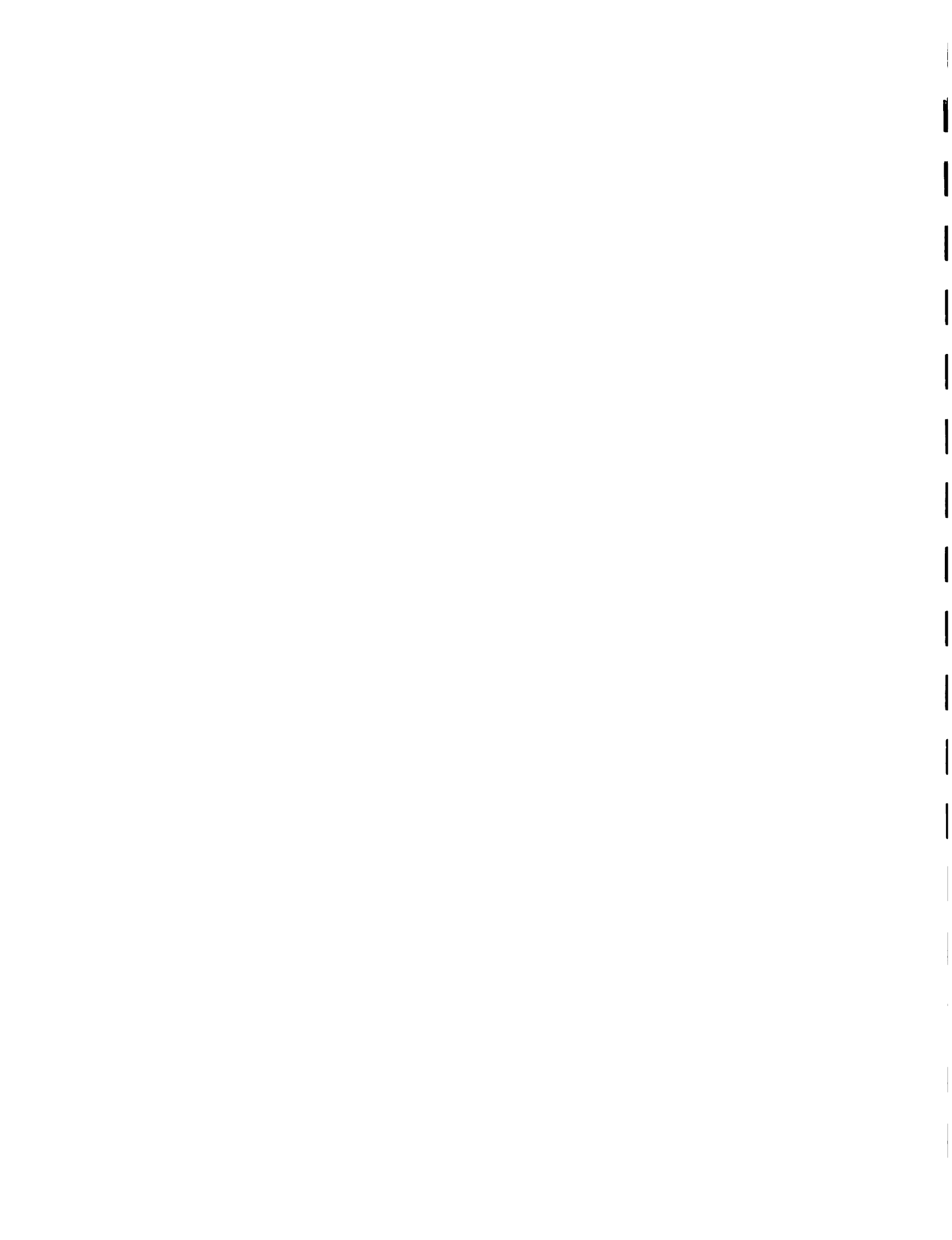
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APPENDIX



ACRONYMS & ABBREVIATIONS

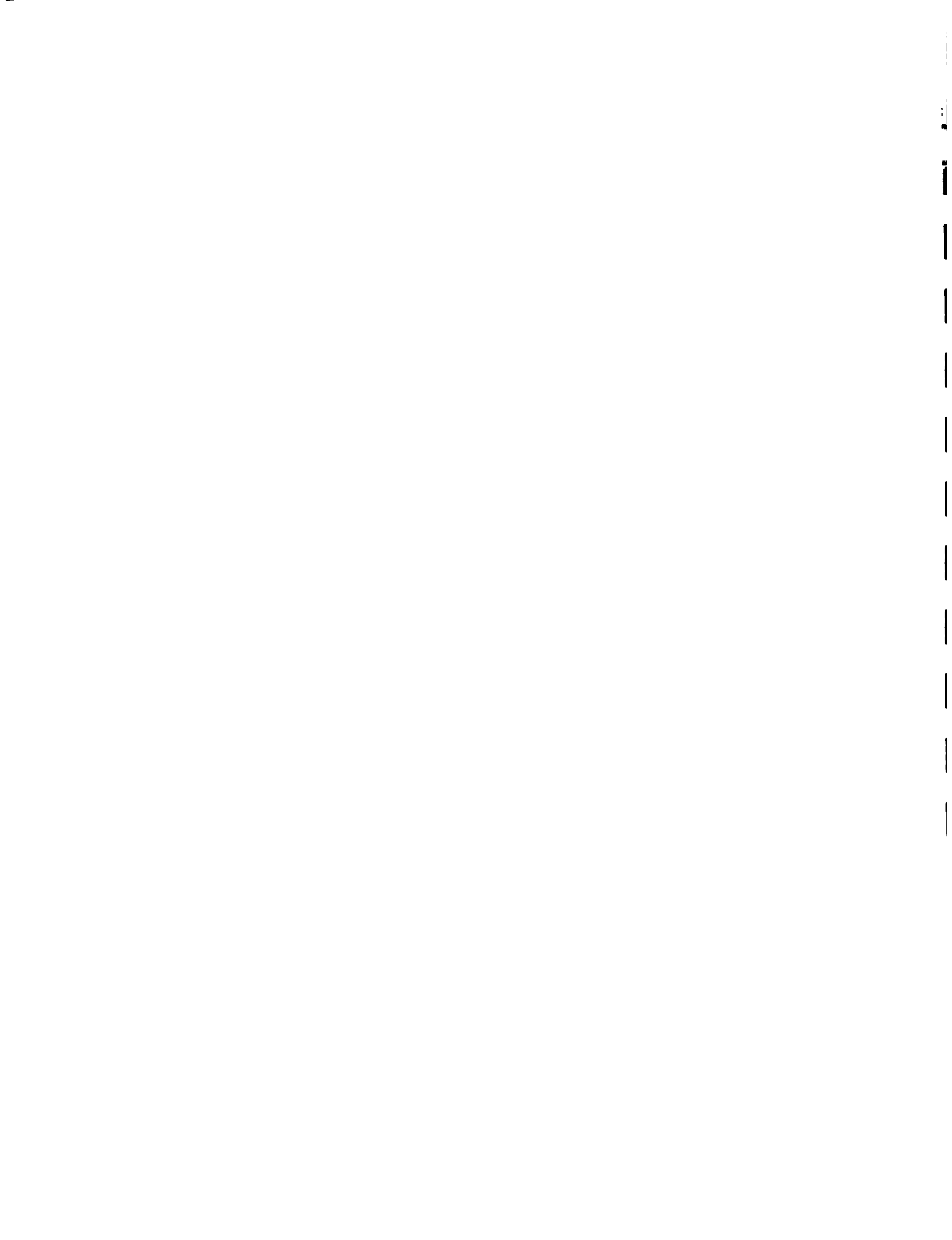
ADCU	-	Agricultural Diversification Coordinating Unit
AED	-	Agricultural Extension Division
ARD	-	Agronomy and Research Department
AREP	-	Agricultural Research and Extension Project
BDD	-	British Development Division
CARDATS	-	Caribbean Agricultural Rural Development Advisory and Training Services
CARDI	-	Caribbean Agriculture Research & Development Institute
CDB	-	Caribbean Development Bank
CEMACO	-	Central Marketing Corporation
CFTC	-	Caribbean Fund for Technical Cooperation
CATIE	-	Tropical Agriculture Research and Training Center
CIAT	-	International Centre for Tropical Agriculture
CIDA	-	Canadian International Development Agency
CIP	-	International Potato Centre (Peru)
CIMMYT	-	International Maize and Wheat Improvement Centre
CRD	-	Crop Research Division
DBKN	-	Development Bank of St Kitts and Nevis
DOA	-	Department of Agriculture
EDF	-	European Development Fund
FAO	-	United Nations Food and Agricultural Organization
FMC	-	French Mission for Cooperation
FND	-	Foundation for National Development
HCO	-	Horsfords & Co. Ltd.
IFAD	-	International Fund for Agricultural Development
IICA	-	Inter-American Institute for Cooperation on Agriculture
INRA-AG	-	French National Agronomic Research Institute - Antilles/Guyane
ISNAR	-	International Service for National Agricultural Research
IPCU	-	Integrated Pest Control Unit
IRAT	-	Tropical Agronomic and Horticultural Research Institute (French)
MOA	-	Ministry of Agriculture
NAAC	-	National Agricultural Advisory Council
OAS	-	Organization of American States
OECS	-	Organisation of Eastern Caribbean States
PAT	-	Project Advisory Team
ROC	-	Republic of China
SSMC	-	St Kitts Sugar Manufacturing Corporation
TDC	-	Trading and Development Corporation
TDT	-	Technology Development and Transfer
TDTS	-	Technology Development and Transfer System
TGT	-	Technology Generation and Transfer
TOP	-	Team of Operations and Planning
TROPRO	-	Tropical Produce Project
UNDP	-	United Nations Development Programme
USAID	-	United States Agency for International Development
UWI	-	University of the West Indies



EXECUTIVE SUMMARY

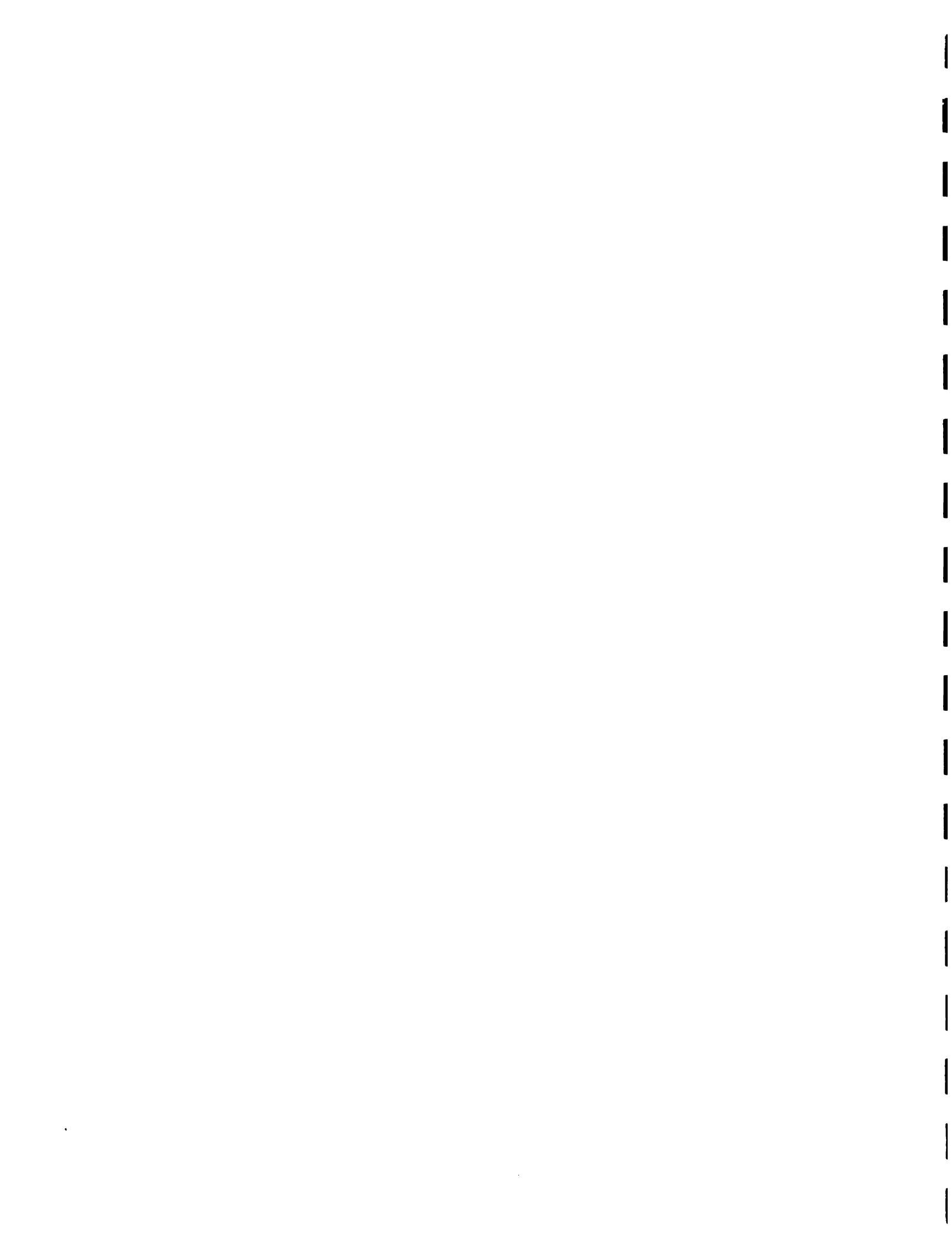
BACKGROUND

1. *The Federation of St. Kitts and Nevis lies in the Northern part of the Leeward group of the Lesser Antilles in the Eastern Caribbean. It became an independent state in association with Britain in 1967 and achieved full political independence in 1983. St. Kitts and Nevis are separated by a Strait, known as the Narrows, a channel of about 2 miles in width.*
2. *The twin-island state with an area of 269km² (104 square miles) and a population of 47,500 has achieved significant gains in the standard of living of the people over the last decade, despite being exceptionally vulnerable to unfavourable external circumstances. The general economy has performed well despite inclement weather, declines in the terms of trade and fluctuations in the growth performance of the world economy, due largely to substantial inflows of grants, concessionary finance and private remittances.*
3. *Real output expanded on average by 6.2% per annum from 1980 to 1989, while real per capita income grew by approximately 4% per year over the same period. At the end of 1989, nominal per capita GDP was EC\$6,364 (US\$2,357) compared to EC\$2,389 (US\$889) in 1980.*
4. *The sugar subsector still remains the mainstay of the economy despite the relative growth in importance of tourism and the services sector in the last decade. Growth in the agricultural sector is largely indicative of the performance of the sugar industry, and the trend in the sector during the 1980-89 period indicates that its contribution to national output has consistently declined by almost 50% from 16.7% of GDP in 1980 to 8.9% of GDP in 1989.*
5. *Both the tourist and construction sectors have steadily expanded over the last decade. The tourist sector has emerged as a major economic activity in recent years with consistent increased in tourist arrivals. Its share of GDP has increased from 3.8% in 1984 to 6.1% in 1988, while value-added increased at an average rate of 33% between 1984 and 1987. Real output of the construction sector has increased by more than 15% between 1986 and 1989, largely as a result of increased public sector investment in the Southeast Peninsula Highway Project, construction of a tourist complex downtown and renovations of commercial and residential buildings. The services sector continues to be the largest contributor to GDP. Its performance in recent years however reflects a steady decline, from 23.2% of GDP in 1984 to 18.9% in 1989.*
6. *The most pressing problems and constraints facing the St. Kitts and Nevis economy can be summarized as follows:*



- a. *Depressed export prices and market uncertainty for sugar generated by a generally declining US quota as well as the planned trade liberalization within the European Economic Community in 1992.*
 - b. *Operations inefficiencies in the sugar industry.*
 - c. *Labour shortages and declining labour productivity.*
 - d. *General production decline.*
 - e. *Oversized civil service.*
 - f. *Deficiency in Planning and Implementation Process.*
 - g. *Inadequate water supply.*
 - h. *Small domestic market.*
 - i. *Chronic trade and current account deficits of the balance of payment.*
7. *The development challenge for SKN therefore is to surmount the potential problems with appropriate strategies so that economic growth can be sustained in the medium and long term. The Government of SKN has recognised the problems and development challenges for the future. It has attempted to address these by various strategies outlined in its National Development Plan (1986-90) and its annual plan for the economy (as indicated by its budgetary proposals). The principal elements of these strategies include the following:*
- (a) *The free-market competitive system is to be the basis of the economic structure of the country.*
 - (b) *Economic diversification is the central focus of the government's policies and strategies. The government's role in the process will be facilitatory and regulatory.*
 - (c) *The economic strategy seeks to provide a more structurally balanced economic base which will be dependent on such sectors as agriculture, tourism, manufacturing and construction. Of these, the first*

three will be the major thrust of the development programme and the principal sources of foreign exchange earnings.
 - (d) *The government seeks to enhance mobilisation of both domestic and foreign capital simultaneously through implementation of appropriate policies and*

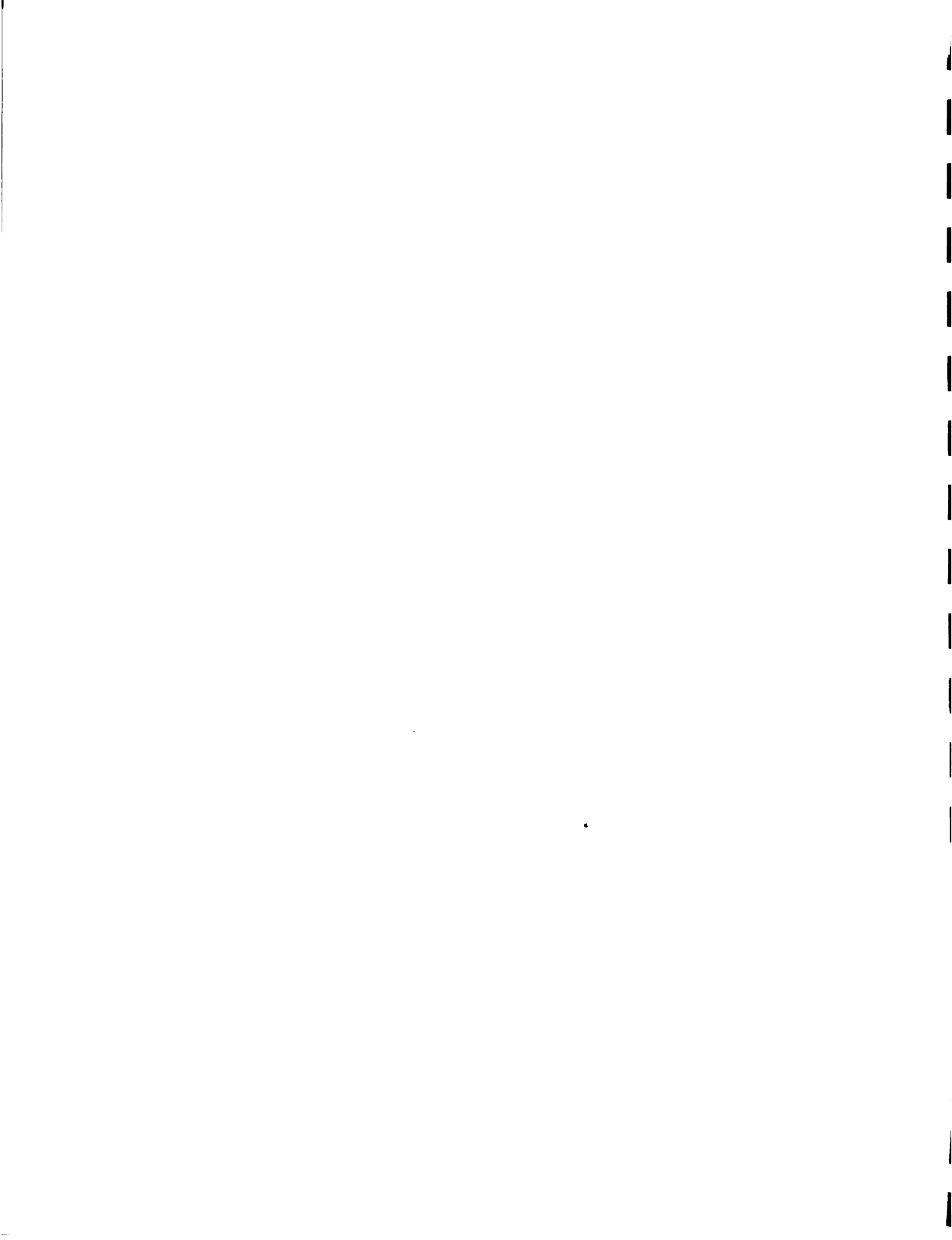


programmes. The public sector investment programme (PSIP) will be the main instrument for mobilising capital. The interest rate policy will seek to provide incentives for domestic savings as well to channel capital into priority areas.

- (e) The level of public sector capital spending will be a critical factor in determining growth in construction and distribution.*
- (f) The strategy also seeks to minimise the rate of inflation and the size of the government's deficit while increasing employment opportunities, the rate of domestic savings and investment.*
- (g) Fiscal and budgetary policies will be used to improve public sector accounts, enhance revenue collection, rationalise expenditures and provide incentives to the productive sectors of the economy.*

AGRICULTURAL DEVELOPMENT STRATEGY

- 8. As indicated before, the agricultural sector has performed poorly over the last decade. Sugar production, which is the main activity in the sector has declined over the period and the financial viability of the industry has been severely reduced. The industry has been also affected by the buoyancy of tourism and construction sectors which has attracted labour from the sugar sector. A strategy to improve the viability and competitiveness of the industry has been developed for its medium and long-term survival. This strategy develop include: a rationalisation of the industry's management structure and operations through joint ventures, the upgrading of plant and equipment to increase efficiency, and development of alternative uses for sugarcane, and achievement of financial self-sufficiency in the medium term.*
- 9. With respect to non-sugar agriculture, The government has embarked on an agricultural development strategy (1986-91) to address the constraints of the subsector and reactivate its role in the economy. The main thrust of the strategy is to effect structural adjustments in the sector agricultural through acceleration of the process of agricultural diversification. The principal elements of this strategy include:*
 - (a) Pursuit of a programme of agricultural diversification with major emphasis on food crop production and the development of fisheries, livestock and forestry.*
 - (b) An improved land-use and land tenure policy to address problems of insecurity and other constraints to production will be the basis for development of the subsector.*
 - (c) Increased production and productivity have been targeted for all areas of agriculture with the aim of achieving self-sufficiency and increased import substitution for both crop and livestock products.*



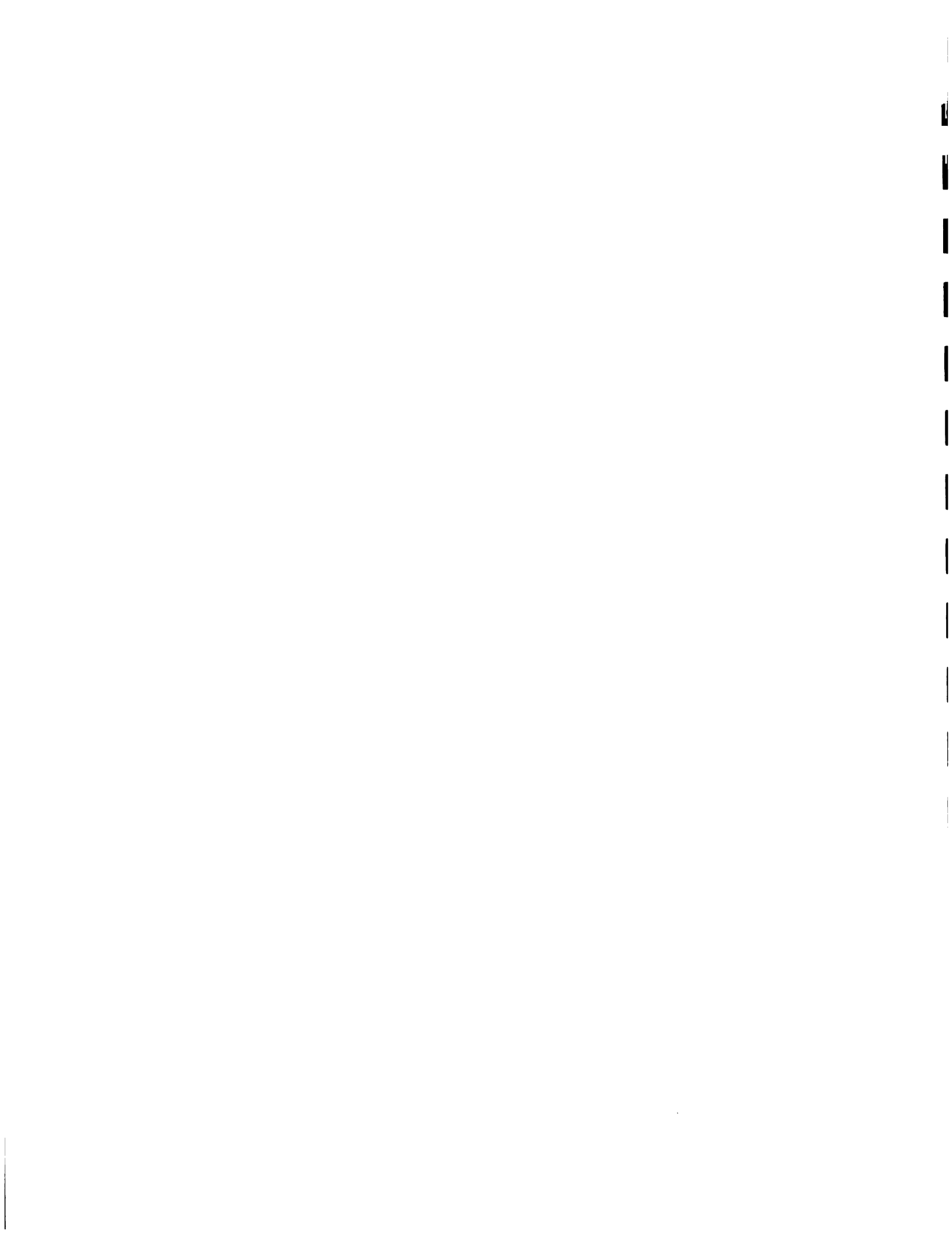
- (d) *Improvement of the marketing system and marketing policy to facilitate production and disposal of agricultural products. The Central marketing Corporation will be strengthened, public market facilities will be upgraded and marketing outlets will be established in outlying areas. In addition, efforts will be made to provide crop forecasting, production monitoring and to conduct market surveys both domestically and in neighbouring countries to identify market opportunities.*
- (e) *An upgrade of the physical infrastructure, particularly roads to facilitate transportation of inputs supplies to farms and farm produce to markets.*
- (f) *An improved incentive scheme to stimulate and encourage increased crop, livestock and fisheries production through the granting of duty free concessions, provision of loan facilities and granting concessionary credit through the Department of Agriculture.*
- (g) *Strengthen institutional support to the agricultural sector at the national, regional and international levels. This includes strengthening the Department of Agriculture to improve the delivery system of its services, planning and coordination with other sector-related and national institutions and increased involvement of regional and international institutions in the agricultural development process.*

MAIN CHARACTERISTICS OF THE AGRICULTURAL SECTOR

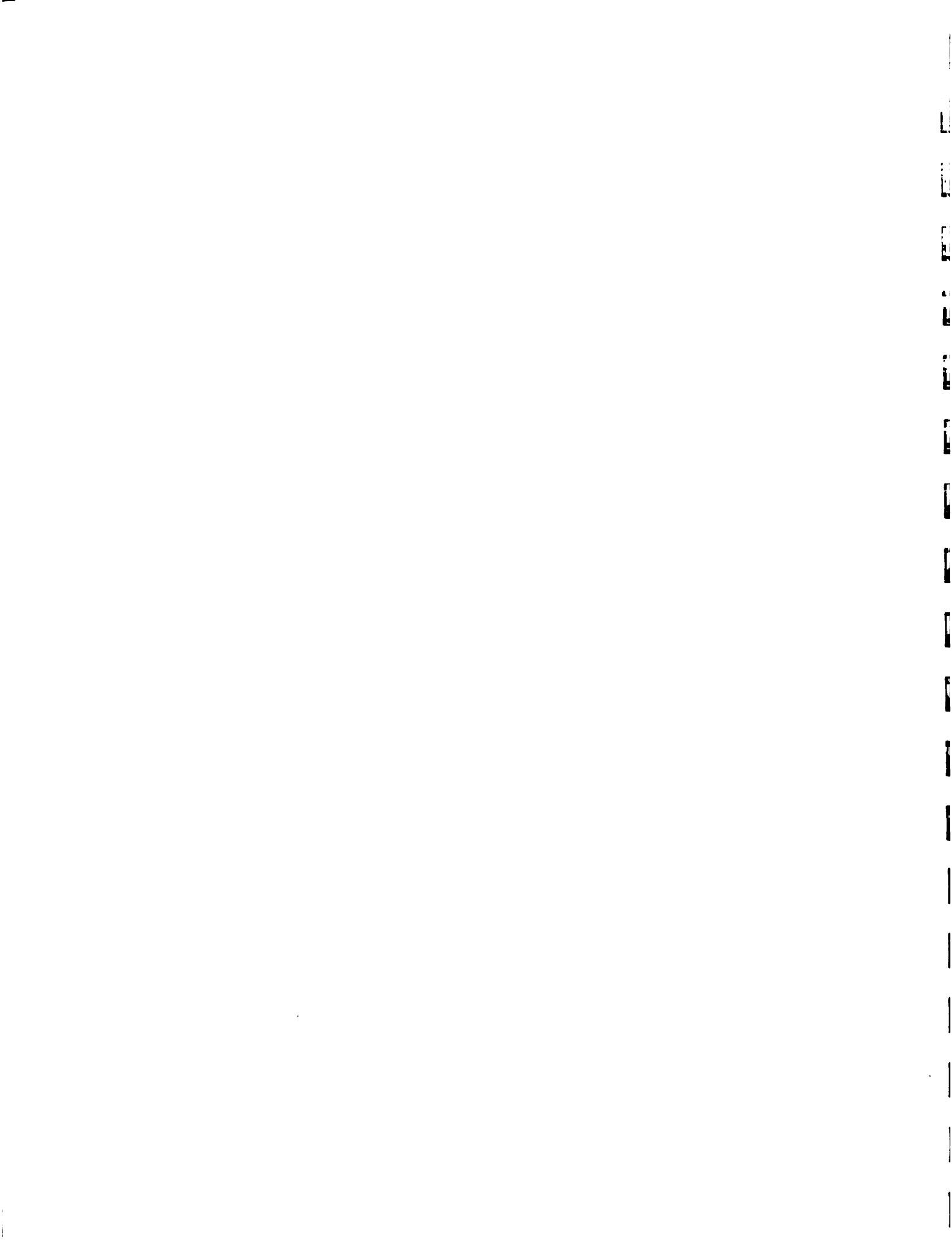
10. *Data on land use in SKN (except for sugar cane cultivation) is not very reliable; most of what is available is largely based on estimates provided by the agricultural census. The last agricultural census of 1986 shows that about 21,000 hectares of land is under agriculture including crop production, pasture, grassland, woodland and forests and other land. Based on a land use survey of 1966, about 26 percent of land (6702 hectares) was classified as high quality agricultural land and 45 percent (11,700 hectares) was considered fair. Relative to St. Kitts a smaller proportion of good lands can be found in Nevis due to its topography and rocky conditions.*
11. *The farming sector is dominated by small farmers with most farms having an area of less than 1 hectare (2.4 acres). The agricultural census of 1986 estimated that there were 3,429 holdings in SKN, with 65% being in St. Kitts and 35% in Nevis. Estimates from the last census further show that more than 90% of farms in the twin-island Federation are less than 2.02 hectares (5 acres), with approximately 81.2% having an average size of less than 1.2 hectare.*
12. *Most of the agricultural activity, particularly in St. Kitts is undertaken on government-owned lands which are sugar estates acquired during the 1972-75 period. St. Kitts has a highly skewed land ownership with 23 properties or 1.0% of the island's agricultural*



- holdings and comprising more than 75% of total land under government control. About 95% of the total holdings are operated by individuals, mainly small farmers while 3% are operated through a partnership. Small farms with less than 2.0 hectares (5 acres) comprise 75% of the total holdings in St. Kitts but control only about 6% of the land.*
- 13. Land ownership is less concentrated in Nevis with the government controlling less than 10% of total land. The government started acquiring estates since 1933 and the last was taken over in 1968. Since then, some of these have been redistributed through leasing and sale to smaller farmers in 3-acre plots. However, most of the large estates are still government-owned or controlled.*
 - 14. The pattern of land tenure in SKN is characteristic of small farm agriculture where there is a combination of plots that are owned, leased or rented. Furthermore, the land distribution situation indicates that there are differences in the types of agriculture found on the two islands. Data from the 1986 agricultural census shows that 53% of total agricultural holdings (82% of the total area) are owned, 27% (8% of area) are rented or leased, 17% (3% of area) are operated under no specific tenurial arrangement and 2% are under other forms of tenure. The data also shows that of the total holdings that are rented or leased, about 90% involves direct cash payment for renting or leasing. There is also evidence that a relatively larger number of farmers in Nevis opt for payment in kind compared to farmers in St. Kitts.*
 - 15. As indicated above, the land tenure situation between the two islands is contrasting. In St. Kitts, only 36% of the island's holdings are freehold compared with 65% in Nevis. It is common for small farmers, particularly in Nevis to possess a small plot of an hectare or so as freehold, then lease a few additional hectares from government for farming and graze cattle on communal pasture or on government land and estates.*
 - 16. The current land tenure system and land use policy are serious constraints to agricultural development in St. Kitts and Nevis. A major inadequacy is that the current system does not give farmers formal land rights and this constraints them to access credit and it is not conducive to make continuous improvements in land quality and/or land management.*
 - 17. The average age of farmers in SKN is more than 45 years; about 63% of total farmers are above 45 years of age. This is partly because small-scale farming is seen as a post-retirement activity, and partly because many small farmers are either present or former employees of the sugar industry who have been granted the use of land after many years of satisfactory service. The age structure of the farming population reflects also the failure of non-sugar agriculture to attract young people to farming. It is partly indicative of the low returns to agriculture vis-a-vis other occupations.*
 - 18. The main constraints found to be affecting agricultural development in SKN are listed below:*



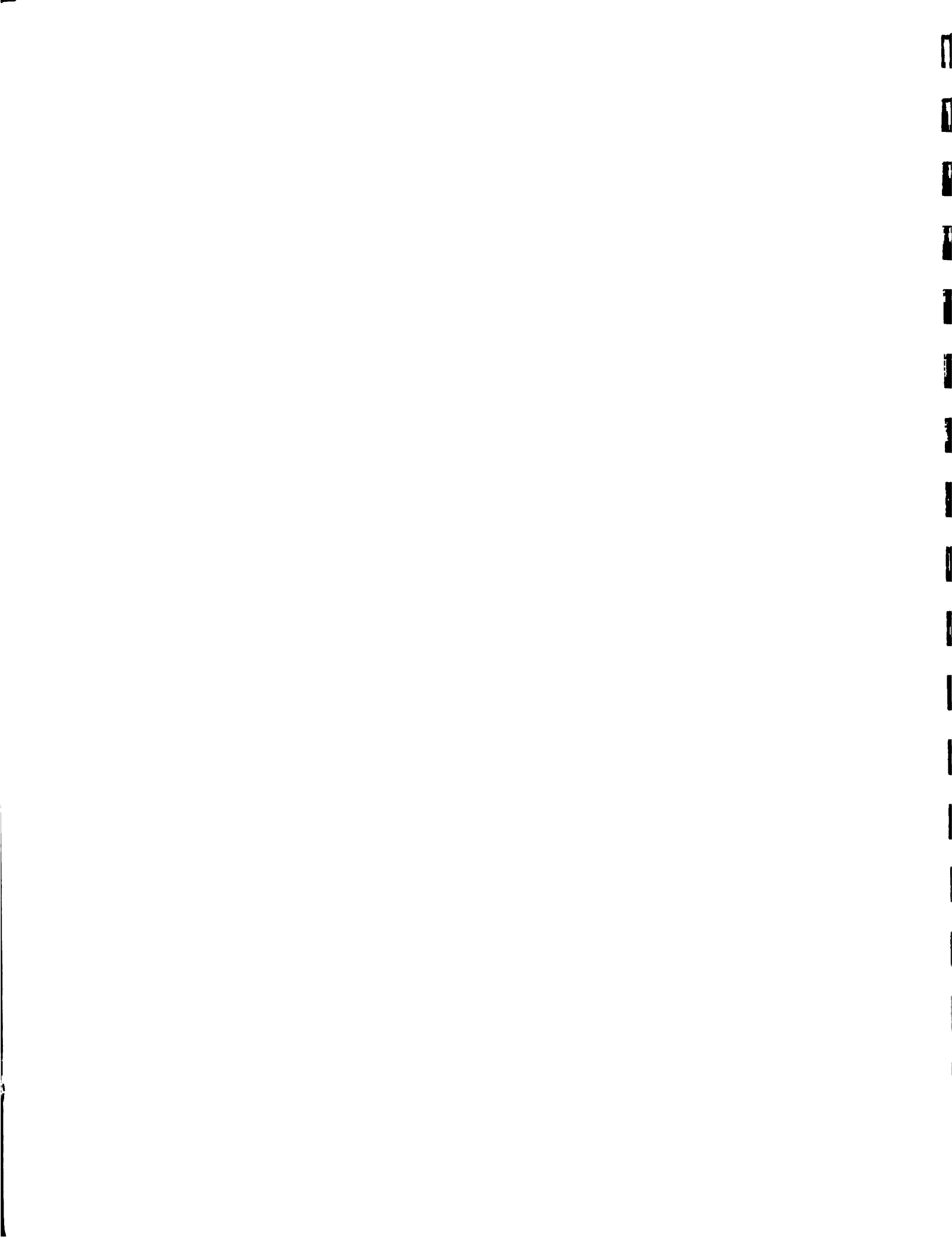
- (i) *The failure of the government to resolve the land tenure problem, particularly in St. Kitts. Although the sugar estates have been fully taken over in 1989 and the government has proposed to address the land tenure question for several years; very little progress has been made on this. As long as St. Kitts lacks a clear land tenure policy, the incentive is reduced for long term investments in non-sugar agriculture and the agricultural diversification programme will be affected. Certain tenorial aspects of land, namely inheritance and fragmentation can also be potential constraints to agricultural production.*
- (ii) *As indicated before, farmers are relatively advanced in age. This factor limits motivation for medium and long term investments in the sector, whether by farmers financing from their own accounts or being financed from institutional sources. This in turn will affect productivity in the sector.*
- (iii) *The sector is characterised by a large number of part-time and subsistence farmers. Small farmers also dominate the sector with almost 80% of farms being less than 1.2 hectares (3 acres). With the advanced age of farmers and low levels of technology employed, small farms do not provide sufficient income and alternative employment opportunities have to be pursued.*
- (iv) *The low profitability of small peasant-type farming is not conducive to sustained development of the sector. The constraints discussed above contribute to a low economic viability of farming; alternative strategies which consolidate farms into more economically viable enterprises should therefore be considered. A few intensive and well-managed farming operations in both islands could almost certainly satisfy all their requirements of eggs, poultry and vegetables. However, such operations will not contribute to creation of employment opportunities in farming nor will it provide equal opportunity for small farmers, which is the focal point of the government's development strategy. Nevertheless, larger and more efficient farms should be encouraged if there is to be increased capitalisation of the sector and if agriculture is to play its vital role in the economy.*
- (v) *There are constraints in both the internal and external markets for the country's agricultural products. Although tourism has expanded, the size of the internal market still limits its capacity to absorb agricultural output, especially during peak production periods. In addition, the cyclical nature of production provides supply problems for the tourist sector as well as to meet external demand requirements throughout the year.*



- (vi) *The physical infrastructure, particularly feeder roads is not adequate to support agricultural production and postharvest handling of products. Much damage is done to equipment and vehicles; both the DBSKN and FND experience persistent repayment problems for loans provided to purchase vehicles and equipment because of their "short" life.*
- (vii) *The availability of water is insufficient to meet the needs of both islands. While there is much potential for vegetable production, the lack of irrigated water is a major constraint. Efforts to diversify agriculture particularly intensive vegetable production will require additional water. The competition for water is likely to intensify as future demands for water come from an increasing population, urban development and an expanding tourist sector.*
- (viii) *The agricultural institutions, particularly the DOA's of both islands are not sufficiently strong to have any major impact on agricultural development. They are affected by a shortage of funds and skilled personnel which constrain agricultural planning and execution of development activities. In addition, the institutions are unable to effectively integrate externally funded projects with their development efforts.*
- (ix) *There are serious deficiencies in the capacity of the research and extension divisions to generate and transfer technology to farmers.*
- (x) *For various reasons, the government's policy goals and targets for agriculture have not been achieved. For example, most of the targets for the sector in the last development plan (1986-91) have not been realised and little has been done to implement an agricultural diversification programme. Sugar is still important to the sector and the economy, but its poor performance has been a financial burden on the government and this may have affected the development of non-sugar agriculture.*

RECOMMENDATIONS

19. *In order for the agricultural sector to contribute to national economic development, to develop strong linkages mainly with the tourist sector and to expand its productive base, as defined in the Development Plan, the following specific objectives should be targeted:*
 - a. *Increase agricultural and livestock production through the expansion of land area utilized and improvement in the level of productivity.*
 - b. *Strengthen the institutional support services provided to farmers in order to improve their managerial and technological capabilities.*

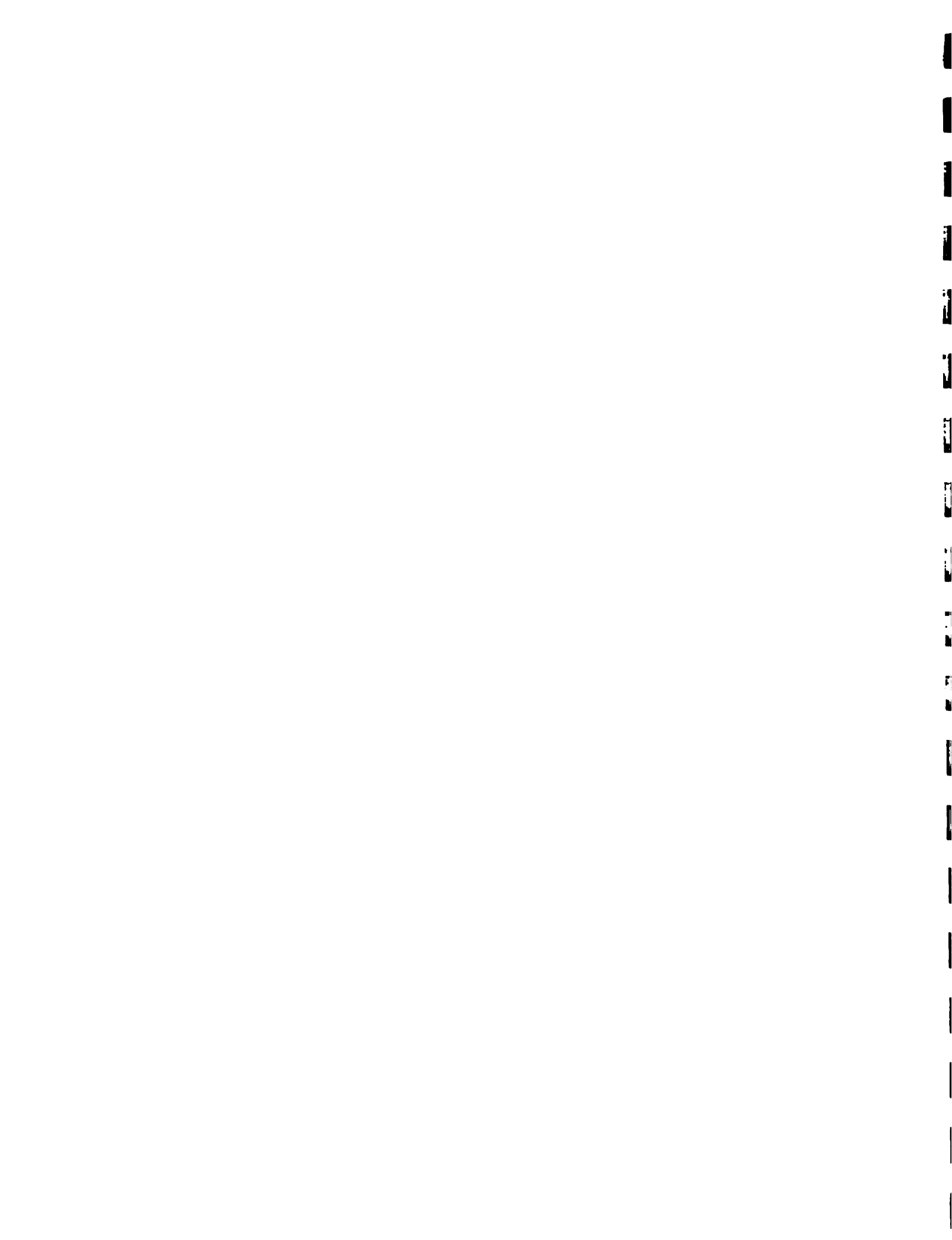


- c. *Strengthen the institutional framework for policy analysis and planning at both the national level and agricultural sector level.*
 - d. *Create and promote mechanisms for farmers participation in the development process.*
 - e. *Improve the efficiency of the agricultural marketing system.*
 - f. *Facilitate access of land to farmers.*
 - g. *Facilitate the access to and use of credit by farmers.*
 - h. *Reduce harvest and post-harvest losses.*
 - i. *Promote the consumption of locally grown food-stuff.*
 - j. *Promote linkages between the agricultural sector and the tourist sector.*
20. *In terms of commodities which should be given priority attention the following are recommended:*
- a. *Food crops and vegetables: white potato, sweet potato, peanut, tannia, pumpkin, pigeon pea, onion, tomato, carrot, sweet pepper.*
 - b. *Fruits: Citrus, papayas, avocados, mangoes, breadfruit, tamarinds, W.I. cherries, guava.*
 - c. *Livestock: Dairy, feedlot production of beef, pigs, broiler, small ruminant.*

INSTITUTIONAL

21. *Policy Analysis and Planning*

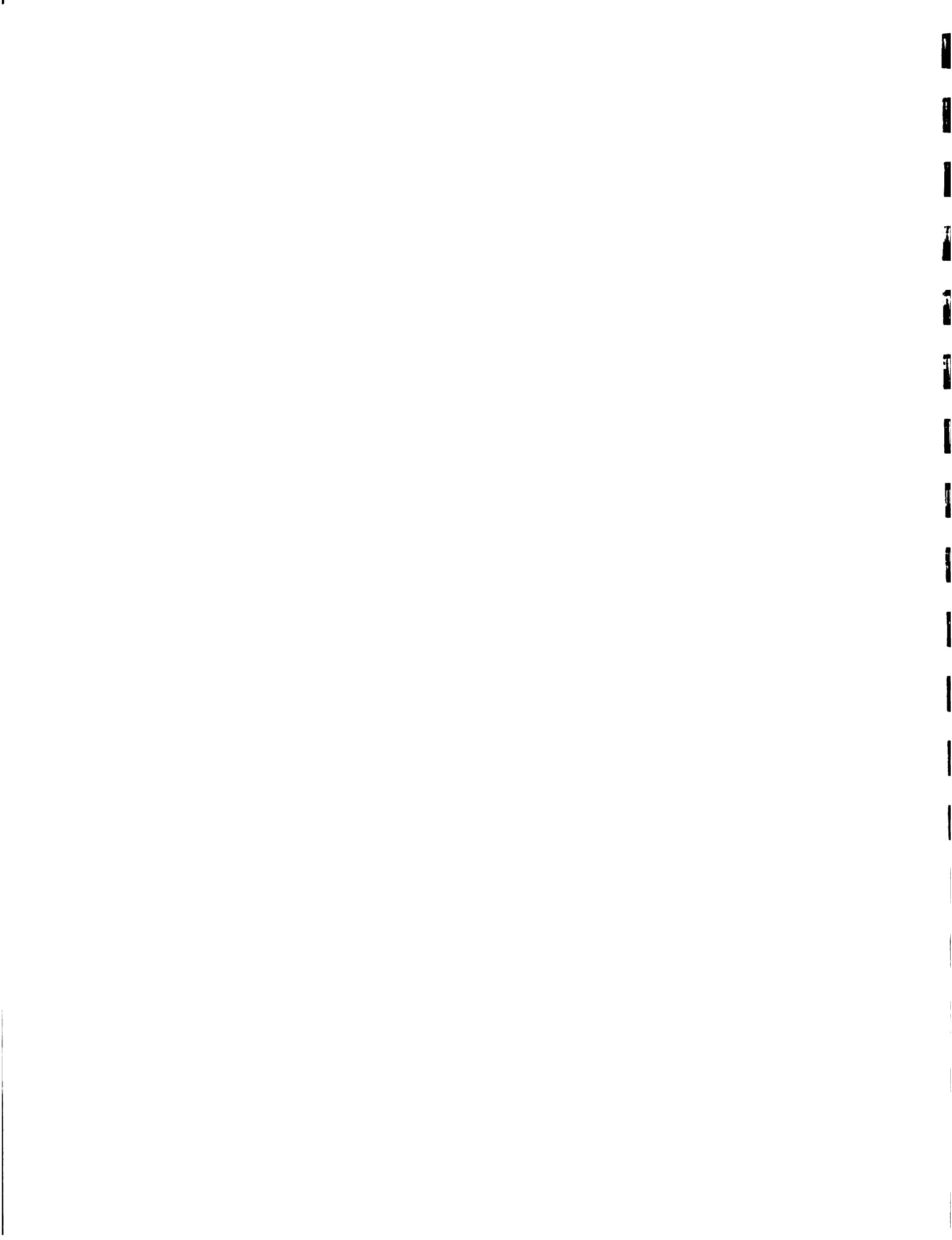
- a. *Establishment of a statistical unit in the Department of Agriculture that will provide relevant and timely information for policy making and planning.*
- b. *Training of staff in the statistical unit and the DOA in methods of data collection, its organisation and management.*
- c. *Introducing methods of annual budgeting, activity programming, monitoring and evaluation in the DOA.*
- d. *Strengthening of mechanisms of coordination between the DOA and the Planning Unit in the area of agricultural planning.*



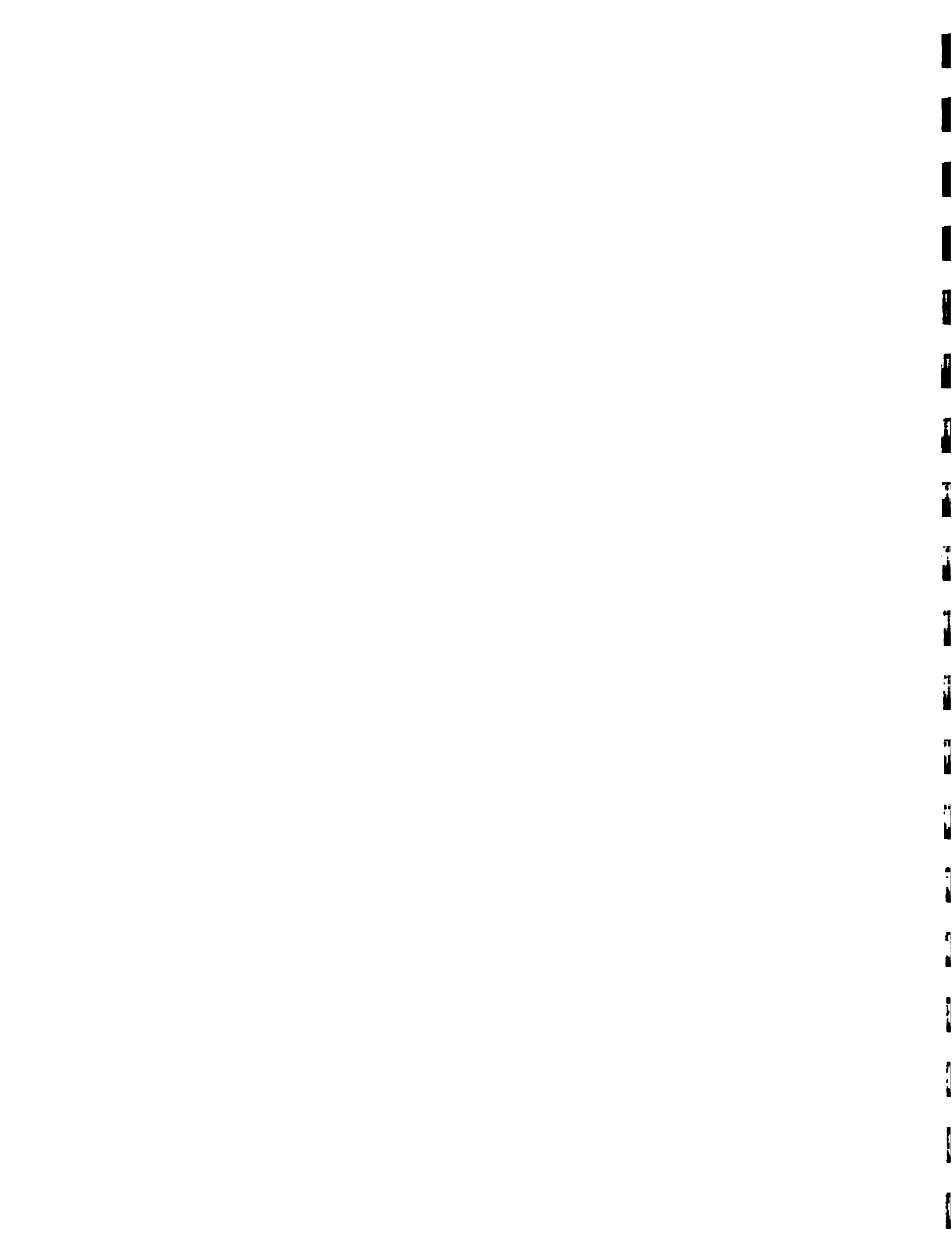
22. *Markets/Marketing*

The proposed Marketing Strategy presented in the Agricultural Diversification Study (ADS) remains valid, however, time and new information may warrant the following modifications.

- (a) In addition to identification of market opportunities, removal of production constraints and strengthening of weak links in the marketing system, priority attention must be given to the building of human resource capability to undertake the necessary marketing functions.*
- (b) Consequently, one additional element to the marketing strategy should be efforts to create and/or strengthen managerial capabilities of farmers organisations.*
- (c) In respect to market identification, the ADS gave priority to root crops and fruit because of their production suitability and "price advantage". CATCO experience has shown that most root crops produce marginal returns or losses. Therefore, very careful attention must be given to the selection of priority crops in the diversification effort.*
- (d) Since the Agricultural Diversification Study was undertaken, both St. Kitts and Nevis have executed several actions and projects. The priority measures identified in the ADS must, therefore, be reviewed and updated. Some of the measures made redundant are the following:*
 - improvement of abattoirs and meat cutting facilities;*
 - renovation and improvement to public markets;*
- (e) In light of new experience and advancements since the completion of the ADS the following suggestions are made for modification of the proposed marketing strategy:*
 - The collection and dissemination of market information should be restricted in the first instance to specific crops with identified market opportunity. this will minimize costs and facilitate the design of an effective model which can later be expanded to their crops.*
 - Investments in marketing infrastructure should be kept to a minimum until clear national marketing policies and strategies have been defined and accepted by the kept participants.*



- *Before initiating activities to strengthen CEMACO, a clear statement of CEMACO objectives within the New Marketing Policy/Strategy should be made and agreed upon by the key players in the marketing system.*
 - *The establishment of a "market terminal" in St. Kitts should be re-evaluated. it is felt that such an initiative would not make the best use of the scarce resources and based upon experiences within the region, could increase rather than decrease post harvest losses.*
 - *Rather than create an "Export Division" to carry out all export functions, it is suggested that export opportunities be identified by an ad hoc committee and then an Export Division be allowed to evolve over time to meet the needs of producers, intermediaries and external markets. the institutionalization of an Export Division, a priori, stands the risk of creating another bureaucratic structure which may not satisfy the real needs of the market. Any Export Division should not be created until a comprehensive marketing policy/strategy has been defined.*
 - *The proposed Marketing Service Unit (MSU) should start small and be allowed to evolve over time to meet the needs of farmers and marketing intermediaries. It should concentrate on one or a few crops until an effective system has been developed.*
 - *Emphasis should be given to the organization of one farmers organisation in St. Kitts and one in Nevis to coordinate marketing activities.*
 - *Efforts should be made to gather baseline decision making information on huckster systems, agro-processing potential and on-going regional marketing efforts as inputs into the design of national marketing policy/strategies.*
 - *The Marketing Advisory Committee, with representation from farmers, CEMACO, SSMC, MOA, Ministry of trade and others, should be organized immediately and assigned the responsibility of preparing an integrated and comprehensive marketing policy/strategy document for St. Kitts and Nevis.*
23. *The Research Development and Extension Services should be modified and strengthened in accordance with priority - commodities to be targeted, and available validated technology should be more readily transferred to the farming communities.*
24. *Implement actions to strengthen Farmers Organizations in order better services to farmers, in addition to facilitating the access to small farmers of those services that otherwise would not be provided.*



25. *Strengthen the Plant Protection and Animal Health programmes by up-grading the surveillance system through in-service training of new and existing personnel and by implementing programmes for enhancing public awareness and through the identification of major pests and diseases of economic importance affecting livestock and priority crops. Additionally, the Pesticide Control Board should be revitalised.*

26. *Statutory Measures*

Development and implementation of a comprehensive land policy programme to include the following:

- (a) *Zoning of land so as to designate areas in which real estate development cannot be allowed; and*
- (b) *Providing longer term security to users of agricultural land in order to encourage long term investment on the land.*

COMMODITY PROGRAMMES

27. *Food Crops*

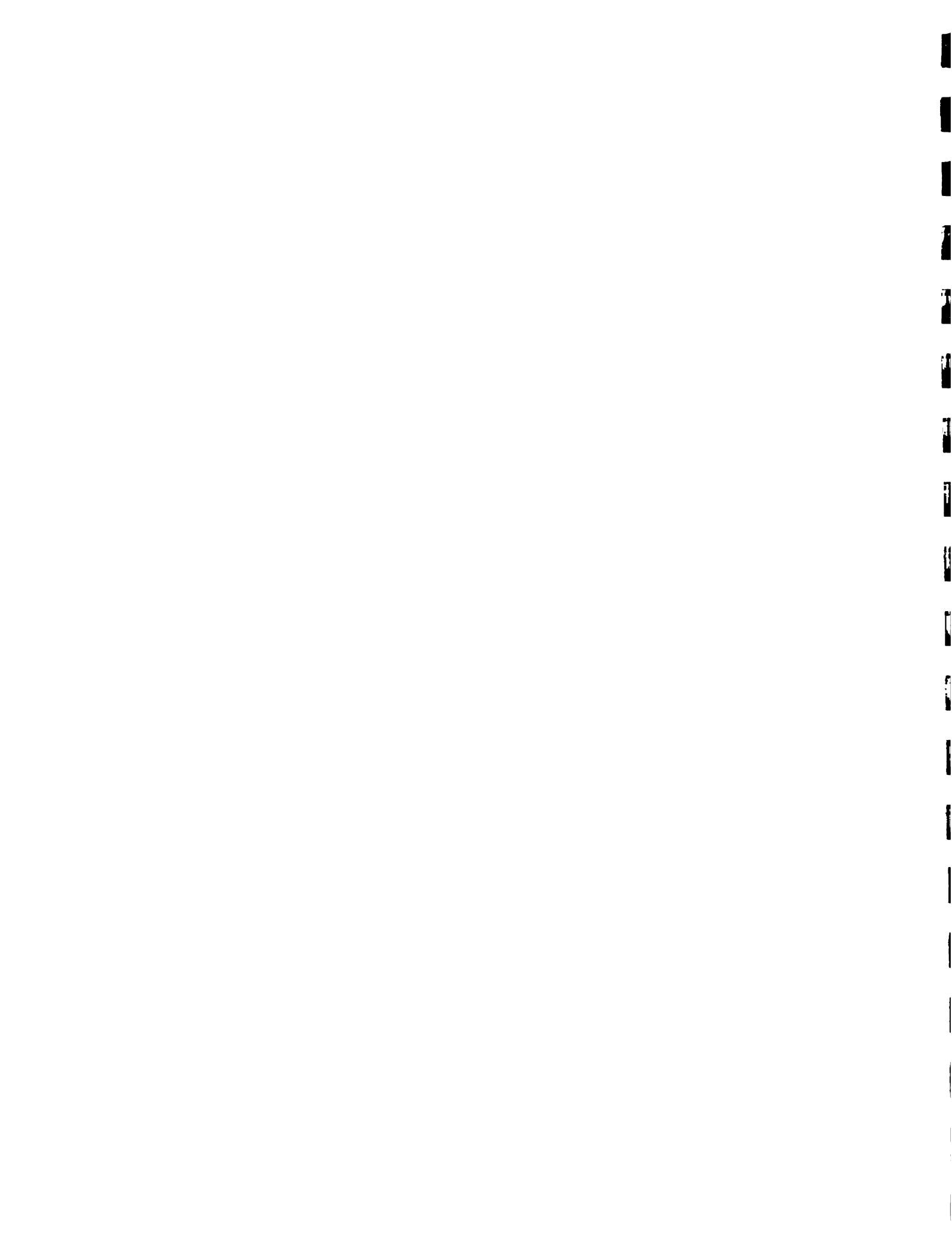
- (a) *Establishment of propagation facilities for the rapid multiplication of planting materials.*
- (b) *Establishment of a national policy with respect to water resource development for irrigation and determine the economic feasibility of irrigating certain food crops as well as vegetables.*

28. *Vegetables*

- (a) *Promote the establishment of on-farm storage facilities for vegetables in order to reduce post-harvest losses as well as the provision of cold storage facilities.*
- (b) *Provide training in vegetable nursery management.*
- (c) *Comprehensive onion production project should be developed and aimed primarily at satisfying demand in the twin-island Federation.*

29. *Fruit Trees*

- (a) *Prioritization of crops, with development plan focusing on three different targets: supply of local market, supply of overseas markets, and protection of the environment.*

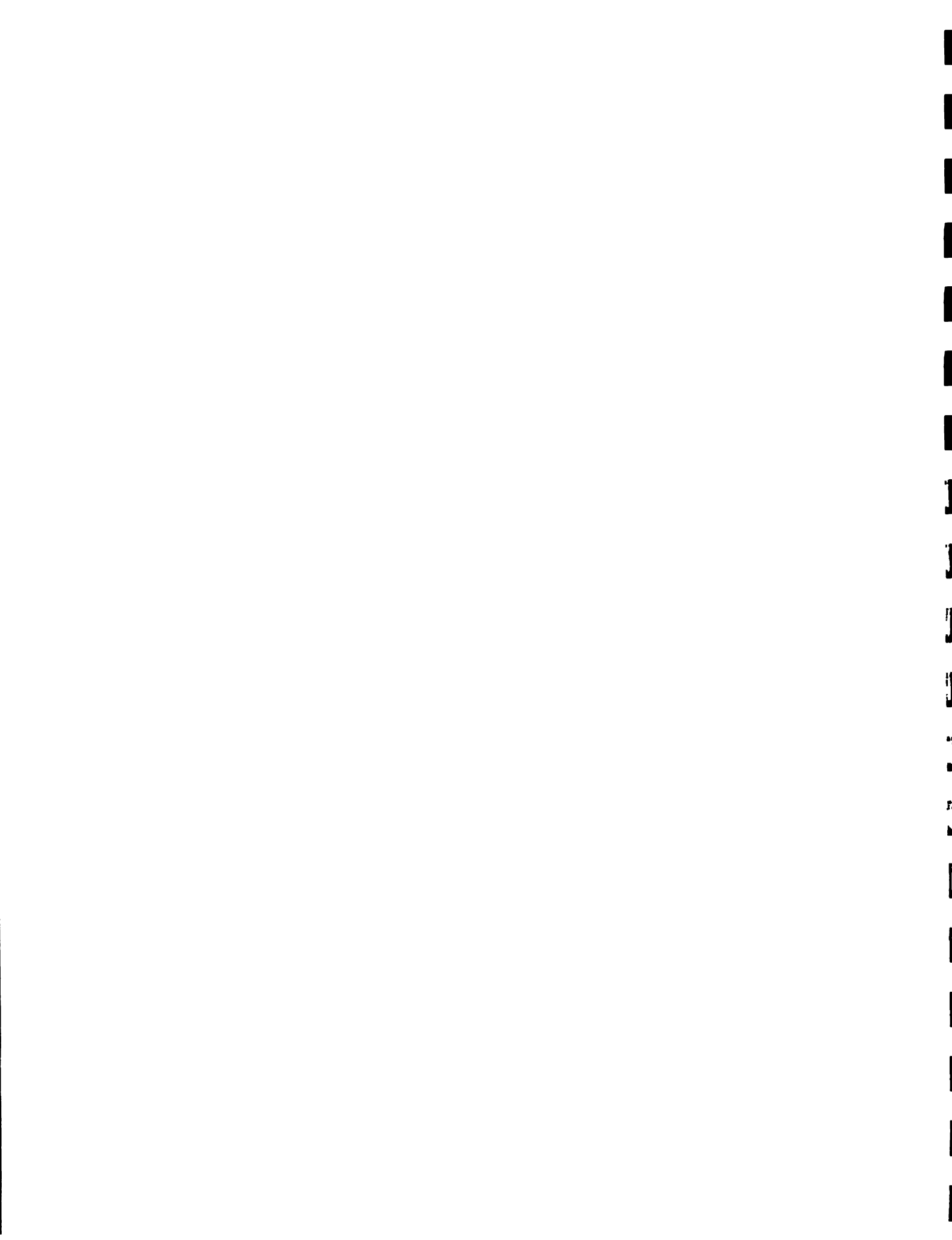


- (b) *Tree crop zoning.*
- (c) *Establishment of demonstration plots in different micro-zones.*
- (d) *Training of staff and farmers to be focused as follows:*
 - *Extension Officers: Problem identification and solution determination*
 - *Nursery Officers: Nursery management and planning*
 - *Other nursery staff: Plant propagation methods and sterilization - treatment practices*
 - *Farmers: Crop establishment and early care*
- (e) *Introduction of planting materials and selection of clones in particular for citrus, papayas, avocados, mangoes, breadfruit, tamarind, W.I. cherries, guava.*

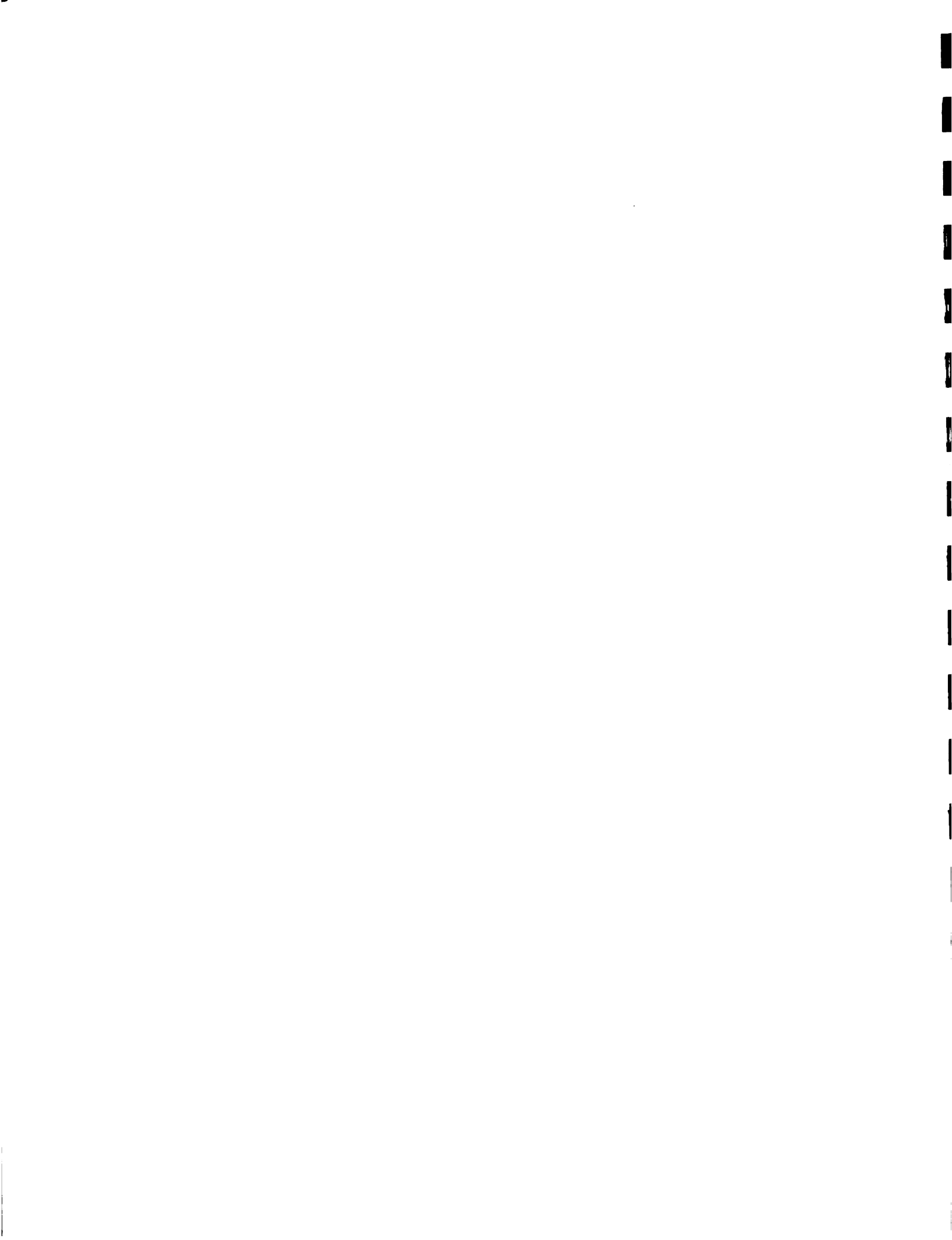
30. **Livestock**

The major programme recommended for the livestock subsector are as follows:

- (a) *Eradication of *Amblyomma variegatum* in St. Kitts and Nevis*
- (b) *Control of Feral Animals in St. Kitts and Nevis*
- (c) *Promotion of Investment in Livestock Ventures including the following projects:*
 - *Con Phipps Area - Agricultural Diversification Programme (FAO)*
 - *Dairy Farm Module - 10 acre unit*
 - *Beef Module - 25 acre unit*
 - *Feed Lot Cattle - Hay, silage, feed lot production in association with SSMC.*
 - *Bayfords; Dairy Development Project*
 - *Pig Development Unit Bayfords (ROC)*
 - *Pig Development Scheme - Rotational System (ROC)*
 - *Small Ruminant Production System - IFAD/CARDI*



- *Broiler Production System*
- *St. Kitts/Nevis Meat Processors Development Project*
- *Promotion of St. Kitts/Nevis Livestock Farmers Association.*



SECTION I

GENERAL ECONOMIC BACKGROUND

1.1 Main Characteristics and Evolution of the Economy

1.1.1 Recent Economic Performance

Over the past decade, the economy of St. Kitts & Nevis has shown strong but variant growth, reflecting the importance of the sugar industry and the economy's sensitivity to the implementation of large projects. Real output expanded on average by 6.2% per annum from 1980 to 1989, while real per capita income grew by approximately 4% per year over the same period. At the end of 1989, nominal per capita GDP was EC\$6,364 (US\$2,357) compared to EC\$2,389 (US\$889) in 1980.

Total output grew from about 4% in 1980 to 6% in 1982 and a negative growth rate of 2.4% was recorded in 1983, as a result of the poor performance of the sugar industry and a drought which affected non-sugar agriculture. The economy expanded very much between 1984 and 1987, when the growth in real GDP averaged about 7.1% per annum. Economic growth was slower in both 1988 and 1989 when output increased by 6.7% and 5.1% respectively. The increase in economic activity in 1989 was largely the result of a strong performance of the construction sector and modest growth in manufacturing and the services sector.

1.1.1.1 Sectoral Distribution

The sugar sub-sector still remains the mainstay of the economy despite the relative growth in importance of tourism and the services sector during the last decade. Growth in the agricultural sector is largely indicative of the performance of the sugar industry.

During the period 1977 to 1989, there has been real negative growth of the agricultural sector (see Figure 1.1). With the exception of 1978 and 1979, the trend indicates that the contribution of the sector to national output has consistently declined over the period by almost 54%. The decline during the last decade alone was nearly 50%, from 16.7% of GDP in 1980 to 8.9% in 1989.

The decline in agricultural output reflects to a large extent, the continued weak performance of crop production, particularly sugarcane which accounts for about 51% of value-added in agriculture (see Figure 1.2). Sugar production has trended downwards with fluctuations, from 46,800 metric tons (mt) in 1978

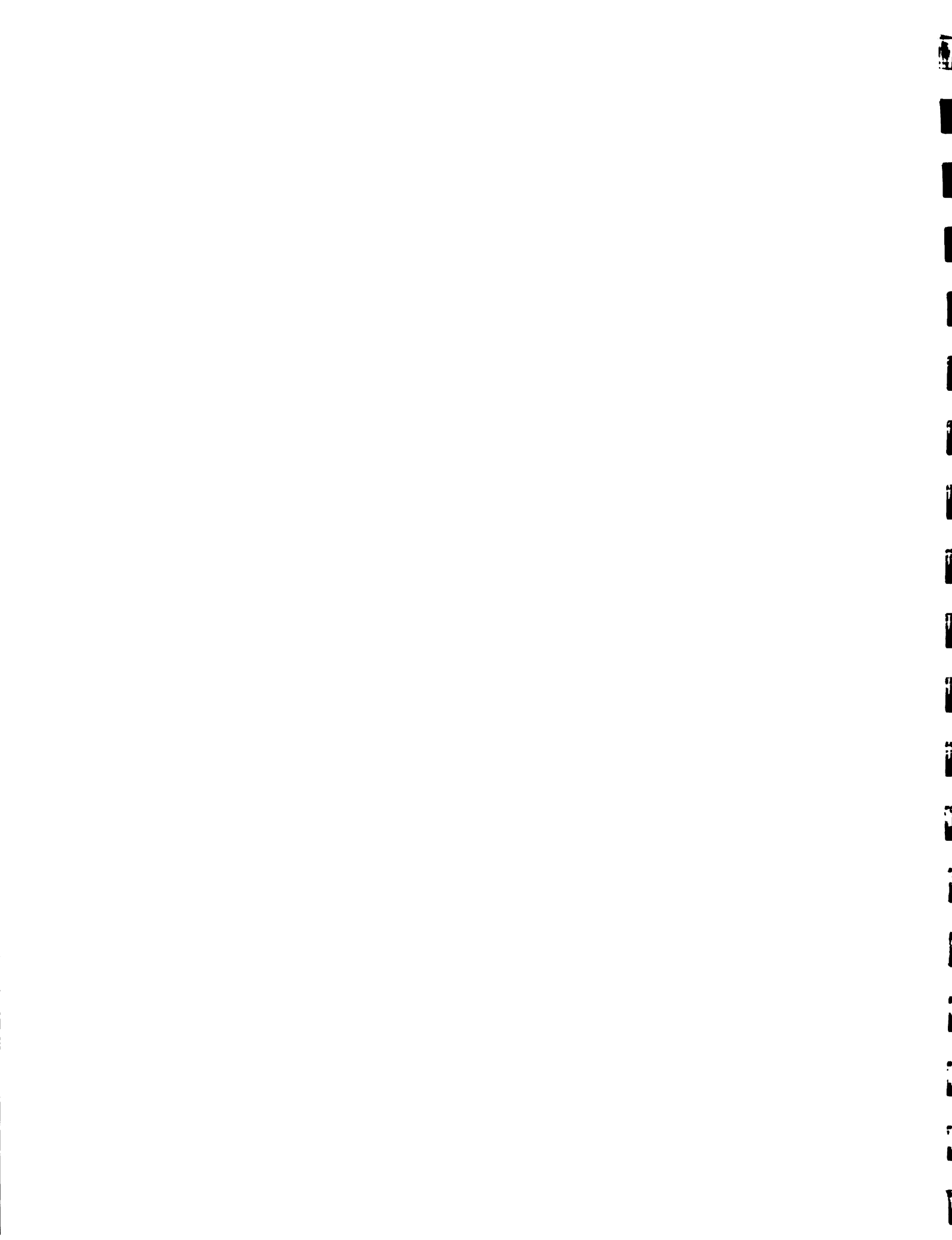


FIGURE 1.1
Total GDP and GDP of Agriculture and
Manufacturing in Constant Prices

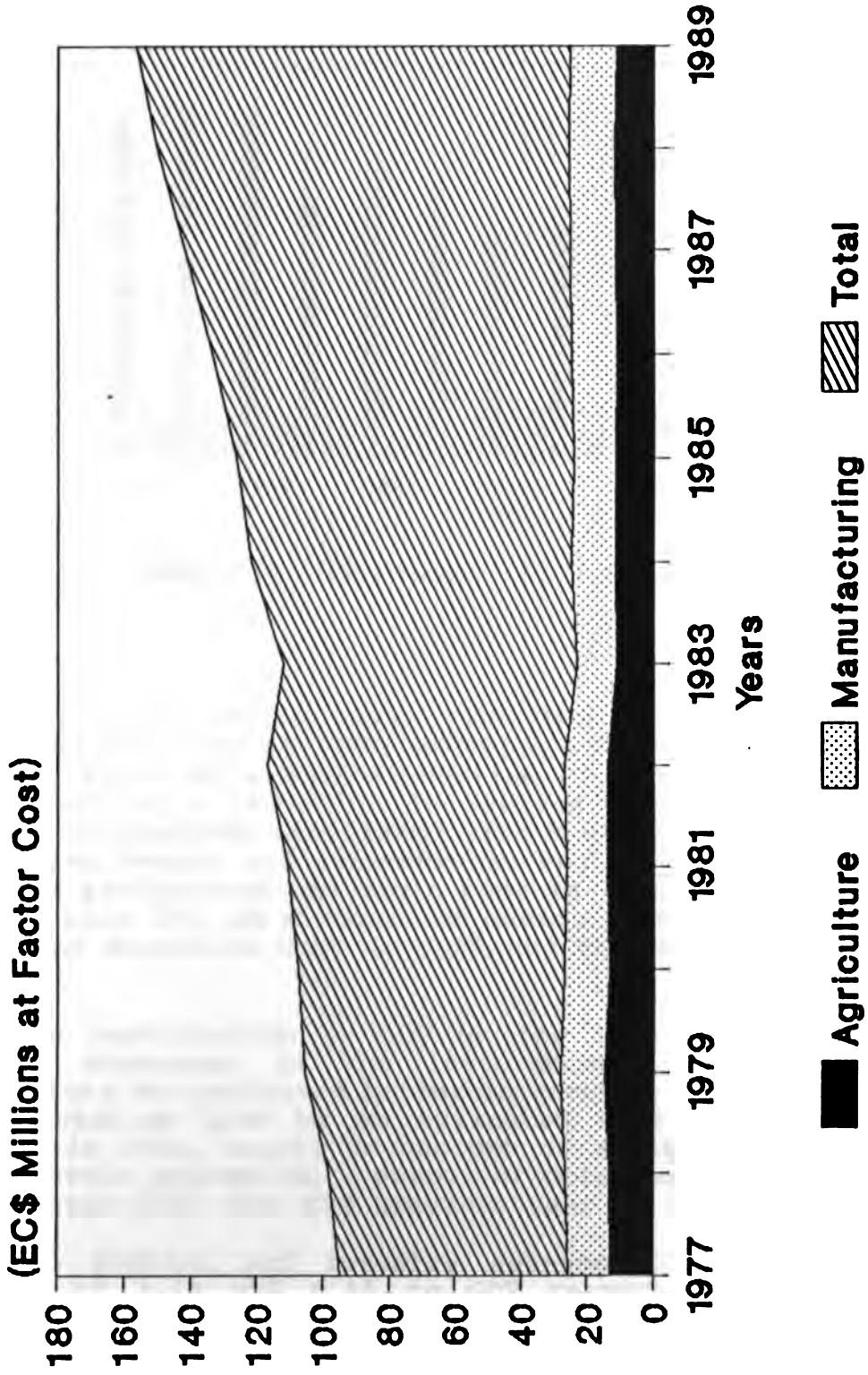
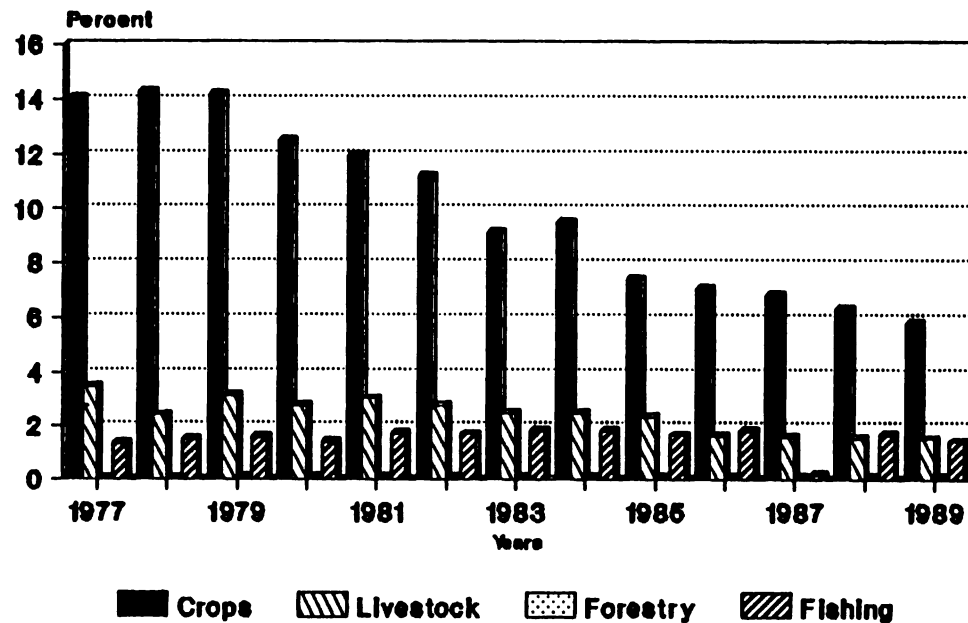




FIGURE 1.2
Agriculture Contribution to GDP
by Sub-sectors (%)



to about 32,400 mt in 1985. The declining trend in production continued from 1986 to 1989, except a modest 1.1% increase in 1988. In 1989, there was a further decline in output by about 3%, partly the result of a reduction in average yield per hectare due to harvesting problems associated with acute labour shortages in the harvesting season and unfavourable weather conditions. The sub-sector's performance was again poor in 1990 with output declining by more than 10%, as a result of damage sustained by the sugarcane crop from Hurricane Hugo in 1989 and the continuing shortages of labour.

The contribution to GDP by the livestock sector has also trended downwards in the last decade. However, non-sugar agriculture has performed better in recent years. Output of fruits and vegetables grew by an estimated 9.3% in 1989 following a decline in 1988, mainly on account of a significant expansion in white potato production. Output of potatoes increased in 1989 by about three-fold over the previous year to nearly 700,000 lbs.

The fishing and forestry sub-sectors has contributed an average of 1.6% and 0.1% to GDP respectively. However, the performance of fishing and related activities declined in 1989 after a positive growth trend in previous years. There were severe damages done to fishing boats and equipment by Hurricane Hugo.

Like the agricultural sector, the relative contribution of the manufacturing sector to GDP has consistently declined, from 18% of

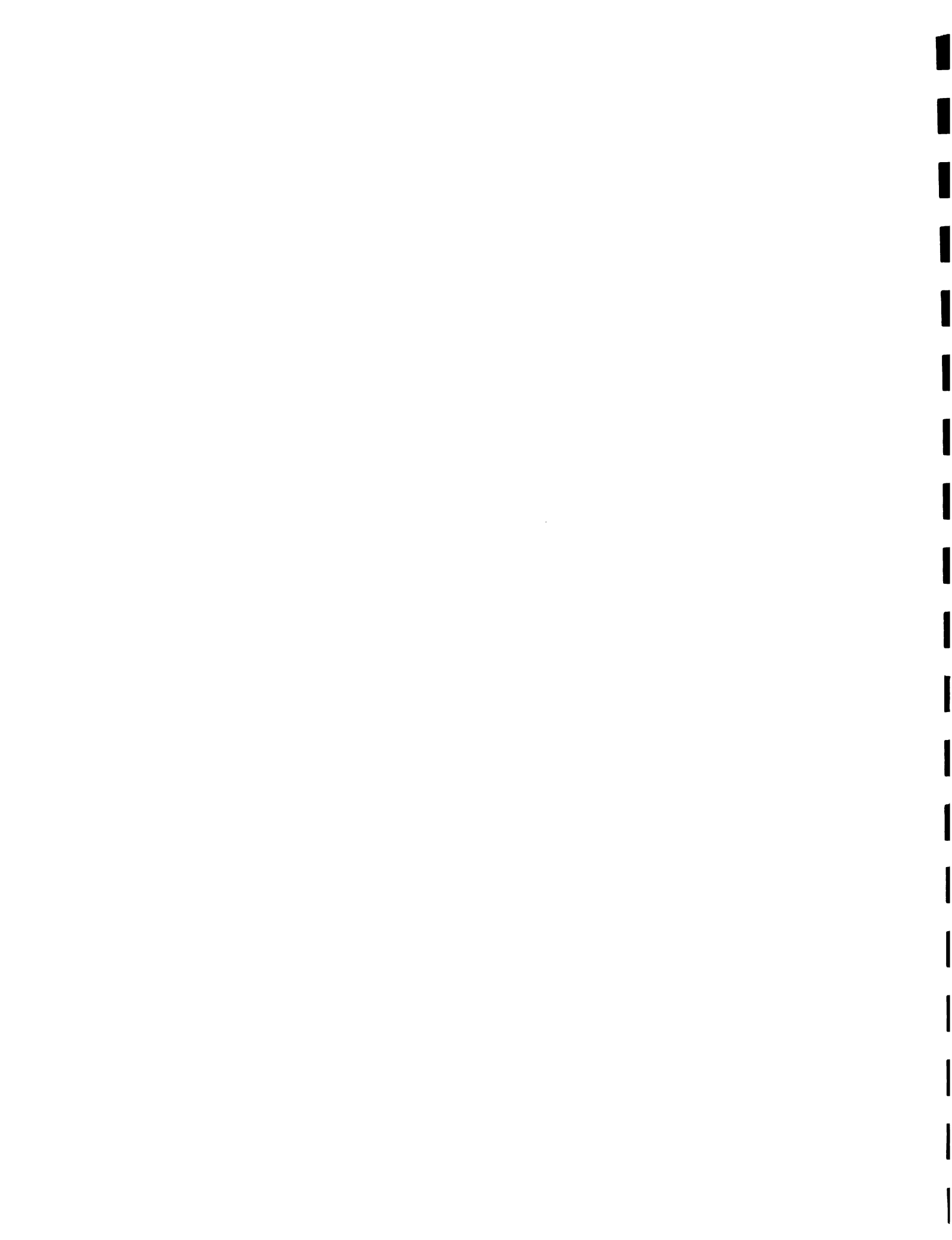
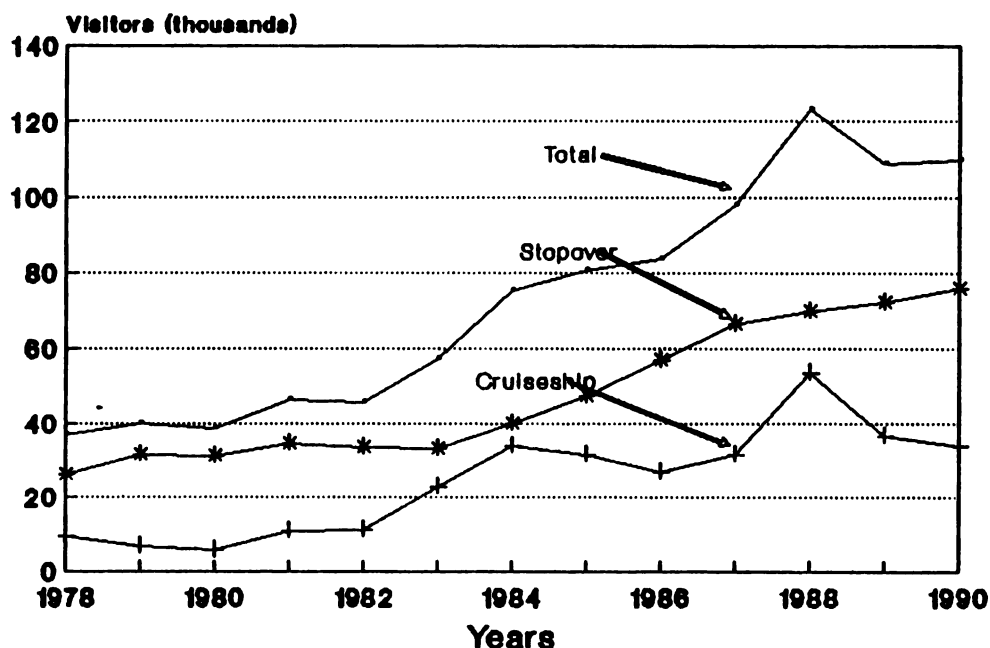


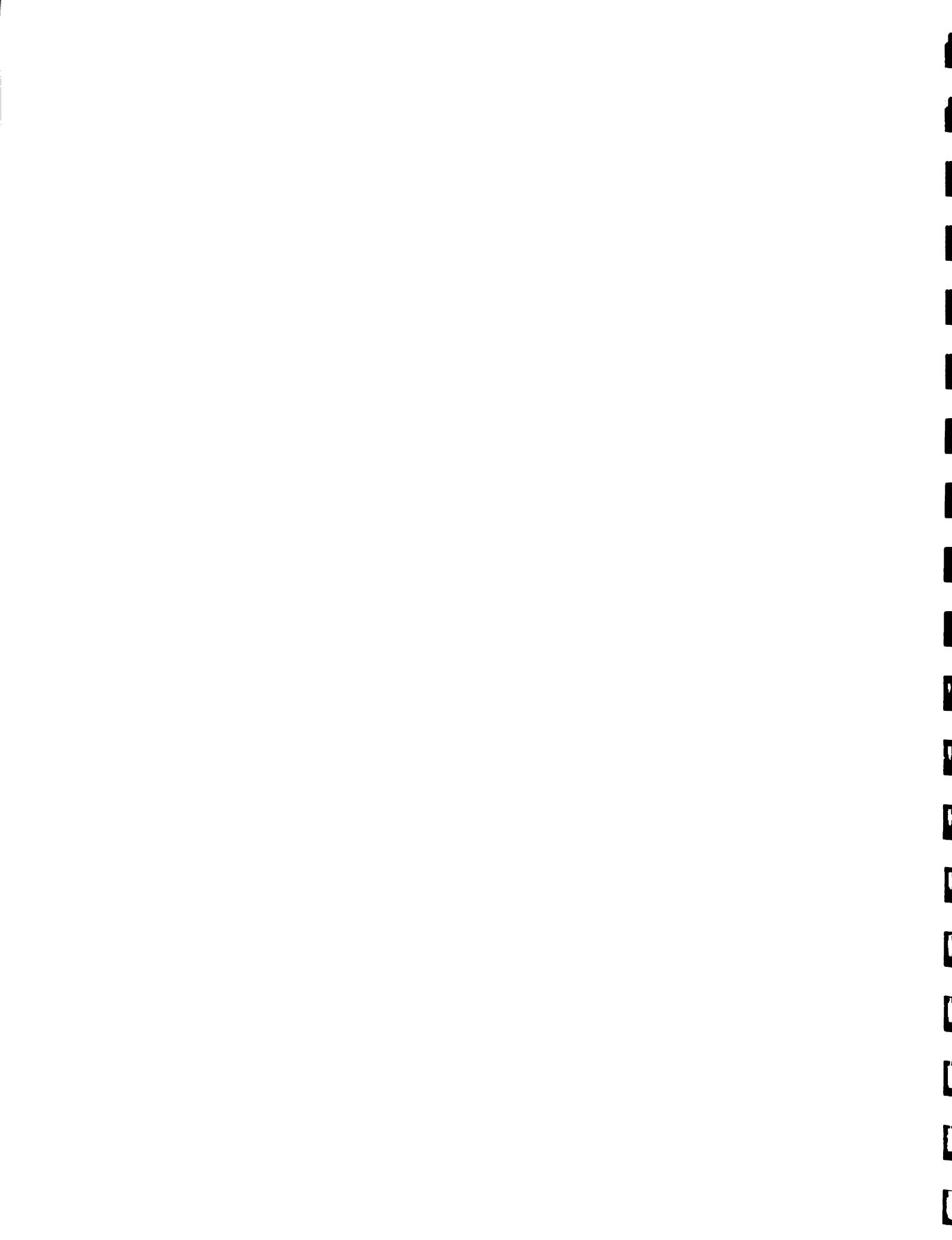
FIGURE 1.3
Total Visitor Arrivals and Contribution
by Cruiseship and Stopover Passengers



GDP in 1977 to 10.6% in 1989. However, the sector has experienced a real growth rate of 1.0% per year and its performance has largely been influenced by the developments in the sugar industry. In recent years, the sector's performance has been mixed. Real value-added grew at a slower pace in 1989 of 1.2% compared to 3.4% in the previous year. With respect to non-sugar manufacturing, real output again increased by 4% in 1989 compared to 4.9% in 1988 and 6% in 1987 respectively. This growth reflected expansion in operations of existing plants and establishment of three factories for the production of pasta and snack foods, plastic products and aluminum building materials respectively.

Both the construction and tourist sectors have steadily expanded over the last decade. Real output of the construction sector has increased by more than 15% in the last four years, largely as a result of increased public sector investment in the South-East Peninsula Highway project, construction of a tourist complex downtown and renovations of commercial and residential buildings.

The tourist sector has emerged as a major economic activity in recent years with consistent increases in tourism arrivals (see figure 1.3). Its share of GDP has increased from 3.8% in 1984 to 6.1% in 1988, while real value-added increased at an average rate of about 33% between 1984 and 1987. Growth in 1988 and 1989 slowed considerably and the sector registered a decline of about 1.3%.



There were declines in total arrivals mainly because of the decline in cruise ship visitors. This was largely due to changes in the routes by some cruise ships and financial problems experienced by one line.

The services sector continues to be the largest contributor to GDP. Its performance in recent years however reflects a steady decline, from 23.2% of GDP in 1984 to 19.8% and 18.9% in 1988 and 1989 respectively. Real growth was experienced in 1989 mainly because of growth in the wholesale and retail trade (2.8%), transport (6%) and communications (22.9%).

1.1.2 Trade and the Balance of Payments

The balance of payments of SKN has three main features. First, the balance of payments is treated differently from that of most countries, mainly because the country is a member of the Eastern Caribbean Central Bank (ECCB). As a result, trade in the currency area is treated within the balance of payments. In addition, the monetary arrangements provide for changes in official reserves to be reflected by changes in the country's position with the ECCB and the government's net foreign assets.

Second, the balance of payments reflects the high degree of openness of the economy and its declining dependence on exports of sugar. The trend in the last decade indicates that the total value of imports and exports account for about twice that of GDP. The trade dependence on sugar exports although substantial, has rapidly declined during the period. The contribution of export earnings from sugar to total exports of goods and non-factor services declined by more than 50% in the period, from about 45% in 1980 to less than 20% in 1989. While sugar's contribution to export earnings have been influenced by sharp fluctuations in production and prices, it is the relative decline of sugar in the economy that has largely accounted for its reduced role in foreign trade. Most of the country's external trade is done with the UK and USA which are also the country's main export markets for sugar.

Third, the balance of payments shows large trade and current account deficits. The trade performance since 1980 indicates that the resource balance gradually decreased between 1980 and 1983, improved slightly in 1984 and then sharply deteriorated since 1985. The trade deficit (including non-factor services) has averaged more than 30% of GDP during the period. In the last three years, transfers (both private and public) have contributed substantially to the current account, estimated to be an average of 12.5% of GDP.

1.1.3 Investment and Savings

With the exception of a few years, the volume of investment has traditionally been large during the period 1980-89, accounting

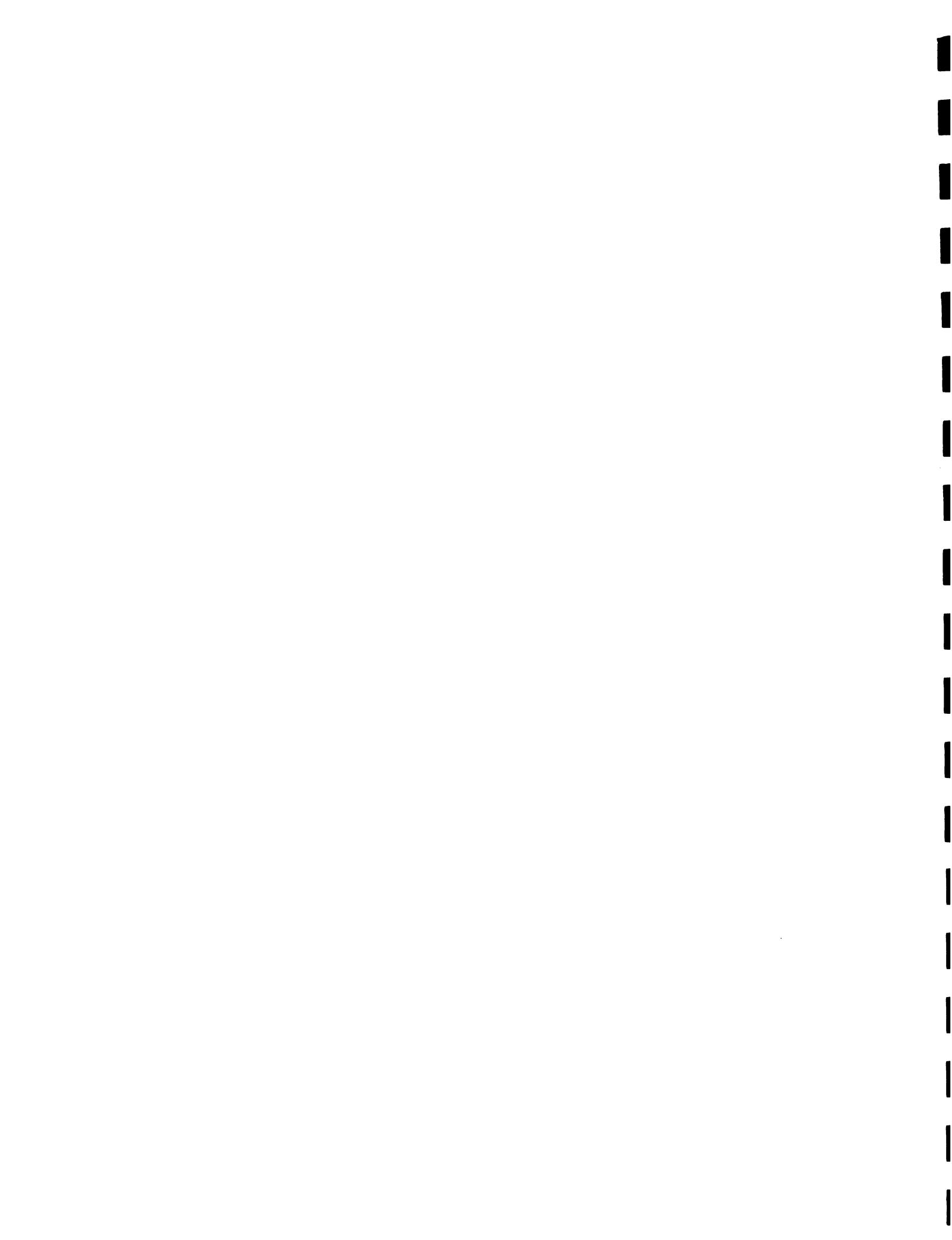
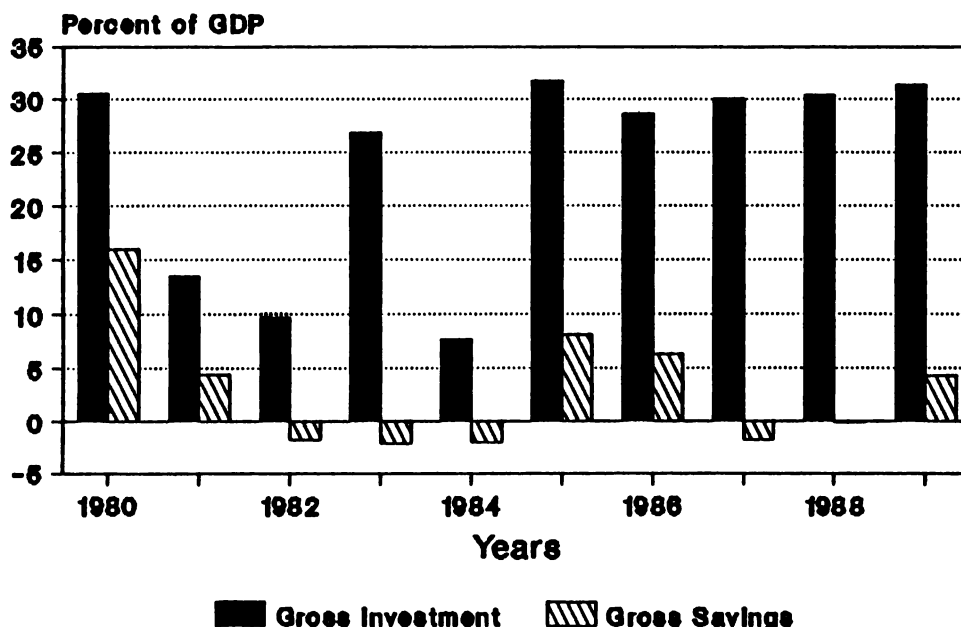


FIGURE 1.4
Gross Domestic Investment and Gross
Domestic Savings as a % of GDP



for more that 25% of GDP, of which more than half has been executed by the public sector (see Figure 1.4). In addition, external sources has been the main source of investment finance. However, since 1984, there has been a declining trend in public sector investment, reflecting the worsening of public sector finances. On the other hand, private sector investment has increased in the last few years, mainly because of rehabilitation and expansion of the tourist sector, the South east Peninsula project and other private sector construction activities.

In general, the trend in gross domestic savings have been cyclical during the last decade. Since 1978, domestic savings have gradually declined, becoming negative in 1981, but sizeable transfers from nationals abroad accounted for gross savings being positive that year. Since 1982 however, the transfers from abroad have been insufficient to offset negative domestic savings. To a large extent, the trend in savings reflects the adverse effects of lower export earnings from sugar and expansion in domestic consumption. As result, foreign savings comprising mainly official grants and concessionary loans have been the prime source of investment finance. The availability of concessionary financing in the future from external sources is becoming increasingly limited. As a result, there is the need to improve the rate of domestic savings and impose taxes to curb consumption of luxury items.

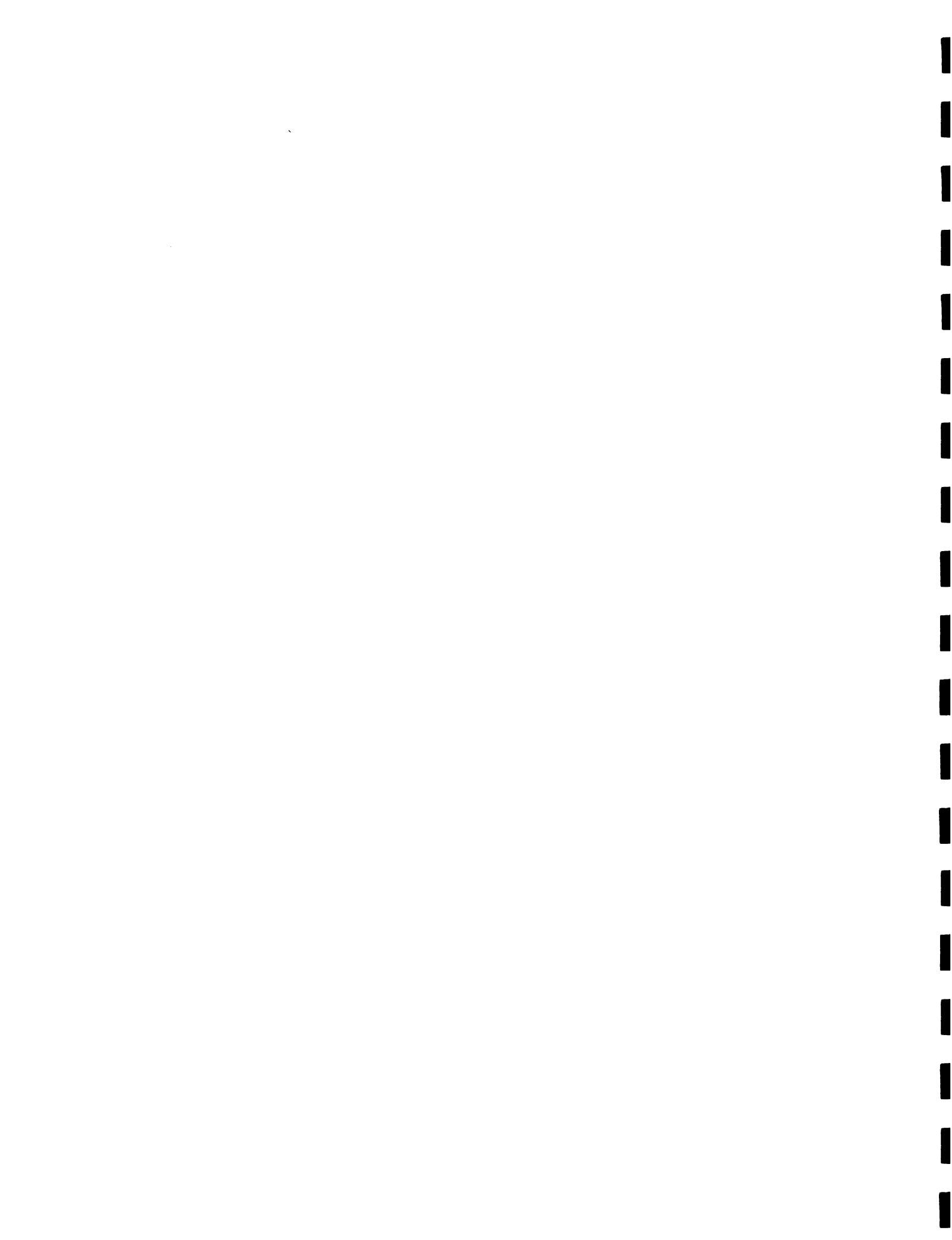
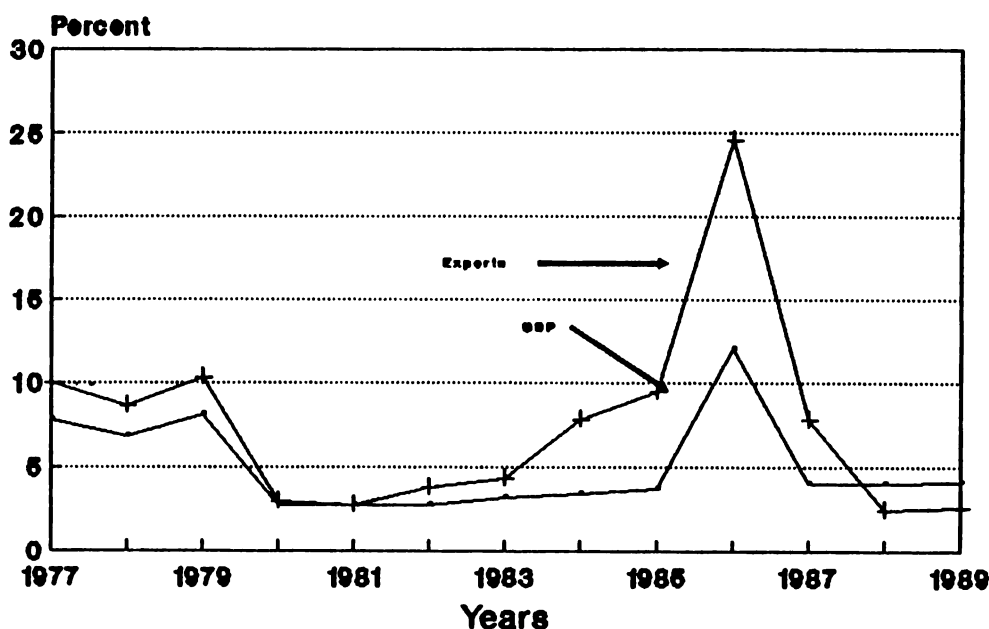


FIGURE 1.5
Debt Service
(as a % of GDP and Exports)*



*Export of Goods and NFS

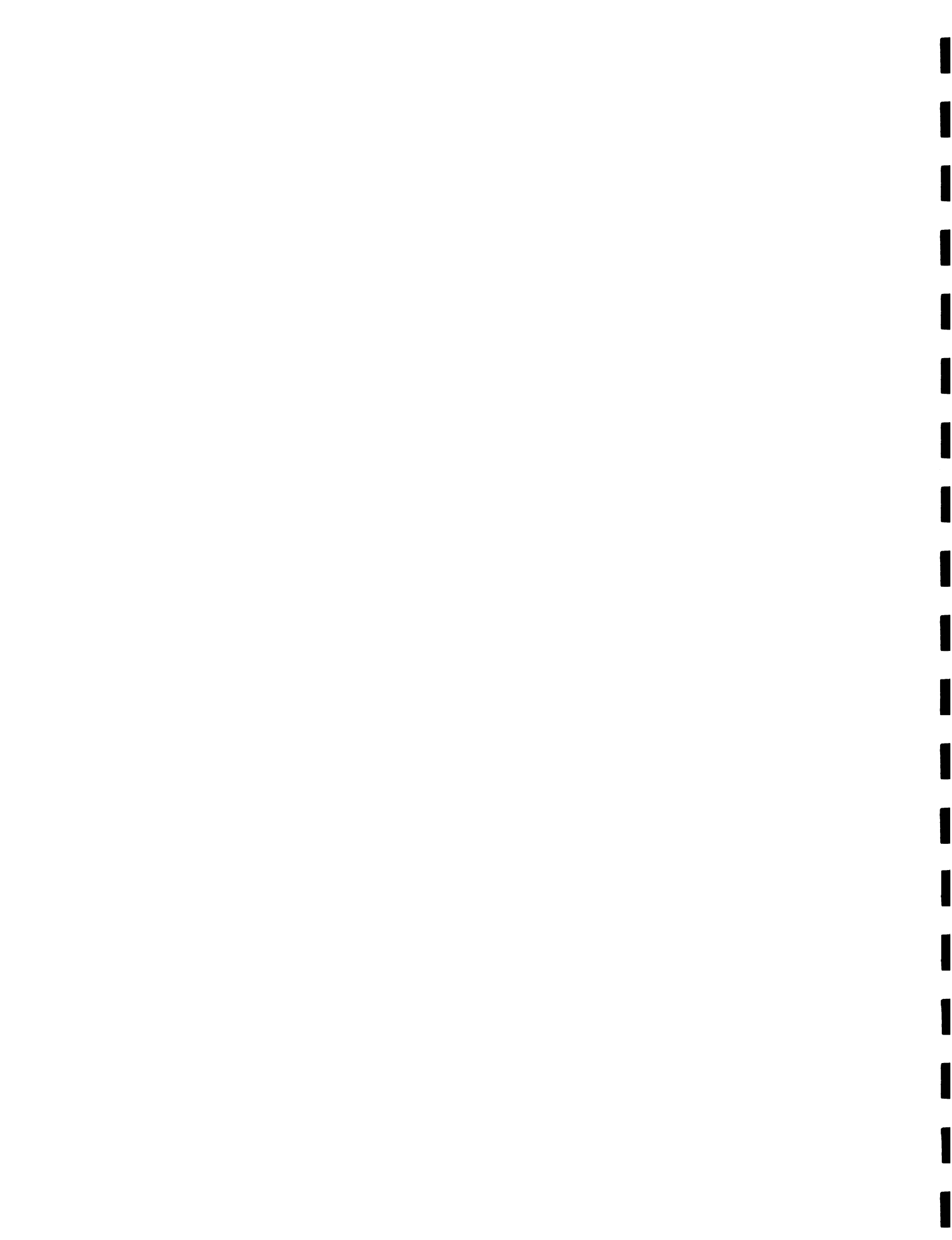
1.1.4 National Debt

The gross external debt of SKN is low compared to most developing countries. At the end of 1989, total outstanding debt was EC\$89.9 million or 69 percent of GDP. Most of this debt is on highly concessionary terms, between 4% and 6% interest rate. Except 1986, debt service payments for amortisation and interests have also been relatively low, amounting to less than EC\$6.0 million per year.

With the exception of 1979 and 1986, the ratio of debt service to exports of goods and services and GDP respectively has been less than 10 percent (see figure 1.5). The primary reason for the substantial increase in the ratio in 1986 has been the charges on outstanding obligations of the government with respect to acquisition of sugar lands in 1975, and an increase in the interest charges on the external debt contracted to pay for the same lands.

1.1.5 Money Supply and Credit

As indicated before, SKN is one of seven members of the ECCB and the country's financial sector is subject to regulations of that Bank. The ECCB is empowered to regulate and oversee the operations of the commercial banks such as setting reserve requirements and interest rates on deposits and loans. The operations of the ECCB also impose strict discipline on the



implementation of monetary policy by member countries. For example, the Bank is obliged by statute to maintain a foreign exchange reserve of no less than 60% of the value of currency in circulation and other demand liabilities and strict ceilings are placed on loans granted to member governments. As a result of ECCB's regulations, a tight monetary policy is maintained in SKN.

During the period of the 1980s, there has been a steady growth of the money supply (which comprise the total monetary liabilities of the banking system) but cyclical changes in private and public sector deposits. Deposit liabilities are largely influenced by the performance of specific economic sectors, namely sugar, construction and tourism. Public sector deposits are predominantly lodged at the government-controlled National Commercial Bank, the funds mainly coming from the national insurance scheme.

There were two periods of a tightening of the liquidity situation during the last decade. In late 1983 and 1984, there was a liquidity squeeze that caused many local banks to seek longer term private sector deposits. There has also been a further tightening of liquidity in the commercial banking system in recent years. This is indicated by an increase in the ratio of loans and advances to deposits in 1989 and 1990 which is the result of a relatively higher rate of increase in loans and advances. In 1989 and 1990, the rates of growth of deposits were 7.7% and 6.0% respectively while the growth of loans and advances were 11% and an estimated 12.5% respectively. Associated with these developments was a contraction in net foreign assets of the banking system of 2.4% in 1989 and a marginal increase in 1990.

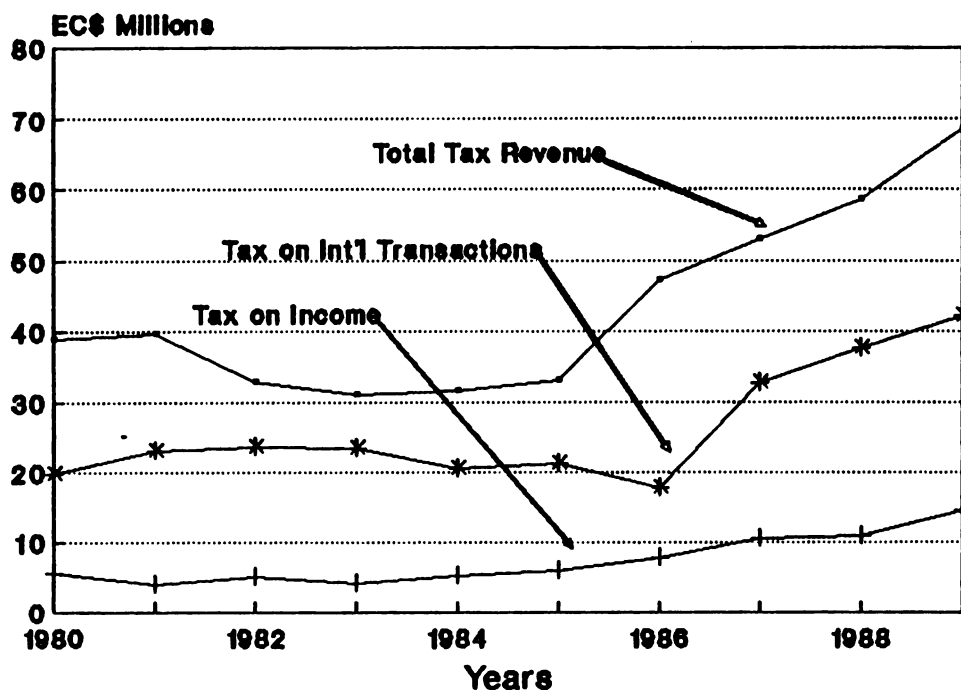
In general, bank credit has increased at a faster rate than the growth in deposits. The growth in credit has largely been influenced by a deterioration of public sector finances and fiscal difficulties of the sugar industry. Growth has also been influenced by changes in consumption by the private sector and the working capital needs of the trade sector, which in turn was largely influenced by growth in manufacturing, tourism and construction and wage increases in both the private and public sectors.

With respect to sectoral distribution of credit, lending to agriculture and manufacturing respectively has averaged less than 10% of total commercial bank credit in the last decade. A large proportion of credit to agriculture has been channelled into the sugar sub-sector. In the last two years, the sectoral distribution of credit indicates a strong demand in the productive sectors, namely agriculture (mainly sugar), tourism and manufacturing. Lending to the productive sector increased by 26% percent in 1990 compared to 30% in 1989.



FIGURE 1.6

Total Tax Revenue and Revenue on International Transactions and Income

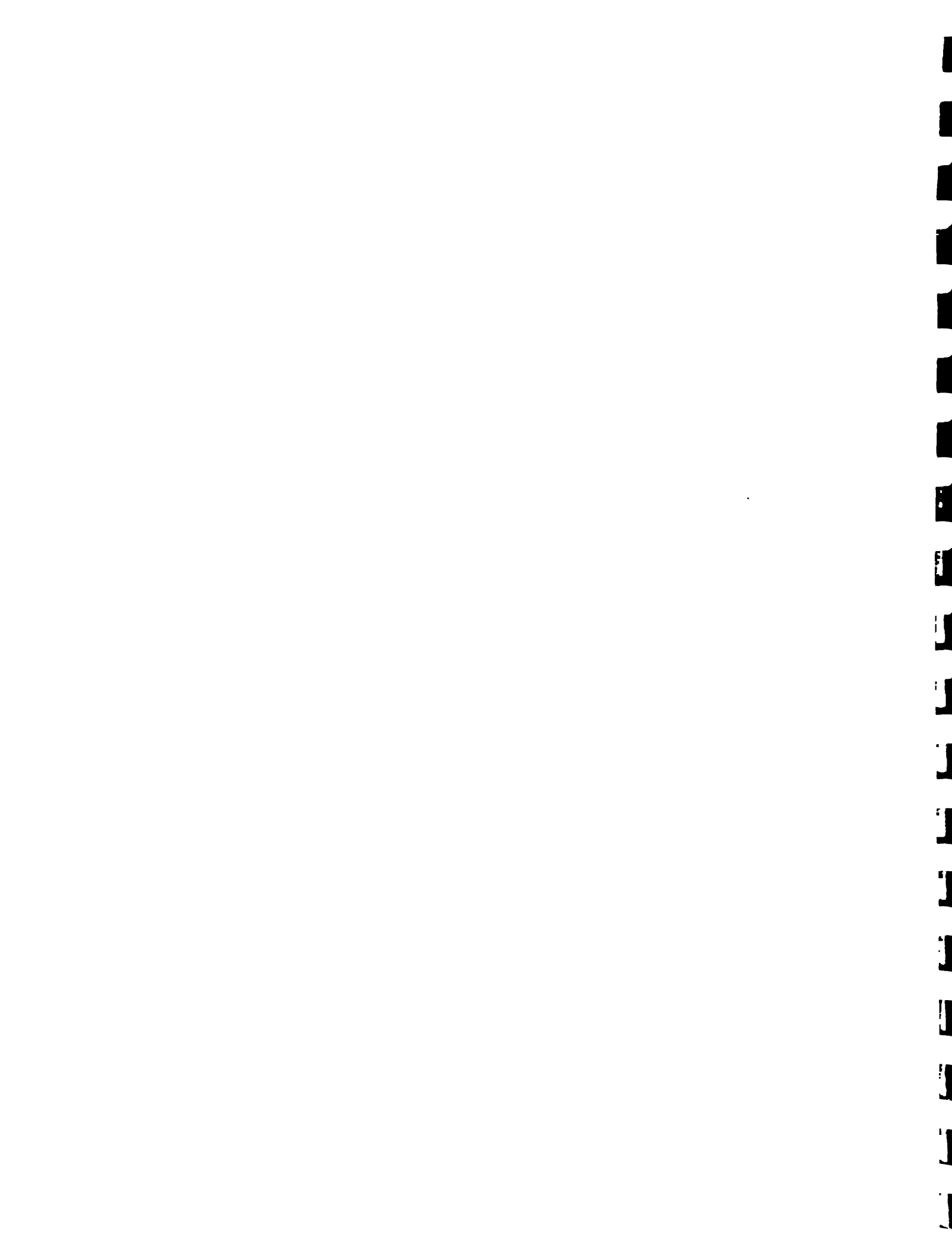


1.1.6 Fiscal Policy and Taxation

SKN applies more than 20 different kinds of taxes, with several of them having a number of sub-categories in their application to different commodities or to different enterprises. Tax revenue has accounted for about 75% of total current government revenue. With no taxes on personal income, the government has increasingly relied on indirect taxes for revenue. More than 50% of total tax revenue is provided by international trade and transactions, particularly through consumption tax and import duties (see Figure 1.6).

The dependence on import duties, consumption tax and corporate taxes as a source of revenue makes them very sensitive to tourism and changes in other economic activities. Import duties in particular, is very significant since an estimated 40% of tourist expenditures go directly for payment of imported items. Most consumption taxes are ad valorem rates applied to the c.i.f value on selected imports. The average rate is about 8%. There is also a consumption tax on some domestic services and goods manufactured in St. Kitts and Nevis.

While the government has granted certain exemptions to the agricultural sector (duty free equipment, etc.), the manufacturing and tourism sectors have benefitted relatively more from fiscal



concessions. Both domestic and foreign developers in these sectors are granted a range of exemptions from certain taxes under the **Fiscal Incentives Act**. These include lengthy tax holidays of up to 15 years, exemption of duties on materials and equipment, repatriation of profits and dividends, access to fully developed industrial estates and duty free access to major markets. These incentives have contributed in a large measure to the growth in enterprises involved in electronics assembly, plastics, footwear, apparel, food processing and tourism.

1.1.7 Public Sector Operations

The public sector of SKN is large, accounting for about 45% of GDP. The sector comprises the Central Government, St. Kitts Sugar Manufacturing Corporation (SSMC), Social Security Scheme, Central Marketing Corporation (CEMACO), Frigate Bay Development Corporation, the Port Authority and the St. Kitts-Nevis Development Bank. The Government also controls 60% of the shares of the St. Kitts-Nevis-Anguilla National Bank.

The fiscal performance of the public sector has been largely determined by two main elements: revenues from sugar and wage policy in the public sector. During the first half of the 1980's, the performance rapidly deteriorated as a result of the complete suspension of revenues accruing from the sugar levy and increases in salaries of public sector employees (see figure 1.7). The major cause of the fiscal problem has been the poor performance of the sugar industry (via a reduction in sugar prices) and the government's inability to benefit from the sugar levy. To a large extent The government has been a net contributor to the industry. There was also a 45% increase in public sector wages and salaries in 1981, which contributed to a decline in public sector savings. During this period, the current account balance of the central government declined from a positive 4.5% of GDP in 1980 to 4.8% in 1985. This deficit was largely financed by resources from the domestic banking system, in particular, the government-controlled National Commercial Bank.

Since 1986, the fiscal situation, particularly with respect to central government balances has consistently improved. The current account surplus increased from 0.4% of GDP in 1986 to 1.4% in 1988 and 3.0% in 1989. This was due mainly to a larger increase in revenue collected in this period which was accompanied by a stabilisation in the level of expenditure. Current revenue, as a proportion of GDP, increased from 23% in 1986 to 29.8% in 1989 while there was a marginal decline in expenditure. The higher revenue was a result of an improvement in the efficiency in revenue collection; most components of tax revenue increased and tax yields on international trade and transactions were substantially higher. These factors together with a decrease in capital spending and net lending also contributed to a reduction in the overall fiscal deficit in the last few years.

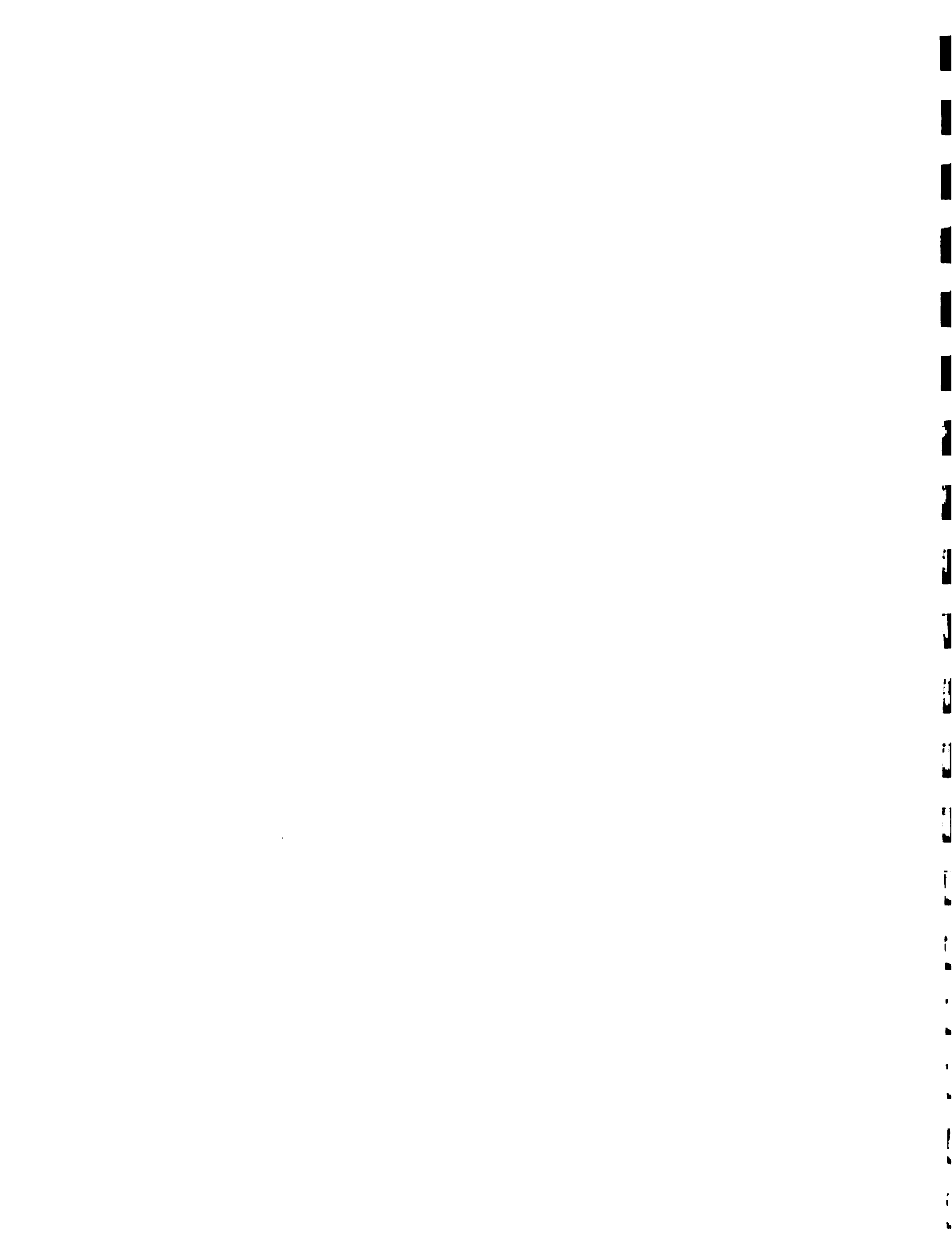
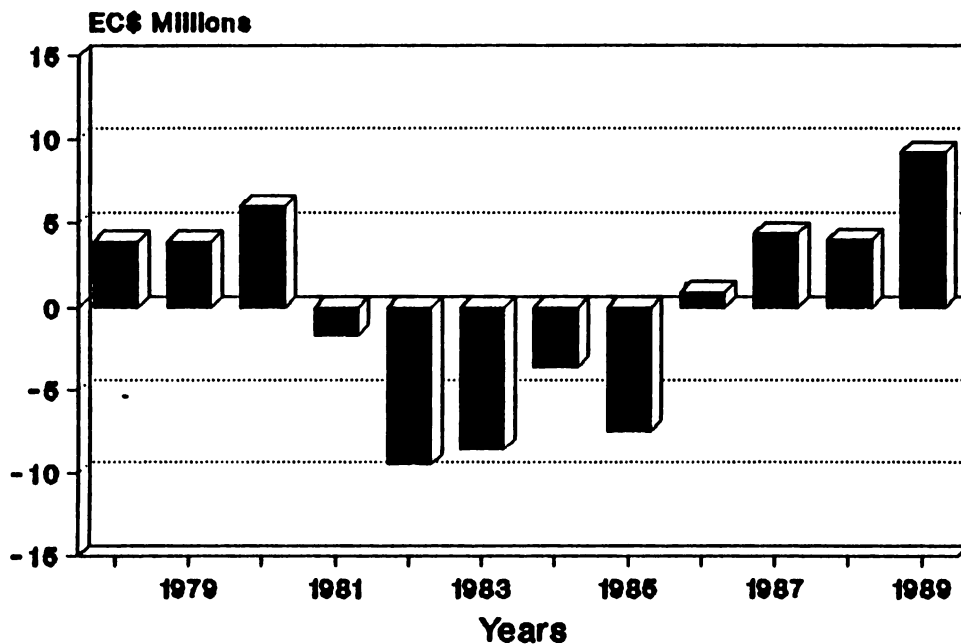


FIGURE 1.7

Central Government Current Balances
1979-1989



With respect to expenditure, total outlays on wages and salaries increased by 7.1% in 1989 reflecting wage increases to public sector workers. However, this component of expenditure decreased relatively as a percent of GDP. Expenditures on goods and services and interest payments also decreased at slower rates compared to previous years. On the other hand, capital expenditure continued to lag behind that anticipated by the government mainly because of weaknesses in the system for programming such activities. This has resulted in many projects remaining unfunded by the end of 1989. The continuation of work on the South Eastern Peninsula, work on the Bay Road tourism complex and expenditure on electricity generating equipment comprised the main areas of capital spending in 1989.

1.1.8 Employment, Wages and Prices

Agriculture has remained as the single most important employer, accounting for about 25% to 30% of the working population. The service sector, comprising trade, hotels and other services employ another 30%, closely followed by manufacturing which accounts for nearly 20% of the labour force. During the 1980's, the expansion in tourism and construction together with changes in manufacturing were the main factors influencing growth in employment. The tourism sector has rapidly expanded and it is estimated that employment in this sector doubled during the decade.

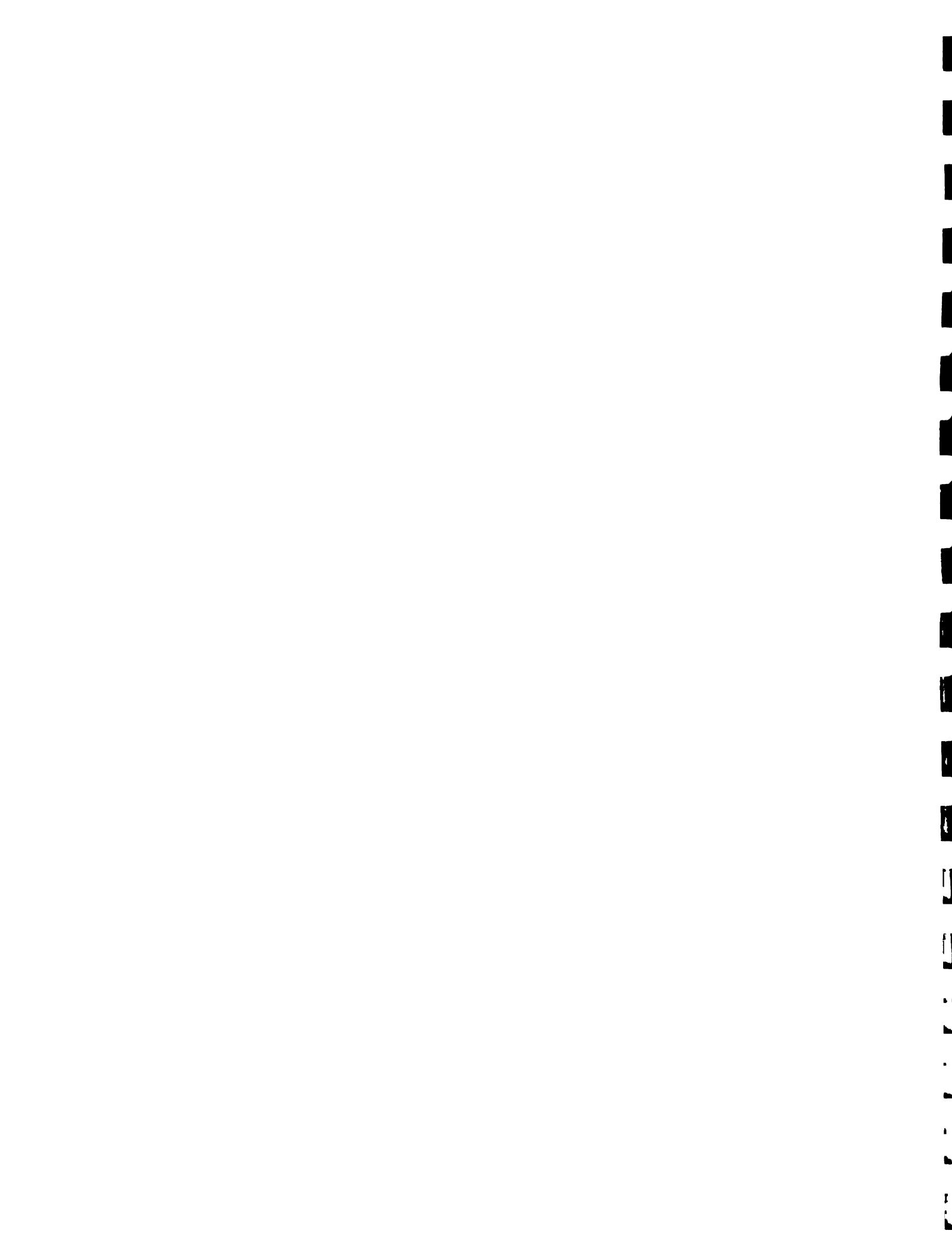


Table 1.1
Employment by Sector, 1980-1990

Sectors	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Garment Industry	807	887	605	714	786	664	864	671	815	500	439
Electronic Industry	297	481	463	481	559	767	709	764	711	985	964
Beverage	107	113	111	116	110	116	105	111	110	129	174
Hotels & Guesthouses	373	345	392	377	443	467	525	463	522	694	669
Construction	137	153	221	382	225	227	250	270	246	750	636
Sugar Industry	4259	3927	3455	2932	2982	2840	3046	2840	2617	2103	2300
N.E. Workers	680	683	683	655	676	679	656	-	-	670	680
Total	6660	6589	5930	5657	5781	5760	6155	5119	5021	5831	5862
Total	6660	6589	5930	5657	5781	5760	6155	5119	5021	5831	5862

Source: Ministry of Labour, St. Kitts & Nevis.

Table 1.1 shows employment in main sectors of the economy during the last decade. The overall trend indicates that employment has declined during the period, with the largest decline occurring in the sugar and garment sectors. Although the sugar industry remains the largest employer in the country, there has been a decline of almost 50% of labour employed in field and factory operations in the period 1980 to 1990. The available data also indicate a shift towards increased employment opportunities in the buoyant electronic, construction and hotel sectors.

Official data on unemployment is not readily available on SKN, but unemployment and underemployment is estimated to have fluctuated between 10% and 20% during the last decade. However, it is felt that the unemployment rate has decreased in recent years as a result of a significant increase in activities related to construction, tourism and related services and non-sugar manufacturing, with labour shortages even occurring in certain areas. Partial data on employment in 1989 indicates that there were increases of 18% and 5.7% in the hotel and non-sugar manufacturing sectors respectively.

With respect to wages, there are two main features in the rate changes over the last decade. The first is rate increases since 1977 have on average been higher than changes in inflation rates. The second feature is that private sector wages have consistently increased over the period because the labour market has been under intense pressure from rapidly expanding private sector activities, particularly those in tourism and construction.

Wages of public sector workers increased by 40% in 1978 due to a rapid rise in the cost of living. In the 1980's, these were further increased by between 40% and 50% (depending on the income level) in a salary review of 1981, followed by a period of general wage restraint between 1982 and 1985. As a result of wage settlements in 1986 and the need to stem the loss of professional staff from the public sector, average increases of 22.5% and 20% were made in 1986 and 1988 respectively. In the sugar industry, annual wage increases were between 10% and 15% between 1977 to 1981, but this was decreased to 3% in 1982 as a result of a decline



in sugar prices. Spécial bonuses to sugar workers also declined when sugar prices decreased. Wage increases in this industry have also been relatively less than that of the private sector and this has contributed to labour shortages in the sub-sector.

Table 1.2
Selected Price and Wage Indicators, 1980-1989

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
GDP Deflator*	13.4	10.8	3.6	4.4	3.4	2.1	15.9	5.7	4.0	3.4
Consumer Prices	17.8	10.4	5.9	2.3	2.8	2.7	-0.1	2.6	0.2	6.6
Import Prices	21.7	5.3	-1.7	-2.6	-1.0	-1.1	-2.2	5.7	5.6	5.9
Government Wages	...	40-50	...	...	...	...	22.5	...	20.0	...
Sugar Industry Wages	25.0	10.0	3.0	1.5	2.0	...	4.0	...	5.0	...
Private Sector Wages**	27.5	37.5	12.7	8.3	8.0	6.3	6.5	8.2	7.8	8.3

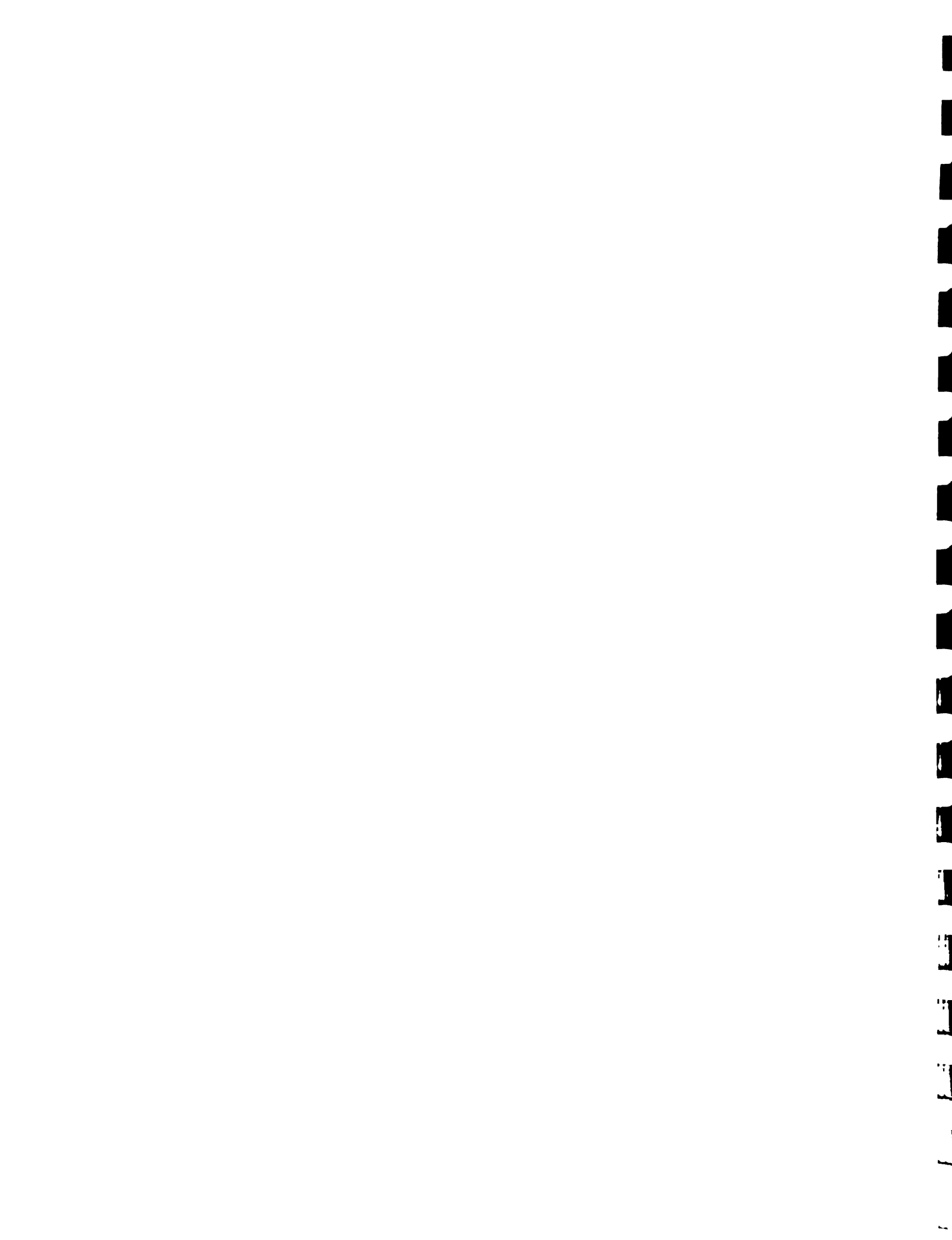
* For 1985-1989 at factor cost.

** For 1985-1989 represents a weighted average of two firms, St. Kitts Enterprises and St. Kitts Breweries.

Sources: (1) World Bank Document, St. Kitts & Nevis Economic Memorandum, 1985 & 1988.
(2) Ministry of Labour, St. Kitts & Nevis.

As shown in Table 1.2, wage increases in the private sector have averaged more than 6% per annum during the last decade. These increases have had implications on inter-sectoral shifts in labour supply as well as the comparative advantage of St. Kitts and Nevis vis-a-vis other countries in specific areas of production. As indicated before, higher wages in the private sector have resulted mainly from increased private sector activities and pressures on the labour market. The electronics industry in particular, have experienced a shortage of skilled workers in recent years with consequent upward pressure on wages. Data for 1989 from the Ministry of labour indicates that average weekly wages for labourers, semi-skilled and supervisory employees in the tourism and construction sectors were between 30% and 50% higher than those of comparable categories of workers in the garment and electronic industries. Data for 1988 and 1989 also show that average weekly wages for various categories of workers in the garment industry in SKN were 25% and 45% higher than wages of similar workers in Jamaica and Haiti.

Price changes in SKN are largely influenced by international price trends due to the openness of the economy. Compared with most Caribbean countries, the rate of increase in the official consumer price index has been very low and the trend indicates that the rate of inflation has gradually decreased since 1980, remaining at less than 3% during most of the decade (see Table 1.2). Moderate changes in import prices, particularly between 1982 and 1986 has largely contributed to low inflation rates. It is believed though that the rate understates the true value of inflation due to limitations in coverage and weighting. However, increased economic activity and higher average prices in the food sub-index (which is the largest share in the consumer goods basket)



in 1989 were accompanied by a sharp rise in consumer prices of 6.6% compared to rates of 2.6% and 0.2% in 1987 and 1988 respectively. The movements in prices during these years also reflect in large part, higher import prices as a result of high inflation rates in major trading partners and pressures of demand on domestic resources.

With respect to price control and import restrictions, the Supply Office of the Ministry of Industry and Trade is responsible for the issuance of import licenses. Regarding agricultural products particularly fresh produce, import restrictions do exist but these are implemented based on the recommendations of the Department of Agriculture.

There are price controls for a number of items but these have not been very effective, particularly in the last few years. The government sets the final prices for sugar, various consumer products, electricity and petroleum products and controls the profit margin of a number of food products including rice, flour and milk which are imported in bulk. However, with the exception of sugar, price control of most imported food items have not been rigidly implemented in recent years.

1.2 Macroeconomic Policy and Agriculture

Macroeconomic policies in SKN have both a direct and indirect impact on the agricultural sector. The principal policy variables which impact agriculture include exchange rate policy, government expenditure policy and trade policy. The implications of these policies on agriculture and resource use are transmitted through changes in inflation rates, real exchange rates and hence relative competitiveness of SKN's goods and services. In addition, the openness of the economy (as well as those of other OECS countries) makes it more sensitive to changes in these variables.

As indicated before, SKN shares a common currency with other OECS countries that is managed by the ECCB. The exchange rate can only be altered by unanimous agreement and the operations of the system provide it with stability. However, although the OECS do not experience similar rates of inflation, sharing a common currency places a limit on the extent to which inflation rates differ. Changes in inflation rates imply changes in the real exchange rate and this in turn affects external competitiveness. SKN can therefore be affected by changes in the real exchange rates as a result of impacts of macroeconomic policies pursued by the OECS countries. In addition, because the EC dollar is linked with the US dollar, changes in inflation rates in the OECS vis-a-vis that of the US will impact on the real exchange rate and export competitiveness of SKN.



One feature of the countries is that there has been a persistent excess of aggregate expenditure over total real output in the last decade which has affected the real exchange rate. The World Bank findings indicate that the excess in aggregate expenditure in SKN impacts the domestic price level and will in turn affect the external balance, only if resources do not move into production of non-traded goods¹. In the last five years, the resource gap of SKN has persistently increased with pressures placed on the balance of payments. Domestic prices in recent years have also showed signs of moving upwards which have implications for the competitiveness of the country's exports.

The role of bananas is critical to the external trade position of the OECS countries and to stability of real exchange rates. Although SKN does not produce and export bananas, this commodity has much significance on the OECS as a group due to the possible impact of a sharp fall in its future price. Basically, a sharp fall in the real price and output of bananas would put severe pressure on the balance of payments of banana-producing countries in particular, but also on the sub-region as a whole. Because of the fixed exchange rate regime, the spillover effects will be on the region's holdings of foreign reserves, and ultimately on the stability of the exchange rate system.

The government's tax and expenditure policies have also impacted on the agricultural sector indirectly. By providing attractive incentives to the tourism and manufacturing sectors, these have expanded by partly diverting resources (particularly labour) away from the agricultural sector. The reduced competitiveness of agriculture vis-a-vis tourism, construction and manufacturing is further compounded by the government's wage policy which contributes to labour shortages in the agricultural sector. The upward pressure on wage rates also impact on the export competitiveness of SKN's goods and services including agricultural products.

1.3 National Development Strategy

The economy of SKN has experienced fairly strong economic growth in the last decade, a result of high levels of grants and concessionary financing, fairly high levels of foreign investment and expansion of tourism and construction. Also, as a result of increases in the size of the services and non-sugar manufacturing sectors, the economy has diversified to some extent during the period. However, two factors, the high levels of concessionary financing and growth in tourism may not be favourable in the 1990's, mainly because of the scarcity of foreign capital and competition for tourists by other destinations including various Caribbean countries. In addition, the poor performance of the

¹. World Bank. Long-Term Economic Prospects of the OECS Countries. Report No. 8058-CRG, Washington, D.C., February 1990.



agricultural sector, particularly sugar has dampened economic growth and there is uncertainty about the future of the industry.

Although the manufacturing sector is relatively diversified, it is confronted with a number of problems which can affect its medium term growth. First, the closure rate of firms during the last decade has been high. It is estimated that on average, there is one closure for every two new firms. The sector also relies heavily on the regional market, but economic growth in the various countries together with new trade barriers have affected the sector's export potential.² In addition, high wage rates have contributed to SKN rapidly losing its competitiveness in labour-intensive manufactured products such as garments and electronic products. To address these problems, strategies should be directed at upgrading the sector's technology and increase labour productivity if it is to remain competitive in both regional and extra-regional markets.

The tourist sector has grown rapidly in the last ten years and has made a significant impact on the economy. However, the sector's growth has had some negative impacts on other sectors of the economy. In particular, tourism along with construction has driven up wage rates and created a wage disparity between sectors. This has affected labour availability to other sectors, as well as created pressures on the economic viability of affected enterprises. The rapid growth in tourism has also impacted land prices and the environment. An integrated strategy for developing tourism and other sectors should be pursued to minimise the existing wage disparity between sectors and the negative impacts of tourism on the environment. This strategy should include attracting specific firms which can attract highly skilled labour, improving labour skills and continually upgrading technology in sectors which compete with tourism for labour resources and a land use policy which contributes to sustainability of the environment.

The development challenge for SKN therefore is to surmount the potential problems with appropriate strategies so that economic growth can be sustained in the medium and long term. Efforts should be also directed to rationalise operations of the sugar industry, encourage the growth of private investment in potential growth sectors through public policies and supported by the provision of suitable public infrastructure, increase domestic savings and keeping external debt service to manageable levels.

The Government of SKN has recognised the problems and development challenges for the future. It has attempted to address these by various strategies outlined in its National Development Plan (1986-90) and its annual plan for the economy (as indicated by its budgetary proposals). The principal elements of these strategies include the following:

². Implementation of the CET and Rules of Origin in CARICOM should resolve some of these problems.



- (a) The free-market competitive system is to be the basis of the economic structure of the country. While the Government's contribution to the national economy has been substantial, it seeks to minimise its role, keeping it to being a catalyst for economic development.
- (b) Economic diversification is the central focus of the government's policies and strategies. The government's role in the process will be facilitatory and regulatory.
- (c) The economic strategy seeks to provide a more structurally balanced economic base which will be dependent on such sectors as agriculture, tourism, manufacturing and construction. Of these, the first three will be the major thrust of the development programme and the principal sources of foreign exchange earnings.
- (d) The government seeks to enhance mobilisation of both domestic and foreign capital simultaneously through implementation of appropriate policies and programmes. The public sector investment programme (PSIP) will be the main instrument for mobilising capital. The interest rate policy will seek to provide incentives for domestic savings as well to channel capital into priority areas.
- (e) The level of public sector capital spending will be a critical factor in determining growth in construction and distribution.
- (f) The strategy also seeks to minimise the rate of inflation and the size of the government's deficit while increasing employment opportunities, the rate of domestic savings and investment.
- (g) Fiscal and budgetary policies will be used to improve public sector accounts, enhance revenue collection, rationalise expenditures and provide incentives to the productive sectors of the economy.

1.4 Agricultural Development Strategy

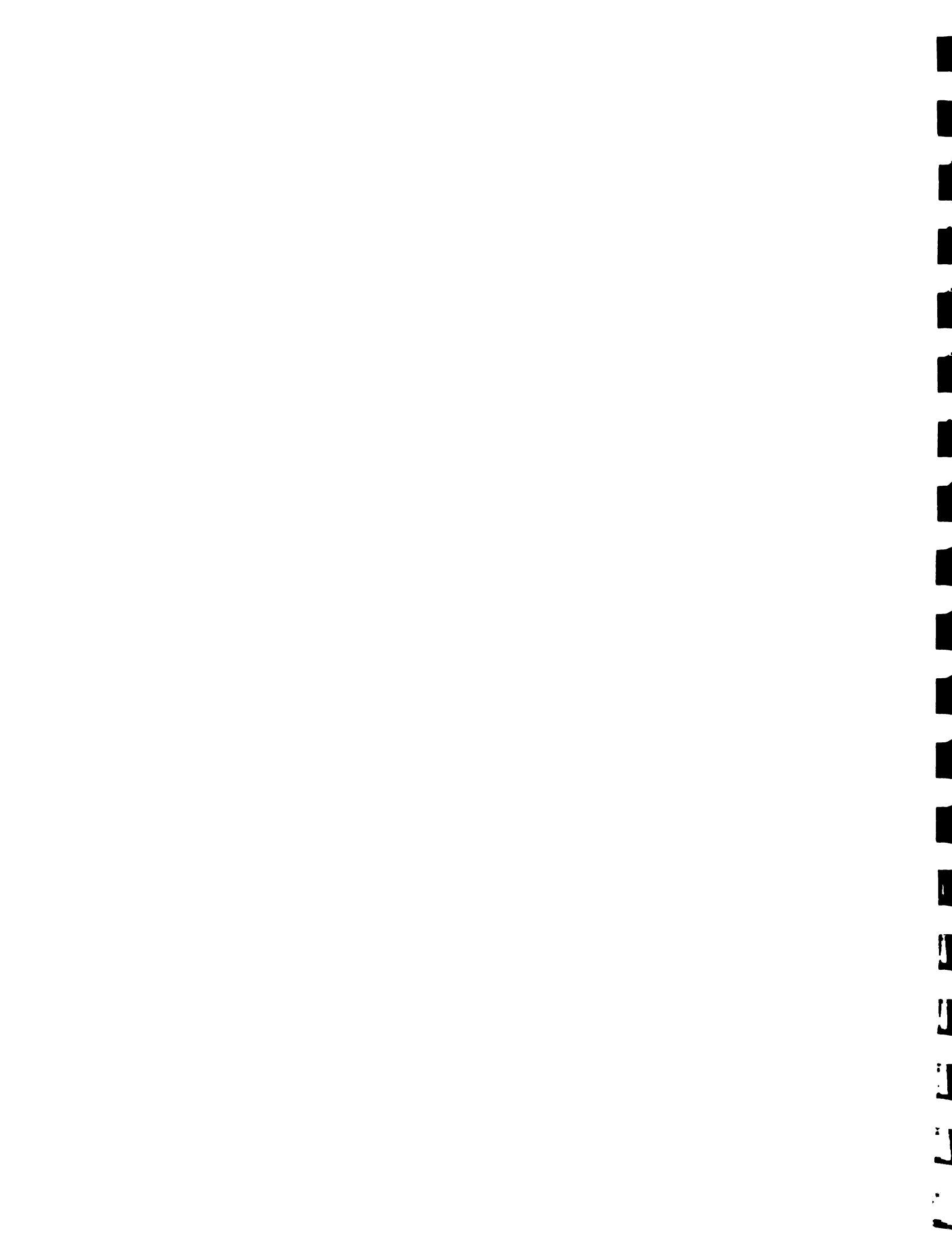
As indicated before, the agricultural sector has performed poorly over the last decade. Sugar production, which is the main activity in the sector has declined over the period and the financial viability of the industry has been severely reduced. The industry has been also affected by the buoyancy of tourism and construction sectors which has attracted labour from the sugar sector. A strategy to improve the viability and competitiveness of the industry is critical for its medium and long-term survival. This strategy should include a rationalisation of the industry's management structure and operations through joint ventures, upgrading plant and equipment to increase efficiency, seek alternative uses for sugarcane and achieve financial self-sufficiency in the medium term.



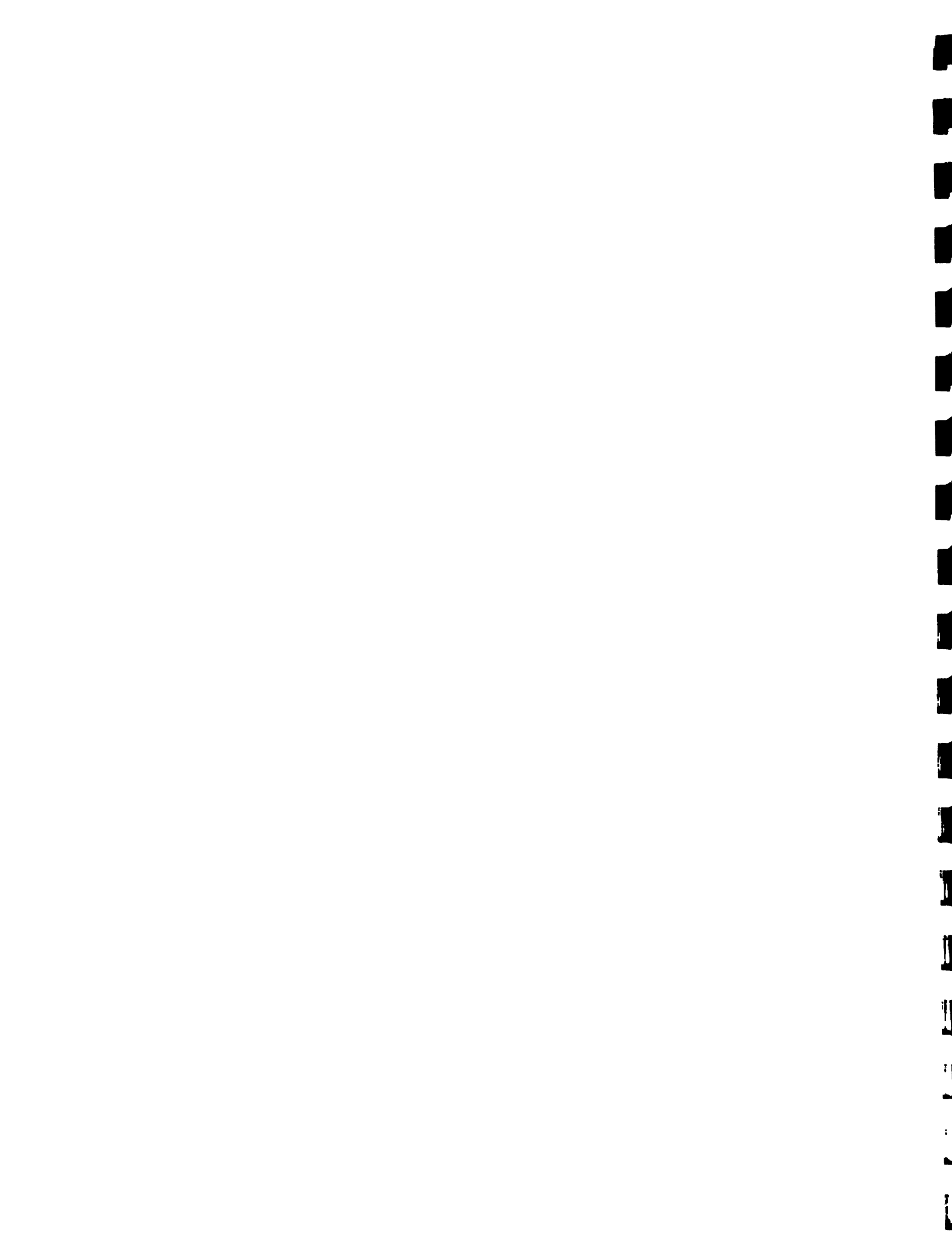
Non-sugar agriculture has remained small but its relative importance in the sector has increased. However, the sector is affected by a number of constraints including the poor performance of the sugar industry and its burden on the national treasury, the existing land tenure and land distribution system, the reduced viability of small farms, inadequate infrastructure and weak institutional support including marketing and sectoral planning.

The government has embarked on an agricultural development strategy (1986-91) to address the constraints of the sector and reactivate its role in the economy. The main thrust of the strategy is to effect structural adjustments in the sector through acceleration of the process of agricultural diversification. The principal elements of this strategy include:

- (a) Pursuit of a programme of agricultural diversification with major emphasis on food crop production and the development of fisheries, livestock and forestry.
- (b) An improved land-use and land tenure policy to address problems of insecurity and other constraints to production will be the basis for development of the sector.
- (c) Increased production and productivity have been targeted for all areas of agriculture with the aim of achieving self-sufficiency and increased import substitution for both crop and livestock products. This is to be achieved through improved husbandry practices and irrigation and water-delivery systems.
- (d) Improvement of the marketing system and marketing policy to facilitate production and disposal of agricultural products. The Central marketing Corporation will be strengthened, public market facilities will be upgraded and marketing outlets will be established in outlying areas. In addition, efforts will be made to provide crop forecasting, production monitoring and to conduct market surveys both domestically and in neighbouring countries to identify market opportunities.
- (e) An upgrade of the physical infrastructure, particularly roads to facilitate transportation of inputs supplies to farms and farm produce to markets.
- (f) An improved incentive scheme to stimulate and encourage increased crop, livestock and fisheries production through the granting of duty free concessions, provision of loan facilities and granting concessionary credit through the Department of Agriculture.



- (g) Strengthen institutional support to the agricultural sector at the national, regional and international levels. This includes strengthening the Department of Agriculture to improve the delivery system of its services, planning and coordination with other sector-related and national institutions and increased involvement of regional and international institutions in the agricultural development process.



SECTION II

THE AGRICULTURAL SECTOR

2.1 The Environment

2.1.1 Geographic Location

The islands of St. Kitts and Nevis lie in the Northern part of the Leeward group of the Lesser Antilles in the Eastern Caribbean. They became an independent state in association with Britain in 1967 and achieved full political independence in 1983. St. Kitts and Nevis are separated by a Strait, known as the Narrows, a channel of about 2 miles in width.

2.1.2 Physiography

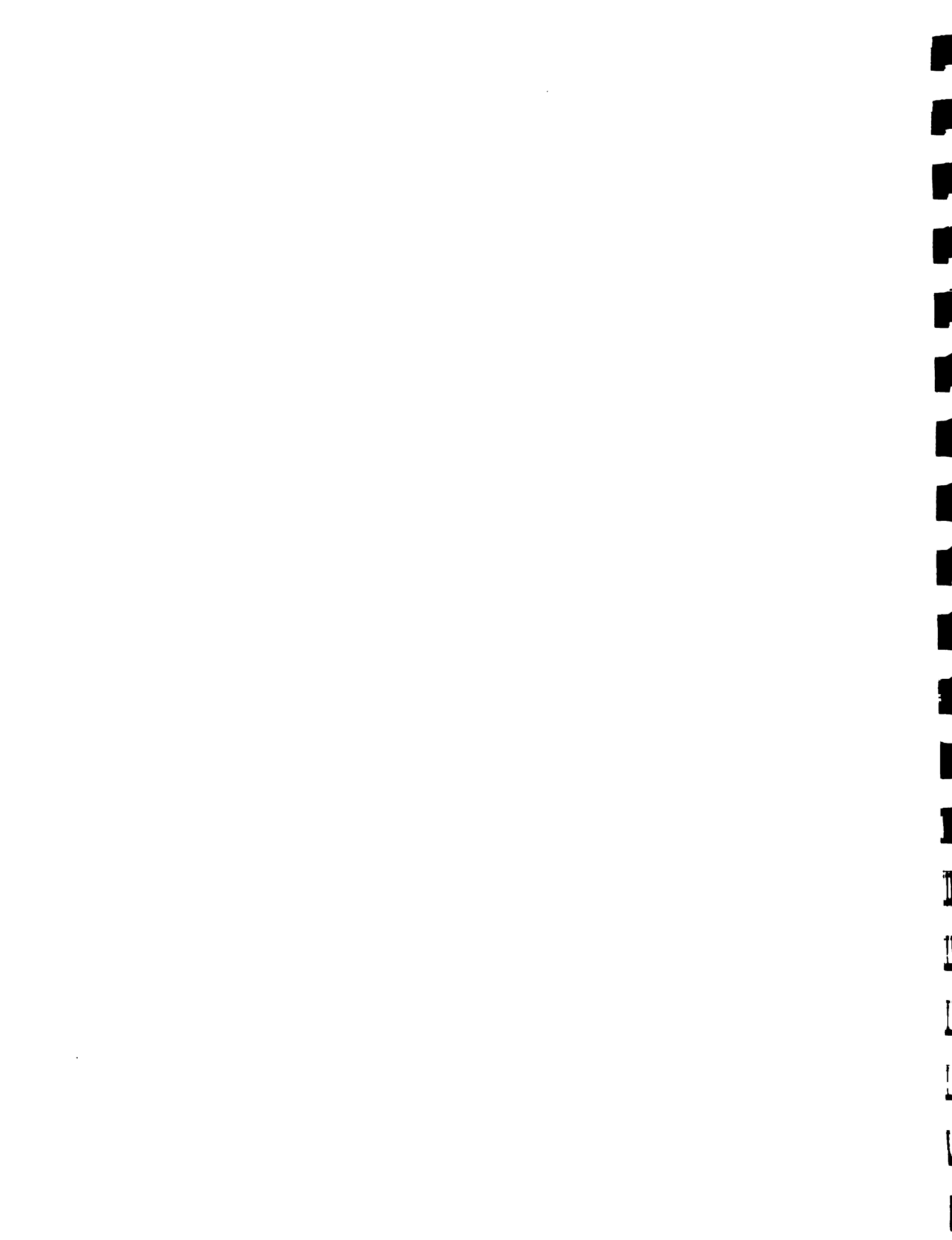
St. Kitts and Nevis with a total area of about 269 km² are entirely of volcanic origin with no known mineral deposits. The topography is characterised by a central mountain range surrounded by undulating plains ending in limited coastal flatlands. The fertility makes them suitable for sugar production and agriculture. However, water is not available in needed amounts all year and this is a constraint to intensive non-sugar crop production.

The soils are volcanic and susceptible to erosion. The major soil types are protosols and lactosols; the former is composed of beach sand and volcanic ash and have rapid drainage, are moderately fertile and predominant on sugar estates. The latter are mature soils of clay formation and are used for food crops, pasture and fruits. Unlike most areas, the sugar estates are rock free and the topography permits field size conducive to mechanisation. Although the soils are well drained and fairly fertile, fertilizers are required in areas that have been under production for many years.

Most of the land is subject to soil loss. Many fields have moderate to steep slopes and are exposed to heavy rains (114 to 127 cm) in the major crop growing areas. Erosion is contained fairly well on sugarcane lands because the crop is contoured and provides good protective cover. Gullying is causing some damage to both islands and farmers frequently plant crops on such land.

2.1.2.1 St. Kitts

St. Kitts (17 N, 62 W), the larger of the two islands, has a total length of 23 miles and its area is 68 sq. miles (176 km square). The island is roughly oval in shape with a narrow band of land extending like a handle from the south-eastern end. The main part of St. Kitts consists of a rugged mountain range, whose highest point is 3,792 feet (1156 m). A branch of the range encloses a spacious and fertile valley on the southeastern seaboard wherein lies the capital, Basseterre. This valley and the circle



of land formed by the skirts and lower slopes of the mountains constitute most of the arable and cultivable land of the island. The higher slopes are covered with short grass affording good forage while the upper slopes are covered with natural forests.

St. Kitts is of volcanic formation and most of its beaches are of black volcanic sand. There are old erosion gullies known as ghauts in the island which deeply intersect the pediment and rapidly drain away surface runoff from the mountains to the sea.

2.1.2.2 Nevis

The island of Nevis (17 N and 62 W) is located to the SE of St. Kitts. Nevis is 35 sq. miles (90 km. square) in area and ellipsoidal in shape, with a maximum length (north to south) of about 8 miles and a maximum width of about six and a half miles. The island is also of volcanic origin and arose from the same submarine bank as St. Kitts. The island is dominated by a central peak which rises in an almost perfect cone to 3,232 feet (985 m).

The upper slopes of the mountain (above 1,100 feet) are well-wooded. Whereas the soil of St. Kitts (except in the mountains) is light and porous, that of Nevis is stiff clay with volcanic boulders.

The top soil in Nevis has been eroded more or less completely from much of the shoal area, due to lack of soil conservation measures after the end of the cultivation of cotton and sugarcane. Soil erosion and consequent loss of top-soil have been due to combined effects of the abandonment of previously intensively cultivated land (sugar estates), clearing of forest for charcoal production and cultivation, high run-off from the relatively impermeable slopes and heavy over grazing.

2.1.3 Climate

The climate of St. Kitts and Nevis is sub-tropical and maritime with a marked dry season in the period January to April. It is usually mild with temperature ranging from 17 degrees celsius to 33 degrees celsius. The islands lie on the path of the north-east trade winds and the climate is influenced by a steady cooling breeze throughout the year. The prevailing winds are mainly easterly with velocities of 18 to 25 km per hour. Stronger winds may occur in the "hurricane" season July to September. The central core of volcanic mountain peaks also influences the climate and the soils of the Islands.

There are two rainy seasons in St. Kitts and Nevis. During the months of April to June, the average rainfall is about 9.9 cm per month and in the period August to October the mean monthly rainfall is about 12.7cm per month.



Rainfall increases proportionally with altitude and the annual rainfall, the intensity of storms and the length of the dry season are variable. Owing to the almost continuous cloud cover on the mountains, evaporation is low and the relative humidity is 100 percent, practically every night during the rainy season from August to November.

Precipitation is highly variable from year to year with an annual average of 137 cm. Annual rainfall increases with height above sea level. Along the coastal areas below elevations of 250 feet (75 m), the annual average rainfall is 130 cm. This increases with elevation and at places 600 meters above sea level the rainfall reaches 203 cm per year; above 600 meters it could be as high as 305 cm per annum.

In Nevis, average relative humidity varies from 70% in March to about 78% in September to November and down to 50% in the dry season. Average rainfall is about 125 cm with a wide annual range.

2.2 Resource Base

2.2.1 Population and Labour Force

SKN has a population of around 47,500 (mid-1989), of which 38,000 are in St. Kitts and 9,500 in Nevis. The population of St. Kitts is scattered in 43 villages comprising nine parishes of the island. It is estimated that more than 25% of the population is concentrated in and around the urban and sub-urban areas of the island's capital, Basseterre. An estimated 55% of the population of Nevis lives in the capital, Charlestown and its suburbs.

Compared to most Caribbean countries, population growth in SKN has been slow during the last two decades, averaging less than 1.0% per annum with negative growth rates being recorded in some years. For example, both SKN and St. Lucia had roughly the same population in 1891: by 1980, St. Lucia's population had almost tripled while that of SKN experienced a slight decline. Although the birth rate is fairly high, growth has been mainly affected by mortality rates and out-migration which have been exceptionally high (estimated at 27 deaths per thousand live births and 30 per 1000 respectively) in the last two decades¹. These two factors have contributed to a decline in mainly the 0-14 and 35-59 age groups respectively. Out-migration has been influenced by both "pull" and "push" factors such as economic opportunities abroad, high fertility levels and poor economic prospects at home.

With the exception of information on the sugar industry, data on the labour force in general and specifically on the agricultural

¹. The country is one of the few in the world to have a constant population in the last 100 years.



sector is not easily available. However, recent estimates suggest that the agricultural sector employs between 25% and 30% of the labour force, with the sugar industry being the single largest employer of labour, both in the agricultural sector as well as in the country. High rates of migration, particularly of the 35-50 years age group has been responsible for the relatively low rate of natural increase in the labour force, estimated at about 0.75% per annum in recent years.

Table 2.1
Farm Employment in St. Kitts and Nevis

	1986	1975	1961
	----	----	----
Total Number of Persons Employed on Agricultural Holdings	9,868	16,433	19,381
Males	6,124	9,531	...
Females	3,744	6,902	...
Hired Labour	3,294	4,491	7,472
Males	2,346	3,152	4,842
Females	948	1,339	2,630

Sources: Agricultural Census of 1986, 1975 and 1961

Data available from the agricultural censuses of 1961, 1975 and 1986 indicate that total farm employment has declined by more than 50% in the last 30 years (see table 2.1). Furthermore, the decline in females employed has been more rapid than the overall reduction of labour in the sector. The reduction in the agricultural labour force is largely attributed to the decline of employment in the sugar industry and rapid expansion of the construction and tourist sectors. It is estimated that total employment in the industry (field and factory operations) declined by more than 50% alone from 1980 to 1989.

2.2.2 Land Area

Data on land use in SKN (except for sugarcane cultivation) is not very reliable; much of what is available is largely based on estimates provided by the agricultural census. The World Bank indicates that total farm land in 1971 was 24,515 hectares. The last agricultural census of 1986 shows that about 21,000 hectares of land is under agriculture including crop production, pasture, grassland, woodland and forests and other land. This represents very little change over the 1975 census data and a 15% increase since the previous census of 1961.

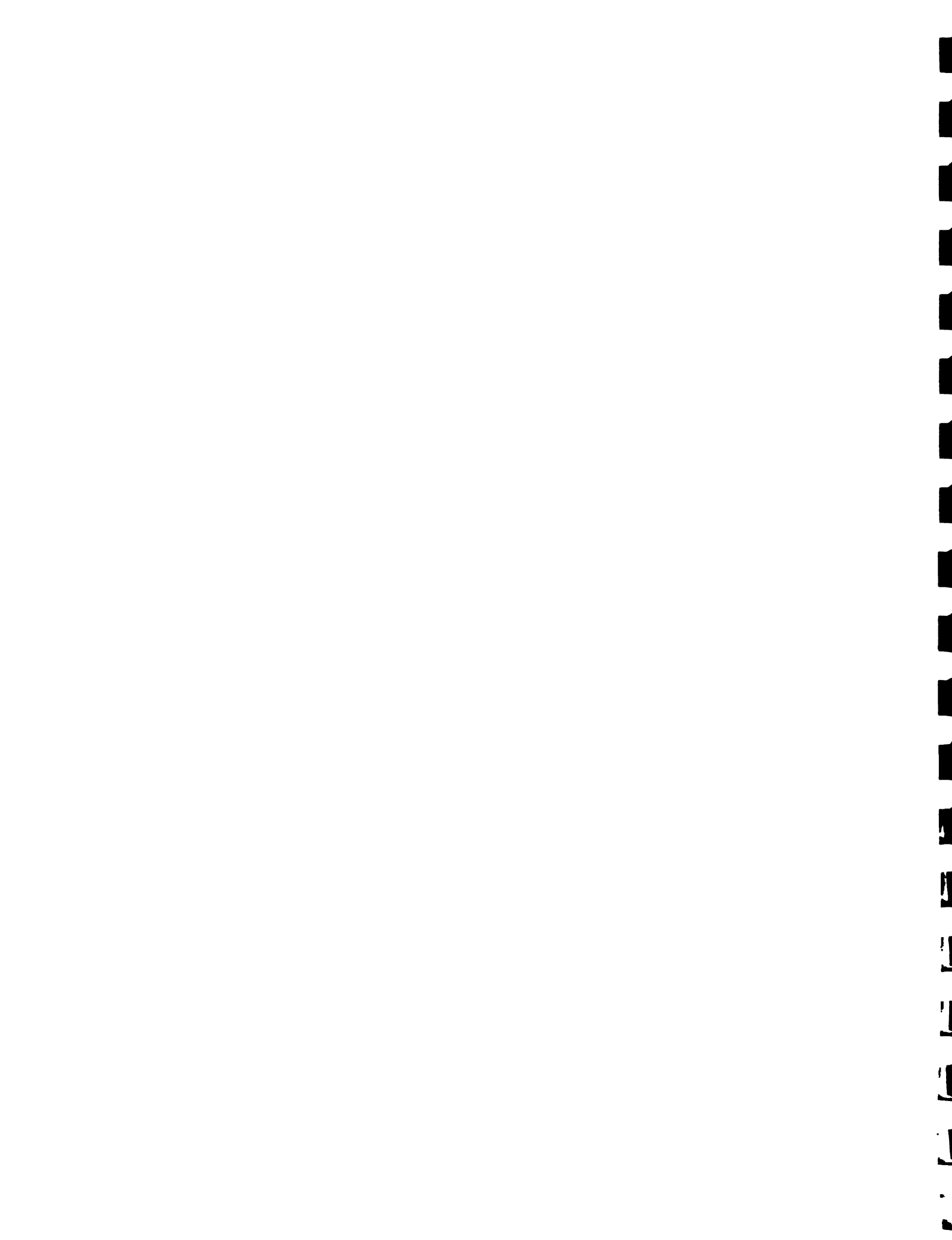


Table 2.2 compares land utilisation in SKN in 1975 and 1986. While there has been little change in the area under permanent crops, a significant reduction in land under temporary crops and forests and woodland has occurred, mainly as a result of the expansion of the tourist sector and expansion in urban and sub-urban areas.

Table 2.2
Land Use in St. Kitts and Nevis, 1986 & 1975*

	1986		1975	
	Hectares	%	Hectares	%
Permanent Crops	1,004	11.3	983	8.1
Temporary Crops	4,105	46.3	6,046	49.8
Fallow	698	7.9	472	3.9
Pasture	1,623	18.3	1,066	8.8
Forests & Woodland	964	10.9		
Other land	474	5.3	650	5.3
Total Farm Land	8,868	100.0	12,146	100.0

* Excludes grassland.

Source: Agricultural Census of 1986 and 1975.

2.2.3 Arable Land/Land Capability

Based on a land use survey in 1966 (table 2.3), Lang and Carroll classified land according to suitability for agriculture. They concluded that about 26 percent was high quality agricultural land and 45 percent was fair. A small proportion of good land can be found in Nevis due to its topography and rocky conditions. However, a more recent reclassification may reveal less good land for agriculture due to loss of land for housing, roads and other development.

Table 2.3
Land Classification of St. Kitts and Nevis, 1966

Classification	St. Kitts	%	Nevis	%
Good Agricultural Soil	5,844	35.12	858	9.31
Fair Agricultural Soil	5,700	34.25	6000	65.10
Land suitable only for Forest	2,800	16.83	1120	12.15
Settlements and Sub-divisions	1,040	6.25	400	4.34
Poor Land	1,256	7.55	838	9.09
TOTAL	16,640	100.00	9216	100.00

Sources: (1) Department of Agriculture, St. Kitts



2.2.4 Roadways and Water Resources

The road system of SKN basically consists of a single, paved road girding each island, with dirt, gravel and a few feeder roads radiating out of it. In St. Kitts there are about 12 miles of streets in Basseterre and a further 70 miles of roads in and around the island while in Nevis, there are about 68 miles of road. The unpaved roads, particularly feeder roads are a serious constraint to the movement of people and products in and out of the agricultural areas. Some of these are poorly designed and subject to erosion.

Agriculture in both islands, particularly intensive crop production is highly dependent on irrigated water. However, irrigation facilities are not adequate to meet the demands of agriculture as well as to satisfy non-agricultural uses.

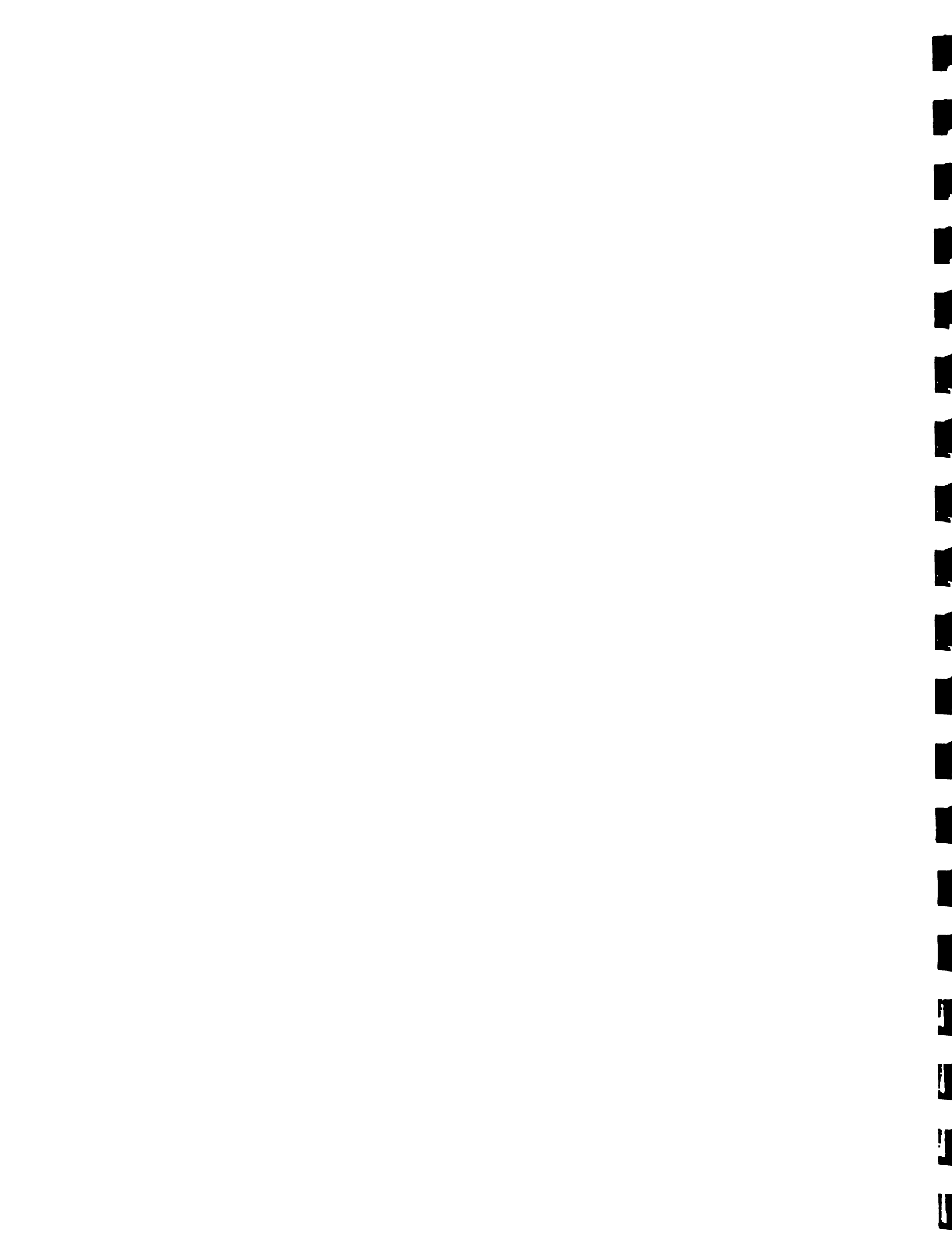
2.3 Structural Characteristics

Sugar has historically been the backbone of the economy. It was cultivated in both islands, but was abandoned in the early 1960's. A process of economic diversification started in the mid-1970's and has been taking place since then although the economy is still highly dependent on sugar. This diversification has taken place through the expansion of non-sugar agriculture (mainly cotton, vegetables, and livestock), through the establishment of new assembly-type industries such as electronics, garments, and electric equipment and through the expansion of tourism.

Several agricultural enterprises occur in both islands ranging from permanent crops and annual crops to livestock and potential forestry. Permanent crops include pawpaw, coconut, breadfruit, guava, plantain, mango, citrus, and soursop. Any of these crops can be found scattered in a plot or concentrated in household gardens. Only coconuts are grown on a large scale by privately-owned estates in Nevis.

Most annual crops are grown on a rainfed and irrigated basis. These include cereals (maize), rootcrops (yam, eddoe, dasheen, tannia, cassava, sweet potato), other (sugarcane, ginger, cotton, peanuts and pineapple) and vegetables (pumpkin, string beans, carrots, tomatoes, okra, onion, etc.). Only sugarcane, peanuts and cotton (in Nevis) are grown on pure stand basis.

There are some differences in the structure of the sector in both islands. In St. Kitts, the government-owned estates comprise more than 60% of total cultivable land; in Nevis, it is less than 10 percent. Because of the government's control of land in St. Kitts, the existing land tenure pattern is considered a serious constraint to increased agricultural production. This constraint does not exist in Nevis.



2.3.1 Number of Farms and Holdings

The farming sector is dominated by small farmers with most farms having an area of less than 1 hectare (2.5 acres). The agricultural census of 1986 estimated that there were 3,429 holdings in SKN, with 65% being St. Kitts and 35% in Nevis. This reflects a 3% less in the total number of holdings (with land) recorded by the census of 1975. Estimates from the last census further show that more than 90% of farms in SKN are less than 2.02 hectares (5 acres), with 81.2% alone having an average size of less than 1.2 hectare (see table 2.4)². The number of small farms in 1986 in this category was about the same as that recorded in the 1975 census, but the number of larger holdings (10.2 or more hectares) have been reduced significantly. This is particularly so in Nevis where larger government-controlled holdings have been redistributed in smaller plots to farmers.

Table 2.4
Number of Farms by Size Groups (1986)

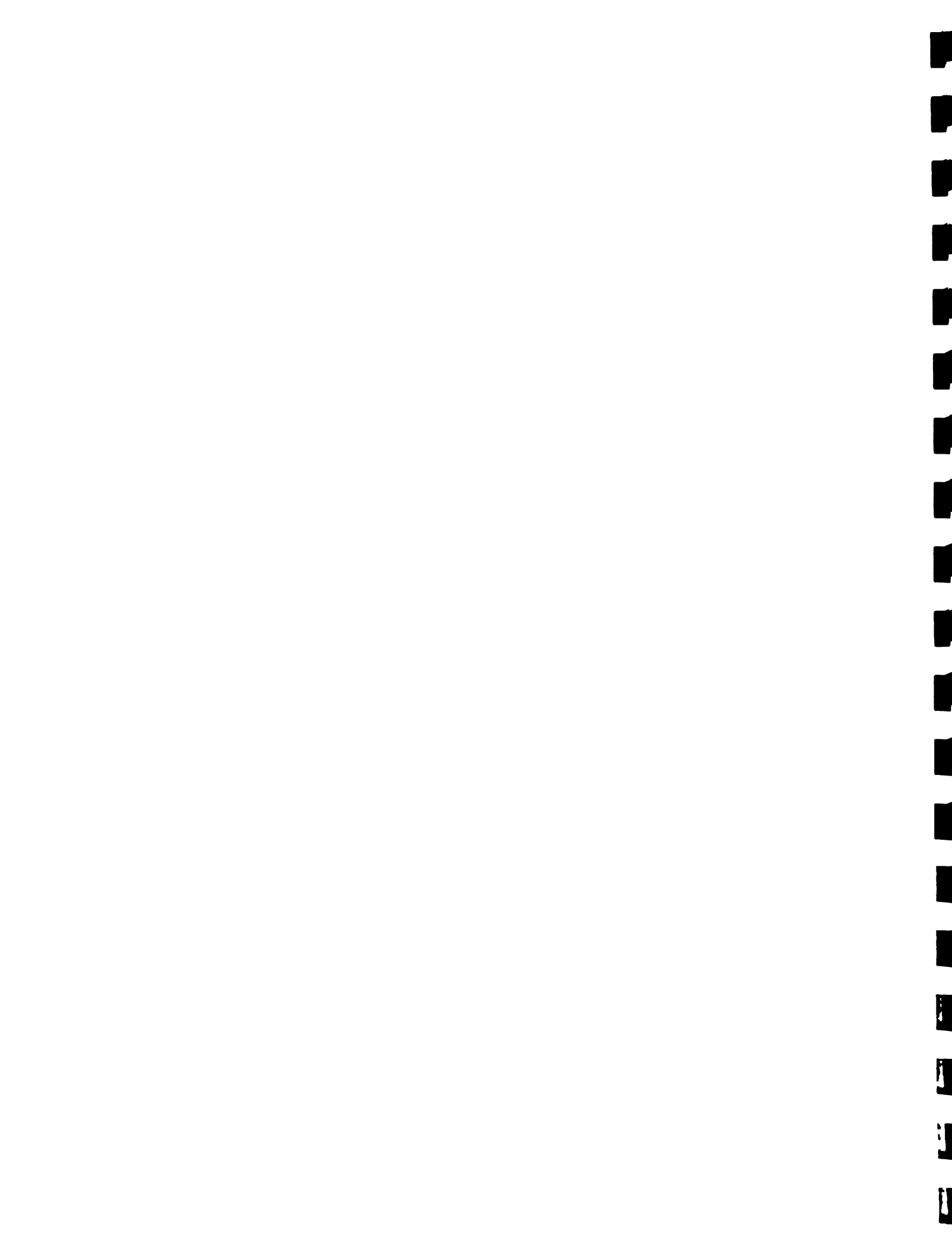
	Number of Farms*			Percent
	St. Kitts	Nevis	Total	
Less than 1.2 hectare	762	492	1,254	81.2
1.2 - 2.02 "	104	74	178	11.5
2.03 - 3.01 "	29	33	62	4.0
3.02 - 4.01 "	1	11	12	0.8
4.02 - 10.1 "	6	10	16	1.0
10.2 and more	9	13	22	1.4
Total	911	633	1,544	100.0

Does not include landless holdings and "large" farms.
Source: Agricultural Census, 1986.

2.3.2 Land Tenure

Most of the agricultural activity, particularly in St. Kitts is undertaken on government-owned lands which are sugar estates acquired during the 1972-75 period. St. Kitts has a highly skewed land ownership with 23 properties or 1.0% of the island's agricultural holdings and comprising more than 75% of total land under government control (see table 2.5). About 95% of the total

². Large farms are differentiated from total holdings in the census because of certain criteria. A farm is considered "large" if at least 0.2 hectare (0.5 acre) is cultivated by cash crops or with more than 50 fruit bearing trees.



holdings are operated by individuals, mainly small farmers while 3% are operated through a partnership. Small farms with less than 2.0 hectares (5 acres) comprise 75% of the total holdings in St. Kitts but control only about 6% of the land.

Table 2.5
All Holdings by Parish and Type of Organisation (%)

Island	Total Holdings	Private			Government	Not Stated
		Individual	Partnership	Corporation		
St. Kitts	2,218	94.4	3.2	0.0	1.0	1.4
Nevis	1,211	97.0	0.9	0.3	0.3	1.4
Total	3,429	95.3	2.4		0.1	1.4

Source: Agricultural Census of 1986

Land ownership is less concentrated in Nevis with the government controlling less than 10% of total land. The government started acquiring estates since 1933 and the last was taken over in 1968. Since then, some of these have been redistributed through leasing and sale to smaller farmers in 3-acre plots. However, most of the large estates are still government-owned or controlled.

The pattern of land tenure in SKN is characteristic of small farm agriculture where there is a combination of plots that are owned, leased or rented. Furthermore, the land distribution situation indicates that there are differences in the types of agriculture found on the two islands. Data from the 1986 agricultural census shows that 53% of total agricultural holdings (82% of the total area) are owned, 27% (8% of area) are rented or leased, 17% (3% of area) are operated under no specific tenurial arrangement and 2% are under other forms of tenure (see figure 2.1). The data also shows that of the total holdings that are rented or leased, about 90% involves direct cash payment for renting or leasing. There is also evidence that a relatively larger number of farmers in Nevis opt for payment in kind compared to farmers in St. Kitts. Furthermore, the land tenure situation seems to have changed very little since the previous agricultural census of 1975, except that a small number of holdings are categorised as "being landless" in 1986.

As indicated above, the land tenure situation between the two islands is contrasting. In St. Kitts, only 36% of the island's holdings are freehold compared with 65% in Nevis. It is common for small farmers, particularly in Nevis to possess a small plot of an hectare or so as freehold, then lease a few additional hectares from government for farming and graze cattle on communal pasture or on government land and estates.

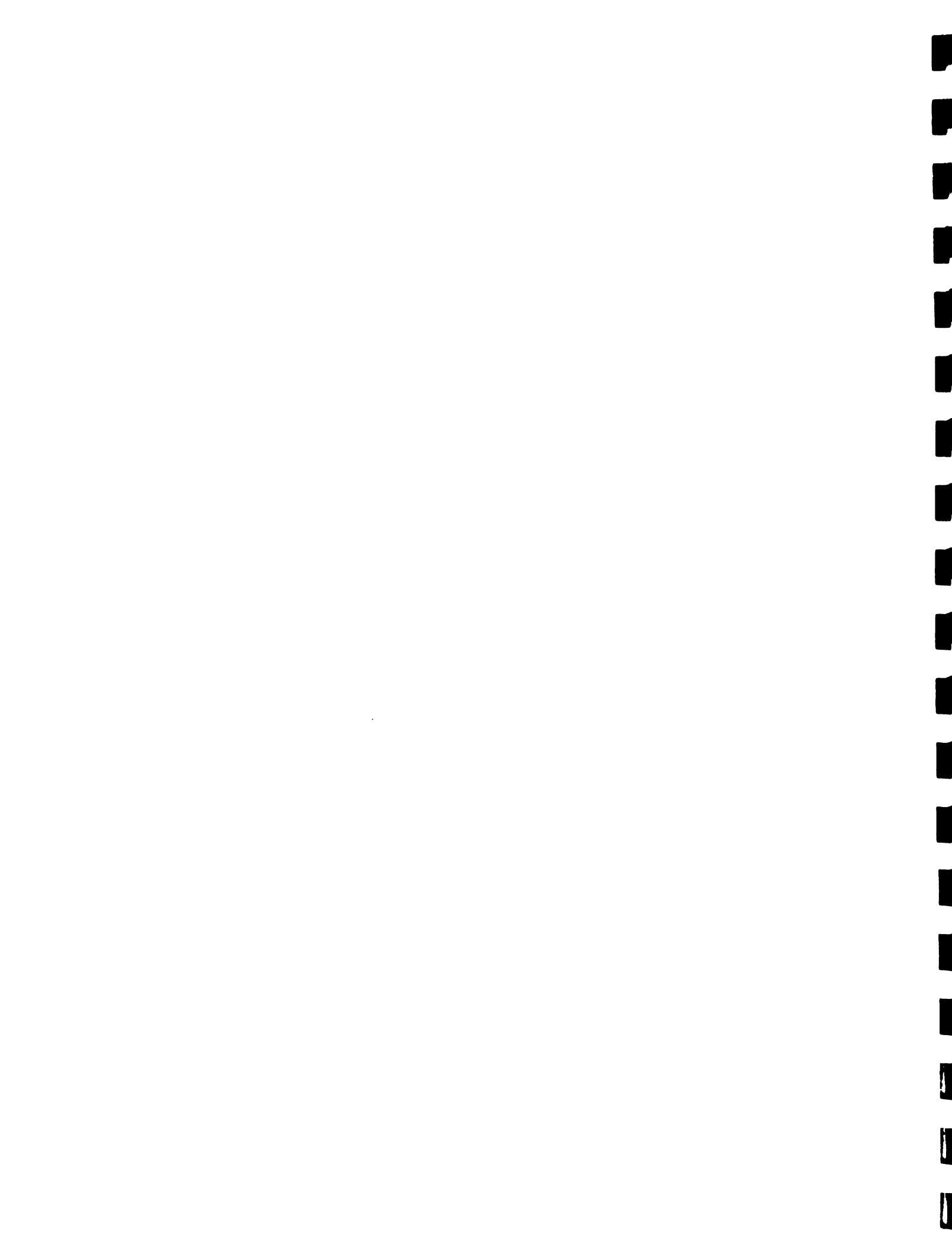
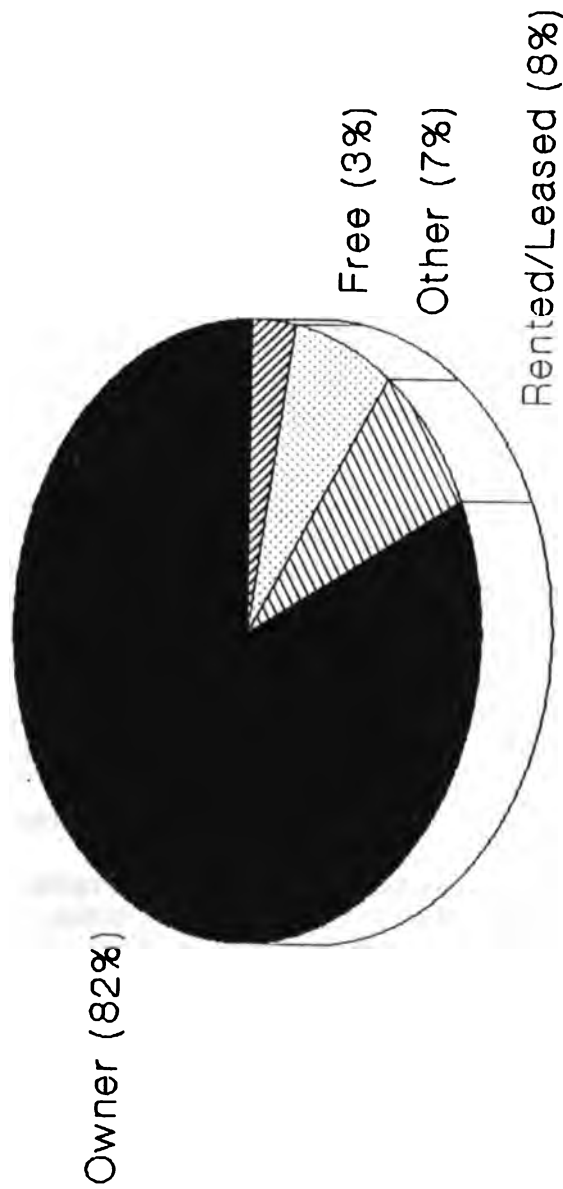
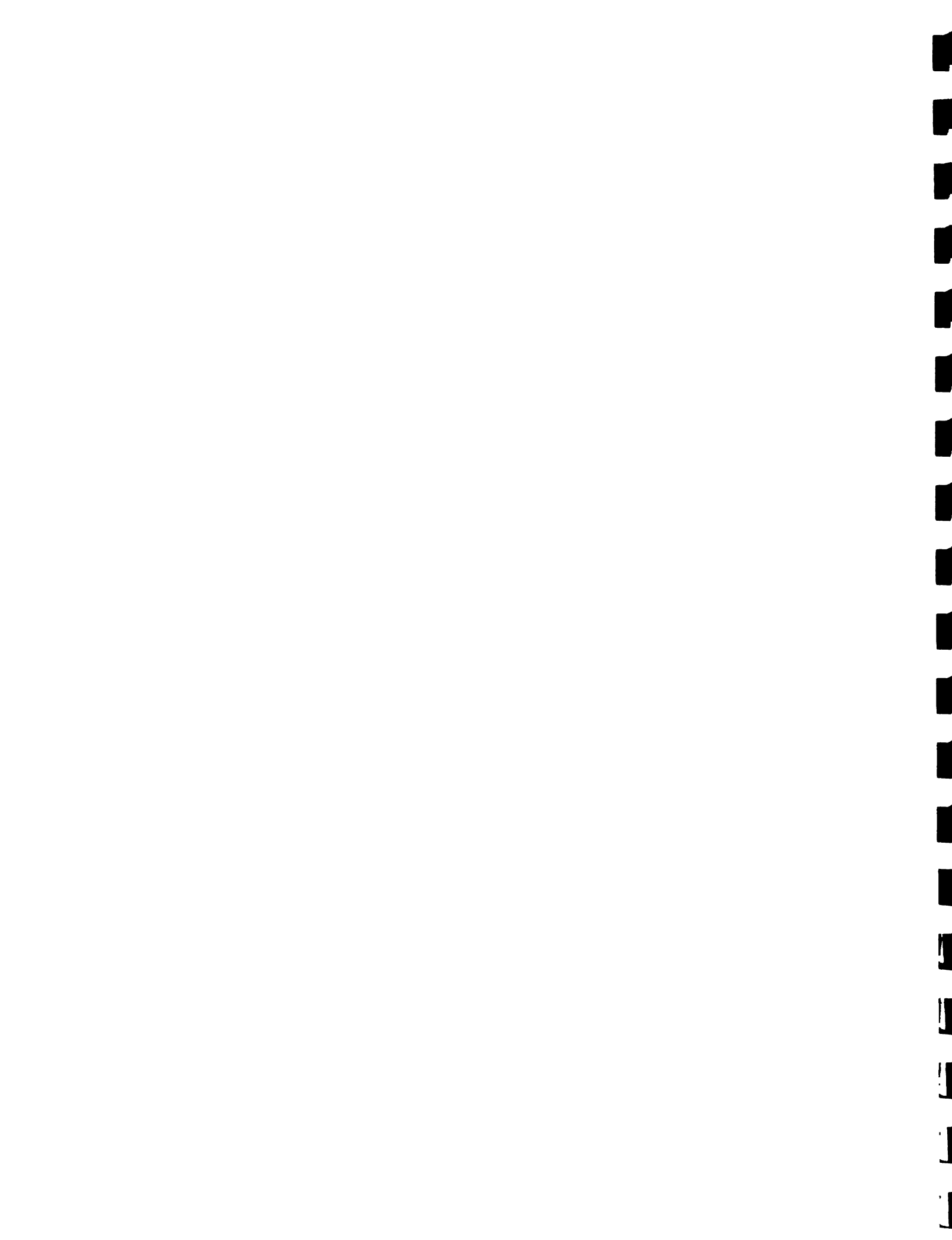


FIGURE 2.1
Land Tenure in St. Kitts and Nevis, 1986





In both islands, farmers often request leases for land from the government. However, a central registration of leases of government lands appears to have been abandoned several years ago and information available on the lease of such lands is very insufficient.

The current land tenure system and land use policy are serious constraints to agricultural development in SKN. Almost all the agricultural land in St. Kitts is owned by the government and there is an absence of an adequate institutional arrangement for granting leases to farmers. A major inadequacy is that the current system does not give farmers formal land rights and this constrains them to access credit and it is not conducive to make continuous improvements in land quality and/or land management. On the other hand, government-owned land in Nevis is being redistributed through long-term leases and sales to farmers and there are signs of greater interest in farming. It is therefore critical that the land tenure problem be solved in St. Kitts in order to proceed with the diversification effort.

SKN also lacks a comprehensive land use policy. The growth in tourism and construction has not only diverted lands away from farming but has also impacted on land prices and the environment.

SKN has become increasingly dependent on tourism and any future growth of this sector should be incorporated into a planned strategy for the medium and long term development of the country's land resources. The susceptibility of land to erosion and the need to preserve sustainability of the environment are additional factors for a more comprehensive land use policy.

2.3.3 Degree of Fragmentation of Holdings

Table 2.6 shows the degree of fragmentation of agricultural holdings in SKN. The data indicates that there is more fragmentation of holdings in Nevis compared to St. Kitts. About 32% of the land holders in Nevis farm 2 to 3 plots compared with only 8% in St. Kitts. The higher degree of fragmentation in Nevis is partly due to the shortage of good agricultural land in a particular location and the relatively higher concentration of land in larger farms in St. Kitts.



Table 2.6
All Agricultural Holdings
by Size and Number of Parcels

Size of holding	Total Holders	Total Parcels	Number of Holdings Consisting of			
			1 Parcel	2 to 3 Parcels	4 to 5 Parcels	6 to 8 Parcels
Under 1.2 hectares	2040	1048	811	109	1	0
1.2 ha & 2.02 ha	108	172	61	43	3	1
2.02 ha & under 3.04 ha	33	72	8	23	0	2
3.04 ha & under 4.1 ha	3	5	1	2	0	0
4.1 ha & under 10.1 ha	6	13	3	2	1	0
10.1 ha & Over	28	39	21	7	0	0
Total: St. Kitts	2218	1349	905	186	5	3
Under 1.2 hectares	1024	1390	677	294	16	0
1.2 ha & under 2.02 ha	101	238	27	55	17	2
2.02 ha & under 3.04 ha	37	91	11	17	7	2
3.04 ha & under 4.1 ha	12	48	0	5	4	3
4.1 ha & under 10.1 ha	13	30	6	5	0	2
10.1 ha & Over	24	49	12	9	2	1
Total: Nevis	1211	1846	733	385	46	10

Note : Because some holdings were "landless", the number of parcels is smaller than the number of holdings.

Source: Agricultural Census of 1986

2.3.4 Age Distribution of Farmers

Table 2.7 shows the percentage distribution of farmers by age group for SKN in 1986 and 1975. Like most eastern Caribbean countries, the average age of farmers in SKN is more than 45 years; about 63% of total farmers are above 45 years of age. This is partly because small-scale farming is seen as a post-retirement activity, and partly because many small farmers are either present or former employees of the sugar industry who have been granted the use of land after many years of satisfactory service. It is estimated that one-half of the "large farmers" in St. Kitts are more than 55 years of age.

Despite the relatively larger proportion of younger farmers in 1986 (compared to 1975), the age of farmers reflects the failure of non-sugar agriculture to attract young people to farming. It is partly indicative of the use of labor intensive methods in current farming practices and the low returns to agriculture vis-a-vis other occupations.

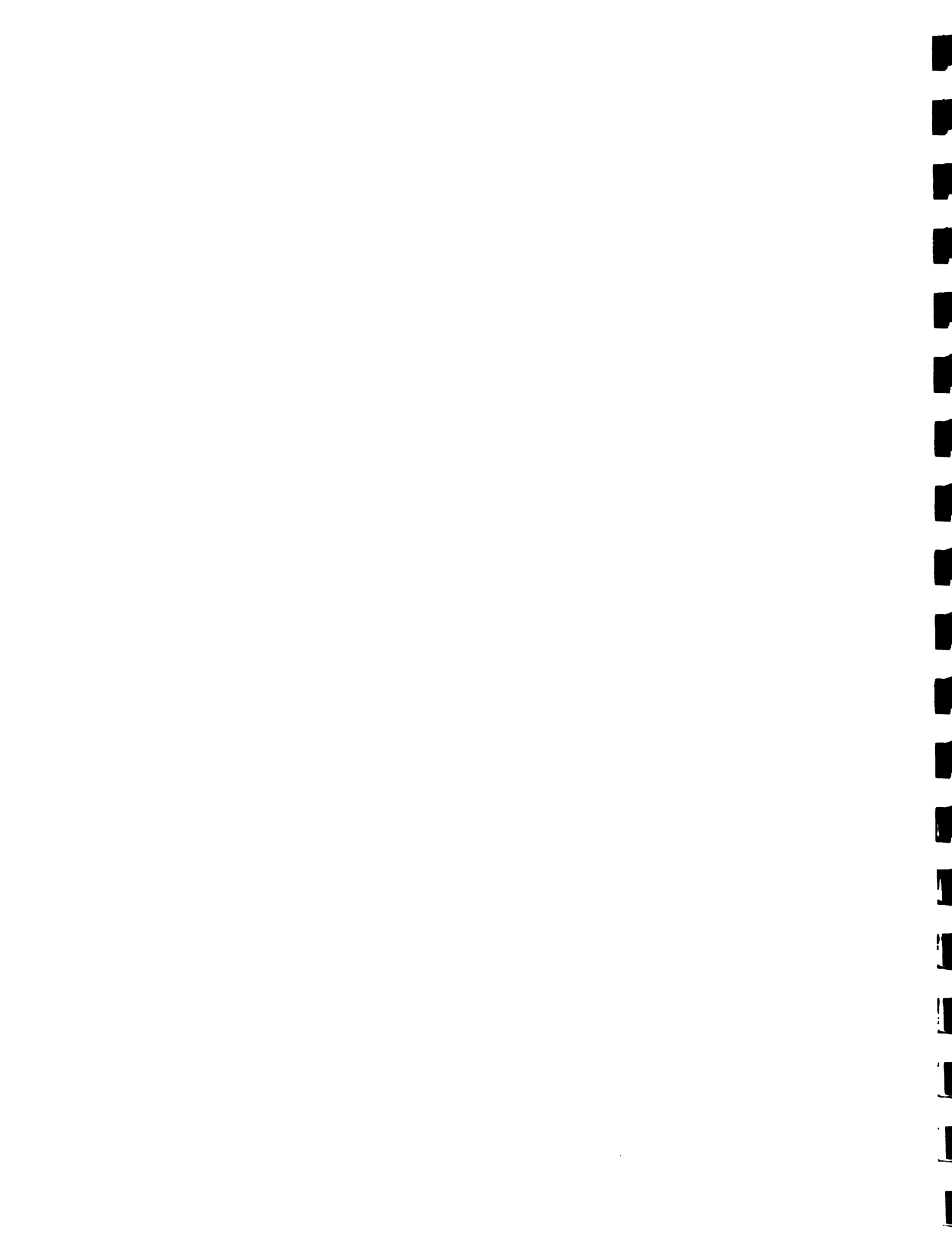


Table 2.7
Proportion of Farm Operators by Age Groups,
1986 and 1975 (%)

Age Group -----	1986 ----	1975 ----
< 25 years	4.7	
25 - 34	15.6	12.4*
35 - 44	14.7	10.9
45 - 44	15.5	23.4
55 - 64	18.9	26.6
65 years & over	28.9	26.6

* .Data for 1975 represent all operators less than 35 years of age.

Source: Agricultural Census of 1986 and 1975

2.4 Institutional Structure

2.4.1 General Administration

The administration of the agricultural sector in SKN is unique because the country is a federation of two islands, each having its own administration. The agricultural sector in St. Kitts is administered by the Department of Agriculture (DOA), which is under the responsibility of one (of two) Permanent Secretary in the Ministry of Agriculture, Lands, Housing and Development. Similarly, in Nevis, there is a Department of Agriculture in the Ministry of Agriculture, Lands, Housing, Labour and Tourism. Regular coordination takes place between the two administrations, mainly at the Director's level³.

There are several national, regional and international institutions actively involved in efforts to foster and develop the agricultural sector in St Kitts and Nevis. While some of these institutions have been relatively effective in carrying out their mandates, the absence of an inter-institutional framework to coordinate their diverse activities has led to some measure of duplication of efforts and inefficiencies in the use of scarce resources. Among the local institutions are: the National Assembly, Ministries and their Department of Agriculture and other Ministries including Communications, Works and Public Utilities; Trade; Industry and Legal Affairs; Education, Health and Community Affairs; St Kitts Sugar Manufacturing Corporation (SSMC); Credit and Marketing Institutions. Among the Regional International Institutions are CARDI and CARDATS in the area of research and the

³. There is usually a meeting between the Minister of Agriculture, Permanent Secretary and Director of Agriculture of St. Kitts with their counterparts from Nevis once per year.



CDB, FAO/UNDP, CIDA, BDD, OAS, USAID, EEC and IICA with respect of technical cooperation and development programme activities.

2.4.2 National Administrative Structure

The Federation of St Kitts/Nevis is governed under the system of Parliamentary democracy with a non-executive Governor General as Head of State, ably assisted by a Deputy Governor General based in Nevis.

Executive power is exercised by a Prime Minister and a Cabinet of Ministers responsible for specific functional areas of Government namely:

- 1) Finance, Foreign Affairs and Home Affairs - the Prime Minister
- 2) Labour and Tourism held by the Deputy Prime Minister
- 3) Agriculture, Lands, Housing and Development
- 5) Education, Youth and Community Affairs, Communications, Works and Public Utilities
- 6) Trade and Industry
- 7) Legal Affairs - Attorney General
- 8) Health and Women's affairs

The ministerial structure is shown in Figure 2.2

The constitution of the Federation of St Kitts and Nevis provides for a National Assembly and a Nevis Island Assembly. The administration of Government activity in the two states is carried out by separate civil service structures based in Basseterre, St Kitts and in Charlestown, Nevis.

The Nevis Administration is structured into three ministries: (see Figure 2.3)

- 1) The Ministry of Finance, Education, Health and Home Affairs (portfolio of the Premier)
- 2) Ministry of Agriculture, Lands, Housing, Labour and Tourism
- 3) Ministry of Communications, Works, Public Utilities and Transport

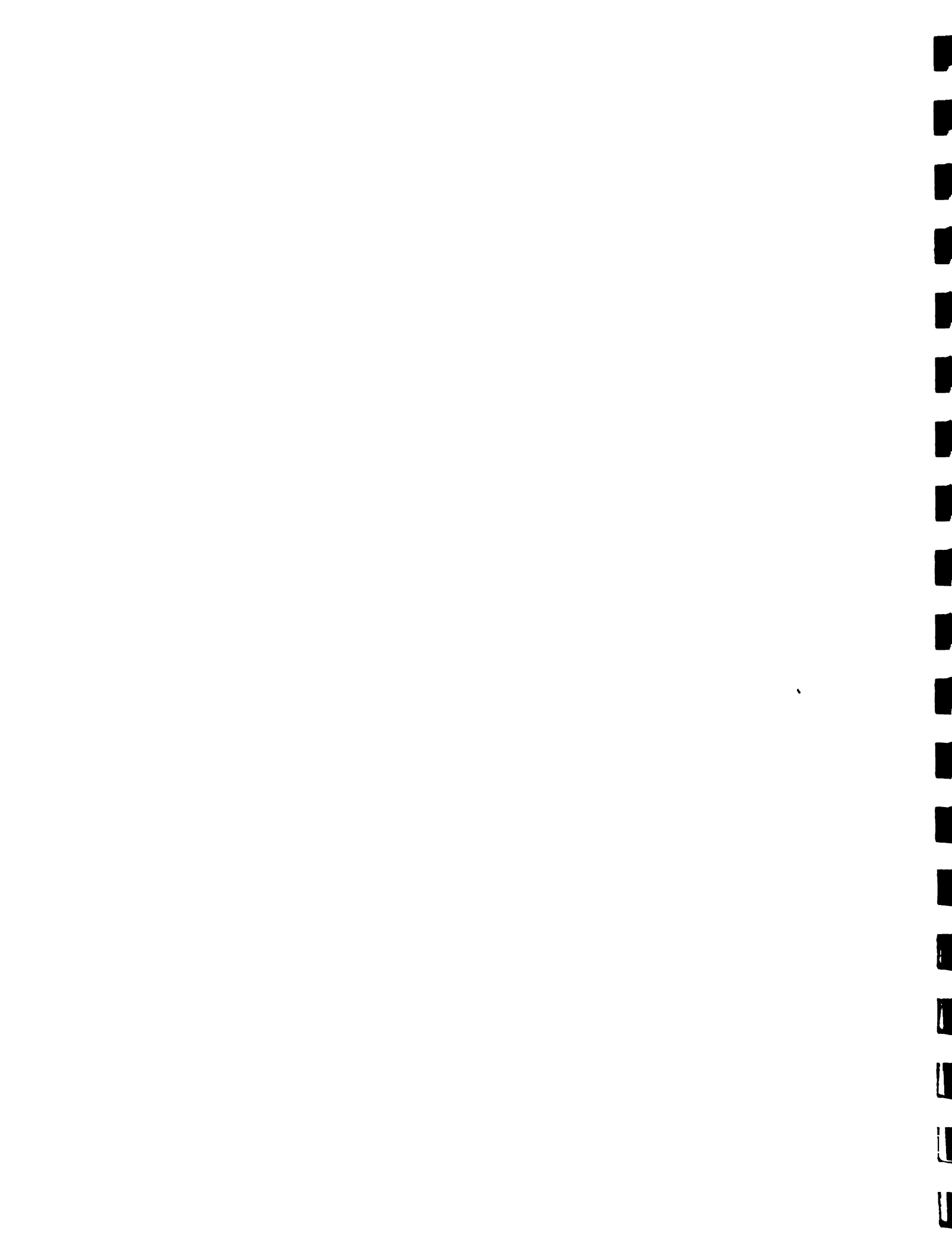


FIGURE 2.2
GOVERNMENT OF ST. KITTS-NEVIS
MINISTERIAL STRUCTURE

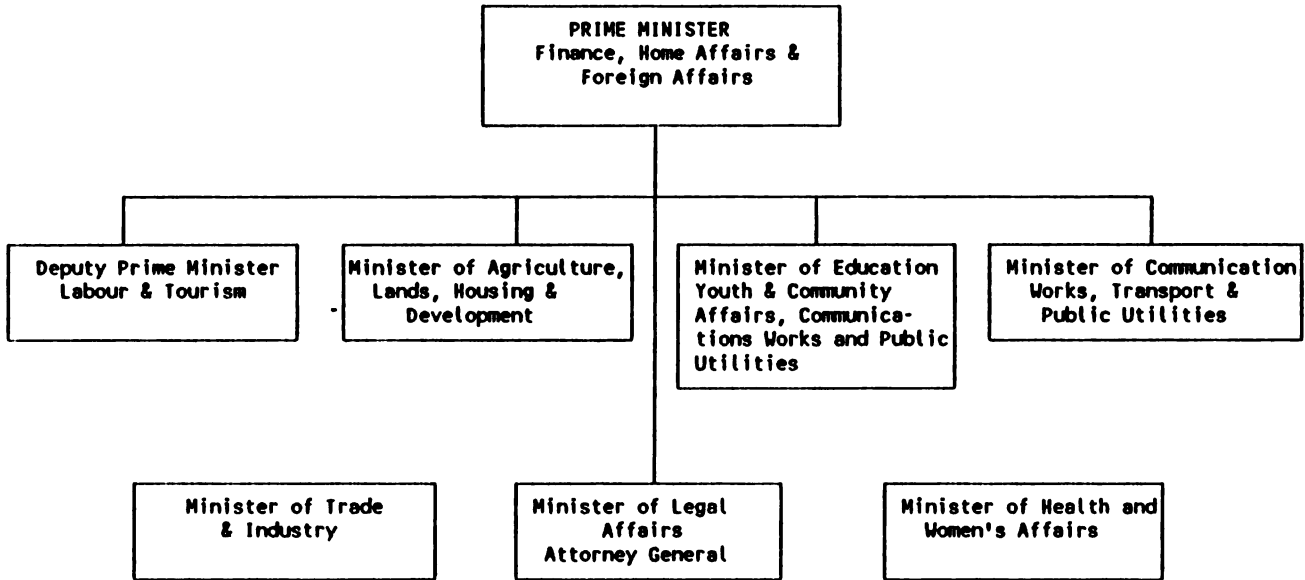
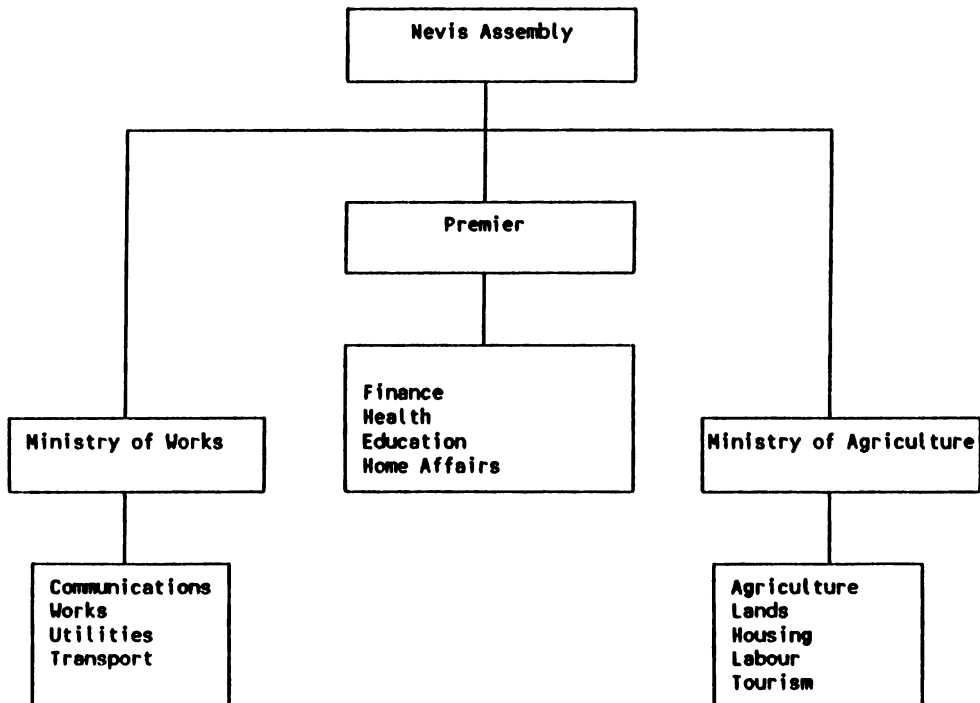


FIGURE 2.3
NEVIS ISLAND ADMINISTRATION
MINISTERIAL STRUCTURE





The functional areas for which the Nevis Island Assembly has power to make laws set out in Schedule 5, Section 117 (1) of the 1983 Independence Constitution. Among these areas are agriculture and infrastructure. There is close co-ordination between the Basseterre based and the Charlestown based administration on all matters of mutual interest. All contracts between foreign Governments or funding agencies and Government entities are handled through the appropriate Federal Ministry in Basseterre. Informal modifications of this procedure in respect of Nevis based projects have however been occasionally implemented on a case by case basis.

2.4.3 Analysis of Agricultural Institutions - St Kitts

2.4.3.1 Public Sector Institutions

The Department of Agriculture (DOA)

The DOA is the lead institution for agricultural development in St. Kitts. It is headed by a Director of Agriculture and it provides support services and coordinate activities in the sector through its seven technical divisions (see Figure 2.4). These include the Livestock, Research, Extension, Engineering, Forestry, Cooperative and Fisheries Divisions. Because of the lack of capital, most of the Department's programmes are supported by regional and international agencies such as CARDI, CDB, World Bank, UNDP and OAS.

There is no formal mechanism or institutional responsibility to plan for the agricultural sector, either within the narrow confines of the Ministry of Agriculture or the Planning Unit of the super Ministry of Agriculture, Lands, Housing and Development. This results mainly from the small size of the DOA and its relationship with the Planning Unit of the Ministry. Each Division has a work plan and each is required to contribute to formulation of the development plan. Submissions are made to the Director of Agriculture and then to the Permanent Secretary. The process is similar for formulation of the Department's annual budget.

There are several constraints to effective agricultural planning in St. Kitts, most of these being institutional. Although the Planning Unit has responsibilities for planning in all areas covered by the super Ministry (including the agricultural sector), it does not satisfy the planning needs of the sector, i.e., the Unit is not actively engaged in agricultural planning. Given the importance of agriculture and the strategy to increase its role in the economy, a formal mechanism to plan for the sector is needed. The absence of an institutional planning mechanism also contributes to the existence of other constraints including weak budgeting practices and very little programme and project monitoring and evaluation. Furthermore, there is lack of an organised information system to support sectoral planning and programme development in the DOA.

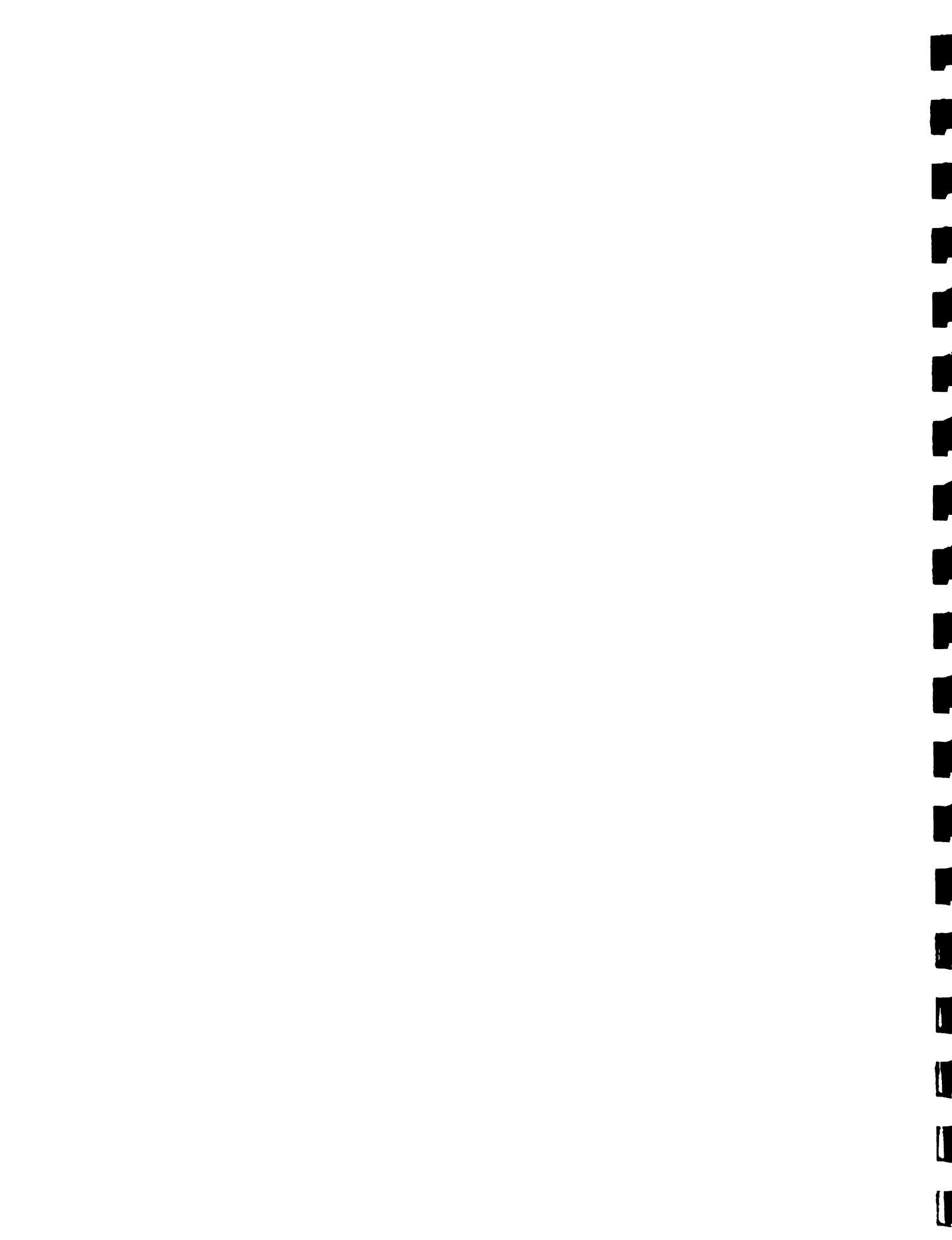
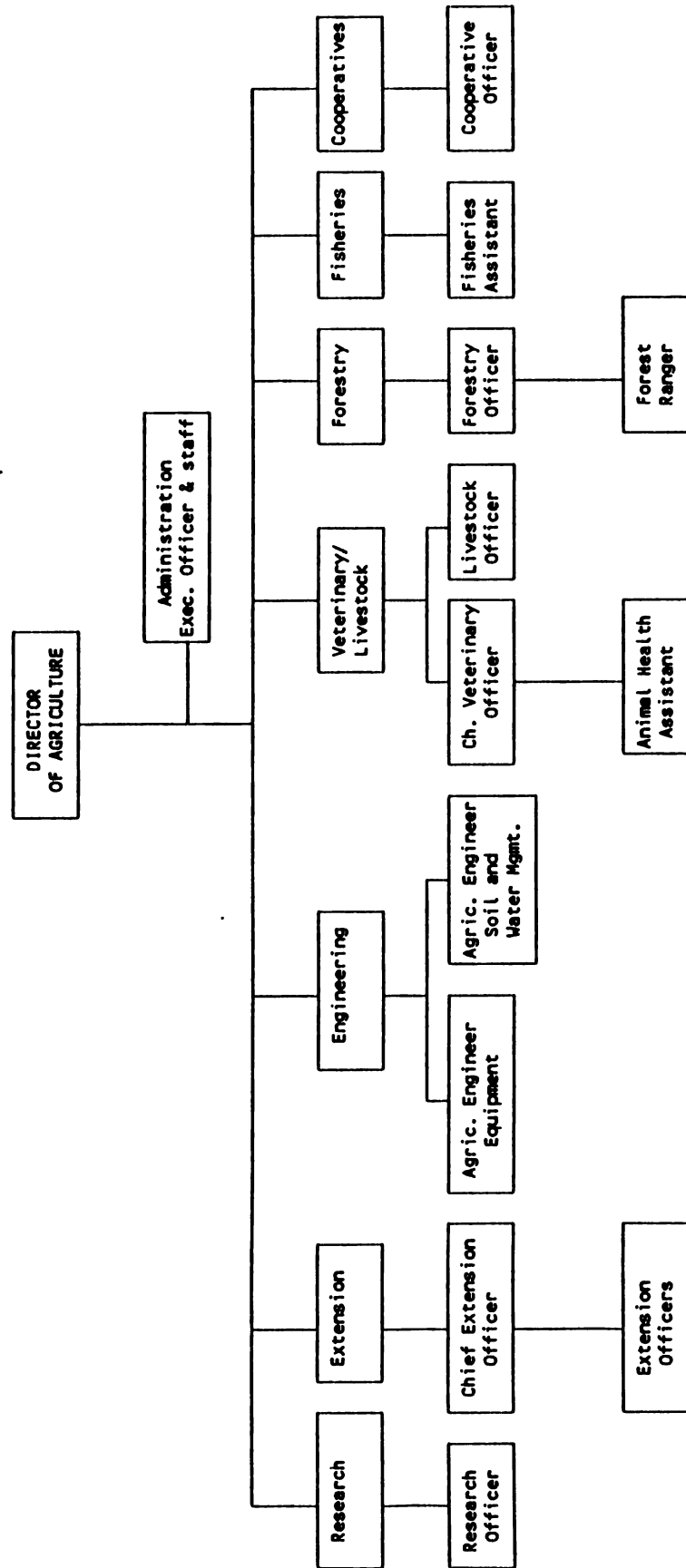


FIGURE 2.4
 STRUCTURE OF THE DEPARTMENT OF AGRICULTURE, ST. KITTS





As in most other DOAs in the Organization of Eastern Caribbean States, the number of professional staff in all Divisions is extremely small. For meaningful technology-led research (Nickel, 1988) the number of qualified personnel is even more exiguous.

The Crop Research Division (CRD) is headed by a Crop Research Officer with a Master of Science (MSc) degree in Agronomy. He supervises two full-time Agricultural Assistants, each holding a Diploma in Agriculture (Dip). A part-time graduate, with a Bachelor of Science (BSc) degree complements the CRD professional team.

The Veterinary Services and Livestock Division is headed by a Veterinarian and depends on a sole professional, the Livestock Officer (with a MSc degree in Animal Science) to develop modern technology for livestock production. The remaining staff (one Animal Health Officer and four Assistants) look after animal health services to livestock farmers.

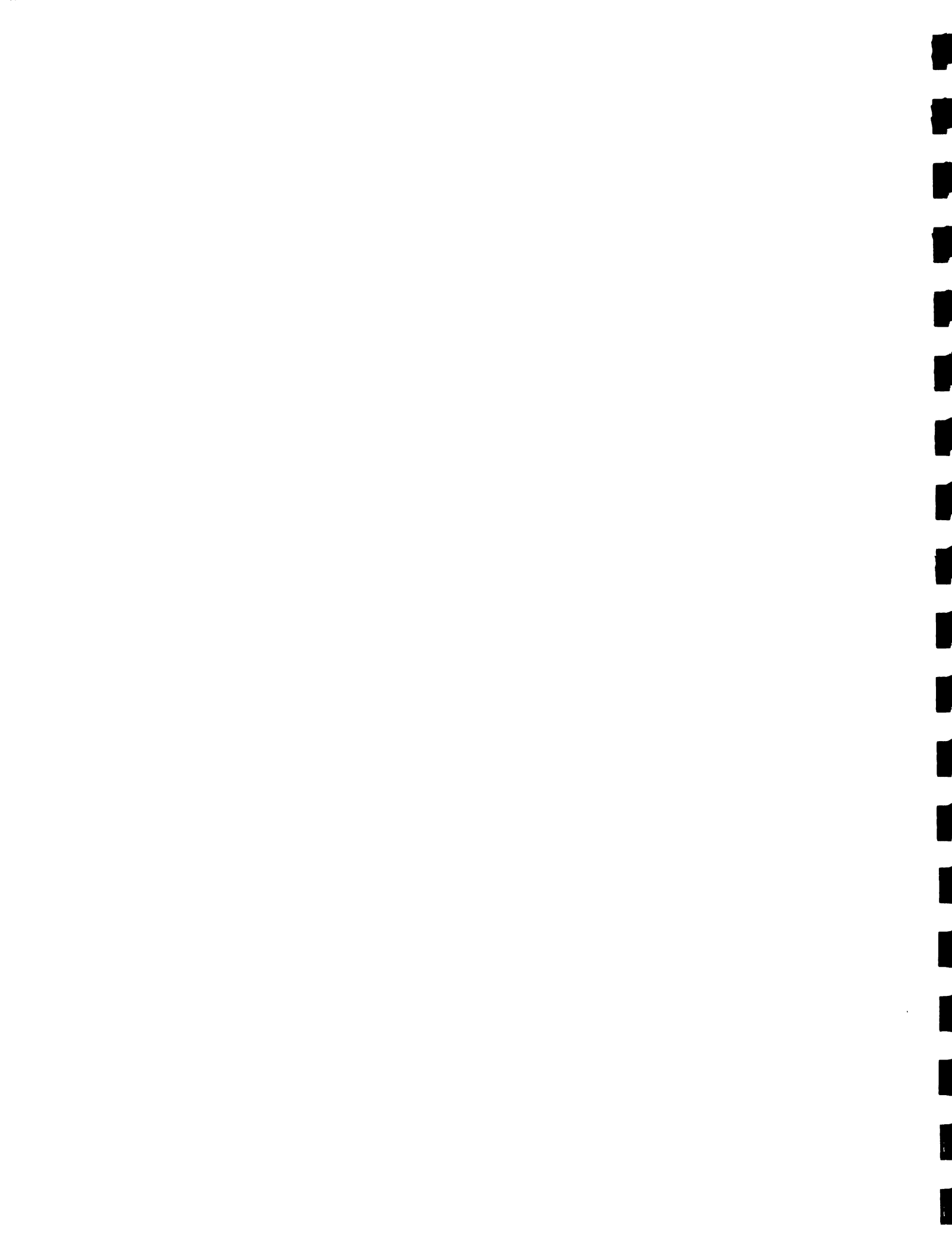
The Extension Division is headed by a Chief Extension Officer with a BSc degree in Agriculture, assisted by five undergraduate (Dip) Extension Officers. It transfers crop and livestock production technologies to farmers in the state's six Extension Districts.

The Co-operative Division is responsible for the supervision and monitoring of co-operatives. As of December 1990 there were 26 active co-operatives registered in St. Kitts and 12 dormant ones credit unions (3), handicraft (2), rabbit production (1), meat production (1), fishing (1), consumer (2), building (1), savings (1)]. This large number of dormant co-ops is an indication of the ease with which co-ops can be registered.

The Co-operative Division had one Co-op Officer up until February 1991. Presently there are two but the Head of the Division will soon be leaving for a six month training course in Nova Scotia, Canada. Both the Head and the Co-op Officer carry out the same functions. Their primary responsibilities are to promote, regulate, monitor and assist co-operatives in their efforts to achieve their goals and objectives.

The primary problems of this Division are:

- very limited man-power to carry out responsibilities in dealing with the 26 co-ops in St. Kitts;
- uncertainty of transportation which must be shared with other Divisions;
- very limited promotional and training materials, e.g. literature, videos, projectors;



- limited technical skills in project identification and formulation;

The Fisheries Division is a one-man operation. This limited staff is a constraint for the timely and adequate collection of data and proper monitoring of the eight landing sites. Extension activities include: education of fishermen in conservation measures of sea life; maintenance of outboard motors and fishing gear; safety on the sea; fishing techniques; first aid; recording of fishing activities; updating the listing of registered boats and identification of fish species. Project activities have included such things as: the modernization and expansion of the fish market at Charlestown; establishment of a fisheries data base system (OECS); trial production of *Tilapia nilotica* (OAS); monitoring of coastal changes (UNESCO), and a Sea Food Survey (OECS). Approximately 105 fishing boats are based at eight different landing sites. In 1989 Nevis exported 12,036 lbs of fish and 7,803 lbs of lobster to the following islands: St. Croix (94% of the fish and 60% of the lobster), Montserrat (1% of the fish, 26% of the lobster), Guadeloupe (1% of the fish, 13% of the lobster), Tortola, St. Thomas and St. Eustatius.

The primary problems of this Division are:

- too small size of staff to adequately provide the necessary facilitating service;
- limited budget for training purposes;
- limited skills in project identification and formulation;

To facilitate the adoption of technologies, the DOA provides the following general support services to farmers through the Divisions:

- 1) Extension (planting materials and other inputs, infrastructures)
- 2) Veterinary Services/Livestock (medicines)
- 3) Agricultural Engineering (equipment for land preparation and irrigation)
- 4) Forestry (zoning)
- 5) Fisheries (materials, equipment)
- 6) Cooperatives (registration)

Considering the diversity of technological needs for agricultural diversification and subtracting professional time spent on administrative or otherwise non-technical duties, the



human resource base for technology development and transfer in the DOA is clearly overstretched. To compound this constraint, precious work time is diverted by the professional staff to ad-hoc non-programmed training, meetings and other non-essential activities. Deepening or spreading dissatisfaction was also expressed by key DOA professional staff, especially at the middle management level, about their work environment.

Yet the DOA has contributed significantly to technological modernization of agriculture in St Kitts. Its annual reports since 1986 were not available for this Assessment Mission but the observed results of its TDT activities in vegetable (especially white potato) production have been highly successful. Performance in livestock development is less impressive, due in great measure to the widespread incidence of the tick-borne disease dermatophiliasis that decimated the livestock population during the 1980's.

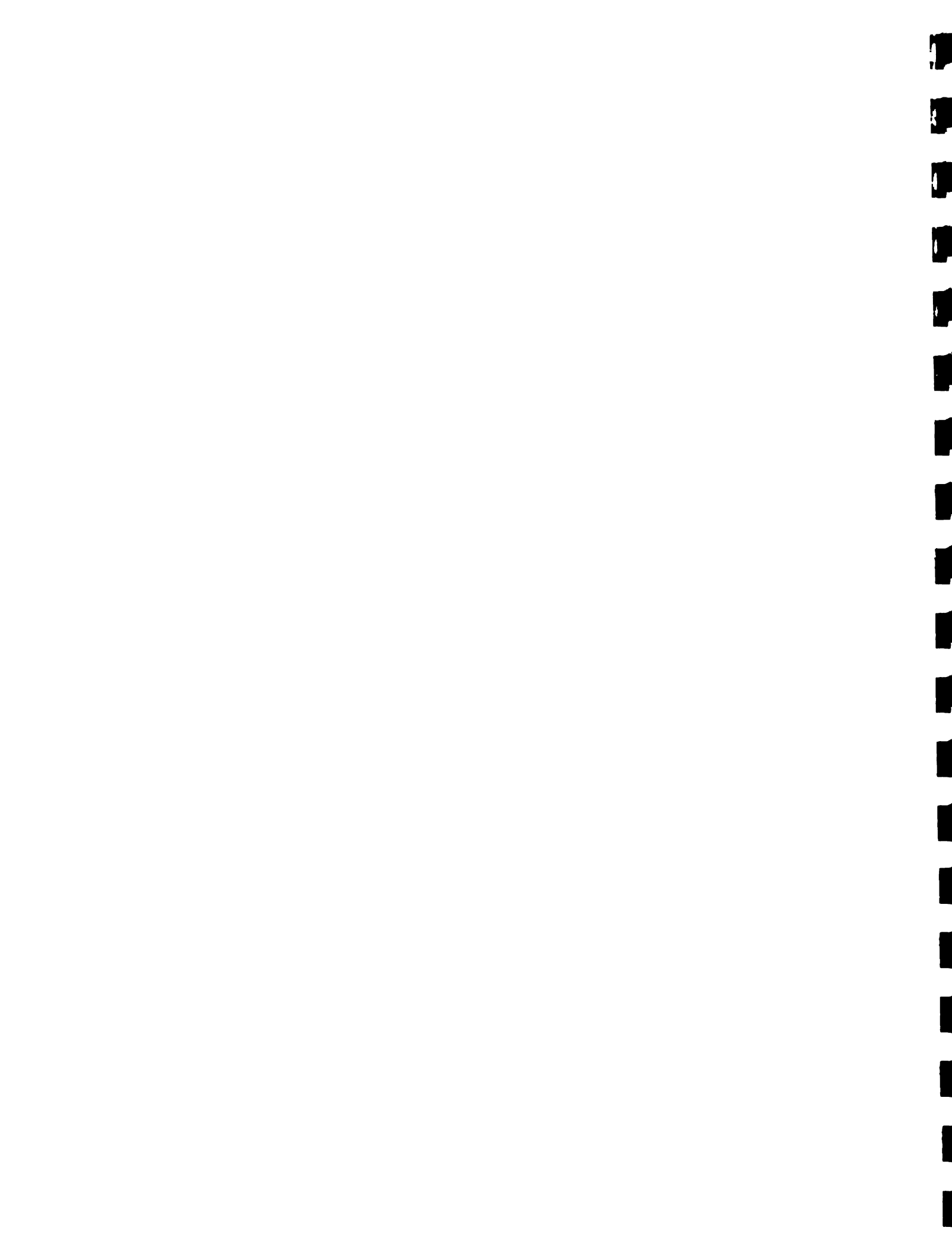
The St. Kitts Sugar Manufacturing Corporation

The SSMC primarily develops and transfers technologies to support its own sugar cane production and diversification ventures. It has however shown less than enthusiastic interest about getting into non-sugar based agriculture (Nurse et al, 1989). But considering that it controls most of the arable land in St Kitts, agricultural diversification as targeted in the MOA's stated policy (Nat. Dev. Plan St Kitts/Nevis, 1986-1990) cannot proceed effectively without its direct or indirect support.

The SSMC conducts TDT through its Agronomy and Research Department (ARD). It also runs jointly with CARDI, the Integrated Pest Control Unit (IPCU), within the purview of ARD.

The Manager of IPCU has a Doctor of Philosophy (PhD) degree in Agronomy and is assisted by nine undergraduate professionals (mostly at the Dip level). CARDI assigns to IPCU one graduate (BSc degree) professional in Entomology, but she is due to leave SSMC soon. No replacement was identified to the Mission.

The ARD's performance has been positive on technical modernization of sugar cane development, although several external conditioning factors (such as low rainfall and equipment breakdown) have negatively impacted on cane and sugar yields lately. Performance in non-sugar commodities (peanuts yam, cabbage, white potato, sweet potato, pineapple, mango, citrus, coffee and others) has been less satisfactory, apparently due to insufficient support from SSMC's management.



The Trading and Development Corporation

The TDC sells agricultural inputs including agro-chemicals, equipment and small tools. Thereby it facilitates and influences the adoption of technologies by farmers. It has maintained functional and operational, albeit informal, linkages with the DOA's technology development and transfer units.

The Central Marketing Corporation (CEMACO)

CEMACO dates from the 1973 Central Marketing Corporation Act. It is based in Basseterre, St. Kitts and does not maintain any staff or facilities in Nevis. A small (10 x 10 x 8 ft) cool room build in downtown Charlestown is used only periodically by the DOA Extension/CARDATS marketing programme.

CEMACO is managed by a General Manager who is directly responsible to a Board of Directors appointed by the Minister of Agriculture. The General Manager oversees a staff of almost 40 persons including 6 at the supervisory level who have responsibilities for areas of Accounts, Depot, Wholesale, Retail, Despatch and Farm Coordination, respectively.

The ACT creating CEMACO gives it a broad range of marketing functions similar of other marketing boards in the region. In effect it is responsible for almost anything related to marketing, i.e.

- to stimulate, facilitate and improve the production, marketing and processing of agricultural produce;
- to develop/secure favourable arrangements for the purchase, handling, distribution, transport, shipping, marketing and sale of agricultural produce;
- to make recommendations on matters related to the production and marketing of produce;
- to collect, analyse and disseminate statistical data on agricultural and livestock production and marketing;
- to assist and advise producers and agricultural and fishing co-operatives in the selection and marketing of their produce;
- to provide training in harvest and postharvest handling;



- to supply producers with farm inputs;
- subject to the approval of the Minister of Agriculture, it has regulatory powers such as:
 - . licensing/registering of producers/wholesalers;
 - . prescribing standards and controlling exports;
 - . issuing licenses to export produce, and
 - . regulating imports of produce.

The ACT stresses the execution of the above functions in benefit to the producer. In practice, it is generally agreed by farmers, intermediaries and professionals alike, and supported in the literature, that CEMACO is having little impact in most of the areas mentioned above. It is commonly heard and seen in the literature that the main functions of CEMACO are related to import, wholesale and direct retailing operations. In its own words "selling of grocery items rather than marketing of locally-grown agricultural produce brought profitability to the Organization" (page 7, Annex 8A, Volume 3, St. Kitts and Nevis Agricultural Diversification Study). To its benefit, and unlike many marketing corporations in the region, CEMACO does cover its expenses and turns a profit due to its import/retailing operations.

In 1990, CEMACO made overseas purchases totaling \$4.6 million, distributed as follows: poultry chilled (\$2,011,444), dry goods (\$1,899,656), fruits & vegetables (\$356,217), liquor (\$163,766), white potatoes (\$102,256), and agricultural inputs (\$53,972). Of the category fruits & vegetables, cabbage represented 18%, carrots 16%, apples 16%, tomatoes 11%, bell peppers 7%, celery 5%, lettuce, broccoli and cauliflower 8%, grapes 3%, oranges 2% and others 15%. Of the category agricultural inputs, 65% were seeds and 35% tools and equipment.

In respect to domestic purchases of fresh produce, CEMACO seems to have reached its peak in 1982 when it purchased 457,482 lbs of 36 different items. The major items were peanuts (56%), sweet potatoes (16%) and cucumber (6%). The remaining 22% was distributed among 33 different products. As a result of high product and financial losses, CEMACO began to scale down its purchases of fresh produce and presently buys primarily to supply its two retail outlets. Since 1982 annual purchases of local produce has been on the decline, reaching as low as approximately 150,000 lbs (35 items) in 1990. Since 1985 the value of CEMACO's purchases of local produce has ranged from 3-8% of the value of annual turnover.



The primary problems of CEMACO are:

- CEMACO is mandated to carry out a series of functions for which it does not have the necessary staff and infrastructure; these functions were defined based on felt needs 18 years ago and are not necessarily the same as the felt needs of today;
- CEMACO is perceived as not responding to the needs of the farmer and therefore not fulfilling its responsibilities;
- there is no clearly defined national agricultural marketing policy which can serve to guide CEMACO in its development activities;
- present staff is inadequate to provide the necessary facilitating services in assembly and export;
- human and financial resources are very limited for information gathering and dissemination, and training in such areas as postharvest handling;
- management has limited skills in project identification and formulation;

Agricultural Credit Institutions

Credit to the agricultural sector is made by commercial banks and the government-owned Development Bank of St. Kitts and Nevis (DBSKN). Credit is also provided by a non-government organisation, the Foundation for National Development (FND), Agricultural Cooperatives (mainly in Nevis) and a Cooperative Credit Union. The FND provides financial as well as technical assistance services to mainly small farmers who are unable to access institutional credit because of lack of collateral.

The DBSKN and FND lend to other activities in the economy but they are the primary sources for agricultural credit. Both institutions maintain branch offices in Nevis. The principal sources of finance for the DBSKN has been lines of credit from external agencies such as the European Investment Bank and the Caribbean Development Bank (CDB), with most coming from CDB. The DBSKN has also borrowed money from the government and the Social Security Scheme. With respect to the FND, funding has been provided by various donors including the Canadian International Development Agency (CIDA), the US Agency for International Development (USAID), the European Community (EEC), Foundation for International Training (FIT). The FND also obtains financial support from incomes derived from its services and contracted activities and from local donations.



The lending policies of the DBSKN and FND are somewhat different. The DBSKN borrows from CDB at 4% interest rate and charges 11% to all borrowers. The collateral requirements of the Bank include a bill of sale on vehicles and equipment, land title or a guarantor (two are needed for loans above \$10,000). However, the Bank is constrained in its lending activities to agriculture because it lacks capable officers with sufficient training in agriculture to appraise projects and loan requests from the sector. In the case of the FND, the interest rate charged on all loans is 7.5% and the maximum loan period is 5 years. The FND also acts as a guarantor for loans to its clients when they are required to borrow from commercial banks. The Foundation's collateral requirements include bill of sale, mortgages, certificate of title as well as guarantors.

Figure 2.6 shows that total lending to the agricultural sector has been very small compared to total bank credit to all sectors of the economy. In general, credit to agriculture as a proportion of total commercial bank credit has been less than 1.0% between 1981 and 1986 and has marginally increased in recent years. Even the loan portfolio of the DBSKN which is the main source of medium and long term lending to the sector has been small, amounting to less than 8% in any one year since it started operations in 1981. A large proportion of the Bank's loans has been channeled into housing development and to finance the expansion of industry and tourism. Within agriculture, fishing has been the main recipient for the Bank's funds but food crops, mainly vegetable production have become important in the last few years (see Figure 2.5). Similarly, the FND's loan portfolio indicates that a small proportion of its loans have been lent to agriculture. Food crop farmers, particularly those cultivating white potatoes have been the main recipient of its loans in the agricultural sector recently.

Sufficient credit funds have been available for agricultural financing but lending opportunities have been limited. The constraints affecting agricultural development are the main factors which have limited lending opportunities in the sector. Poor roads and infrastructure and lack of markets for agricultural products have constrained farm production and affected the "credit worthiness" of farmers. Other interrelated factors include (a) the predominance of part-time farming which can be financed from other sources; (b) lack of security of tenure and (c) the age of farmers. Together, these factors have contributed to a lower opportunity cost for resource use in agriculture.



FIGURE 2.5

Commercial Bank Credit and Contribution to Agriculture and Manufacturing

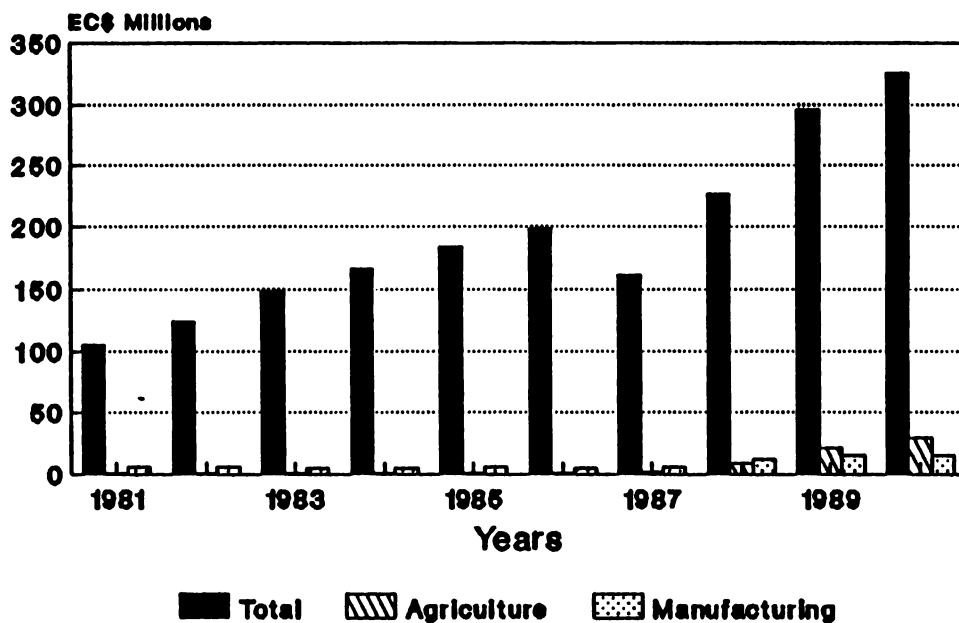
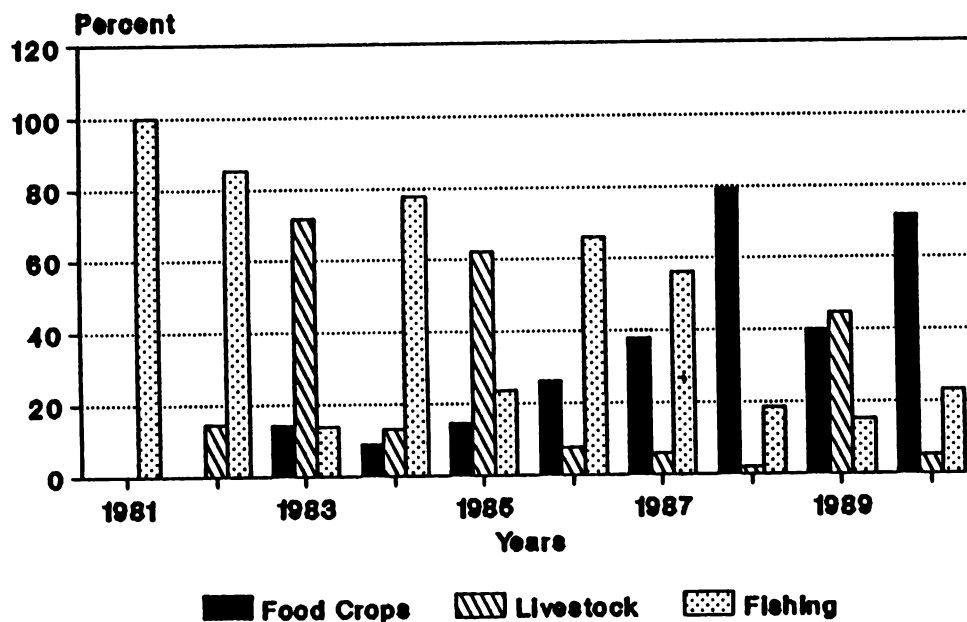
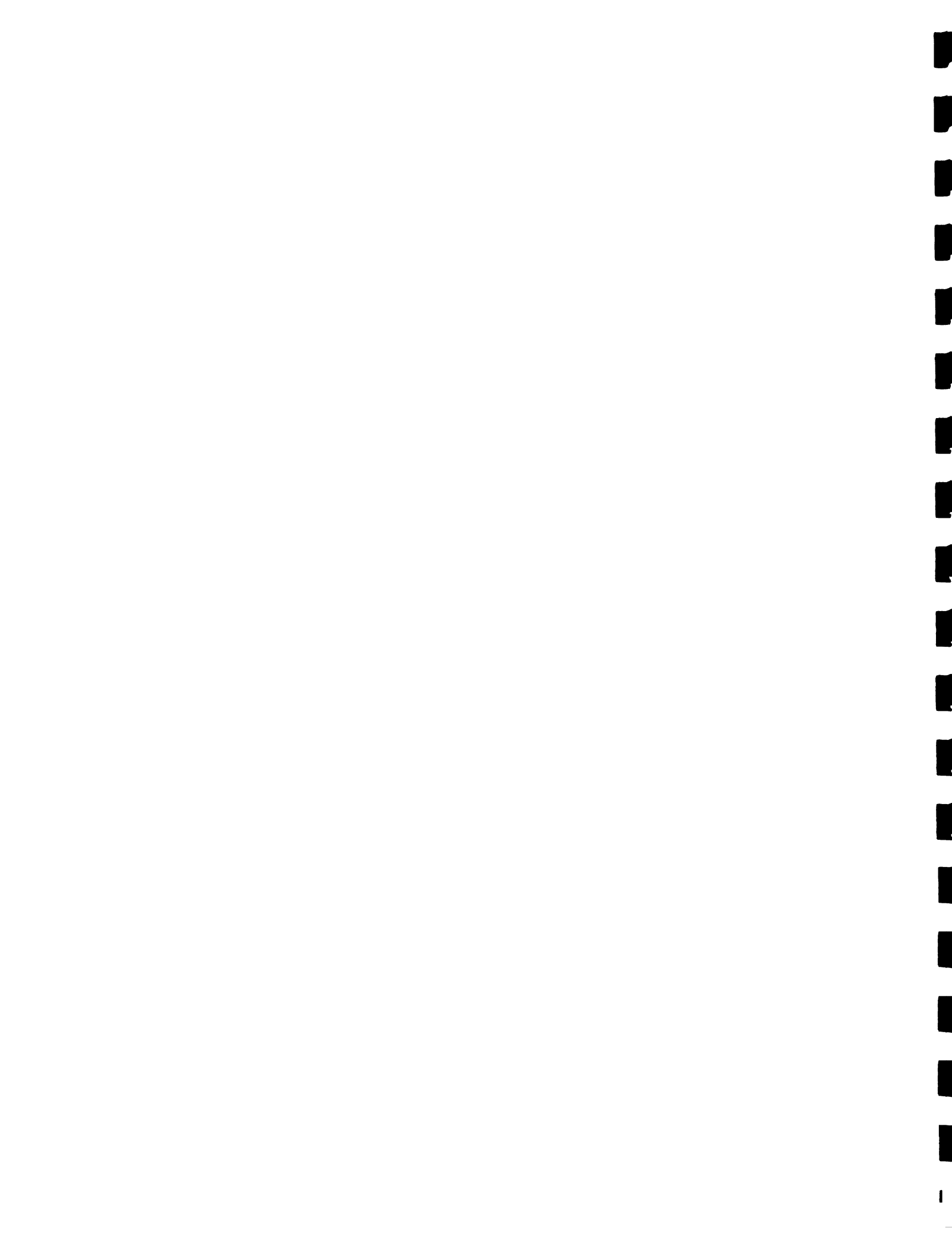


FIGURE 2.6

Loans to Agriculture by St. Kitts & Nevis Development Bank





2.4.3.2 Private Sector Institutions (Identification, Structure, Function, Constraints)

There are a few private sector organizations in St. Kitts which directly or indirectly impact upon agricultural development. These are the following:

a) S L Horsfords & Co Ltd

S L Horsfords & Co Ltd plays a role similar to that of TDC to facilitate the adoption of technologies by farmers. Its functional and direct operational linkages with the DOA seem weaker than TDC's. Nevertheless it has contributed to technology modernization of the agricultural sector in St Kitts, through the sale of inputs and equipment.

b) St. Kitts Horticultural Society

c) Chamber of Commerce and Industry is the local agent for the Small Enterprise Assistance Project. In 1990, the Chamber co-ordinated and funded technical assistance and training worth over EC\$85,000.

d) Foundation for National Development approved 171 loans worth EC\$1.2 million in 1990. Services, agriculture and retail sectors dominated the portfolio. An extensive range of training workshops benefitted over 190 small and micro-entrepreneurs. The Foundation opened new offices in Nevis in 1990.

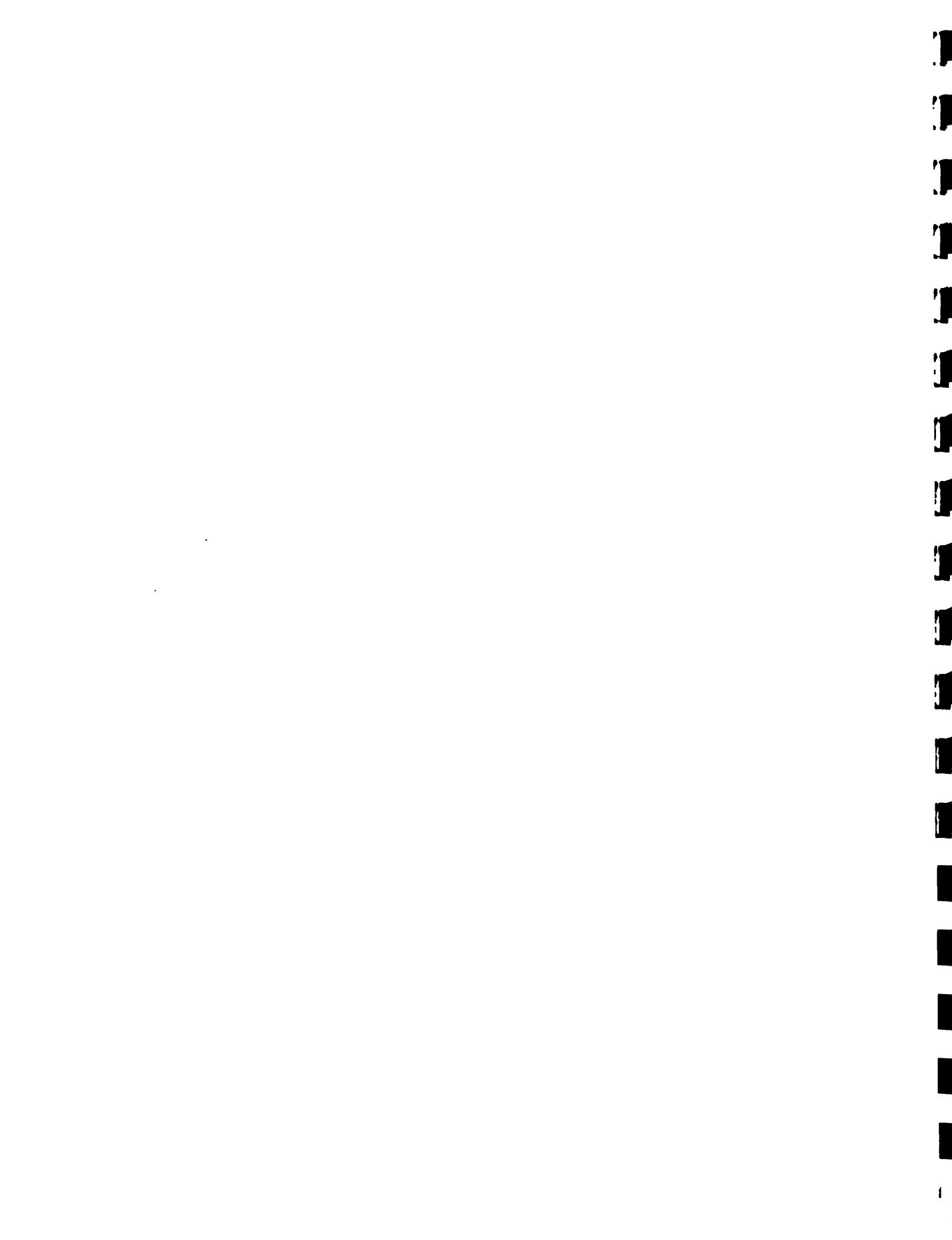
e) The St. Kitts-Nevis Small Business Association continues to identify and support small businesses in the two islands.

f) Cooperatives

There are a total of 26 active co-operatives in St. Kitts. Summary information on each co-op or type of co-op follows.

i) School related Co-operatives

Of the 26 co-operatives in St. Kitts, 18 (total of 2317 students with savings of \$186,500) are primary societies in schools (16 primary and 2 secondary) and one is a secondary level society (APEX) which provides school supplies and uniforms (total sales in 1990 of \$128,200) to 18 schools in St. Kitts and 8 schools in Nevis.



The primary problems of APEX are:

- volume of sales is too low to cover operational expenses;
- insufficient working capital;
- no privately owned facilities;
- important items not sold, e.g. textbooks;
- too heavy dependence on DOA.

The remaining 7 co-operatives in St. Kitts are adult organizations including two credit unions, 3 fishing co-ops, one consumer co-op and one home industries co-op.

ii) Credit Unions

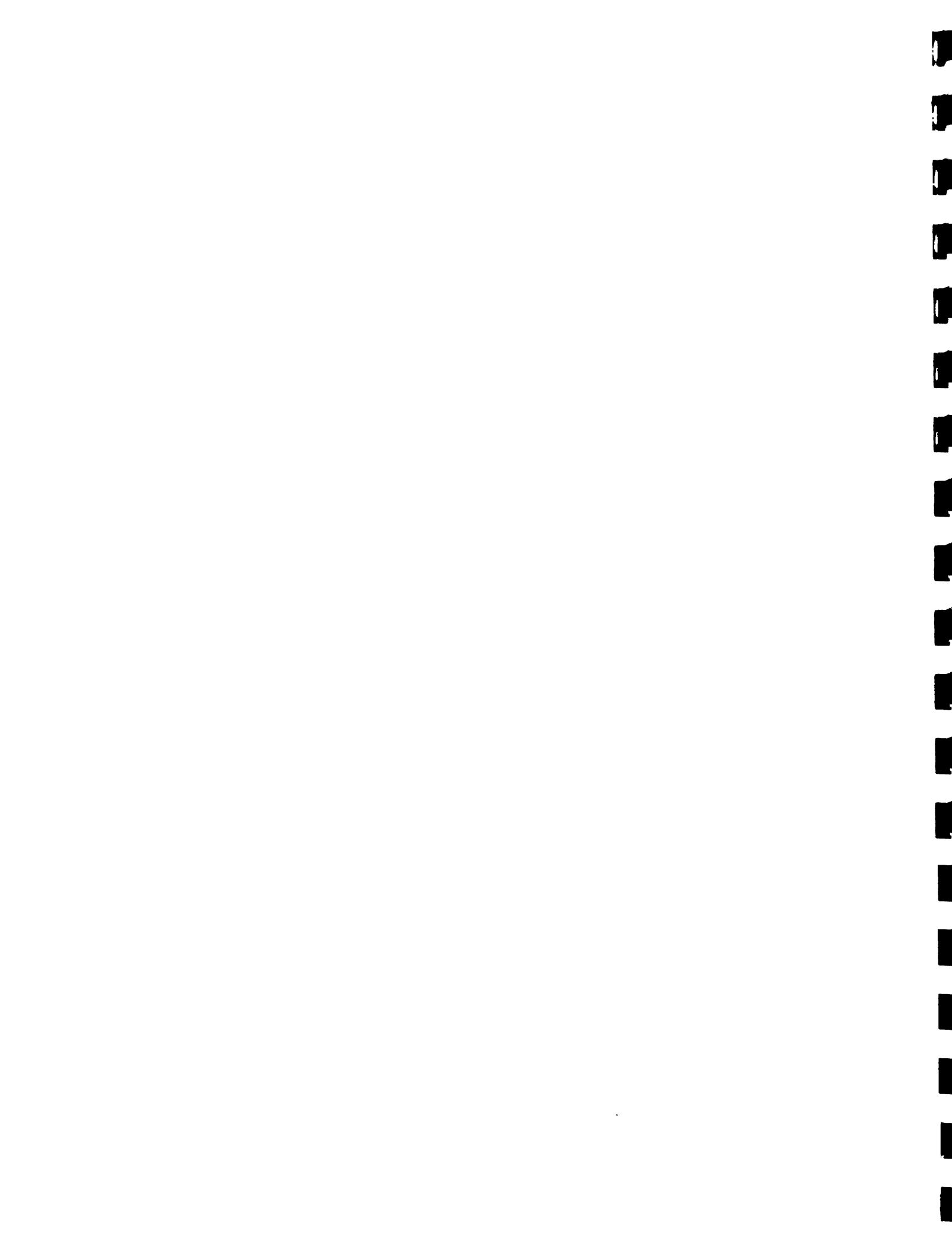
There are two active credit unions in St. Kitts. The Police Co-operative Credit Union Limited is a closed co-op with 452 members. In 1989, 479 loans were granted for a total of \$831,600. Total assets were \$757,124 and total shares stood at \$700,958.

The St. Kitts Co-operative Credit Union Limited had 2,906 members on December 1990 with share capital of \$1.5 million. Number of loans disbursed in 1990 were 490, amounting to \$1.4 million. While loans outstanding surpass \$2.0 million, delinquent loans were only \$43,729. Only one percent of the loans (\$20,800) made were for farming. Seven percent were for other small business. The bulk of the loans went for housing/furniture/repairs (41%), vehicles (10%), vacations (12%) and others (29%).

iii) Fishing Co-ops

There are three functioning fishing co-ops in St. Kitts of which one is dormant. The active co-ops are Capis Terre Fishermans Co-op (29 members), Sandy Point Fishermans Coop (23 members) and Old Roads Fishermans Co-op (17 members).

All three co-ops are interested in two basic services, i.e. marketing of their members fish and retailing of fishing supplies. In achievement of these goals the three co-ops are at different stages of development. Old Roads has no facilities to provide such services and presently is concentrating their efforts on development of a



breakwater to protect their landing site. The group sells motor oil to members. Capis Terre has exported lobster to Tortola. They are presently constructing their headquarters with the help of a grant from USAID. This multipurpose building is 80% complete and will house a meeting room, retail outlet, engine repair room and a cold room with a chest freezer. They have bulk - imported rope for their members. Sandy Point Co-op has a building which is used for meetings and retailing fishing supplies. They have one chest freezer.

The problems affecting the three groups of fishermen are similar and have to do with:

- indifference of members;
- weak management capabilities and business management skills;
- heavy dependence on Co-op Division to keep their records and accounts in order;
- small scale of operations;
- insufficient investment capital for such things as larger size fishing boats which would allow them to increase their catch;
- insufficient working capital to expand their retail operations;
- insufficient storage capacity for their fish;
- no means of transporting their catch to market;

iv) Consumer Co-op

The St. Kitts Sugar Manufacturing Corporation Employees Co-op is a consumer co-op. It is presently in a state of limbo as a result of the uncertainty of the sugar industry. Although it still has a stock of supplies, it closed at the end of 1990 and had not reopened as of April 1991.

v) Home Industries Co-op

The St. Paul's Cottage Industries Co-op grew out of the Youth Skills Training Project (OAS, USAID, Government of St. Kitts/Nevis). It was started in



1990 by 12 ladies, aged 20 to 40 years who received training in making home furnishings such as bed spreads, pillow cases, pot holders, placemats, cushions, etc. The group has no equipment or capital and have been using equipment belonging to the Youth Skills project. The market for output has been slow and the outlook for this group seems uncertain.

Problems encountered by this group can be summarized as:

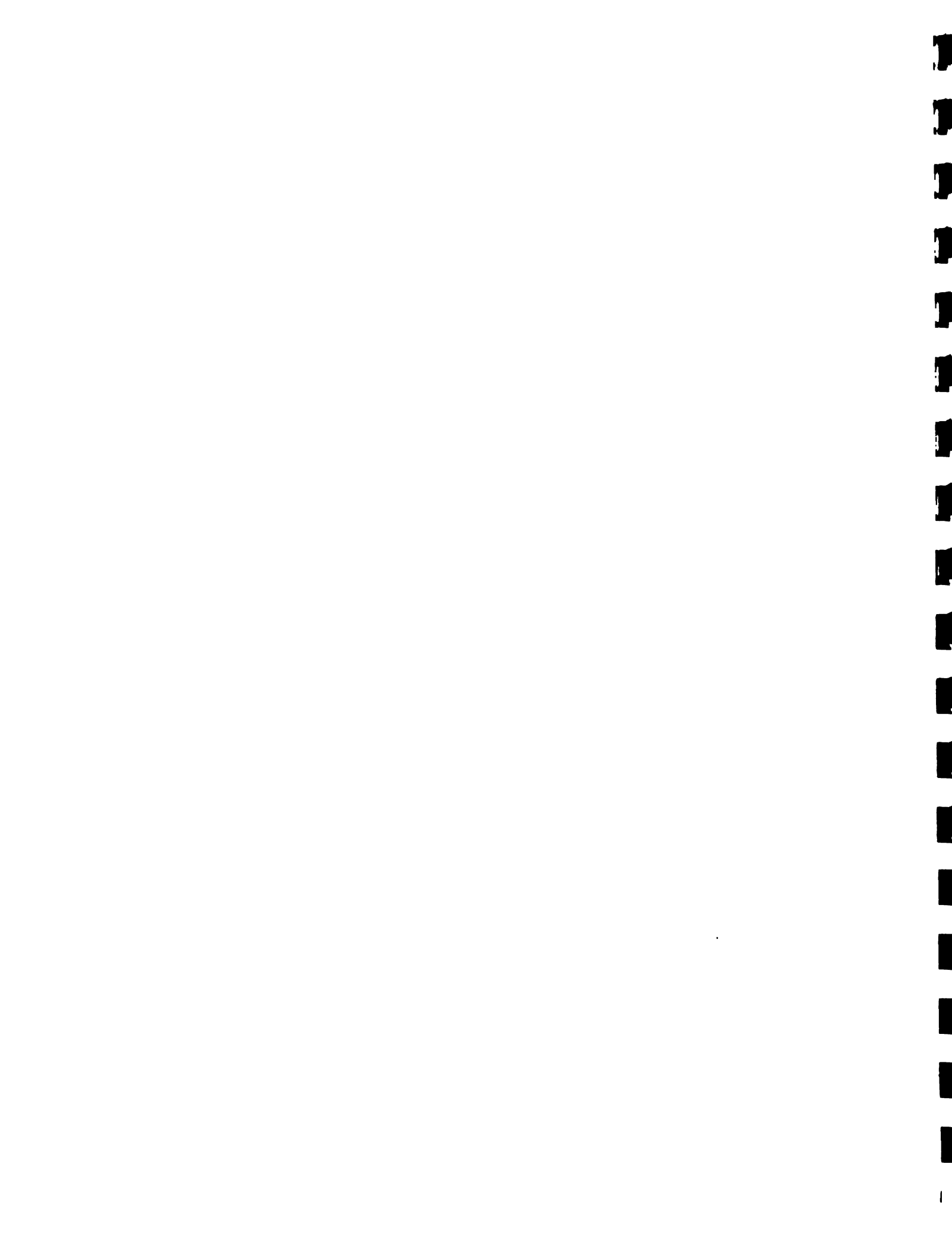
- limited organizational and management skills;
- scarcity of resources for investment and working capital;
- insufficient capacity to identify and develop market opportunity;

g) Farmers Organizations

Perhaps as a result of the high level of dependency of the agricultural sector of St. Kitts on plantation agriculture and in particular the cultivation of sugarcane, there has been little activity in the organization of farmers. Over the years farmers have held several meetings to discuss the prospect of establishing an organization and at one point a Farmers Union was formed. For lack of leadership and organized support all attempts at farmer organization have been unsuccessful. There is presently a general feeling among a small group (10) of commercial farmers that a farmers organisation would be beneficial to them, particularly in the area of domestic and export marketing.

The problems giving rise to the desire of some farmers to form an organization are the following:

- strong competition from imported fruits and vegetables;
- restrictions on imported items are often imposed too late so that glut situation cannot be avoided;
- inability or uncertainty of getting land preparation services on a timely basis from the small farm equipment pool;



- difficulty in obtaining the best quality seeds and other farm inputs on a timely basis;
- no centralized point for assembly, grading and short-term storage of produce.

2.4.3.3 Regional, Bilateral and International Institutions

The Caribbean Agricultural Research and Development Institute (CARDI)

CARDI for all practical purposes is the institutional arm of the DOA for applied Research. And due to the small size of the professional staff of the DOA's Crop Research Division, CARDI is also expected by the DOA to play a major role in technology generation and adaptation. Former activities undertaken by the now phased-out Caribbean Agricultural Rural and Development Advisory and Training Services (CARDATS) in support of technology transfer, have been transferred to CARDI.

But CARDI's own professional staff size in St Kitts is small relative to the assigned responsibility. A livestock Specialist, (with a MSc degree in Animal Science), is its Administrative Representative in the Federation. In St Kitts he is assisted by one graduate (MSc degree) Agronomist and one undergraduate (Dip) Technician in Livestock. One graduate (BSc) degree) Entomologist and one undergraduate (Dip) Assistant employed by CARDI are assigned to the IPCU. Both the graduate Agronomist and Entomologist will leave their posts by the middle of this year.

In spite of such staff constraints, valuable technological contributions have been made by CARDI to agricultural development in St. Kitts. They have resulted in significant progress especially regarding insect and disease control in vegetable and root crops and improvement of small livestock (sheep and goat) production management (through CARDATS).

The University of the West Indies

The University of the West Indies (UWI) does not have resident TDT professional staff in St Kitts. However, through the USAID funded Agricultural Research and Extension Project (AREP), the UWI representative based in Antigua and Barbuda provides technical assistance to the DOA's Extension Division. The major contribution of AREP, as a follow-up to the former Caribbean Agricultural Extension Project, also run by UWI and funded by USAID, has been to induce more effective functional and operational linkages between the research/development (CRD, CARDI) and transfer (AED) structures in the TDTS.



The Agricultural Technical Mission of the Republic of China (Taiwan)

The ROC Mission has been providing technical and financial assistance to the DOA in technology development for vegetable production and training of professional staff in crop and livestock husbandry. Its current professional staff includes one retired professor in Entomology (with a PhD level degree) and three Assistants (at the Dip level). They presently concentrate their work mainly on vegetable and fruit tree crop production.

The ROC has significantly contributed to technological modernization of vegetable production in the State, as observed during field visits by this Assessment Mission.

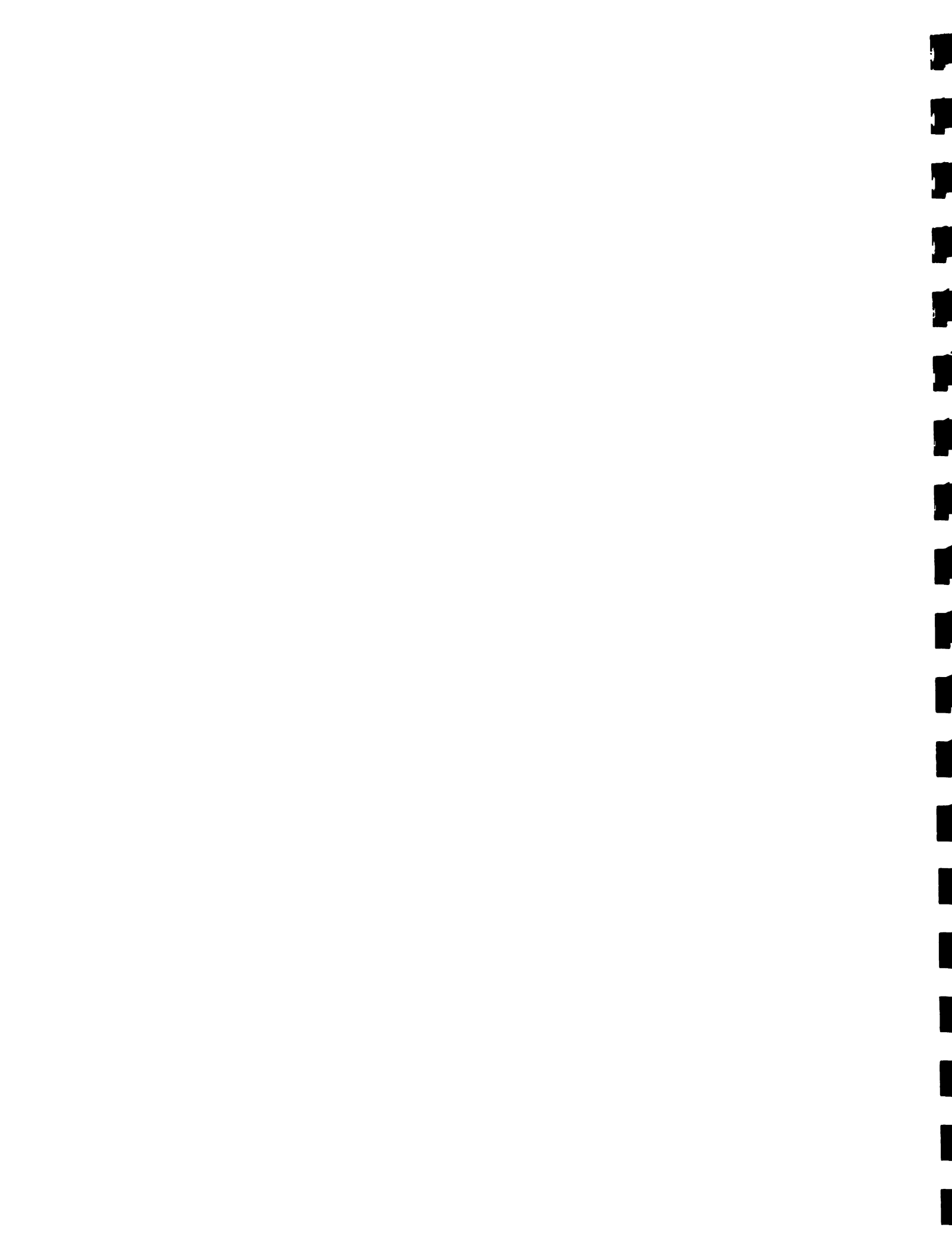
Other External Technical or Financial Supporting Entities

The agricultural sector of St. Kitts has benefitted from the technical or financial assistance provided by a large number of other external institution or agencies, either directly or through intermediaries.

The ADCU's USAID-funded Tropical Produce Project (TROPRO) has facilitated the participation of the DOA's research and extension staff in regional training activities. Through both the OECS Vegetable and Yam (Food Crop) Development Projects Networks, sponsored by ADCU, the French Mission for Cooperation in the OECS (FMC) and IICA, the sector has accessed technological information and materials from INRA-AG and IRAT/CIRAD, especially regarding new tomato varieties and yam cultivars tolerant to anthracnose.

The OAS has supported agro-forestry development through its Forestry Development and Resource Management Project. Directly or through UNDP-funded projects, FAO has technically supported agricultural development in various areas including nursery management and production technology for fruit tree crop development. Financial and technical support from BDD covers fruit tree crop production and animal health.

Other funding agencies including CIDA, EDF, CDB, IFAD and CTFC have contributed one way or another to agricultural development in St Kitts. Just as this Assessment Mission was about to conclude, UNDP approved for funding an Agricultural Diversification Project for St Kitts and Nevis, to be administered by FAO, immediately.



2.4.4 Analysis of Agricultural Institutions - Nevis

The major institutions or agencies involved in agricultural development in Nevis are mostly the same as in St Kitts excepting SSMC, CEMACO, and HCO among the most important.

2.4.4.1 Public Sector Institutions

The Department of Agriculture

Administrative and technical responsibilities for agriculture in Nevis is under a Department of Agriculture which is headed by a Director. The Department is one of five ministerial departments under the Ministry of agriculture, Lands, Housing, Labour, Tourism and Development.

The Department of Agriculture in Nevis has 17 professionals distributed between 7 Divisions or sections as follows:

- Administration Division (2) plus Secretary and 2 clerks;
- Extension Division (5);
- Co-operative Division (2) plus VSO volunteer;
- Livestock Division (5);
- Small Farmers Equipment Pool and Engineering Unit (1);
- Abattoir (1) and;
- Fisheries Division (1)

The Animal Production Unit is headed by a graduate (BSc degree) Livestock Officer, assisted by three undergraduate (Dip) Animal Production Extension Agents who also provide health services livestock farmers.

The Co-operative Division has two officers - a Senior Co-op Officer and a Co-op Officer. They receive support from one VSO volunteer assigned to the specific area of beekeeping. They work closely with other Units of the Department and monitor closely the activities of the Co-op Societies on the island. The two DOA staff persons have divided their responsibilities as follows: The Head of the Division concentrates on adult groups in the areas of promotion, education, supervision/monitoring and auditing and bookkeeping. The Co-op Officer concentrates his activities more with the 12 school co-operatives. He works with teacher

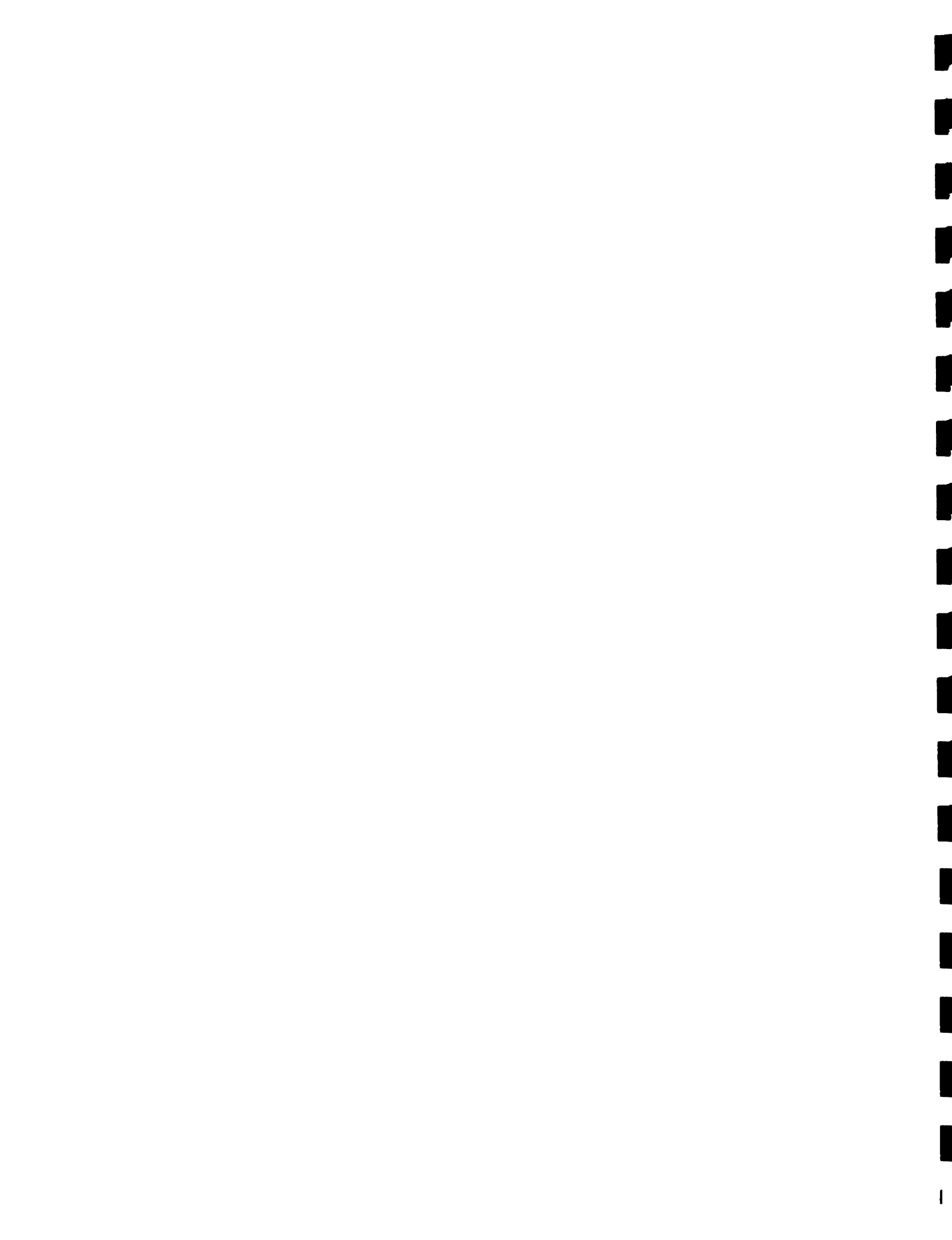
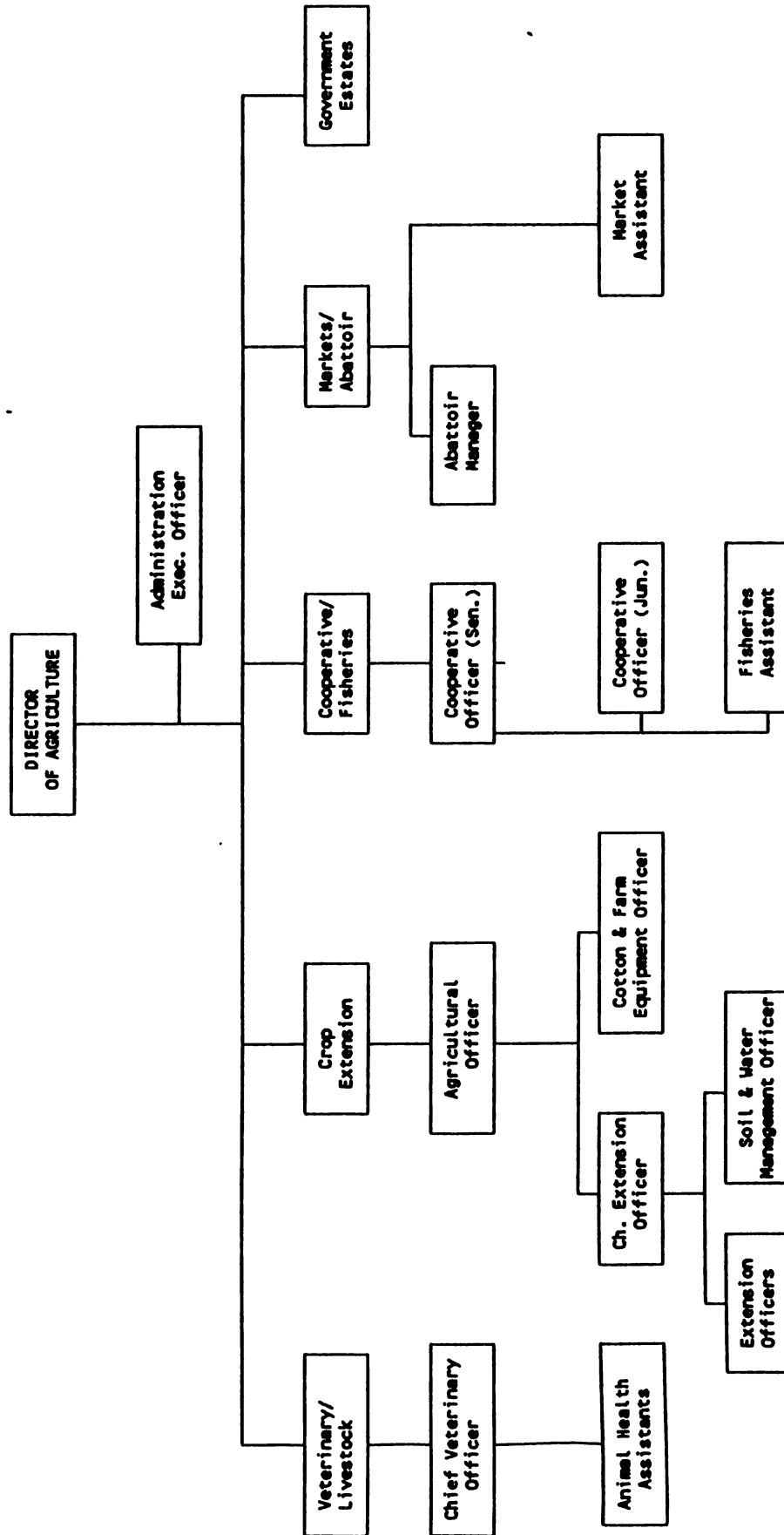


FIGURE 2.7
 STRUCTURE OF THE DEPARTMENT OF AGRICULTURE, NEVIS





guides and head teachers in such things as coordination of school supplies and supervision of savings programme. The two Officers work closely together, filling in for each other as the need arises.

The Officers of the Co-operative Division work with both pre-co-operatives and co-operatives to ensure that the various societies abide by the provisions stipulated in the Co-operative Societies Ordinance, as well as the Statutory Rules and Orders made thereunder. The Officers place emphasis on auditing the financial records of the diverse groups, verifying accounts and assisting in the preparation of final accounts.

The primary problems of this Division are:

- too small staff to adequately service the 21 co-operatives in Nevis;
- limited budget for training purposes;
- limited skills in project identification and formulation, and
- lack of training materials and equipment.

2.4.4.2 Private Sector Institutions

There are a few private sector organizations in Nevis which directly or indirectly impact upon agricultural development. These are as follows:

- a) The Nevis Horticultural Society exists but is not very active.
- b) The Nevis Historical and Conservation Society.
- c) The Anglican Young People's Association is active. It has Committees of young people in various villages throughout Nevis which promote diverse development activities. DOA Extension Officers coordinate some of their agricultural development activities with these Committees.
- d) Nevis Association for Agricultural Workers in Extension
- e) The Foundation for National Development has an office in Nevis.
- f) Cooperatives



Co-operative type organisations are relatively abundant in Nevis. In fact, one of every three Nevisians belong to some form of co-operative society. Sixty-five percent of the total are members of credit unions. Over 700 young people are members of 12 school co-operatives. There is one artists co-op, two co-ops which deal with handicrafts, one fishing co-op, one co-operative of bee keepers and four farmers co-operatives or pre-co-ops.

The reason for the relatively large number of persons belonging to some form of organisation in Nevis may be partially explained by the fact that Nevis left monoculture over 60 years ago and has therefore had more time to learn the benefits of working together towards common goals. More specifically, it is felt that greater effort has gone into the promotion of co-operatives in Nevis. Another factor of significance is that a number of Peace Corps and VSO volunteers have actively promoted and supported cooperatives in Nevis. Not to be overlooked is the fact that several regional, international and NGOs have provided technical and financial assistance to a number of co-ops in Nevis over the past 15 years.

A brief description of the present situation and problems proposed actions for each co-operative in Nevis are presented below:

i) Nevis Co-op Credit Union

This co-op was formed in 1972 and by the end of 1990 had 2,265 members with share capital of EC\$2.7 million, assets of over EC\$5.0 million and society savings exceeding EC\$1.3 million. Loans outstanding in December 1990 totaled EC\$3.6 million. Some 448 loans, totaling nearly EC\$2.0 million were made in 1990. This was down from 543 loans made in 1989, totaling EC\$3.5 million. Of the loans made in 1990, 22% were for land and housing, 13% for vehicles, 13% for household furnishings, 12% for traveling, 5% for business and the balance for miscellaneous others. No loans were identified as given for agricultural purposes although some may have been classified as business. Dividends of 5% on shares and 3% on deposits invested in the society were paid in 1990.

The Credit Union has one location in Nevis, a two story building in downtown Charlestown. The building was constructed in 1982, with contribution from CIDA, valued at EC\$190,000.00. The Credit Union has a staff of five persons including a Manager, Assistant Manager, Field Officer and two Tellers.

All loans are made at 1% monthly interest on reducing balance. Loans under \$25,000 require 10% in shares or deposits and over \$25,000 require 20% in shares or deposits.



The Nevis Co-op Credit Union is considered a vibrant and growing institution.

Principal problems identified by management have to do with:

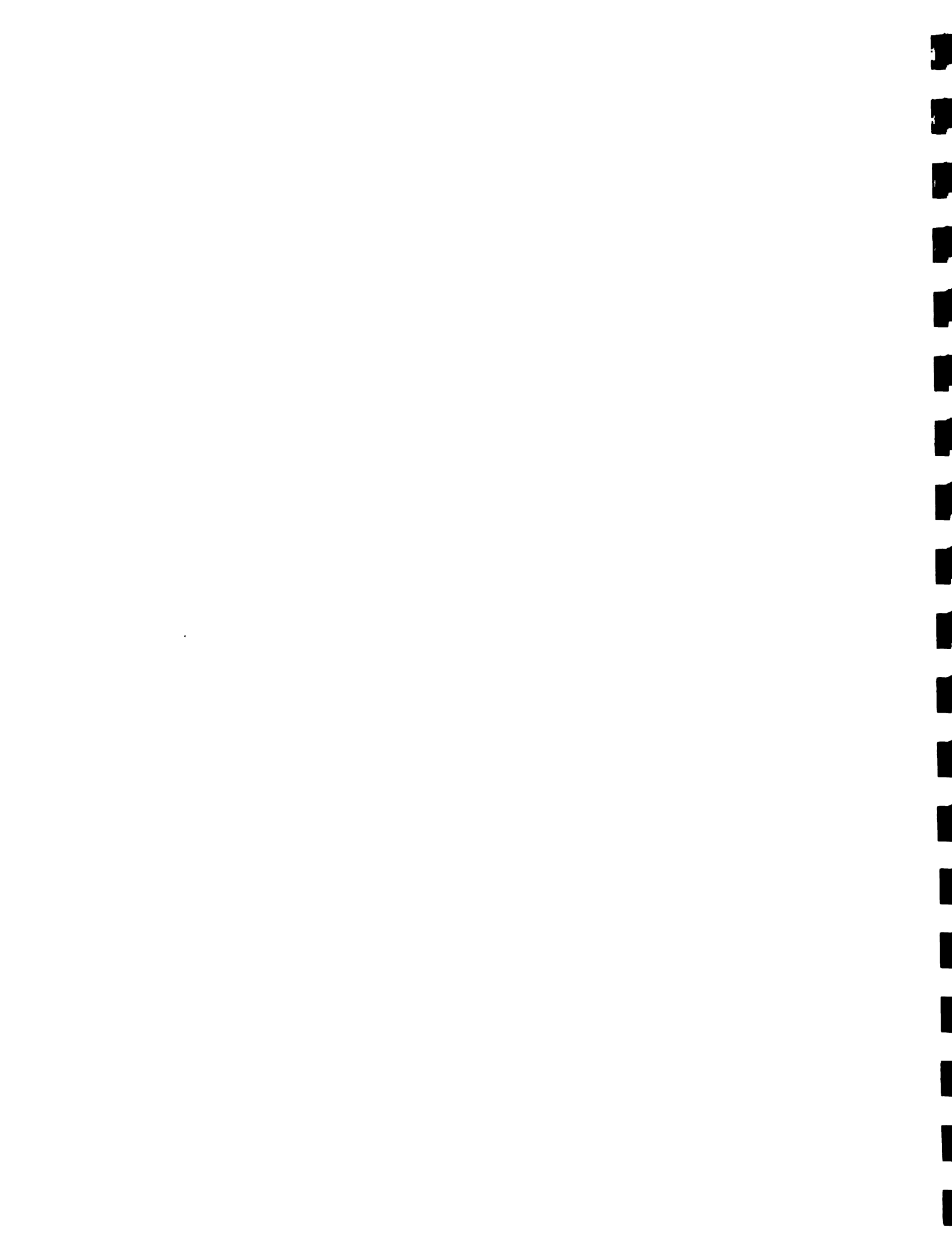
- insufficiency of funds (savings) to meet the demand for loans, particularly larger loans for housing;
- strong competition from commercial banks;
- general feeling among members that the Credit Union is a small institutions with limited capacity to provide services;
- insufficient capacity to provide services to members, e.g. checking accounts;
- delinquency on a number of loans, particularly loans given on character basis before collateral or second signature was required; many of these persons have left Nevis and the loans will have to be written off as bad debts.

ii) School Co-operatives

There are 12 primary, secondary, prep schools distributed throughout Nevis which participate in the APEX co-operative programme. Each of these schools has a co-operative with the same two basic functions. The first is to promote savings as a common practice and the second is to make school supplies and uniforms available at lowest possible cost. These co-ops are considered a learning ground for young people and is an effective way of promoting the co-operative spirit. Under teacher supervision, students collect, bank and monitor cash savings. These co-ops were initiated by a VSO volunteer in 1977 and they continue to provide a useful service to the school children of Nevis.

Problems impacting this programme include:

- the Co-op Officer acts as the supervisor of this programme, providing technical assistance, management and transportation, therefore, it is not yet self-sustaining;
- the programme does not generate enough funds to cover its operational costs;
- the volume of school supplies handled is considered way below potential.



iii) Nevis Handicraft

This organisation has its commercial retail outlet in Charlestown on Main Street, Nevis. It started in 1969 and in 1990 had a membership of 116 persons supplying the co-op with homemade arts and crafts. Small volumes of a large number of wooden fiber, pottery, food and miscellaneous items are sold, mainly retail and some wholesale. Some items are purchased outright but most are sold on consignment. Most items are made from local materials. Some items are supplied by St. Kitts and neighbouring islands. Total value of sales has increased from EC\$90,000 in 1987 to over EC\$115,000 in 1990. Approximately 10% of sales are of food items such as guava jellies, cheese, honey, chutney and wines. As a result of surpluses on sales of crafts, bonuses of 7% were paid to members in 1989.

Problems identified by this group include:

- low manager's salary;
- high costs of operation of the Magic Toy Shop;
- inadequate quality control;
- insufficient space for effective display and storage;
- difficulty in adding new members for lack of space and resources;
- limited managerial capability.

iv) Newcastle Pottery

Located at the northern end of Nevis, this co-op started in 1981 and was registered in 1984. It is a self-sustaining small business with annual sales in 1990 of approximately EC\$70,000. This business has a woman manager, a male potter and five women workers. Clay is hauled into the site at Newcastle where it is washed, partially dried, kneaded by machine and given form by a potter. The potter was recently trained in Taiwan and Barbados in glazing and wheel throwing. Dishes, pots, planters, coal pots and miscellaneous other items are baked in the traditional manner using coconut husks. Considerable breakage occurs. Glazed items can be baked in a small kiln provided by USAID although it is presently inoperative. Products are sold in Nevis, neighbouring islands and even as far away as the USA. A recent order valued at US\$6,000 is being prepared for Anguilla. Plans are underway to prepare a small glazed pot for holding glass jars of local honey for sale to Four Seasons Resort Hotel. Assistance has been obtained for the purchase of the kiln (USAID), kneading



machines (USAID & CIDA) and partial repair of roof damage (USAID) caused by Hurricane Hugo. (1989).

Problems include:

- insufficient capabilities in small business management;
- inadequate accounting system;
- limited technical capabilities of staff;
- inappropriate firing system to produce high quality products;
- some unrepaired damage caused by Hurricane Hugo to the building;
- difficulty in having the electrical wiring of the kiln repaired;

v) Nevis Fishermen's Co-op

Nevis Fishermen operate out of several fishing villages around the island. Their central facility is located near the wharf, next to the public market in Charlestown, and includes a walk-in freezer (14 x 10 x 8 feet), four chest freezers and an ice making machine. Their principal objective is to increase net returns to fishermen while obtaining self-sufficiency for Nevis. This group was registered as a co-operative in 1975. Membership has grown steadily from 104 persons in 1986 to 191 members in 1990. Value of fish sales has climbed from EC\$2,427.00 in 1986 to EC\$124,450.00 in 1990 although volume of sales in 1990 (28,597 lbs) was down from 32,580 lbs in 1987. Value of sales of fishing supplies has gone from EC\$841.00 in 1986 to EC\$78,421.00 in 1990.

The Fisheries Complex was completed in 1987 and was funded by the Canadian Co-operative Association (formerly Co-operative Union of Canada) with a grant of EC\$620,734. Project included building, equipment and salaries of staff during the first year.

This group has been given high marks for the professional manner in which it is run, due to the efforts of a competent full-time manager. Accounts are well maintained and audited annually. In addition to the Manager the Complex has a clerk, paid monthly, and 3-8 temporary processors of fish, paid on the basis of pound of fish processed. Management feels that the Complex is near its level of self-sustaining capacity. Much of the income to cover operating costs, including salaries, comes from margins on over 100 different fishing



supplies purchased from North America through suppliers catalogues.

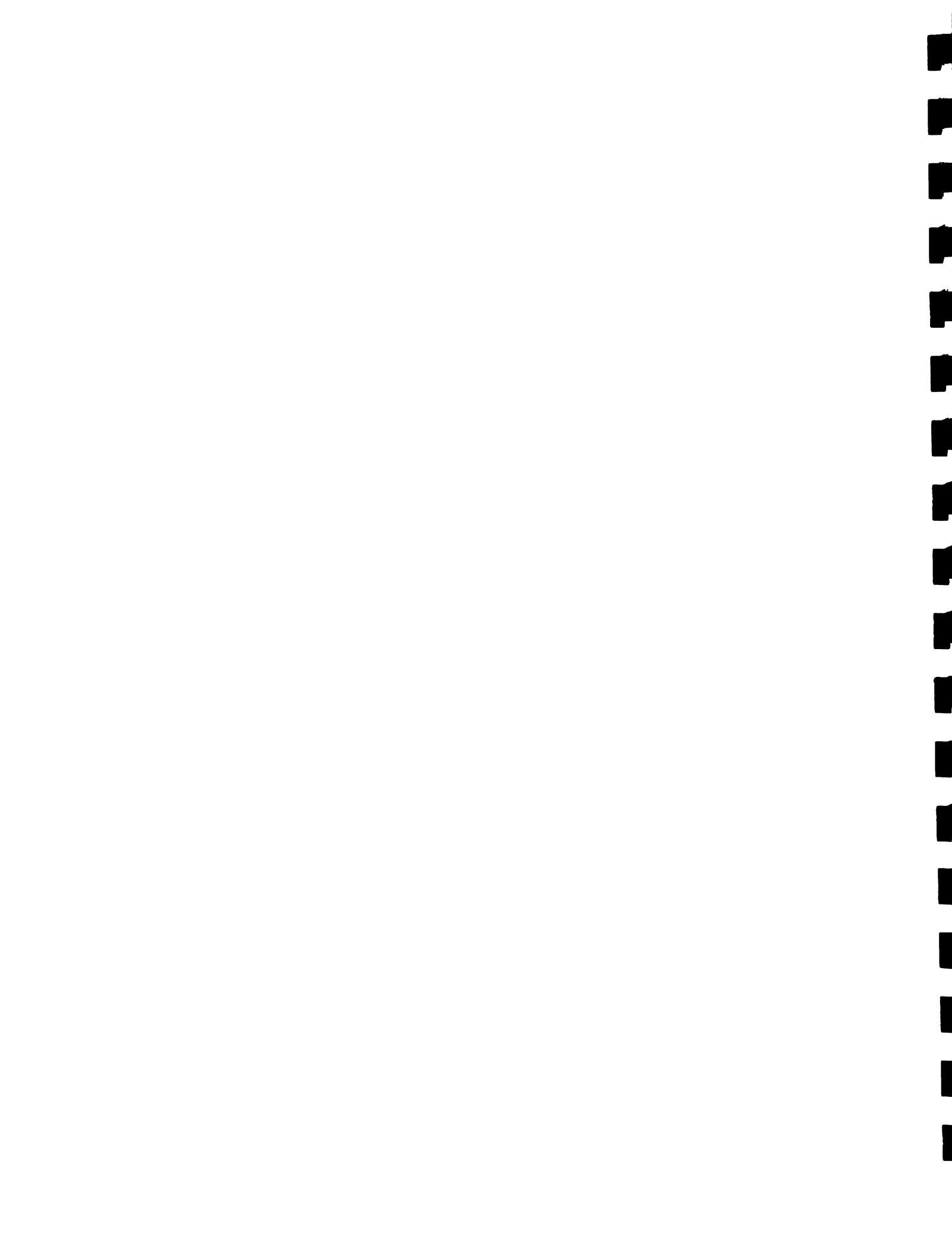
There is a growing demand for cleaned fish on the local market. The Complex has the capacity to handle larger volumes of fish than presently handled. Throughput in 1990 was estimated at one-third of the annual Nevis catch.

The principal problems of this co-op were identified as follows:

- the fisheries complex is underutilized as the fishermen tend to sell much of their catch in St. Kitts where higher prices are paid or on the beach;
- fishermen tend to be very independent and uncommitted to co-operative principles;
- fishermen reluctant to retail fish inside market complex (where they are charged \$5.00 per stall) as it is more troublesome than their traditional practice of selling on the beach or in the street;
- type of fishing and techniques used are those of traditional subsistence ones;
- seasonality of fish supply (low during period January to April);
- volumes of fish sold by any one fishermen are small and therefore sales can be easily conducted outside the complex in a short period of time;
- traditional boats are very small and have no storage space, therefore cannot travel far from shore nor stay more than a few hours at sea;
- have trouble keeping the ice making machine in operation;

vi) Nevis Beekeepers

Hive beekeeping was reintroduced into Nevis in 1987 with the establishment of 10 Langstroth beehives under the assistance of ODA. In that same year the VSO provided the services of a volunteer beekeeper to work in the Co-operative Division of DOA to support the development of the industry. By December of 1987, the Nevis Beekeepers Co-operative was formed with 12 members. In January 1988, Barclays Bank International commenced funding of the VSO's wages over a three year period. In 1989, USAID provided funds (US\$8800) to purchase 80 beehives and the Nevis Government made available a disused



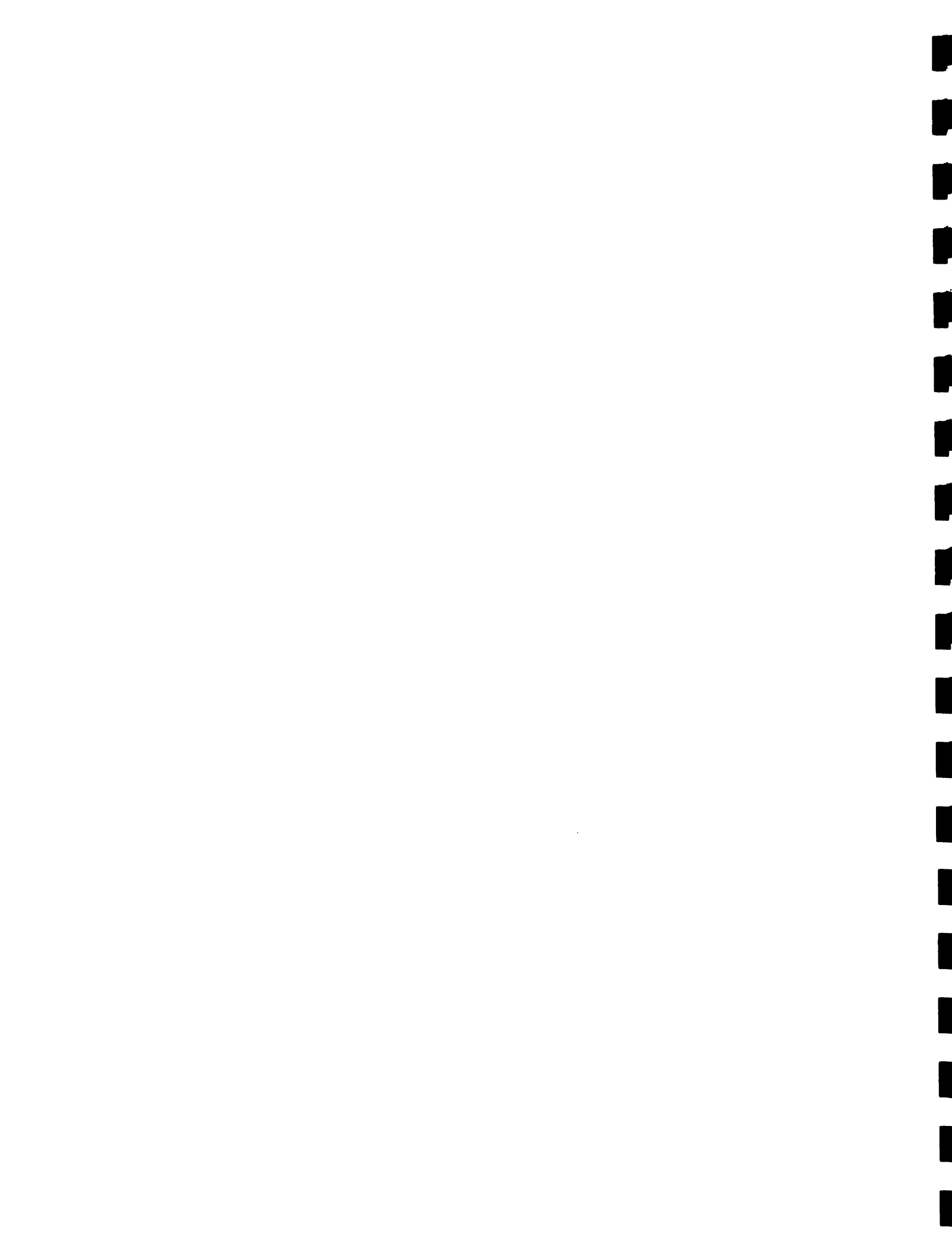
building for the Beekeepers centre of operations at Gingerland. Considerable progress in establishing hives was devastated by Hurricane Hugo in September 1989 and nearly one year was required for recuperation. During 1990 additional financial assistance (EC\$5000) was provided by the British High Commission to refurbish the Beehouse on a self-help basis. By early 1991 some 80 hives, most with double brood boxes, were in operation by 15 beekeepers. The largest beekeeper keeps 34 hives and several of the smallest only one. In February 1991 the Four Seasons Up-market Hotel with 190 rooms opens on Nevis and shows interest in purchasing natural products such as honey and bee wax candles.

The principal problems of the Nevis beekeepers are the following:

- insufficient investment and working capital to expand production;
- inadequate technical skills of beekeepers;
- difficult access to transportation to move hives, extract honey and market products;
- independent nature of part-time beekeepers and difficulty in getting them together at the same time;
- deficient management of the co-operative;
- poor contact with other beekeepers in the region and little exchange of experiences;
- poor physical conditions of bee house.

vii) Nisbett Plantation Farmers

This group, located at the northern end of Nevis, was registered in 1982 and consists of 19 women farmers, several of whom have received training in food processing. They work four acres of partially irrigated land, originally part of the Nisbett Plantation, rented from government. Although the organization has 19 members, only 8 have plots of irrigated land. Water is provided by a unique system (infiltration trench) where three sump holes are connected by perforated, buried plastic pipe. Water is pumped from the center sump to a reservoir (12,000 gals.) at the highest end of the land from where gravity flow takes it to the diverse plots. One member is responsible for water distribution. The fence around the 4 acres was contributed by USAID and put in place and maintained by co-op members. The water system was financed by BDD (1989) and the Australian Government funded (US\$3,000) the



construction of a small building used for meetings and storage of equipment and sometimes produce. Crops grown on the 1/2 acre plots include tomatoes, sweet peppers, melons, papaya, pigeon peas, tannia, cassava and others. Much of the production is consumed by the respective family households who rely heavily on their gardens for food and cash income. Surplus amounts are sold at the public market or to hotels and restaurants. During the high production season (January to March) excess production are processed in home kitchens to facilitate storage, e.g. tomato catchup, mango chutney, peanut butter, cucumber relish, pickled vegetables and smoked ham. Some members of Nisbett's gather and package bush tea which is sold to local buyers.

The principal problems of this group relate to:

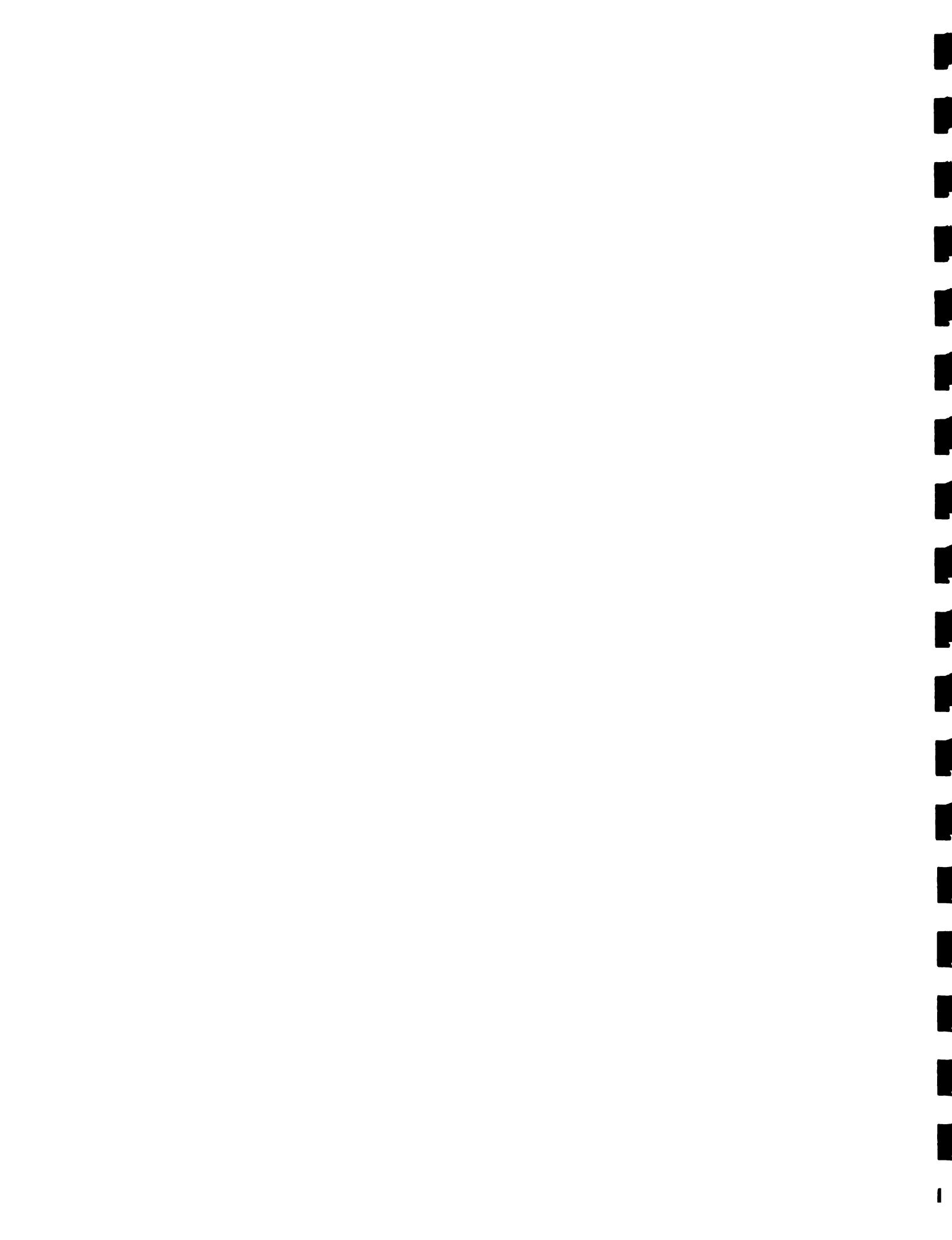
- limited water supply;
- lack of pressure in water supply system;
- limited organizational and managerial capabilities;
- difficult access to working and investment capital;
- no building to house co-operative cottage industry;
- inadequate and insufficient equipment and materials for small-scale processing of fruits and vegetables;
- insufficient information on market opportunities to make business decisions.

viii) Potworks Farmers Co-operative

This group is located at Potworks in St. James Parish on the Windward side of Nevis. It was originally called Maddens Farmers Co-operative. Due to inactivity caused by aging of farmers it is in process of being reorganized as Potworks Farmers Co-operative. In 1990 the group received financial assistance (US\$2,200) from the Australian Government to fence approximately 10 acres of land, on a self-help basis, to protect their crops from stray animals. The Potworks dam was expanded in 1989 and now has capacity for over one million gallons of water. Piping is in place to carry the water to farmers plots. Vegetables are the principal crops produced. CARDATS/CARDI has installed one demonstration drip irrigation system.

The priority problems of this group have to do with:

- weak organizational and managerial capabilities;



- few commercial farmers (approximately 8);
- tendency of the older farmers to produce low risk traditional crops such as sweet potatoes, yams, pumpkins, peanuts and unwillingness to change;
- large percentage of farmers over 70 years old;
- loss of water in dam through filtration;
- unavailability of storage facilities for onion crop.

ix) Cades Bay Farmers

Cades Bay is located on the north leeward side of Nevis, some 4 miles from Charlestown. The farmers group was registered in 1978 but was dormant for some time. It was reorganized in 1989 and presently consists of 17 farmers. The Co-operative and Extension Divisions work closely with CARDATS/CARDI in the support of this group. Water for irrigation is obtained from the three dams situated at Spring Hill with total capacity of 2.5 million gallons. Five farmers presently have an average of 1/2 acre each in drip irrigation.

The problems of greatest concern to this group have to do with:

- insecurity of farmers due to uncertain land tenure;
- lack of effective leadership;
- no facilities for proper postharvest handling and retailing of produce;
- no central location for meetings or for storage and retailing of farm supplies;
- stray animals which damage and destroy vegetable and fruit crops;
- difficulty in marketing produce, particularly the lack of adequate transportation;

x) New River Farmer's Co-operative

This loose knit structure of some 20 farmers is located at New River on the Windward side of Nevis. It was registered in 1989 but is recognized as needing considerable organizational improvement. Each farmer rents from government between 1/2 and 3 acres of irrigated land. Within this group there is a



fairly active sub-grouping of 5 farmers who work closely together in both the production and marketing of their crops. Principal crops grown in New River are melons, sweet peppers, tomatoes, cantaloupe and others. Most produce is sold off vehicles in town and to hotels, primarily Four Seasons Resort Hotel. Small amounts of produce are infrequently exported by air to neighboring islands, e.g. Montserrat, St. Barts, St. Eustatius.

CARDI/CARDATS, in collaboration with the DOA, is providing technical and material assistance in the installation of drip irrigation systems. By April of 1991, 8 farmers had received their own drip irrigation systems, each sufficient to irrigate approximately 1/3 acre of land.

As a farmers organization, New River Farmer's Co-op is in its infant stage. It is supported by the Co-operative and Extension Divisions of the DOA. Plans are underway to strengthen the group's organizational and managerial capabilities.

The principal problems of concern to this group are:

- weak organizational and managerial capability;
- difficult marketing arrangements, particularly lack of transport;
- poor cooperation among some of the farmers;
- untimeliness of land preparation services offered by the Small Farm Equipment Pool;
- limited supply of water for expansion of the land area.

2.4.4.3 Regional, Bilateral and International Institutions

The same external regional, bilateral and international institutions or agencies identified for St Kitts support agricultural development in Nevis.

CARDI has only one professional in Nevis. He holds a MSc degree in Entomology and works closely with the DOA's. He assists the Crop Division in all its technology development and transfer activities and provides technical support to livestock production management. CARDI/CARDATS project in Nevis is also actually involved in extension and marketing activities at Cades Bay, Potworks and Nisbett.

The ROC Mission has no resident staff in Nevis but provides training and other forms of technical assistance to professionals in the State.



2.4.5 Analysis of Other Support Institutional Structures

2.4.5.1 A Review of the collection, processing, analysis and use of Agricultural Statistics in St. Kitts and Nevis

2.4.5.1.1 Introduction

The need for accurate and timely data on production, prices and trade are critical to the process of decision-making for agricultural diversification. In St. Kitts and Nevis, a number of agencies are involved in the collection, analysis and dissemination of agricultural statistics both in the sugar and non-sugar sub-sectors. In addition, plans are afoot for the establishment of databases in some of these agencies. It is, therefore important that the entire system be examined to ensure that:

1. decision-makers' needs for statistics to assist in planning and policy-making for diversification are satisfied,
2. there is no overlap or duplication of effort in the collection process.
3. the system is flexible enough to allow for the free exchange of information among the various users of the system, and
4. resources are efficiently used.

With this in mind, this part of the sector assessment study was undertaken to identify and propose projects, actions and measures, where appropriate, to improve the overall agricultural sector data gathering, collation, processing and dissemination.

The analysis is to be presented in four (4) parts. Part 1 (2.4.5.1.2) outlines the government's stated agricultural policies and determines the statistical needs for decision-making and planning for each of those policies. By so doing, the demand for statistics and the users of those data are identified. The second part of the study (2.4.5.1.3) evaluates the existing arrangements for data collection, processing, analysis, interpretation and dissemination in terms of:

- (a) the sources and types of data collected,
- (b) the methodology of collection and analysis, and
- (c) institution arrangements, agency responsibility and inter-institution coordination.

On the basis of the statistical needs set out in Part I and the review of the existing situation described in Part 2, the data gaps, and needs for training and institutional strengthening are identified in Part 3 (2.4.5.1.4) of the study. Proposals for projects, actions and measures are then outlined in Part 4 (Section 5.4.1.2)



2.4.5.1.2 Statistical needs for Policy and Decision Making

The determination of statistical needs for policy formulation and planning must be based on government's policies, targets and strategies for the agricultural sector as stated in the National Development Plan for St. Kitts and Nevis (1986-1990)⁴. These data requirements for planning and policy making associated with each policy issue may therefore be classified into 9 broad categories - macro-economic, production, productivity, nutritional, trade, marketing, environmental, resource availability and socio-economic data.

(a) Macro-economic Data

Macro economic data give an indication of the sectors's performance in terms of the country as a whole and in comparison with the other sectors of the economy. These data include statistics such as the GDP for Agriculture and the contribution of the various sub-sectors to Agriculture's GDP, output and prices, revenue, expenditure, wages and salaries, and other information necessary for National Accounts and Finance.

(b) Production Data

The government has identified a number of commodities for which they intend to save foreign exchange by import substitution. These commodities include vegetables such as tomatoes, carrots, cabbages, peanuts, white potatoes and cucumbers; tree crops such as citrus, coffee, banana and coconut and livestock products such as broilers, milk, beef, goat meat and mutton. Fish production is also targeted for an increase, especially in the area of high-value species for the local market. Forestry, too, has been identified as a key area. Data required for assessing forestry projects include inventories and acreages of existing forest species, as the potential of these species for satisfying the local demand for charcoal, fencing, etc.

In order to make recommendations on import restrictions, however, reliable and timely information is needed on domestic production and consumption of these commodities. A farmers' register indicating acreage under production of each commodity, estimated production and times of harvest is therefore necessary.

⁴ The National Development Plan for 1991-1995 has not yet been prepared.



(c) Productivity Data

For some of the above-mentioned commodities, increased production has to result not only from increased acreage planted but also from improved productivity. Productivity data also have implication for evaluating the impact of technology transferred to the farmers. With this in mind, data on acreage planted in the respective crops and livestock numbers for all classes of livestock are required. Moreover, for evaluating technology, data would be needed on inputs used in production.

(d) Nutritional Data

To improve the nutritional status of the population, the government must first know what the nutritional requirements of that population are. Hence data are needed on the age and sex distribution of the populace and the nutritional levels of the population must be monitored on an on-going basis. Such monitoring would require the development of food balance sheets which are derived from data on total amount of food consumed.

(e) Trade Data

Volumes and values of agricultural imports and exports of commodities targeted for import substitution must be obtained to accurately project short and long term local agricultural production levels. Trade data are also requested by the Ministry of Trade to evaluate the nation's regional performance in trade agreements. Local merchants and potential entrepreneurs also require trade information to evaluate business opportunities.

(f) Marketing Data

In the National Development Plan, marketing has been described as a perennial problem. The Plan goes on to explain that "the problem of marketing is associated with the absence of a highly developed marketing infrastructure, including market intelligence and crop forecasting systems". In an effort to address this problem government plans "to introduce an effective marketing surveillance system which will address such areas as crop forecasting, designing and monitoring effective pricing mechanisms and arrangements for import control from extra-regional sources". To establish such a system will require data on wholesale and retail prices, production schedules, demand for the various commodities. Volumes of produce sold to supermarkets, wholesalers, retailers, the public market and to hucksters would also be necessary to maintain proper market intelligence.



(g) Environmental Data

Data on rainfall, temperature, relative humidity, wind speed and rates of evaporation are essential not only for the determination of farmers' irrigation needs, but also in examining relationships between climatic conditions and the incidence of pest and disease as well as the resultant effects on production and prices.

(h) Resource Use and Availability

Land

Land Use and Land Capability Surveys provide information on areas which have a comparative advantage for the production of certain commodities. Cadastral surveys will also provide data for land settlement schemes when addressing land tenure issues.

Labour

Statistics such as number of persons employed in the agricultural sector, wages, incomes and distribution by age and sex of the labour force will help in determining whether the government policy of generating employment opportunities and increasing farm income is being addressed.

Capital

An inventory would have to be made of machinery, physical infrastructure (e.g. access roads, farm buildings, etc), irrigation and farm equipment used by farmers as well as the value of subsidies and other incentives farmers received from the purchase of the equipment. These data would be instructive in assessing whether these incentives have assisted the farmer to (a) improving his/her standard of living (b) increase farm production and productivity, and (c) improve the marketing of his produce.

Also of interest under the capital incentives sub-heading is the question of Agricultural Credit to farmers. Relevant data for decision-making in this area include number and size of loans disbursed in the various sub-sectors, purpose of the loans and default ratings among borrowers.

(i) Socio-economic Data

The farmer and his family are the ones who, it is hoped, will benefit from the proposed programmes and projects. It is,



therefore important to understand their needs so that the programmes which are proposed are relevant, make an impact and improve their welfare. With this in mind, socio-economic data such as level of education, number of dependents, age, sex, etc are required in determining, issues such as the structure of extension programmes and appropriate and affordable technologies to be transferred to the farmer and his family.

2.4.5.1.3 An assessment of the supply of Agricultural Statistics

Data Collection

(a) Macro-economic Data

Macro-economic data are collected annually by the Statistical Office of the Planning Unit. The Planning Unit is not involved in the collection of primary data, instead, it requests those data or data summaries from the various agencies and departments which have field officers who do the collection. An interesting arrangement exists for Financial Data. The Ministry of Finance collects all financial data and sends them to be processed at the Eastern Caribbean Central Bank (headquarters are in St. Kitts) on a quarterly basis. The processed data are then returned to the Ministry of Finance and the Statistical Office of the Planning Unit.

GDP for Agriculture is estimated by the product approach. First the value of output for each crop is calculated as the product of the quantity and product price. Then, the value of material inputs is deducted from this value to estimate the value added. Since there are not data available for the value of inputs of the non-sugar commodities, this value is estimated as a percentage of the value of the outputs. Agriculture GDP for the non-sugar industry is therefore not accurate.

Some data on agricultural inputs are collected by the Department of Agriculture. These data include, volumes and prices of inputs as well as name enterprise of the buyer. It is therefore possible to desegregate these input data into the various sub-sectors if necessary. CEMACO and TDC also sell inputs, however, although data may be available on the volume of sales of the inputs, it will be impossible to determine the commodities in which they will be used without changing their system of recording sales.

(b) Production Statistics

Sugar

For the sugar industry, the St. Kitts Sugar Manufacturing Cooperation (SSMC) keeps meticulous records of all

aspects of production. Thus, data are available on production of cane, sugar, molasses as well as cost of inputs and overall cost of production. These data are collected on a daily basis during the harvest season from all sugar estates in St. Kitts and recorded in their monthly agronomy reports.

Food Crops, Tree Crops and Vegetables

In the non-sugar sector SSMC also conducts research on peanuts, yams, cabbages, mango, citrus and sweet potatoes. In mid 1988 the government gave the SSMC management responsibility for the 60-acre Wingfield Tree Crop Project, a government owned experimental project. This farm comprises citrus, mangoes, avocados, bananas, plantains and cashews. Detailed production and cost data for these crops are recorded weekly and presented in the monthly Agronomy Reports as well as annually in SSMC's annual reports.

For non-SSMC holdings tree crop production is usually estimated as a percentage SSMC's yields for that year. The percentage used for each crop depends on the proportion of the land area of that crop which is planted compared with the land area used by SSMC for that crop.

Fairly reliable estimates of production are made for the crops targeted for the crop forecasting and yield estimation programme - white potatoes, cabbages, tomatoes, carrots, and sweet potatoes. In addition to the aforementioned crops, yields are also estimated for watermelon, cantaloupe and cucumber in Nevis. In both islands forecasts are made on the basis of yield estimates from the larger commercial farmers only. Small, non-commercial farmers are not considered. Since the commercial farmers' yields account for about 70% of total production in St. Kitts and over 80% in Nevis, this omission of small farmer yield is not thought to affect the estimates seriously.

Methods of data collection and estimation differ between the two islands. In St. Kitts, for forecasting white potato yields, the Crop Research Officer and two assistants visit the farmers at least once every fortnight during the forecast period. At these visits they record crop type, stage of growth, number of plants and average yield per plant. Average yield per plant is determined by harvesting 3 rows of 10 consecutive plants per acre of the crop. The bulk weight of the 3 groups of 10 plants is recorded and the average yield per plant of each group is derived by dividing the bulk weight by 10. The average of the three averages is then taken and used



as the average weight per plant. Total plot yield is then calculated by multiplying the average plant yield by the plant population.

Crop yields for the other vegetables and root crops are estimated by walking through the field and making a visual assessment of the overall crop yield.

In Nevis the Agricultural Officer and 4 assistants visit the farmers weekly. They record the same type of information as in St. Kitts. However, plant population is estimated by making a rough measurement of the length of the plot (this is done by counting the number of paces along the length of the field); counting the number of plants per row and then multiplying that by the number of rows. The average yield per plant is estimated visually and this figure is multiplied by the number of plants per plot to give an estimate of overall yield.

Both methods have some shortcomings. In the case of St. Kitts the rows of plants are not randomly selected, thus estimates may be biased as there is a tendency among enumerators to choose the more lush part of the field and avoid the patchy areas. There is also the tendency to select rows within the plot rather than border rows. Since yields near the border may differ from yields elsewhere in the plot, this may also introduce so called border rows. Since yields near the border may differ from yields elsewhere in the plot, this may also introduce so called 'border errors'. Finally, no consideration is given to post-harvest losses. The end result of these biases is that crop yield is usually overestimated.

A recent analysis⁵ of the sampling precision of the St. Kitts data revealed that "the current practice of taking, on an average, three samples per acre results in means being estimated to within 23% with 90% confidence". The analysis further indicated that at least 15 samples are required to reduce the error to about 10%.

The methodology used in Nevis, like that of St. Kitts, does not take into consideration post-harvest losses. It is also very subjective and may therefore give inaccurate estimates if the enumerators are inexperienced.

⁵ Analysis conducted by William Fielding, Biometrician in the C.A.R.D.I. Office in Jamaica



Livestock

Data on the number of livestock slaughtered at the abattoir in St. Kitts and Nevis are recorded daily. An additional 20% is added to this figure to account for home slaughters. This percentage was derived from a study conducted by the U.N. in 1983. No recent studies have been conducted to determine whether this figure is still valid today.

Livestock weights are not recorded because of the unavailability of scales at the abattoir. Livestock numbers are only recorded during agricultural censuses. The last census was held in 1987.

Through the IFAD project which is being executed under the CARDATS project, detailed information on sheep and goats is monthly from 20 farms (10 in St. Kitts and 10 in Nevis). Data collected include production indices such as calving intervals, mortality rates, days to slaughter, calving rates, etc., as well as production costs, costs of inputs, sales and management practices.

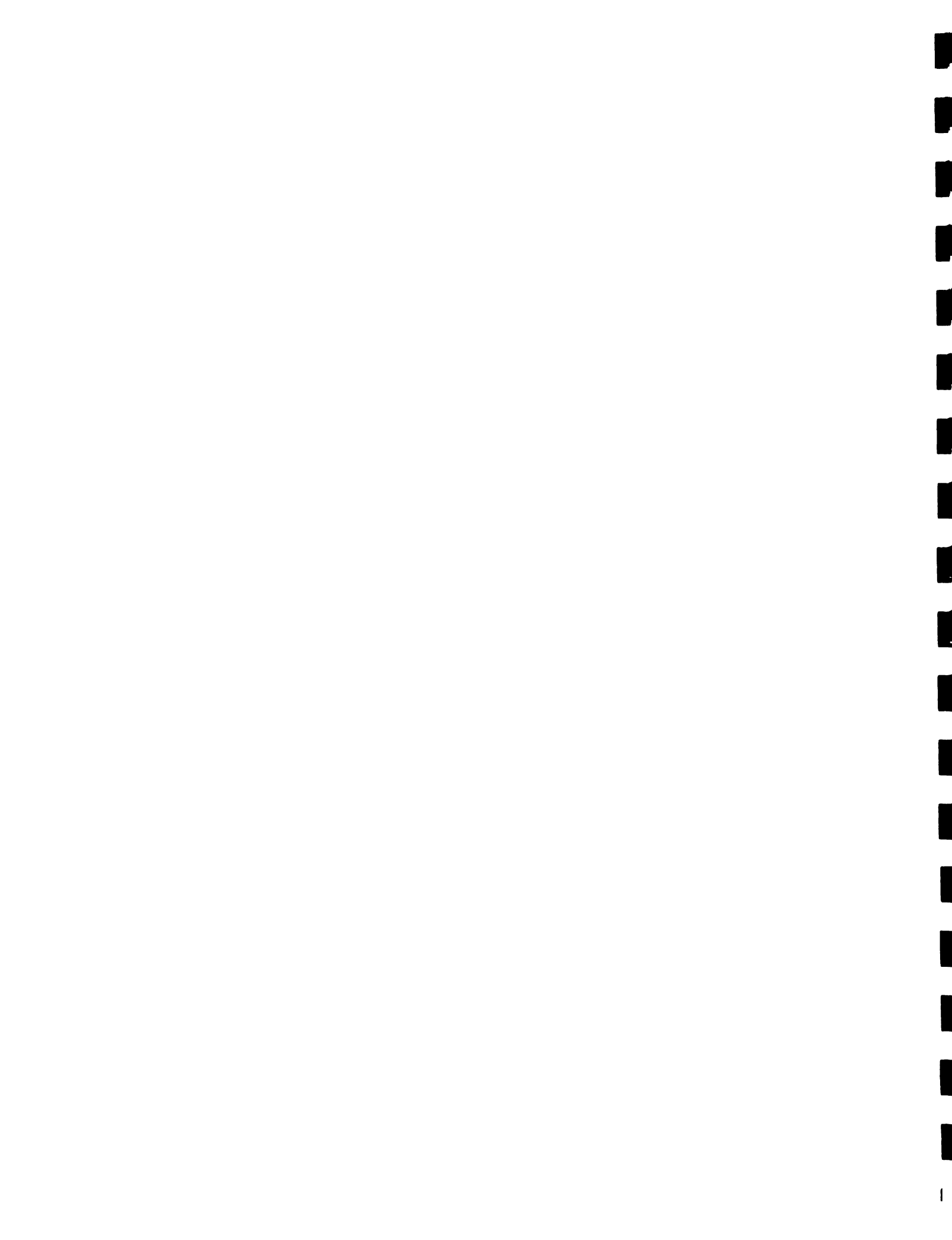
No data on pig, poultry and rabbit production are collected.

Fisheries

The Fisheries Division of the Department of Agriculture in St. Kitts is in a process of rebuilding. A Fisheries Officer was appointed about 1 month ago and his two assistants are abroad on training courses. Thus, for St. Kitts there is no on-going data collection. In Nevis, the Fisheries Cooperative collects data on the volume and prices of fish, conch and lobster which are channelled through the Fisheries Complex. The data are collated and summarized monthly by the Fisheries Officer in the Department of Agriculture and he also records information on fishing equipment owned by fisherman. The figures, however, only represent about 50% of the total catch. The majority of fish, etc are either sold on the beach or directly to hotels. Because there is only 1 Fisheries Officer, it is virtually impossible to collect data on daily catches on all the beaches.

Forestry

There are no reliable data on forestry available in St. Kitts and Nevis. the Planning Unit collects information on charcoal production but these data are not accurate.



(c) Productivity Data

Land area used for the production of the various crop commodities is recorded during the crop forecasting surveys. Yields are then derived by dividing production by land area. Productivity for beef, cattle, pigs and poultry are not recorded because of lack of data. However, the IFAD project provides some information on sheep and goats.

(d) Nutrition Data

The collection of Nutrition data is the responsibility of one individual, a nurse. She collects data for the Nutrition Surveillance Unit of CFNI, at the request of the Institute.

Types of data collected include trade data on food imports and local production of agricultural commodities which are obtained for the Planning Unit. These data are then used to calculate the total calorie and protein value of the food consumed by the population and a partial balance sheet is done to determine whether the population gets an adequate supply of protein and calories per head.

The main shortcoming of this procedure is its untimeliness. Data collection is only done at the request of CFNI and the recommendations about nutritional standards are made retroactively. It would be more meaningful if this type of analysis were done using the crop forecasting data along with the population data on age and sex distribution of the country.

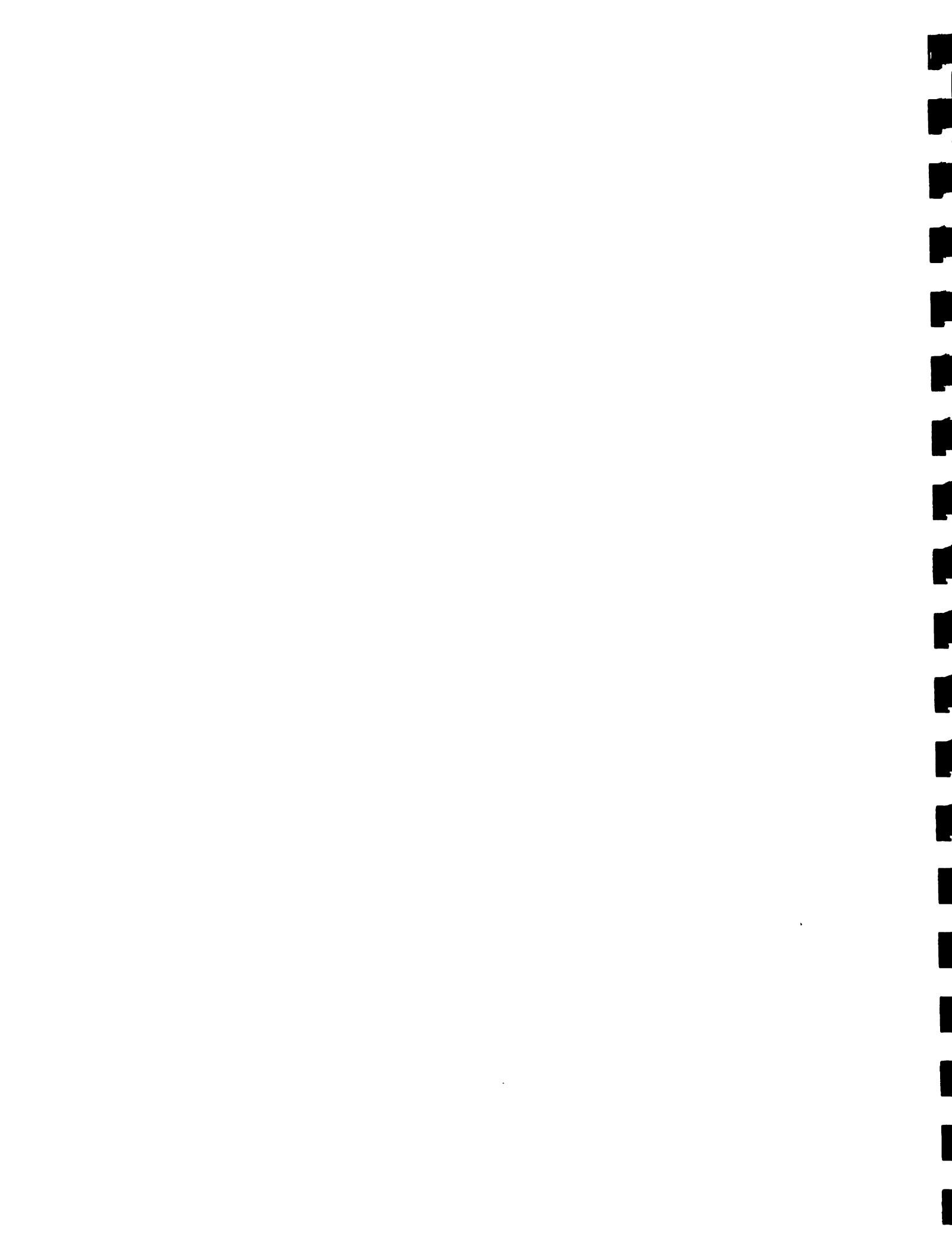
(e) Trade Data

The Planning Unit collects, processes and publishes data on volumes and values of agricultural imports, domestic exports and re-exports for the Federation. Primary data are customs warrants which are collected from the Customs Department at the end of every year.

In Nevis customs warrants are available with data on volumes and values of goods which enter the country by air from countries other than St. Kitts. However, goods which enter by sea from and via St. Kitts are not recorded. This means that there are no records of the huckster or 'turn hand' trade.

(f) Marketing

The Central Marketing cooperation, CEMACO records daily wholesaler and retail prices of its local and imported fresh produce. They also record the volumes of each commodity that are purchased. Data on volumes sold on credit arrangements are available but cash purchases are not.



The Planning Unit sends a clerk to CEMACO daily to collect price data and these data are used to compile the weekly consumer price index.

CARDI, through the CARDATS project, also has a Marketing Technician who collects data weekly on retail prices as well as volumes of imported and local produce purchased by CEMACO, the Hotels, supermarkets and public market. The source of the produce, i.e. the name of the local farmer and the country of origin of the imported produce are also recorded.

For its crop forecasting exercise, the Department of Agriculture estimates the local demand for vegetable and food crops from food importation figures. The demand for a particular commodity is calculated as the volume of that commodity which is imported when there is no local production. The accuracy of this estimate is questionable for commodities which have a long shelf life, as food importers are known to import in sufficient quantities to satisfy local demand for more than one month at a time.

(g) Environmental Data

SSMC collects and records data on maximum and minimum temperature, rainfall, windspeed and relative humidity for 43 sites in St. Kitts and the meteorological office records similar data for the airport in St. Kitts. In Nevis the Department of Agriculture collects daily rainfall data from 8 sites. No other environmental data are collected because there is no meteorological station on the island.

(h) Resource Use and Availability Data

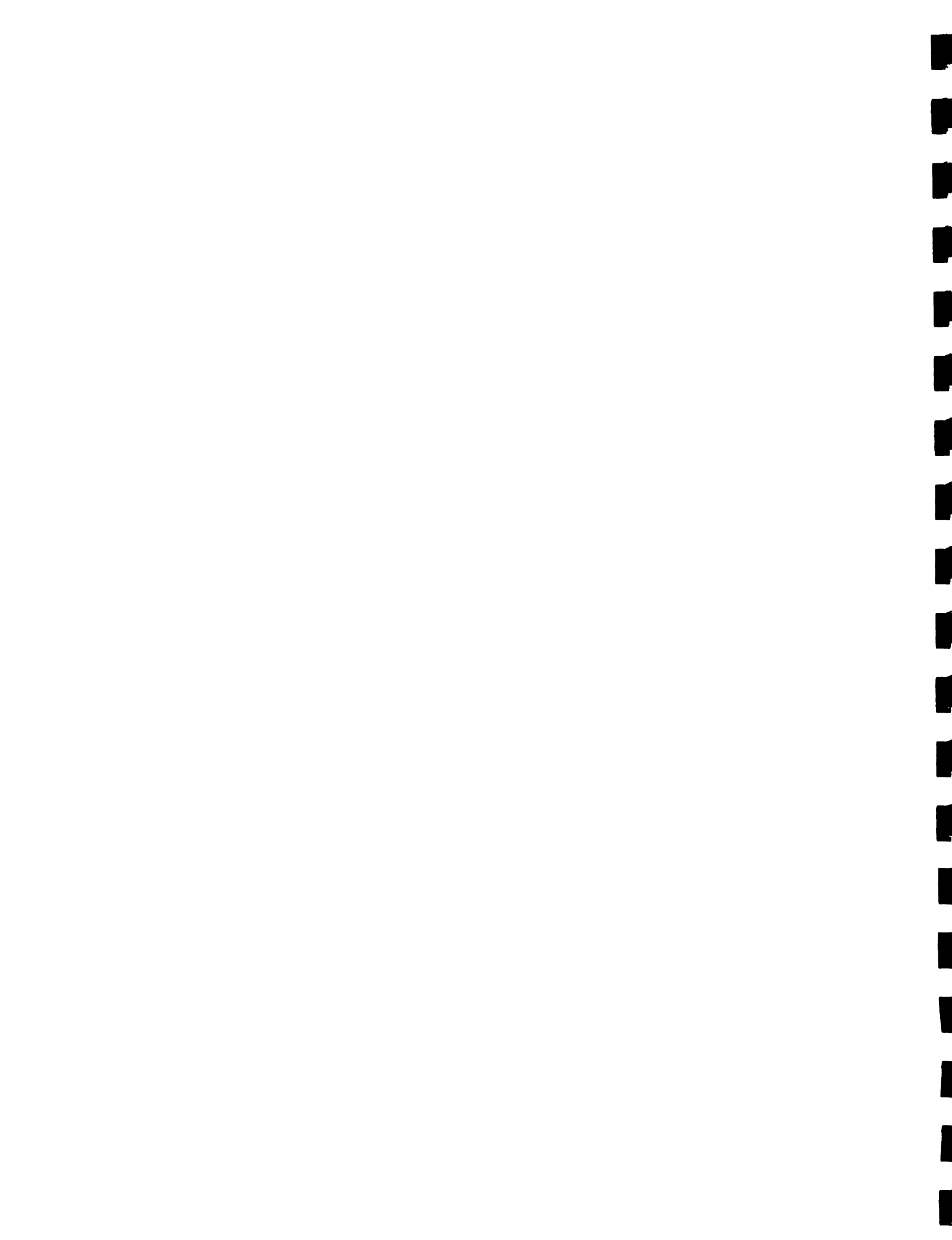
Land Use and Land Capability Surveys have been conducted for both islands and maps are available. A cadastral survey is scheduled to begin in St. Kitts shortly.

Labour

Data on the number of persons employed in the sugar industry and their wages are collected and published annually by the SSMC. The last Agricultural Census which was conducted in 1987 also contains data on the age and sex distribution of the non-sugar agricultural labour force as well as their wages and incomes.

Capital

The Agricultural Census presents information on equipment and machinery owned and used by farmers. There is no indication, however, of infrastructure on the farm nor access roads to farmers' holdings.



The Development Bank and the Foundation for National Development are the main lending agencies to farmers. They provide the Planning Unit with their annual report which contains data on the number and size of loans to the Agricultural Sector. Further breakdowns of loans to the various sub-sectors are only available for St. Kitts, but information on the purpose of the loan and default rates is not available.

Data Processing and Analysis

(a) Data Processing

With the exception of the Planning Unit in St. Kitts, the agencies involved in data processing do not have a formal system in place for data cleaning. This shortcoming is particularly noticeable in the case of the CARDI marketing data in which there is some double counting, but which are nevertheless presented without adjusting for this error.

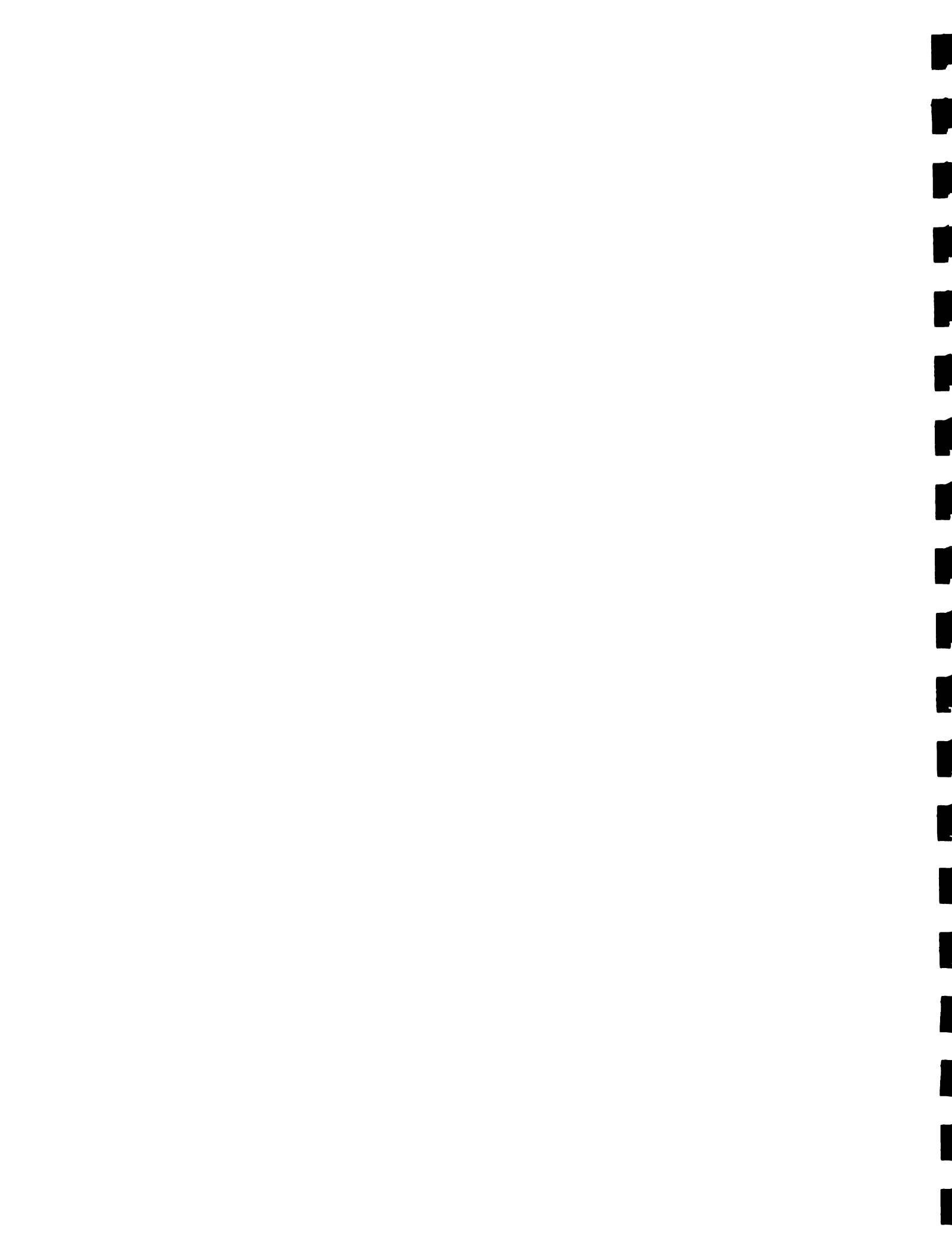
Although the Planning Unit has 6 IBM P/S2 machines at its disposal, the high demand for the machines leaves only 2 available for data entry. There are also 2 members of clerical staff who are engaged full time in this task. With the present practice of requesting data for national accounts at the end of each year, there is a tremendous backlog which appears to be increasing in geometric progression every year.

Another problem with the computing facilities of the Planning Unit is the hard disk capacity of the machines. All are 20 MB. Obviously, this capacity is inadequate for the large volumes of data which have to be stored and processed. It has also resulted in a cumbersome system of storing historical data on diskettes and reloading those diskettes whenever the information is needed. Moreover, the diskettes are stored in dust filled rooms with no air conditioning and no backups are made. Consequently, the system is very vulnerable.

The Planning Unit and Department of Agriculture in Nevis and CEMACO each have one IBM compatible computer with a 20 MB hard drive. The Department of Agriculture in St. Kitts has two IBM P/S 2 machines also with 20MB hard drives.

The use of appropriate computer software is also an important consideration. The Planning Unit in St. Kitts uses DBase III as well as Lotus 1-2-3. Its staff has been trained in the use of these programmes. The other agencies (Planning Unit and Department of Agriculture in Nevis, CEMACO and the Department of Agriculture in St. Kitts) have Lotus 1-2-3.

Two cases have been cited where numerical data were entered into a form set up in WordStar! Thus, simple manipulations



such as calculations of monthly and yearly averages, means, etc. cannot be executed without retyping the data into a spreadsheet or database program. This represents a waste of valuable time and resources and predisposes the data to further errors in data entry.

(b) Data Analysis

The analytical methods used by the various agencies are very elementary and inadequate. They consist primarily of the calculation of totals, averages, ranges and frequency distributions. Measures of variability are seldom reported.

Generally, the data collection agencies do not routinely conduct sample surveys. Some sampling is done for the estimation of crop yields in crop forecasting, but the samples are not randomly selected, thus some bias is introduced. Furthermore, it is impossible to establish measures of precision or confidence intervals for crops other than white potatoes because of the subjective method of estimating of crop yields.

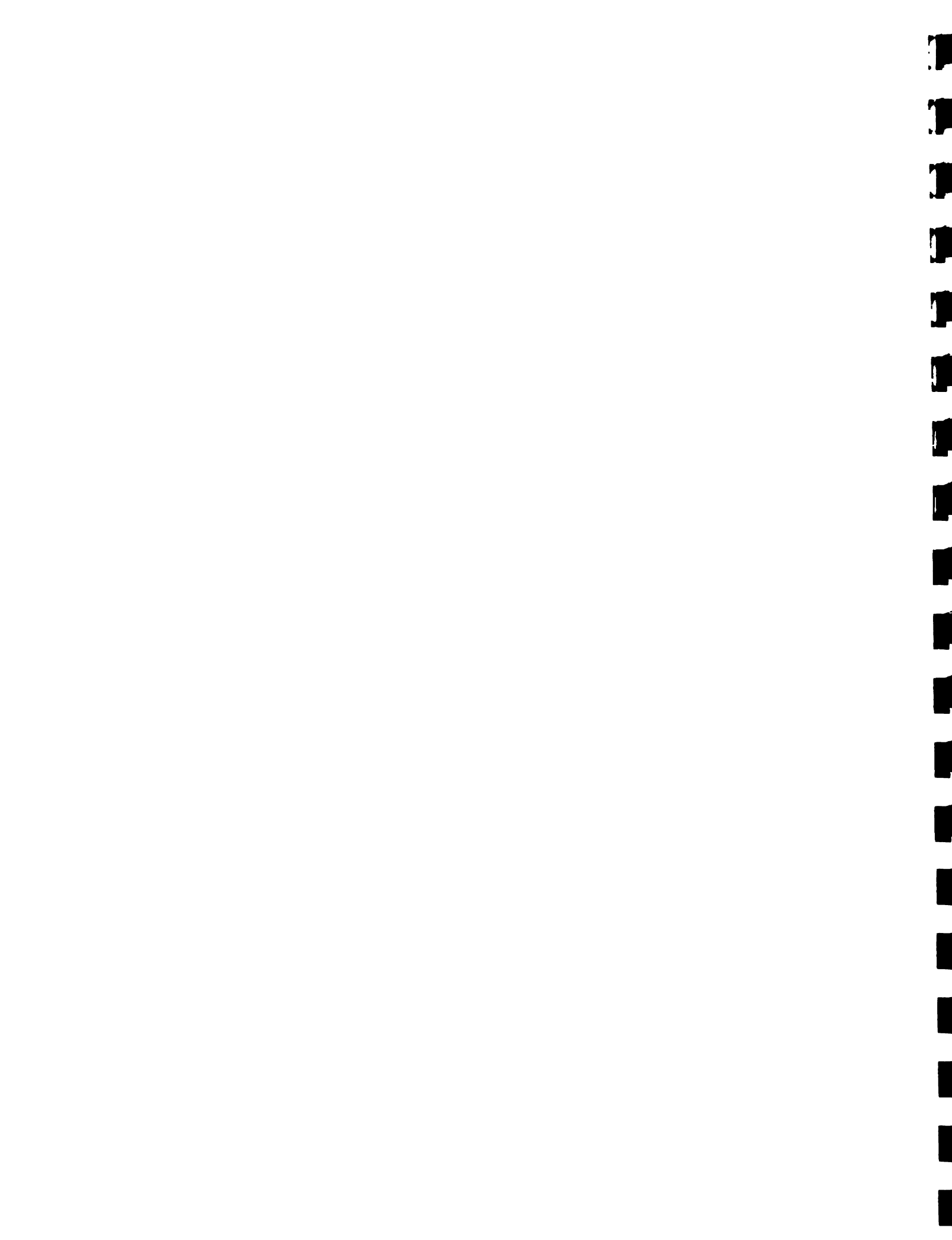
Relationships among variables are not explored by correlation or regression analysis nor is regression analysis used for forecasting. Relationships between prices and quantities produced and sold are not explored to determine whether the import restrictions placed on the various commodities have been successful in controlling retail prices. Most trend analyses (limited to visual observation of the previous month's or year's data, rather than careful scrutiny of the previous 10 years' data.

Data Interpretation, Presentation and Dissemination

The various agencies involved in primary data collection present simple tables with a commentary of the results. These tables are usually circulated through monthly in-house reports or annual reports which are distributed to the various agencies. SSMC generates monthly crop data and summarizes its environmental data as well. These are assimilated into their annual report.

The Department of Agriculture in St. Kitts produces a monthly crop forecasting bulletin which provides estimates of production and demand for selected commodities and makes recommendations for import restrictions. The Department in Nevis is in the process of establishing a similar system.

Weekly price data collected from CEMACO are processed and presented monthly by the Planning Unit. Up to one year ago CEMACO published Market News Update - a quarterly bulletin which contained useful marketing information such as prices, the supply of commodities, estimated production and crop forecasting. Weekly



price data were announced on a weekly radio program run under the CARDATS project. But this has been discontinued with the departure of CEMACO's Farm Co-ordinator.

Currently, the data collected by the Marketing Technician of CARDI are summarized manually at the end of every month and assimilated for the annual report.

The Planning Unit in St. Kitts prepares an Annual Statistical Digest, Annual Trade data, Stats in Brief and a few other publications. Their counterpart in Nevis, however, has just produced its first Annual Statistical Digest.

One of the main stumbling blocks of the information dissemination system, especially for the Planning Unit is the printing of Annual reports. Because of the large circulation of the Planning Unit's report, they have to rely heavily on government printery for assistance in copying and binding. The printery, on the other hand, uses old equipment and is prone to breakdowns. Furthermore, because of these breakdowns, there is a large backlog. The end result is that important documents such as the Agricultural Census, although it has been completed since 1987, is not yet available as a bound document. Instead, copies of the tables may be requested from the Planning Unit.

There are also no formal communication among agencies or between the two islands. This, therefore, leads to an ad hoc system of information exchange which in turn results in an inefficient system.

2.4.5.1.4 Data Gaps and Areas for Improvement

Having listed the Statistical needs for decision-making and diagnosed the existing situation, we are now in a position to identify the data gaps which need to be filled. These are as follows:

1. Volumes and values of Agricultural Inputs and other use in the various sub-sectors.
2. Livestock numbers for all classes of livestock.
3. Livestock production in terms of weight of animals slaughtered, milk, pork, eggs and broiler meat produced.
4. Fish and seafood production
5. Inventory of forest species and production of forest products e.g. charcoal, fencing material etc.
6. Volumes and values of commodities traded by Hucksters and



7. Volumes and values of commodities imported and exported from St. Kitts to Nevis.
8. Local demand for commodities.
9. Temperature, relative humidity and wind speed data for Nevis.
10. Annual data on employment, age and sex distribution and wages of the agricultural labour force.
11. Number, size, purpose and default ratings of agricultural loans in Nevis as well as purpose and default rating of agricultural loans in St. Kitts.
12. Inventory of farm equipment and machinery, infrastructure and access roads used by farming community.
13. Annual update of socio-economic data on farmers i.e. a farmers' register.

Other areas for improvement include:

- a) The system for data cleaning before data entry
- b) Proper storage and maintenance of diskettes
- c) Statistical analysis, interpretation, and presentation of data
- d) Communication and dissemination of data and results both among institutions and between islands.

2.4.5.2 Assessment of the crop protection status of St. Kitts and Nevis

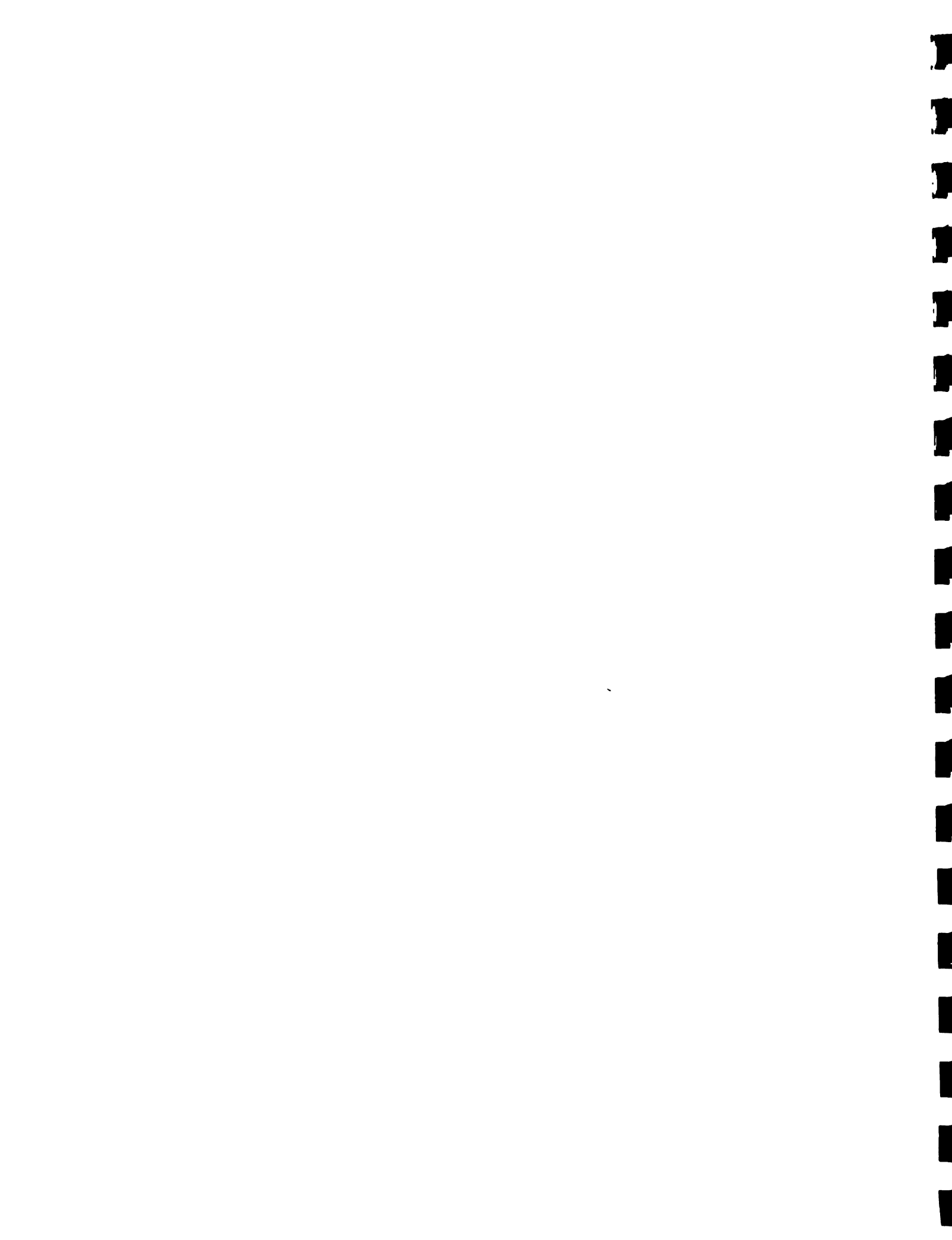
2.4.5.2.1 St. Kitts

(a) Institutional Arrangements

Plant Protection duties in St. Kitts are the responsibility of the Integrated Pest Control Unit (IPCU) which is staffed by one entomologist and one technician from CARDI and one technician from the St. Kitts Sugar Manufacturing Company (SSMC).

The Department of Agriculture (DOA) presently has no staff member in the IPCU specifically involved in plant protection.

The Republic of China or Taiwan (ROC) has an agricultural mission in St. Kitts which is headed by a retired entomopathologist. He has been assisting the IPCU with entomological identification and advice on control measures.



There has also been collaboration on the implementation of biological control trials and experimentation with the use of pheromone traps for control of pests.

An FAO funded 'Plant Protection and Quarantine' Project (TCP/STK/0051) has commenced implementation. Dr. Alexis Hernandez, an FAO Plant Quarantine consultant, visited St. Kitts in November/December 1990 and held discussions with the DOA authorities (report, Appendix 1 (a)). A number of recommendations were left by the consultant. The project will provide the following:

- (i) laboratory equipment
- (ii) training in plant quarantine
- (iii) assistance with the review of the plant quarantine legislation.

It is understood that provision of facilities - office and laboratory space - and personnel constitute a sort of prerequisite for the above activities.

There is a Pesticides Control Board, but it has been inactive for a number of years now. However, efforts are currently underway to revitalize it, since the advent of the new Chief Medical Officer.

No other agencies, except for the SSMC which takes care of pest problems in sugar, are involved in plant protection activities in St. Kitts.

(b) Operational Arrangements

The IPCU operates out of facilities located at SSMC. It consists of two offices and a small laboratory that is equipped to conduct routine entomological work (Appendix II).

The main activities of the IPCU have been:

- (i) research into methods of pest control on vegetables and food crops,
- (ii) visiting farms to provide diagnostic and advisory services,
- (iii) holding of training sessions in pest control for farmers and extension officers.

Because the IPCU has been managed by an entomologist, most of the work done and information available is on pests, so there is a deficiency of information on diseases and their control.



The extension officers provide basic crop protection advice to farmers, mainly on correct use and application of pesticides.

Plant Quarantine is the responsibility of Mr. Earl Thomas who is also in charge of the Propagation Unit. He inspects produce for export and issues phytosanitary certificates and with the close collaboration of the Customs at both the seaport and airport, who hold back incoming produce, he does inspection at the ports also.

2.4.5.2.2 Nevis

(a) Institutional Arrangements

The DOA in Nevis has no structure comparable with the IPCU in St. Kitts. No personnel or facilities are specifically dedicated to plant protection.

There is presently no ROC agricultural mission operating in Nevis, but efforts are underway to have one established.

The FAO consultant, Mr. Hernandez visited Nevis in December 1990 and held discussions with the authorities re the Plant Protection and Quarantine TCP (Appendix 1 (a)).

(b) Operational Arrangement

There are no crop protection offices or laboratory facilities in Nevis. Mr. Sherman Weekes, the CARDI Representative in Nevis who is qualified in crop protection and nematology, is, in effect, the sole authority on these matters. He visits farmers and provides diagnostic and advisory services and sometimes uses his office as a make-shift laboratory.

The extension officers on their routine farm visits provide basic crop protection advice, again, mainly on the use and application of pesticides.

The CARDI entomologist, Mrs. Laura Pricard-Leach of the IPCU in St. Kitts, visits Nevis once or twice a month to monitor the pest situation there and to service the traps for the fruitfly survey that she is conducting.

The DOA does provide a spray service, but this is principally for cotton growers with limited service to other farmers.

The Trading Development Company, (TDC) is the major supplier of pesticides and other farm inputs, but has no sales person knowledgeable in the effective use of pesticides and so is unable to provide farmers with sound, objective advice.



The strategy adopted by Mr. Weekes is to promote among the farmers an integrated approach to pest management, stressing on the agronomic practices and using pesticides as spot treatment or as a last resort control method.

2.4.5.2.3 Legal Framework

The current legal provisions and regulations governing plant protection and quarantine in St. Kitts and Nevis include the following legislation:

Plant Protection Act of 1923
Pesticides Control Act of 1973

Both pieces of legislation need updating. The Plant Protection Act of 1923 requires total reviewing and this is scheduled to be done under the FAO project using the Acts of Grenada and Dominica as models.

INDIA



SECTION III

ANALYSIS OF SECTOR PERFORMANCE

3.1 Crops

3.1.1 Food Crops Sub-sector

3.1.1.1 General Overview

Kittitian and Nevisian farmers cultivate a wide range of food crops which include white potato, sweet potato, peanut, yam, pumpkin, pigeon pea, banana, plantain, tannia, dasheen, eddoe, cassava and corn. In Nevis, dasheen is cultivated only by a few subsistence farmers. Production of upland rice in St. Kitts (in the mid-1980's), although initially showing encouraging results, was discontinued due to inadequate and unreliable rainfall, and high labour cost.

In St. Kitts, white potato is cultivated almost exclusively by commercially oriented farmers who are generally young and enterprising, and control relatively large acreages (10-20 acres). Cultivation of four other food crops (sweet potato, peanut, yam and pumpkin) is quite popular among commercial as well as semi-commercial and subsistence farmers. Cultivation of the other food crops is undertaken mainly by subsistence farmers; a commercial banana plot at Wingfield Estate must be noted as an exception.

In Nevis, recent attempts at commercial production of white potato have not been very successful. However, commercially oriented Nevisian farmers, generally with less than three (3) acres, have been cultivating sweet potato, peanut and yam. Cultivation of the other food crops appears to be the domain of the semi-commercial and subsistence farmers of Nevis.

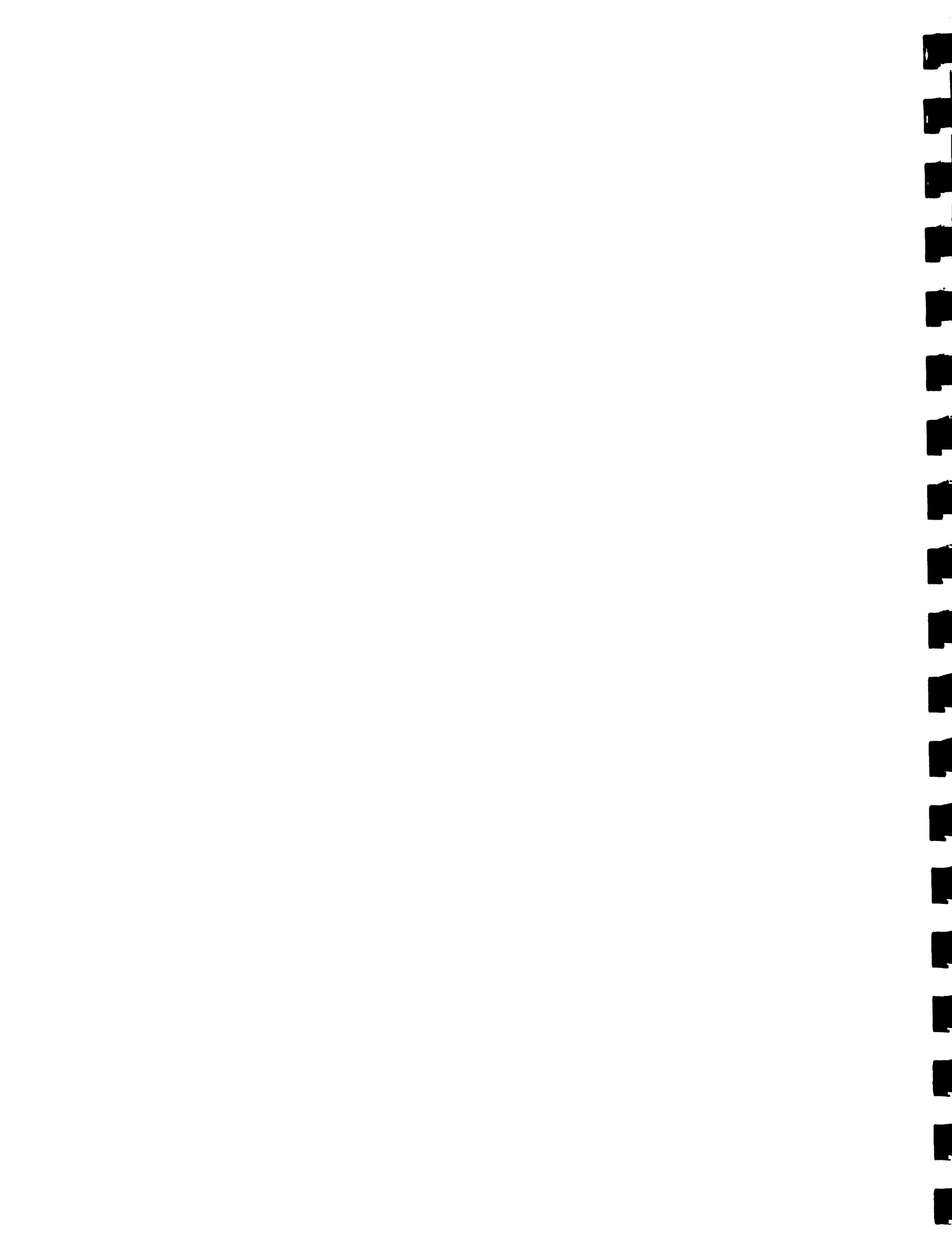
3.1.1.2 St. Kitts

(a) Ecological Considerations

Ecological factors affecting food crop production in St. Kitts are well documented. These include mainly climate (Rainfall and wind) and soil condition.

The island's rainfall pattern highlights two distinct intense rainy periods (April to June, and August to October) when the rainfall in the farming areas is relatively high, averaging 3.9 inches (99mm) and 5.0 inches (127mm), respectively.

Although St. Kitts overall experiences an average annual rainfall ranging from less than 40 inches (1000mm) in the south-east to approximately 150 inches (more than 3750mm) in the central mountains, the major food crop areas receive 50



inches to 80 inches (1250mm to 2000mm) annually, on average. Unfortunately, the rainfall is very unevenly distributed, with much of it occurring during August and September.

Ironically, water stress in crops could be quite pronounced during certain periods of the hot rainy season. This is mainly the result of fairly high temperatures (up to 32 degrees centigrade), windy condition (wind velocity of 16-48km per hour) and the free draining nature of the soil.

Most of the soils of St. Kitts are of two types: sandy loam and loamy sand. They are therefore, from a "texture" standpoint, ideally suited for food crop production. Their acidity level (pH 6-7) is also favourable. However, their productivity is limited by inadequate soil moisture, rapid leaching and high rates of evapotranspiration. Given these conditions, of the food crops cultivated on the island, those with relatively low water requirements (cassava, pigeon pea, peanut, sweet potato, yam and pumpkin) are more likely to give satisfactory yields under rainfed conditions, provided appropriate soil and water management practices are observed. The other food crops could also be successfully cultivated, but site location and timing of the planting operation could be most crucial.

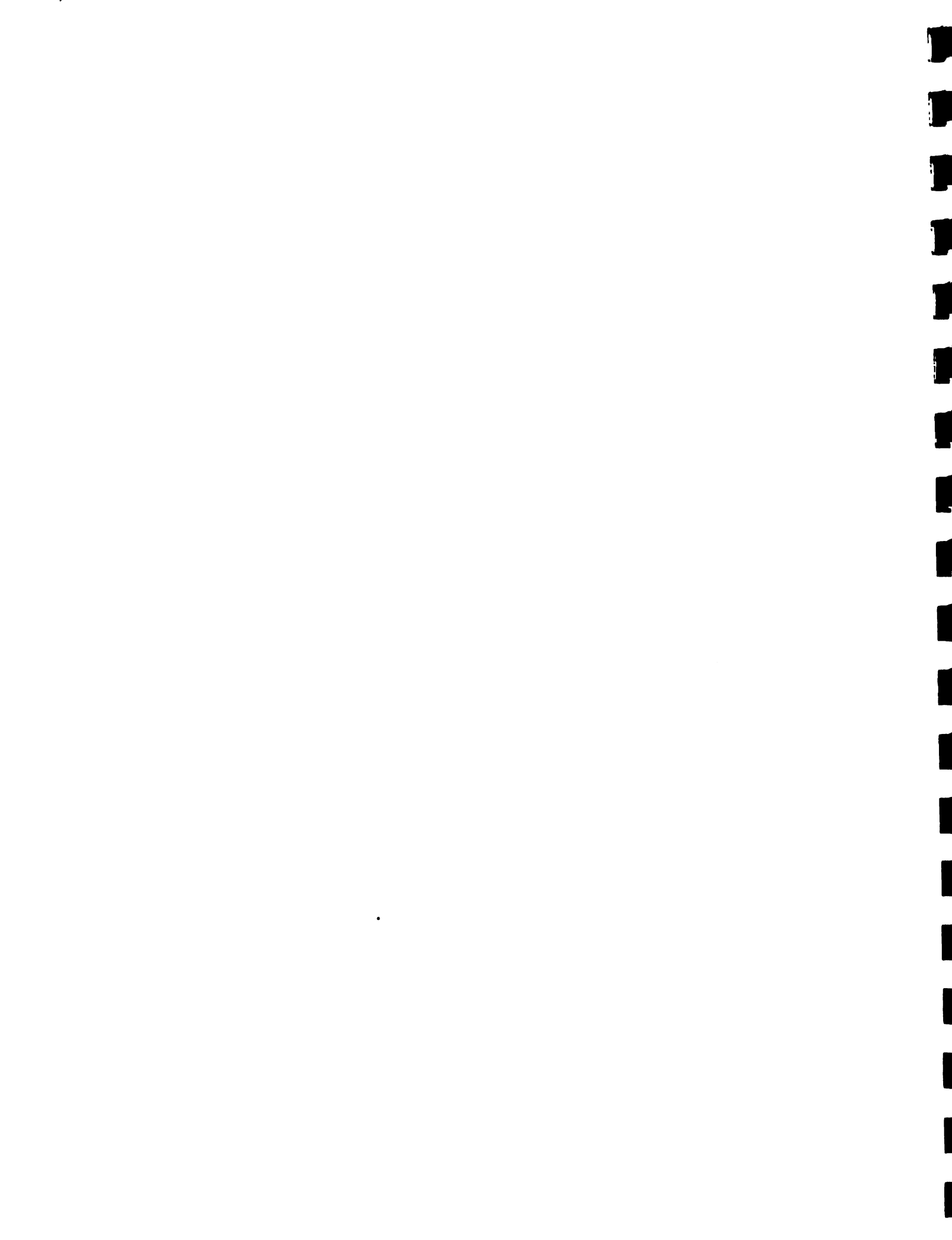
(b) Pre-Production

In St. Kitts, there are no nurseries for producing food crop planting materials. Apart from white potato planting material, all other food crops planting materials are provided by individual farmers or obtained from "neighbours" and "friends". White potato "seeds" are imported by the Department of Agriculture, pre-germinated and distributed (sold) to farmers.

The white potato variety cultivated is Desiree. However, a new cultivar (Bartina) has recently been introduced.

The peanut variety most widely cultivated is Tennessee Red. In the case of yam, the much preferred white fleshed variety (Dioscorea alata) is very susceptible to anthracnose disease (caused by a fungal organism Colletotrichum gloeosporioides) and is no longer recommended. CARDI is currently initiating an activity for the rapid multiplication (for future distribution) of an anthracnose disease tolerant yam variety (Oriental). In the meantime, farmers are cultivating whatever local "varieties" are available. For instance, one farmer claims to be cultivating a variety known as "Foot Yam".

There appears to be no special varietal recommendations with respect to the other food crops. Farmers, especially the subsistence farmers, are cultivating a mixture of local sweet



potato "varieties" and appear unaware of the existence of named varieties of the other food crops cultivated.

(c) Production to Harvest

The commercial food crop producers in St. Kitts are also vegetable producers. Their food crop production activities are limited to three main crops: white potato, peanut and sweet potato cultivated in pure stand. On the other hand, most of the semi-commercial and subsistence farmers cultivate a wide range of food crops in mixed stands. Two of the more common crop combinations observed are:

1. aroids (in furrows) together with sweet potato and corn (planted on the same ridge); and
2. cassava and tannia (together with snap bean).

Banana and plantain are usually planted on the periphery, or scattered throughout the field.

Land preparation activities of the commercial producers are completely mechanized. A few of these producers own and operate their tractors; others hire the service provided through Government's Farm Machinery Pool at the rates of EC\$85 per hour and EC\$100 per hour for ploughing and harrowing/ridging, respectively. A few farmers also rent small machines (Power Tillers) from the Pool at the rate of EC\$150 per month. However, most farmers who hire the service complain of its unreliability.

Although a few semi-commercial food crop producers get their lands ploughed through the Farm Machinery Pool, the majority prepare the land manually, using garden hoes. Land preparation activities of all subsistence food crop farmers are manually undertaken.

Farmers generally experience problems in obtaining farm labour. Consequently, many have tended to scale down their food crop production activities. Others have tended to neglect or reduce the level of certain cultural practices (e.g. mulching) known to be beneficial to food crop production.

Farmers generally maintain a good planting density, and seem quite knowledgeable concerning the relationship between crop density and yields and pest control.

Weed control programme appears to be effectively implemented and maintained. This is achieved through the use of herbicides and limited hand weeding (by commercial farmers); and hoeing (by semi-commercial and subsistence farmers).



Food crops are adequately fertilized by commercial producers, based on recommendation by technical officers of the Department of Agriculture (DOA). However, few semi-commercial producers and even less subsistence farmers apply fertilizer to their crops.

Fertilizers mostly used are of the complete (N.P.K.) formulation in the ratio of 15:15:15. None of the commercial producers, and very few of the others, use organic manure.

Food crop plots in St. Kitts are not irrigated. However, there is a great need for irrigation if the performance of food crops (banana, plantain, tannia, white potato, dasheen and eddoe) with relatively high water requirements is to be improved.

Except for anthracnose disease in yam, pest and diseases of food crops are not a serious problem in St. Kitts.

All food crops are manually harvested. Given the current shortage of farm labour in St. Kitts, the possibility of introducing mechanical harvesters, with respect to the root crops, could be explored.

(d) Postharvest Handling and Processing

Harvested plantains and bananas are simply placed on a pickup truck and transported to the farmer's home for overnight storage before being sold. Other food crops are packed in bags and transported in pick-up trucks to the farmer's home where they are cleaned, trimmed and sized (selected). Storage may be just overnight (for sweet potato, dasheen, tannia and eddoe) or from a few days to weeks (for white potato), or 3 to 4 months (for yam and pumpkin), or even a year (for corn and peanut). There is limited on-farm storage, mainly during short periods when the harvested produce is left in the field awaiting the arrival of transport. One or two subsistence farmers use the donkey to transport produce from field to home.

There is a great need for long term storage facilities for white potato. If not provided, then the potential for significantly expanding white potato production on the island could be limited.

None of the food crops produced is processed.

(e) Institutional Services

Three major credit sources available to Kittitian food crop farmers. They are:

1. the commercial banks,
2. St. Kitts and Nevis Development Bank, and
3. the Foundation for National Development.

Also, limited quantities of input supplies are available, on credit, from the DOA.

Not many farmers access the available credit. A few commercial producers obtain loans from the commercial banks mainly to purchase farm vehicles and equipment. Semi-commercial and subsistence farmers seem to shy away from dealing with banks and other formal credit institutions. They express preference for borrowing from relatives and close friends.

Food crop producers appear to be adequately serviced by the DOA's extension officer. They maintain close contact with extension agents who provide technical advice as well as assistance in obtaining farm inputs and tractor service for land preparation. Whenever convenient, extension officers also assist farmers in transporting and marketing their produce. Training seminars/workshops for farmers are also organized and conducted by extension officers with assistance from resource persons from CARDI.

CARDI (St. Kitts) has been conducting research into the production of white potato and yam. Research information relative to most of the other food crops is generated through CARDI's activities in other islands, and is available to farmers in St. Kitts.

With respect to marketing, a Crop Forecasting System has been developed for white potatoes by the DOA in St. Kitts. White potato and other food crop commodities are marketed mainly through the local public market. Some produce are also marketed through supermarkets and hotels. "Turn Hands" (Hucksters) maintain a thriving export trade to Nevis, Montserrat, St. Eustatius and St. Maarten. The Central Marketing Corporation (CEMACO) has also been involved in white potato but however will not be exported to Antigua this year (1991) because of farmer's disagreement with purchase price being offered by CEMACO. It therefore seems that future white potato exports to Antigua are doubtful, and this could adversely affect farmers' plans to expand their white potato acreages.

Generally, low commodity volumes and inadequate and disorganized shipping service are among the major constraints to export marketing of food crops in St. Kitts.



Farmgate and market prices for food crop commodities in St. Kitts are not available. Tables 3.1 and 3.2 indicate average farmgate and market prices, respectively, during a 10-year period (1979-1988), in St. Kitts and Nevis. It must be noted that, in all cases, market prices are more than double farmgate prices. This probably indicates that the "middle men" (hucksters) are involved in a very lucrative trade in food crop commodities. Alternatively, there is possibly a high cost in moving produce from farmgate to market. Postharvest losses and transportation are possibly major contributors.

In St. Kitts, approximately 70 acres (27.56 hectares) are cultivated with white potato. The average yield is given as 10,000 pounds per acre (11,210 kilograms/hectare). However, white potato trials conducted by CARDI at three locations in St. Kitts resulted in extrapolated yields ranging from 9,037 kilograms per hectare to 20,365 kilograms per hectare. Yields currently obtained by commercial and subsistence potato farmers average 12,000 pounds per acre (13,452 kgs/ha) and 6,000 pounds per acre (6,726 kgs/ha), respectively. Unfortunately, similar information is not available for the other food crops produced in St. Kitts.

Although the island's overall production of individual food crop commodities is inadequate to satisfy local demand, over production of a commodity during any one crop season may necessitate export of the commodity which may then be imported during the off-season. Data on food crop exports and imports for St. Kitts (1985 to 1990) are presented in Tables 3.3 and 3.4 respectively. The data indicate that St. Kitts is a net exporter of pumpkin, cassava and sweet potato, but imports varying quantities of the other food crop commodities annually.

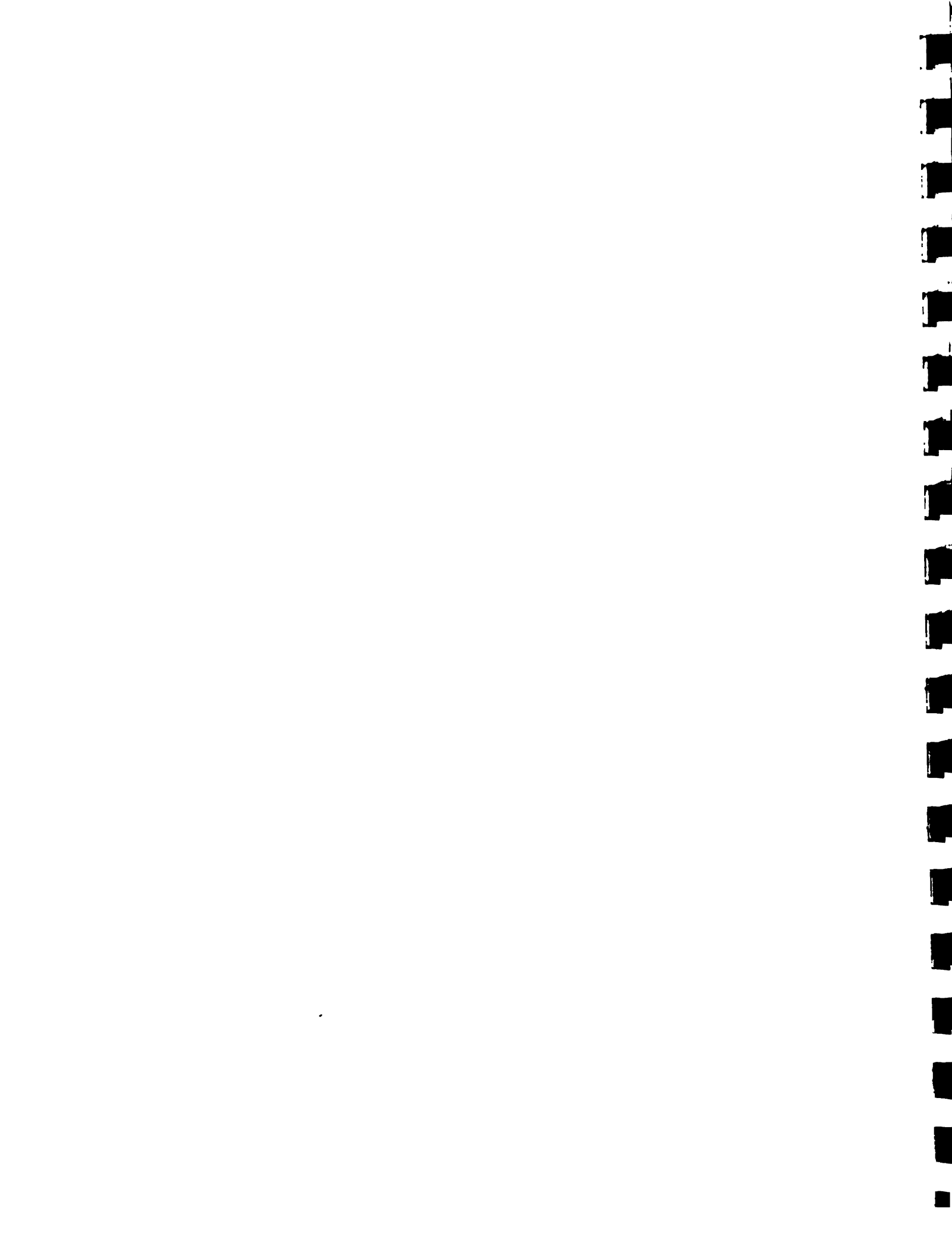


Table 3.1
Farm Gate Prices of Food Crop Commodities in St. Kitts and Nevis
(ECS/lb), 1979-1988

COMMODITY	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Banana	0.77	0.77	0.88	0.88	0.55	0.88	0.88	1.32	1.32	2.20
Cassava	1.10	1.10	1.21	1.32	0.55	0.55	0.55	0.55	0.55	1.10
Corn	2.20	2.20	2.42	2.53	2.20	2.20	1.10	2.20	2.20	2.20
Dasheen	1.32	1.43	1.43	1.54	1.10	2.16	2.16	2.42	2.42	5.50
Eddoe	1.32	1.43	1.43	1.65	1.10	2.20	2.33	2.97	2.97	4.40
Peanut	5.06	5.28	5.61	5.94	6.60	5.50	4.07	7.70	7.70	7.70
Pigeon Pea	1.76	1.87	1.87	1.98	1.98	NA	1.76	5.50	5.50	5.50
Plantain	1.10	1.10	1.21	1.32	2.20	0.88	1.76	4.40	5.50	5.50
Pumpkin	1.54	1.54	1.65	1.76	1.54	1.65	1.65	3.30	3.30	3.30
Sweet Potato	0.55	0.55	0.66	0.66	0.77	0.99	0.99	2.75	2.75	2.75
Tannia	4.32	1.32	1.41	1.54	1.65	2.42	2.42	2.20	2.20	5.50
White Potato	-	-	-	-	-	1.87	1.94	1.98	1.98	2.20
Yam	1.65	1.65	1.76	1.87	1.14	NA	NA	2.20	2.20	4.40

NA means 'Not Available'

SOURCE: Central Planning Unit, Basseterre, St. Kitts

Table 3.2
Market Prices of Food Crop Commodities in St. Kitts and Nevis
(ECS/lb.) 1979-1988

COMMODITY	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Banana	1.72	1.72	1.96	1.96	1.23	1.96	1.96	2.93	2.93	4.88
Cassava	2.44	2.44	2.68	2.93	1.23	1.23	1.23	1.23	1.23	2.44
Corn	4.88	4.88	5.37	5.63	4.88	4.88	2.44	4.88	4.88	4.88
Dasheen	2.93	3.17	3.17	3.43	2.44	4.88	4.80	5.37	5.57	12.23
Eddoe	2.93	3.17	3.17	3.67	2.49	4.88	5.19	6.60	6.60	9.77
Peanut	11.24	11.73	12.47	13.20	14.67	12.23	9.04	17.12	17.12	17.12
Pigeon Pea	3.92	4.16	4.16	4.40	4.40	NA	3.92	12.23	12.23	12.23
Plantain	2.44	2.44	2.68	2.93	4.88	1.96	3.92	9.97	12.23	12.23
Pumpkin	3.43	3.43	3.67	3.92	3.43	3.67	3.67	7.33	7.33	7.33
Sweet Potato	1.23	1.23	1.47	1.47	1.72	2.20	2.20	6.12	6.12	6.12
Tannia	2.93	2.93	3.17	3.43	3.43	5.37	5.37	4.88	4.88	12.23
White Potato	-	-	-	-	-	4.16	4.20	4.40	4.40	4.88
Yam	3.67	3.67	3.92	4.16	12.55	NA	NA	4.88	4.88	9.77

NA means 'Not Available'

SOURCE: Central Planning Unit, Basseterre, St. Kitts

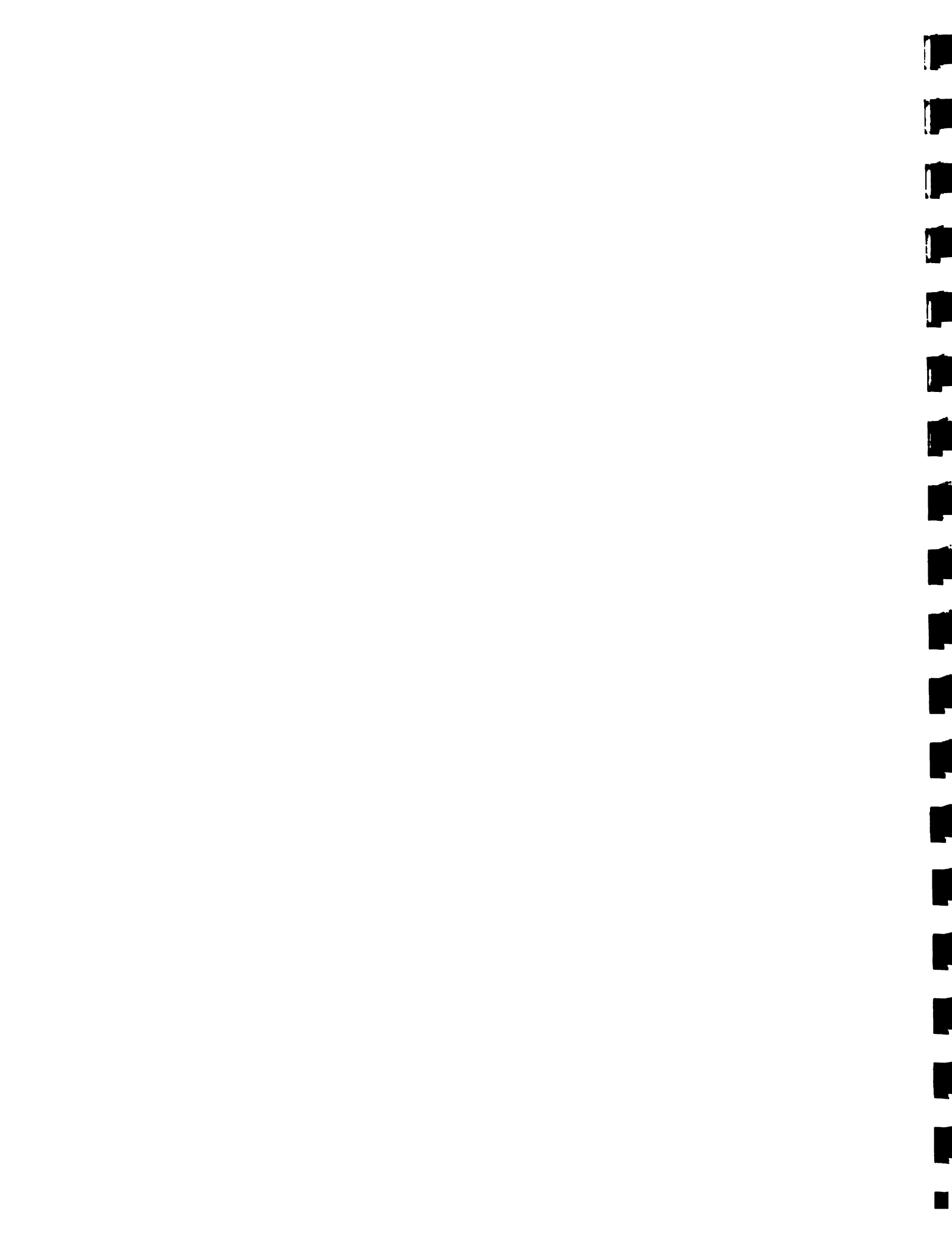


Table 3.3
Quality and Value of Food Crop Exports (St. Kitts) 1985-1989

COMMODITY	1985		1986		1987		1988		1989	
	QUANTITY (kg)	VALUE (EC\$)	QUANTITY (kg)	VALUE (EC\$)	QUANTITY (kg)	VALUE (EC\$)	QUANTITY (kg)	VALUE (EC\$)	QUANTITY (kg)	VALUE (EC\$)
White Potato	688	610	1026	515	-	-	75	75	1340	1940
Pumpkin	5570	5870	6632	7631	3876	6774	1402	1783	2456	4135
Dasheen and Eddoe	18	40	12	12	10	6	580	260	-	-
Cassava	909	800	13906	10820	3050	3480	2100	3250	981	1274
Banana	772	2134	869	620	544	471	1041	954	353	891
Plantain	200	276	225	145	350	382	216	176	384	395
Sweet Potato	-	-	63824	61631	23105	30006	35335	39488	55928	28030
Tannia	-	-	600	548	67	90	622	303	204	295
Yam	-	-	1241	1967	761	655	886	1780	2628	4226
Groundnut (roasted)	-	-	250	142	-	-	-	-	60	110
Groundnut (not shelled)	-	-	32565	56845	-	-	-	-	979	1654

SOURCE: Central Planning Unit, Basseterre, St. Kitts

Table 3.4
Quality and Value of Food Crop Imports (St. Kitts) 1985-1989

COMMODITY	1985		1986		1987		1988		1989	
	QUANTITY (kg)	VALUE (EC\$)	QUANTITY (kg)	VALUE (EC\$)	QUANTITY (kg)	VALUE (EC\$)	QUANTITY (kg)	VALUE (EC\$)	QUANTITY (kg)	VALUE (EC\$)
White Potato (fresh or chilled)	596363	487903	676672	634069	494215	559745	481165	557592	425854	537968
Pumpkin	1507	1421	5660	5589	3705	1527	489	362	638	1301
Dasheen and Eddoe	43	91	501	796	2196	1066	3401	2340	1085	3200
Cassava	-	-	-	-	-	-	50	32	-	-
Banana	3454	5831	16227	13710	41503	24638	21220	8752	5258	4211
Plantain	4150	5653	11726	10413	23904	19202	19734	13022	8765	3954
Sweet Potato	1654	1962	682	487	38	20	-	-	588	2373
Tannia	3000	1710	4154	4590	14852	15414	2646	1685	865	1002
Yam	295	196	339	1007	398	240	47	60	659	1194
Groundnut (roasted)	6223	38745	4088	37407	2916	33702	7971	63670	5782	66662
Groundnut (not shelled)	3186	5323	8391	18964	7430	16900	8433	19636	6732	20091

SOURCE: Central Planning Unit, Basseterre, St. Kitts



3.1.1.3 Nevis

(a) Ecological Considerations

Food crop cultivation in Nevis is affected by two major ecological factors: soil and climate. In most areas of the island, besides being of a clayey nature, the soil is stony and bouldery and therefore present a difficult proposition for cultivation of food crops - especially roots and tubers. The soil pH, although in excess of 7 in some areas, poses no immediate problems for food crop production.

Climatically, wind blast (particularly on the windward side of the island) and the low mean annual rainfall of 33 inches to 52 inches (838mm to 1320mm), in the areas topographically suited to food crop cultivation, are constraining elements to production of most food crops. Food crops such as banana, plantain and white potato are particularly affected. Temperatures do not normally exceed 28 degrees C.

Relatively high rainfall (approximately 100 inches or 2500mm per year) in the mountainous areas, and the high clay content of the soil give rise to a significant amount of surface runoff during the rainy season when water is collected in dams and stored. A few natural springs also provide a good water source for irrigating crops in the low lying areas. However, food crops are not normally irrigated. They are rainfed and are therefore cultivated during the rainy season (July to January).

Based on soil and rainfall considerations, the areas most suited for food cultivation are Potworks, Maddens, Gingerland and Cades Bay. Except for Cades Bay, these areas have been targeted by the Nevis Department of Agriculture as the major areas for promoting food crop production. (Cades Bay farmers show limited interest in food crop cultivation.)

(b) Pre-Production

White potato "seeds" are imported, via St. Kitts' Department of Agriculture, by Nevis' Department of Agriculture for distribution (sale) to Nevisian farmers. They are of the Desiree variety and are pre-germinated prior to distribution. Planting materials for other food crops are obtained locally (in Nevis) and result from the farmer's previous crop.

The variety of peanut cultivated is the Tennessee Red. However, there is little knowledge by farmers of the "variety" of food crops, other than white potato and peanut, cultivated. Most farmers merely refer to the varieties as "local".



There is no established nursery for the production of food crop planting materials in Nevis.

(c) Production to Harvest

Food crop production in Nevis is generally undertaken in small patches - usually less than 0.1 acre. White potato, peanut and sweet potato are normally planted (in pure stands) during the months of September, October and November. The other food crops are usually planted (in mixed stands) at the onset of the rainy season in July.

Most farmers use herbicides to clear the land which is then ploughed by tractors obtained from Government's Farm Machinery Pool at a cost of EC\$85 per hour. Although the tractor service is appreciated, a few farmers complain about the extended time lag between requesting and receiving the service. Some farmers persist in using the hoe for land preparation activities.

There is much to be desired with respect to the area of crop management practices among food crop producers. The timely planting, weeding and fertilizing of food crops are not observed. Timely observance of these practices is especially important given the precarious climatic situation in Nevis. Mulching is an important crop management practice which is generally neglected. Food crop plots are not irrigated.

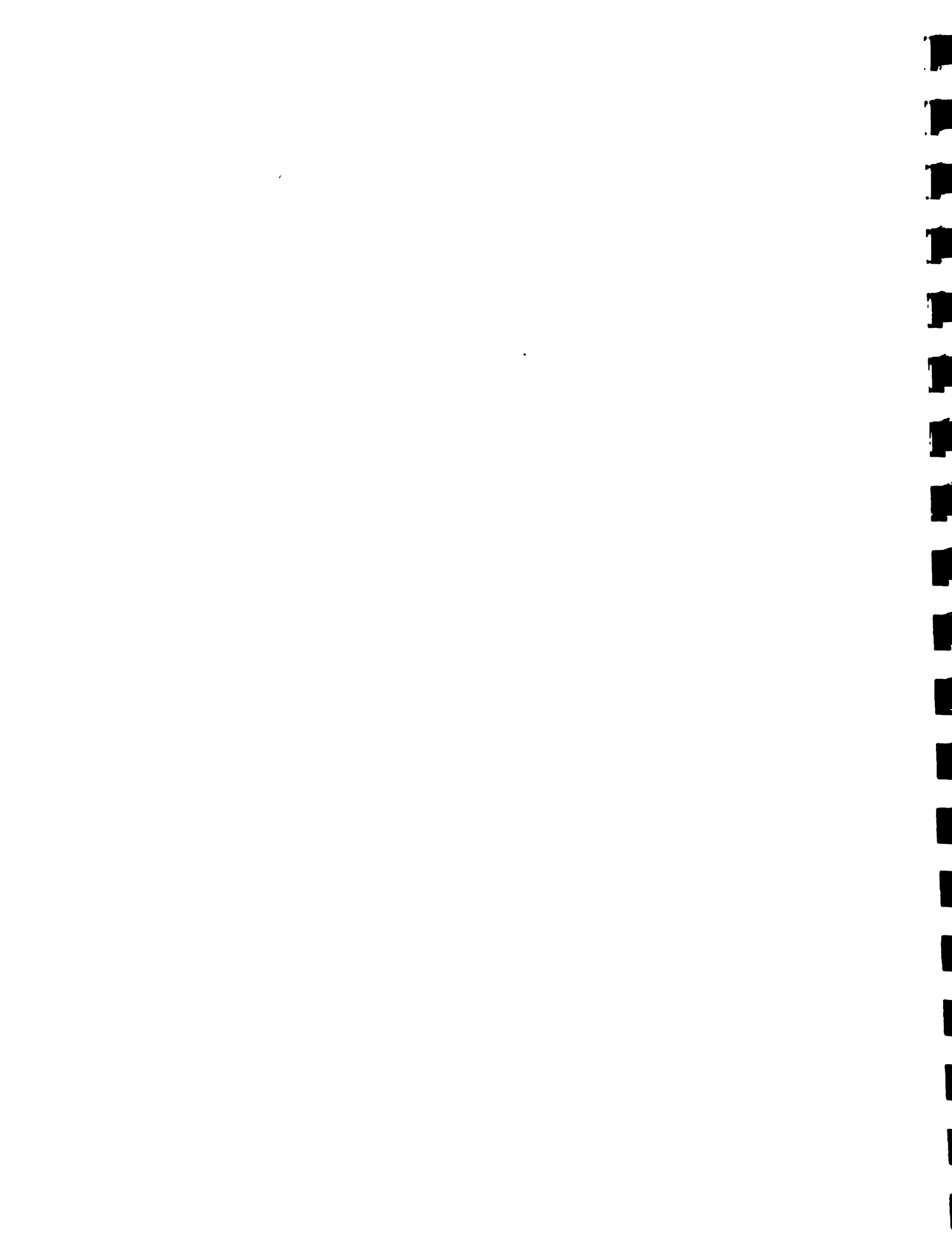
Anthracnose disease in yam is the most serious food crop disease in Nevis. There are no major food crop pests on the island.

In Nevis, all food crops are harvested manually. This is not a constraint since plots are generally small. Plans significantly increase the national white potato acreage may have to be shelved because of the poor performance of recently harvested plots.

(d) Postharvest Handling and Processing

The situation in Nevis is generally similar to that in St. Kitts. However, transportation of produce (from farm to farmer's home and to the market) is more expeditiously handled through direct assistance from DOA and CARDI officers who provide pick-up trucks for the same. Also, it is worth mentioning that a few farmers are equipped with temporary on-farm storage sheds in which produce is selected and prepared for market.

Since the government-owned corn factory (mill) at Hardtimes went out of commission in 1989, through inadequate maintenance repairs and lack of needed spare parts, corn has not been



processed in Nevis. Other food crop produce have never been processed.

(e) Institutional Services

Nevisian food crop farmers, like their kittitian counterparts, can access credit through the commercial banks, the St. Kitts and Nevis Development Bank, and the Foundation for National Development.

CARDI, through the CARDATS project, provides farmers with farm inputs on credit terms.

Mainly because of the small size of their food crop plots, few farmers have utilized formal credit sources for food crop development purposes, per se. However, a few food crop/vegetable farmers have borrowed funds from banks to purchase pick-up trucks.

Both the DOA and CARDI provide tremendous support to Nevisian food crop farmers. Such support is usually in the areas of on-farm technical advice, training, transporting farm inputs and produce, and organizing markets for farmers' produce.

The DOA and CARDI have so far developed a Crop Forecasting System (draft) and have surveyed the various local marketing outlets.

Food crops produced in Nevis are marketed mainly through the public market and the Huckster trade. However, hotels (especially the Four Seasons Hotel) are being targeted as important outlets for pumpkin, banana and sweet potato. Through the huckster trade, many food crop commodities are frequently exported to St. Kitts, and occasionally to other neighbouring islands.

(f) Production and Estimated Demand

White potato acreage in Nevis is estimated to be 5 acres (2 hectares), with an average yield of 10,000 pounds per acre (11,210 kilograms per hectare). Such a yield is considered "low" when compared with yields of almost 16,000 kilograms per hectare obtained in certain parts of St. Kitts. Similar information is not available for other food crops.

Production figures for some food crops are available only for a 3-year period (1987-1989). These figures (Table 3.5) indicate that yam has been the food crop commodity with the highest production (22.68MT) and the highest percentage (66.64 per cent) production increase over the three years. They also indicate a significant (49.70 per cent) decline in white potato production when the 1987 and 1989 production figures



are compared. For the other food crop commodities, production has been more or less constant, but much lower than that of white potato.

Table 3.5
Domestic Production (Metric Tonnes) of Food Crop Commodities
in St. Kitts and Nevis, 1979-1988

COMMODITY	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Banana	190.63	180.74	165.84	151.10	139.34	137.36	8.79	115.38	129.12	129.12
Cassava	9.34	9.34	8.24	8.24	6.59	6.04	5.93	8.24	0.77	4.95
Corn	3.57	2.20	2.47	2.47	2.20	3.85	3.96	0.55	0.66	0.66
Dasheen	21.43	21.43	21.43	22.53	38.90	14.29	14.45	11.87	14.56	17.03
Eddoe	20.88	20.88	21.98	21.98	26.43	19.51	19.23	15.38	15.38	17.03
Peanut	247.25	245.82	245.45	162.09	177.82	70.88	74.18	36.26	39.29	43.96
Pigeon Pea	23.22	20.08	21.10	21.10	4.45	NA	2.75	1.65	2.20	3.41
Plantain	10.99	11.54	12.03	13.19	116.65	11.84	9.59	4.12	4.56	6.76
Pumpkin	99.22	101.16	125.76	136.73	NA	84.73	92.86	73.63	80.77	80.77
Sweet Potato	423.34	329.16	381.45	381.45	263.74	208.79	208.13	288.46	318.68	197.80
Tannia	14.84	15.38	15.38	15.38	11.54	14.18	13.74	14.29	17.58	15.66
White Potato	-	-	-	-	-	-	-	19.51	42.58	134.07
Yam	183.66	150.77	127.42	105.44	102.17	74.73	74.95	32.97	28.57	43.96

NA means 'Not Available'

SOURCE: Central Planning Unit, Basseterre, St. Kitts

Data on food crop exports and imports for Nevis are unavailable. However, the island is known to be a net importer of food crops with yam, sweet potato and cassava being exceptions. More than 20MT of yam were exported in 1989 (Table 3.6)

TABLE 3.6
FOOD CROP PRODUCTION IN NEVIS (1987-1989)

COMMODITY	PRODUCTION		
	1987	1988	1989
Sweet Potato	3.63	4.08	4.54
Peanut	4.54	5.44	4.54
Yam	13.61	21.32	22.68
Pigeon Pea	0.36	0.36	0.54
Tannia	1.36	1.59	1.59
Dasheen	0.68	0.45	0.45
White Potato	8.75*	1.00	4.31

*Based on data from Central Planning Unit, St. Kitts

Source: "Agriculture in Nevis" Nevis Country Environmental Profile, 1989.



3.1.2 Vegetables Sub-sector

3.1.2.1 General Overview

In both St. Kitts and Nevis, the Department of Agriculture (DOA) is concentrating much effort and resources towards the development of the vegetable subsector. Commercial farmers consider vegetable production a most profitable undertaking, and as such vegetable crops are an important component in the mixed cropping activity of the semi-commercial and subsistence farmers.

Based on available production figures, the most important vegetable crops produced in St. Kitts are tomato, carrot, cabbage, sweet pepper, watermelon, cucumber, snap beans and lettuce. The DOA in St. Kitts also emphasizes onion production but farmers do not appear very enthusiastic towards the crop. In Nevis, according to the DOA Work Plan, the priority vegetable crops include cucurbits, solanaceous crops, brassicas and onion. The DOA in Nevis plans to develop the production of other vegetable crops (snap, bean, okra, eggplant and carrot) to satisfy increasing local demand.

A few exotic vegetable crops were introduced into St. Kitts by the Republic of China (ROC) Technical Mission which established a 3-acre demonstration/training farm on the island in 1983. These crops include asparagus, honey-dew melon, broccoli, cauliflower, butternut squash and zucchini.

3.1.2.2 St. Kitts

(a) Ecological Considerations

Climatic and soil conditions are the main ecological considerations pertaining to vegetable production in St. Kitts. In terms of climate, rainfall (intensity and distribution) is the most crucial factor since vegetable production is mainly under rainfed conditions. Soil fertility and water retention capability are the main soil factors to be considered.

Climatically, the agro-ecological zone with greatest concentration of commercial vegetable production activities is characterized by low, unpredictable and poorly distributed rainfall. The annual rainfall ranges from approximately 49 inches (1,250mm) to 70 inches (1780mm). Although the rainy season spans a period of seven months (June to December) because of the highly unpredictable nature of rainfall during the months of June to early September, most commercial vegetable farmers producing, under rainfed conditions, consider their cropping period to be limited to only three or four months (mid-September to December or January). The least intense and more reliable (regular) rainfall occurs during



November and December. Heavy downpours of rain and few rainy days can be expected during the period June to early September. Apart from the unpredictable rainfall, high temperatures (up to 32 C) and fairly strong (16-48 km per hour) and constant winds are common occurrences during the months of June to September.

Because the soils in the vegetable growing areas are mainly sandy loams and loamy sands, their moisture holding capacity is low, and so they are rapidly leached. Moreover, the loose nature of the soil predisposes it to erosion which can be rather severe even on the moderate slopes. Vegetable producers who farm on eroded soils encounter soil fertility problems.

(b) Pre-Production

As indicated in Table 3.7, seeds of a wide range of vegetable crop species and cultivars are available, mainly from the Trading Development Company (TDC) and the Department of Agriculture (DOA). However, a few commercial vegetable farmers import seeds directly from seed companies in the United States of American (USA). The ROC Mission has its own stock of vegetable seeds, imported from Taiwan, and is an occasional source of seeds for the DOA. Tomato cultivars suited for wet (hot) season production in St. Kitts are available.

Apart from the DOA nursery which produces limited quantities of vegetable (mainly tomato) seedlings for sale (at subsidized rates) to farmers, there are no commercial vegetables seedling nurseries in St. Kitts. Farmers generally produce their own seedlings on raised, unsterilized beds. Seedbed preparation appears inadequate, and nursery management standards could be improved. However, during the past two years there has been an increase in the used of speedling trays for producing vegetable seedlings. (Sale of speedling trays by TDC increased from 400 in 1989 to 1300 in 1990; and 600 were sold during the first quarter of 1991.) This is a very encouraging sign since nursery management tends to be easier when trays, rather than beds, are used for seedling production.

(c) Production to Harvest

It is estimated that about twenty (20) commercial farmers account for more than fifty per cent of the vegetables produced in St. Kitts. These farmers operate under rainfed conditions. They are very enterprising and business oriented. They operate on approximately 10-20 acres of leased lands (from Government), possess their own means of transportation, and a few have even invested in tractors to ensure timely ploughing of their fields. The semi-commercial and



Table 3.7
Vegetable Seeds available in St. Kitts (April, 1991)

VEGETABLE SPECIES	CULTIVAR (SEEDS) AVAILABLE AT	
	DOA	TDC
Tomato	Calypso Caraibe Floradade Capitan	Floradel Calypso Marglobe
Carrot	Chantenay Long Danvers 126	Danvers Half Long Chantenay Chantenay Red Core Danvers 126
Cabbage	Copenhagen Market Early Jersey KK Cross KY Cross Market King Fortuna	Jersey Wakefield Copenhagen Market KK Cross
Sweet Pepper	California Wonder Keystone Resistant Giant	California Wonder Keystone Resistant Giant
Watermelon	Sugar Baby Imperial Yellow Doll	Sugar Baby Crimson Sweet
Cucumber	Dasher 2 Poinsett 76	Poinsett 76
Snap Beans	None	Contender Provider
Lettuce	None	Minetto
Onion	Granex Yellow Texas Yellow Grano Granoble	Yellow Granex F, Hybrid Texas Early Grano
Broccoli	Packman	Laser
Cauliflower	Early Patina	None
Squash	Early Butternut	Early Butternut Zucchini
Beet	Detroit Dark Red	Detroit Dark Red
Eggplant	Black Beauty Long Purple	Black Beauty
Melon	None	Honey Dew Gold Rind
Radish	None	Crimson Giant
Cantaloupe Parsley	None Moss Curl	Hales Best Jumbo None



subsistence farmers cultivate smaller acreages (1-3 acres), and their level of investment in vegetable production activities is minimal. They generally engage in mixed cropping (vegetable and root crops).

Land preparation activities by the commercial vegetable farmers are undertaken mechanically. Land clearing is usually undertaken, using herbicides. Farmers without tractors use the service available through the Farm Machinery Pool. Some farmers use mechanical seeders when planting by direct seeding. Pre-emergence and selective herbicides are commonly used, especially when cultivating carrot and onion. Both granular and liquid complete (NPK) fertilizers are used by most commercial producers. Sulphate of ammonia, muriate of potash, triple superphosphate and lime are also used, but mainly on the advice of the DOA's extension officers. However, such advice appears to be based on the officer's experience rather than a technical analysis since there is no soil testing facility in St. Kitts.

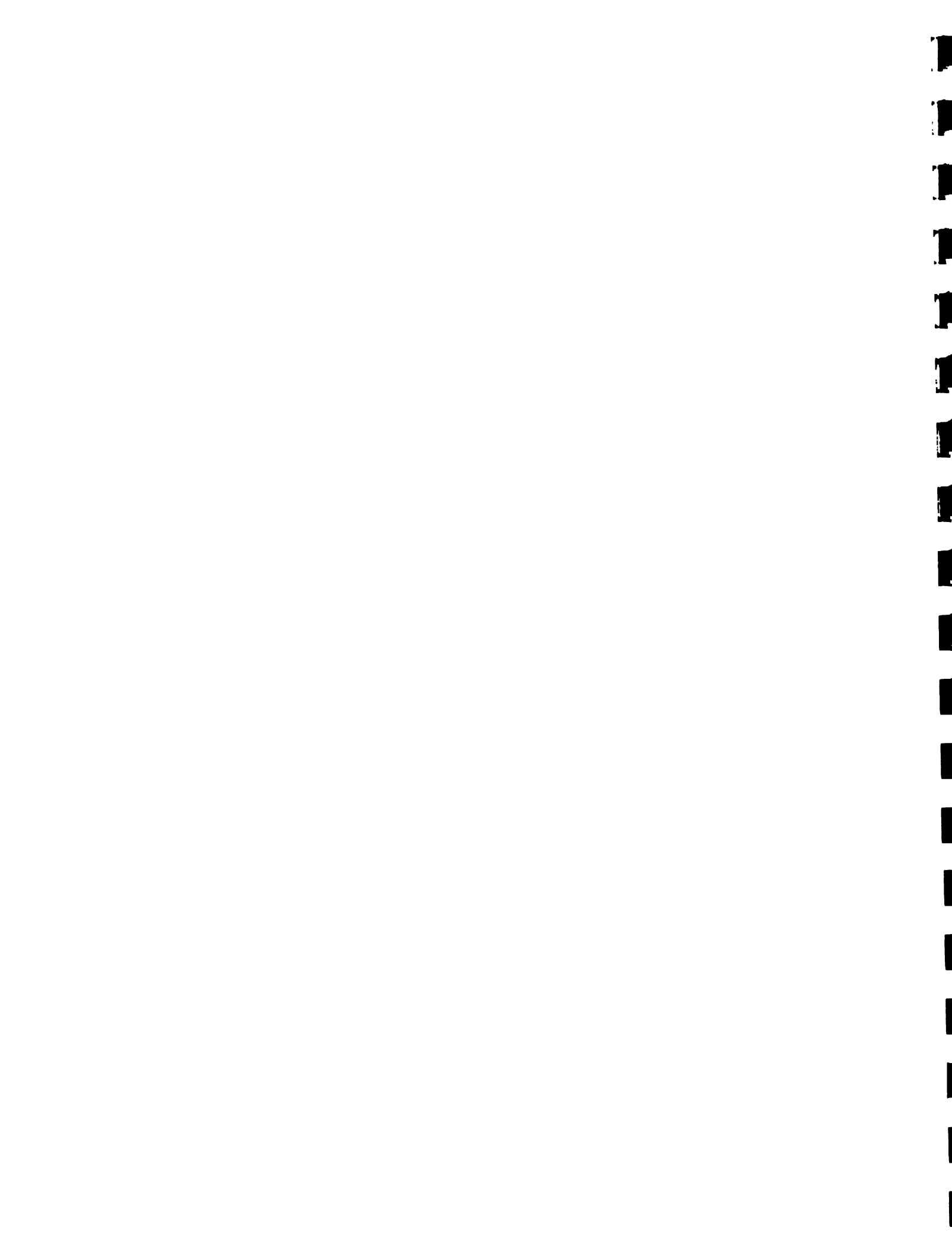
Although the planting season begins in June, based on the commencement of the rains, most farmers admit that planting early in the season could be very risky given the unpredictability and torrential nature of the rains during the first 3 to 4 months of the rainy season. However, a few farmers take the risk, but the majority wait to prepare and plant their seedlings during the months of October and November. Some continue to plant up to January and February, with the hope of a prolonged rainy season.

During the first quarter of 1991, CARDI (through the USAID-funded TROPRO project) began establishing a series of drip irrigation systems (each extending over a 1/4 acre plot) on farmers' holdings as demonstration activities. Eight such systems were to be established by the end of April, 1991.

Given the soil and climatic conditions in St. Kitts, the level of soil management among vegetable producers leaves much to be desired. Mulching is very rarely observed, and anti-erosion measures on sloping lands are inadequate.

Tomato is the only vegetable crop observed being staked. Steel rods, cut into lengths of approximately one metre and painted, are generally used for staking. However, at the ROC Mission's farm at Needsmust, bamboo stakes were used.

All vegetables are harvested manually. Farmers appear quite knowledgeable concerning the correct stage at which the various vegetables are to be harvested. However, as occasionally occurs, crop maturity may coincide with a market glut and the farmer is forced to leave the produce unharvested for an extended period. This often results in over-



mature/over-ripe produce which become unmarketable, resulting in significant loss of income to the farmer.

Generally speaking, the semi-commercial and subsistence farmers in St. Kitts rely on manual layout to execute all farming activities. Their level of farm input is low (most do not fertilize) and their returns are also low, but they seem satisfied with the returns for their efforts. In any case, most are concerned primarily with providing food for their households and keeping themselves occupied on the farm.

(d) Postharvest Handling and Processing

There are no on-farm storage facilities. Therefore, harvested vegetables are often exposed to the sun's heat for varying lengths of time before being transported to the farmers home, and then to the market. Neither at the farmers home nor at the market place are there appropriate storage facilities geared to prolong the shelf life commodities.

Vegetable produce are generally cleaned and trimmed. They are graded only if destined for the hotels or supermarkets, which demand a certain quality standard.

There are no organized vegetable processing activities in St. Kitts. However, a few farmers are believed to be involved in limited ad hoc processing of hot pepper and "herbs", based on availability of raw materials.

(e) Institutional Services

Credit for vegetable producers in St. Kitts is available mainly through the St. Kitts and Nevis Development Bank and the Foundation for National Development. Commercial banks (especially Barclays) also make credit available for vegetable production activities, but collateral security requirements are generally very demanding.

Marketing services are poorly organized. The Central Marketing Corporation (CEMACO), which is expected to play a major role in the marketing system, provides very limited assistance to vegetable producers in the areas of input procurement and vegetable marketing. However, the DOA (mainly through its extension officers) greatly assists farmers in transporting produce. Additionally, the DOA has established a "Crop Forecast" system for selected vegetables such as tomato, cabbage, carrot and sweet peppers. The Department estimates that these vegetables could be adequately supplied locally, provided farmers receive the necessary production and marketing support. through the forecasting system, the Ministry of Trade is advised regarding the possible of lifting



of import restrictions with respect to the commodities being monitored.

Vegetable research and development activities are being undertaken by CARDI in close collaboration with the DOA. Useful information, including tech-packs developed, have been made available to vegetable producers through the DOA extension service. A considerable amount of vegetable research has also been undertaken by the ROC Mission operating in St. Kitts. However, the expected close collaboration between the Mission and DOA's extension service appear to be minimal.

Vegetable producers have benefitted from seminars and workshops organized by the DOA and CARDI. Two leading farmers have also received hands-on training at the ROC Mission's vegetable farm at Needsmust.

(f) Production and Estimated Demand

As indicated in Table 3.8, vegetable production in St. Kitts is grossly inadequate to satisfy the estimated domestic demand. However, there is generally an over-supply of certain vegetables (mainly tomato, sweet pepper, cabbage and cucumber) on the local market during the period January to April. During this period, small quantities of certain vegetables are exported, mainly to neighbouring Nevis. Vegetable exports from St. Kitts are presented in Table 3.9.

Table 3.8

Estimated Vegetable Demand and Production (MT) in St. Kitts (1986-1990)

	ESTIMATED AVE. ANNUAL DEMAND (MT)	ESTIMATED PRODUCTION (MT)				
		1986	1987	1988	1989	1990
Cabbage	81.63	22.68	18.14	45.35	56.68	27.21
Carrot	81.63	22.68	34.01	45.35	59.41	56.68
Cauliflower	NA	2.27	1.81	2.27	0.9	0.9
Cucumber	NA	39.91	40.82	40.82	27.21	27.21
Lettuce (heads)	NA	25000	30000	35000	30000	30000
Onion	226.76	2.27	2.27	4.54	4.54	4.54
Snap Beans	NA	9.98	11.34	13.6	9.07	9.07
Sweet Pepper	21.77	11.79	11.79	9.07	22.58	11.34
Butternut Squash	NA	4.54	4.54	9.07	6.8	4.54
Tomato	97.96	45.35	54.42	68.02	77.1	68.02
Watermelon	18.14	18.14	34.01	36.28	31.74	45.35

NA means 'Not Available'

SOURCE: Department of Agriculture, St. Kitts

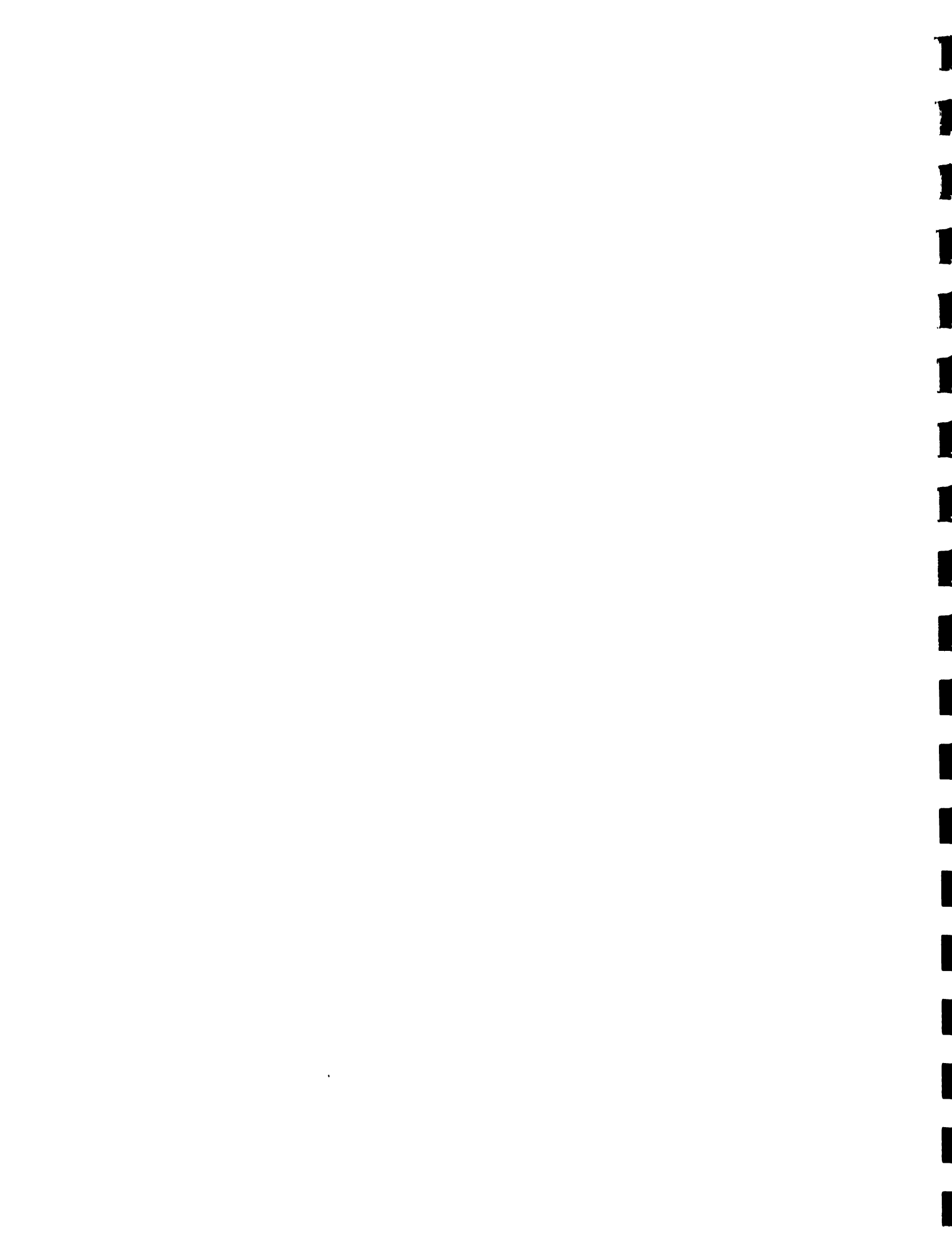


Table 3.9
Quality and Value of Vegetable Exports (St. Kitts) 1985-1989

COMMODITY	1985		1986		1987		1988		1989	
	QUANTITY (kg)	VALUE (EC\$)	QUANTITY (kg)	VALUE (EC\$)	QUANTITY (kg)	VALUE (EC\$)	QUANTITY (kg)	VALUE (EC\$)	QUANTITY (kg)	VALUE (EC\$)
Cabbage	8	6	5148	1299	-	-	76	163	-	-
Cucumber	2895	3323	-	-	417	614	907	892	354	203
Tomato	266	538	30	25	-	-	-	-	903	713
Sweet Pepper	95	296	10	15	10	15	118	350	-	-
Okra	101	197	-	-	30	25	-	-	10	12

SOURCE: Central Planning Unit, Basseterre, St. Kitts

Significant quantities of vegetables are imported annually to compensate for production shortfalls. Table 3.10 shows the quantities and corresponding values of vegetables imported for the period 1985 to 1989.

Data presented in Table 3.8 indicate a general increase in production of the major vegetable crops during the 5-year period 1986 to 1990. In particular, tomato and carrot have shown steady and significant production increases between 1986 and 1989; the decrease in tomato and carrot production (in 1990) were, respectively, 11.8 percent and 4.6 percent. Cauliflower and cucumber production declined significantly in 1989, and maintained that low level in 1990. Cabbage production peaked in 1989, but dropped by more than fifty percent in 1990. It is interesting to note that onion, the vegetable in greatest demand, recorded a 100 percent production increase in 1988 but has not shown any further increases in 1989 and 1990.

Considering Tables 3.8 and 3.10, it appears that the domestic demand for some of the vegetable commodities, onion and cabbage in particular, as stated in column 1 of Table 3.8, has been underestimated. Onion, for example, is recorded as having an estimated annual demand of 226 tonnes, but the average import figure exceeds 250 tonnes annually (Table 3.10). Similarly, cabbage import (average) exceeds the stated demand.







Table 3.10
Quality and Value of Vegetable Imports (St. Kitts) 1985-1989

COMMODITY	1985		1986		1987		1988		1989	
	QUANTITY (kg)	VALUE (EC\$)	QUANTITY (kg)	VALUE (EC\$)	QUANTITY (kg)	VALUE (EC\$)	QUANTITY (kg)	VALUE (EC\$)	QUANTITY (kg)	VALUE (EC\$)
Cabbage	62328	86190	83038	142155	103211	152515	80354	130299	93360	142018
Cucumber	48	58	-	-	120	480	267	1179	784	1911
Tomato	52105	141752	35754	145593	50038	199170	76449	185871	38840	164965
Onion	284091	272825	249886	311636	215626	330249	264251	344145	251696	378259
Snap Beans	99	1210	136	520	9	11	327	923	-	-
Carrot	48464	84883	56294	136073	69577	128883	67735	127961	57880	123731
Carrot	3945	10326	110	539	1859	3712	106	1002	11656	31727
Beet	1957	4758	300	426	1832	25969	-	-	59	243
Sweet Pepper	7250	24295	13392	40844	20577	67212	28697	82478	18265	65413
Okra	-	-	160	553	7269	4822	2351	8749	3400	10876

SOURCE: Central Planning Unit, Basseterre, St. Kitts

3.1.2.3 Nevis

(a) Ecological considerations

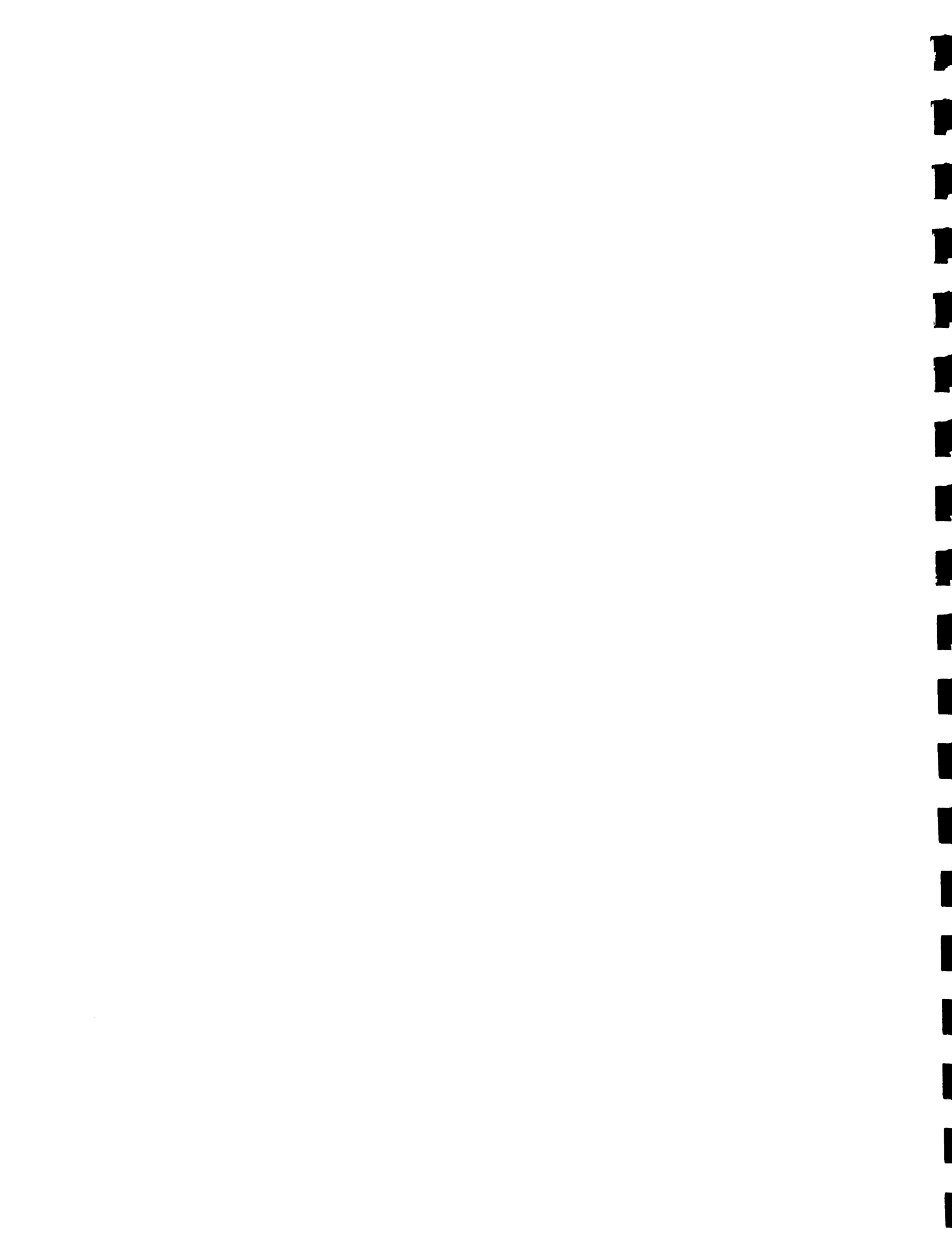
Low rainfall, windy conditions and a clayey and bouldery soil (in most areas) are the major ecologically constraining factors constraining vegetable production in Nevis.

The annual rainfall averages 33 inches to 52 inches (838mm to 1320mm). Besides, the rainfall is poorly distributed. The wet season (July to January) is characterized by a very wet period (July to October) when the rains are heavy but unpredictable, and a period (November to January) when the rainfall is less intense but predictable windy conditions prevail year round.

Because of its texture, the clayey soil holds much moisture during the rainy season. However, the low rate of water infiltration allowed by the heavy soil leads to a high level of surface runoff and erosion during heavy downpours. Erosion adversely affects soil fertility and, if the soil is tilled when it is either too wet or too dry, soil productivity could also be affected. Additionally, the stoney/bouldery nature of most of the Nevis soils makes cultivation by mechanical means very difficult and expensive.

(b) Pre-production

There is a good supply of vegetable seeds in Nevis. Nevis Development Bank (on behalf of the IDB-funded Input Revolving Fund Project), CARDATS and TDC are the main suppliers of vegetable seeds. TDC stocks a limited quantity and range of seeds of any one vegetable species, but can obtain additional stock (when necessary) from the parent company in St. Kitts.



There are no commercial vegetable seedling nurseries in Nevis. However, the DOA plans to establish a modern vegetable seedling nursery as part of the plant propagation station to be constructed at Prospect. Poor nursery management practices, currently observed on many farms, must be considered a major obstacle to the rapid development of the vegetable industry.

(c) Production to Harvest

Vegetable producers in Nevis farm very small acreages (0.25 to 3 acres). Land preparation is done mechanically wherever possible. Some areas are very stonely/bouldery, and this precludes the use of machinery for ploughing. In such cases, the land is forked and hoed prior to being planted. Herbicides are generally used for weed control, and mulching with Khus Khus grass has been observed. Soil conservation measures (grass barriers and land terracing) have also been observed.

In a few areas (for example, Cades Bay and New River) selected as sites for implementation of two externally funded vegetable production projects, pipelines and drip irrigation systems have been established through technical assistance from CARDATS and funding from USAID and FAO. In these areas, vegetables are cultivated year round. A few farmers in other areas, through CARDATS assistance, have also installed drip irrigation systems on small (0.25 acre) vegetable plots. It is significant to note that these farmers have invested funds towards purchasing additional drip irrigation lines in order to extend their vegetable crop area under irrigation. It must also be noted that the DOA has decided to promote the use of micro sprinklers as well as drip irrigation systems.

Vegetable crops are generally fertilized based on recommendations from technical officers from the DOA and the CARDATS project. (These officers work in very close collaboration and their activities are well coordinated.) A complete (NPK-15.15.15) fertilizer is most commonly used. However, some farmers occasionally apply additional nitrogen (in the form of urea or sulphate of ammonia) and potash. A few farmers have also admitted to using pen manure.

Weed control is almost exclusively by means of herbicides (both pre- and post-emergence). Selective herbicides are used in carrot and onion cultivation.

Apart from the diamond-back moth (Plutella maculipennis) in cabbage, there are no serious pests of vegetables in Nevis.

All vegetables are harvested manually. By experience, farmers have learnt the correct stage for harvesting most vegetables. However, during times of glut, certain vegetables (for



example, sweet pepper) are allowed to remain in the field for extended periods. Depending on the length of such periods, the crop may be considered unmarketable and therefore a total loss.

(d) Postharvest Handling and Processing

In Nevis, there seem to be significant postharvest losses in vegetables due mainly to storage and transportation problems and inadequate coordination with market outlets. In an attempt to reduce the level of postharvest losses, the DOA, with support from the CARDATS project, is promoting the erection of simple storage sheds on vegetable farms. One of these sheds was observed on a farm at New River.

Cold storage facilities located at Charlestown are soon to be assigned to farmers whom it was originally intended to serve. Vegetable producers are expected to make greatest use of these facilities. As a complement to the cold storage facilities. The training of vegetable farmers in proper postharvest handling methods should be considered a necessity if the level of postharvest losses is to be minimized.

Vegetables are not processed in Nevis.

(e) Institutional Services

The Nevis Development Bank and the Foundation for National Development are the major credit sources for vegetable farmers in Nevis. The CARDATS project also provides credit for land preparation activities and farm input procurement. However, CARDATS is in the process of scaling down its credit operations since the project is due to terminate shortly. Farmers hoping to continue accessing credit through this project have been advised to use the Input Revolving Fund facility being administered by the Nevis Development Bank. Unfortunately however, farmers have expressed doubts regarding the viability of vegetable seeds stocked by the Development Bank.

The DOA and the CARDATS project provide much assistance in the marketing of vegetables. Postharvest handling training sessions have been conducted and, whenever possible, vegetable producers have been assisted in the transportation of their produce. Contacts and negotiations with market outlets (hotels and supermarkets) have also been made on producers' behalf. The DOA is currently spearheading efforts to ensure that cooling facilities at Charlestown are made available to vegetable producers. It is also on the verge of implementing a Crop Forecasting System for the purpose of regulating the importation of selected vegetables produced in Nevis.



In terms of vegetable research and development activities, the DOA and CARDI/CARDATS are the major institutions spearheading those activities. However, the DOA, plans to seek additional technical support from the ROC Mission in St. Kitts. Through the CARDATS project, very useful production cost and income data are available on the following vegetable crops: cucumber, tomato, cabbage, carrot and watermelon.

(f) Production and Estimated Demand

Vegetable production data (over a 3-year period) for Nevis are provided for fourteen crops in Table 3.11 (based on the "crop year" which ends in March) and for nine crops in Table 3.12 (based on the calendar year) - eight of the crops are common to both tables. The data in Table 3.13 were deduced based on consideration of two sets of data: Vegetable Production in St. Kitts (Table 3.8) and Vegetable Production in St. Kitts and Nevis (Table 3.13). Considering commodities common to Table 2.18 and 2.19, and comparing overall production figures for the 3-year period covered in each table, there appears to be significant variations between data presented in both tables. Such variations could not be reasonably accounted for by the difference in the manner of compilation.

Considering the data in Table 3.13, it is evident that most vegetable crops showed significant production increases during the period 1986 to 1988: Carrot, lettuce, onion and sweet pepper were most outstanding, with 1988 production being greater than the previous year's by 112 percent, 233 percent, 70 percent and 117 percent, respectively. (Data in Table 3.8 also indicate significant, but less remarkable, production increases for most crops.) Onion production is likely to continue on the upward trend until all onion imports (currently just over 18 tonnes) are replaced. In fact, the DOA's goal is to increase onion production to the level at which local demand could be surpassed and the excess commodity exported to St. Kitts. The remaining eight vegetable crops (listed in Table 3.13), and others (cantaloupe and watermelon) are required in relatively large quantities by the hotels - particularly, the Four Seasons Hotel. They therefore seem to have great potential for increased production, provided Nevis' tourism industry continues to flourish.

Data on vegetable imports and exports were unavailable. However, it is believed that relatively large quantities of vegetables are imported through the Hucksters and directly by hotels. Small quantities of vegetables are exported by Hucksters during times of glut.

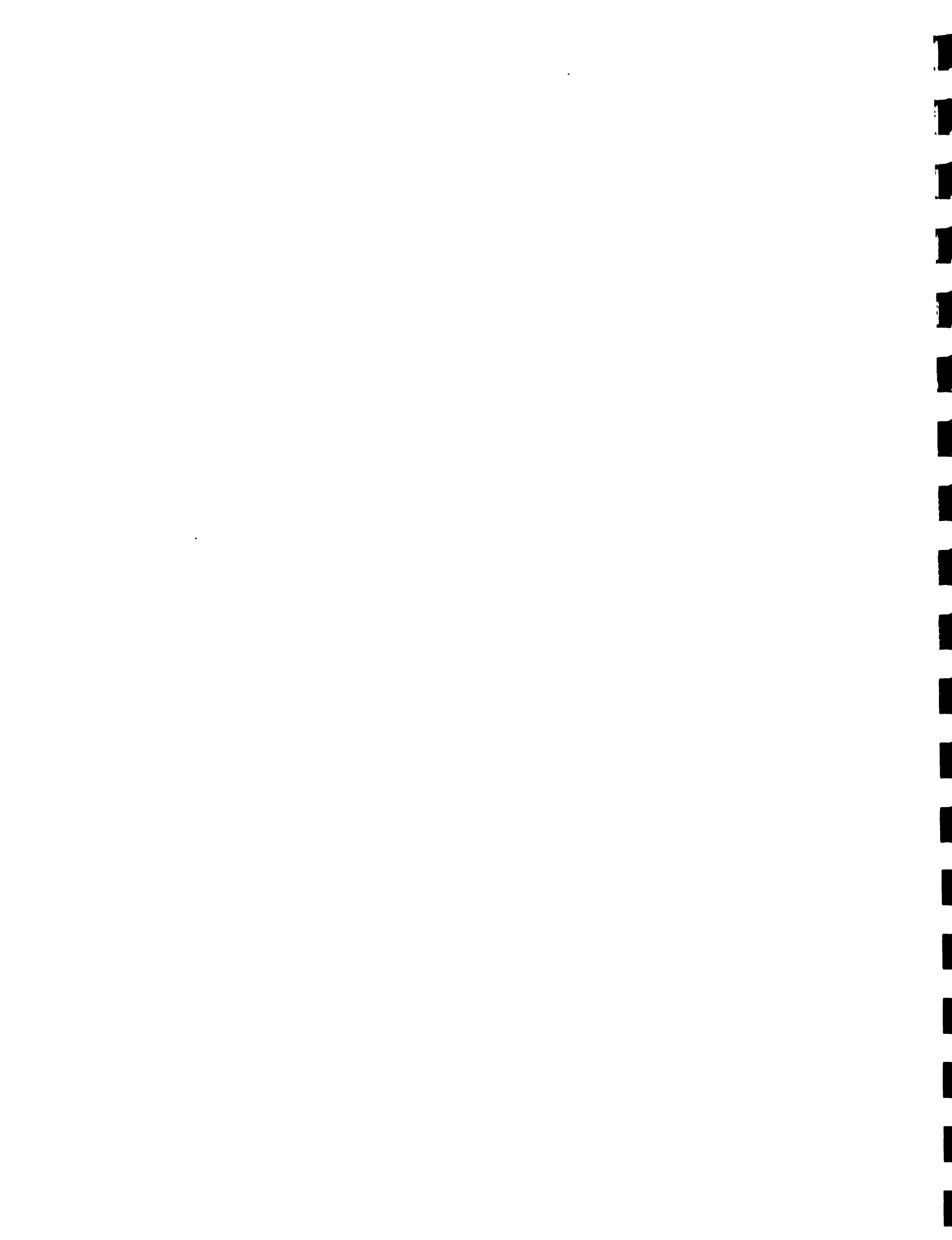


Table 3.11
Vegetable Production in Nevis (1986-87 to 1988-89)

COMMODITY	PRODUCTION (mt)		
	1986-1987	1987-1988	1988-1989
Cabbage	6.80	9.07	8.16
Carrot	9.07	11.61	15.87
Cauliflower	0.14	0.11	0.16
Cucumber	2.72	2.94	4.54
Lettuce (heads)	7000	12000	10000
Onion	1.13	1.13	1.81
Sweet Pepper	3.17	2.72	4.08
Tomato	3.62	3.04	5.44
Eggplant	0.54	0.45	0.54
Squash	2.26	2.26	2.72
Watermelon	3.62	6.80	5.90
Cantaloupe	0.38	0.90	1.81
Christophene	0.45	0.50	0.40
Parsley	0.09	0.09	0.11

SOURCE: Agriculture in Nevis. Nevis Country Environmental Profile, 1989.

Table 3.12
Vegetable Production in St. Kitts and Nevis, 1979-1988

COMMODITY	PRODUCTION (mt)									
	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Cabbage	34.29	30.77	39.84	32.97	27.75	34.34	32.24	30.22	25.82	15.38
Carrot	17.86	17.45	16.93	17.03	19.23	16.76	18.68	32.42	45.60	74.18
Cauliflower	-	-	-	-	2.75	3.85	3.79	2.91	2.35	2.94
Cucumber	12.29	-	1.43	-	19.23	28.19	31.87	50.60	51.65	54.95
Lettuce (heads)	-	-	-	-	25000	12000	24500	30000	33000	45000
Onion	12.83	12.08	11.70	12.80	0.29	4.67	7.42	3.85	4.12	7.69
Snap Beans	-	-	-	-	-	-	2.75	12.47	14.29	17.03
Sweet Pepper	8.86	6.13	10.27	10.54	7.63	9.88	10.99	14.84	14.95	15.93
Tomato	24.80	23.98	28.48	29.58	24.73	30.77	31.87	65.93	74.18	89.01

SOURCE: Central Planning Unit, St. Kitts

Table 3.13
Vegetable Production in Nevis 1986-1988

COMMODITY	PRODUCTION (mt)		
	1986	1987	1988
Cabbage	7.54	7.68	7*
Carrot	9.74	13.59	28.83
Cauliflower	0.64	0.55	0.67
Cucumber	10.69	10.83	14.13
Lettuce (heads)	5000	3000	10000
Onion	1.58	1.85	3.15
Snap Beans	2.49	2.95	3.43
Sweet Pepper	3.05	3.16	6.86
Tomato	20.58	19.76	20.99

* St. Kitts and Nevis (combined) production figure (Table 3.12 is less the St. Kitts production figure (Table 3.8) This is an apparent error.



3.1.3 Fruit Tree Crops Sub-sector

3.1.3.1 General Overview

Despite the potential of the twin-island Federation to grow fruit trees, only one commercial project exists in St. Kitts, and four to five small private orchards in Nevis. Coconuts are the exception for Nevis where large scale plantations can still be found. The St. Kitts based Wingfield Fruit Project, owned and administrated by the St. Kitts Sugar Manufacturing Corporation (SSMC), has three main orchards of mangoes, avocados, and citrus. Regrettably however, most of the trees show signs of neglect.

Many fruit species can be found growing and bearing well in the numerous ghauts of St. Kitts. Most of the trees found in these ghauts were either planted by sugar workers and their families or grew voluntarily from seeds which fell from the original trees planted. Among these fruit trees, mangoes (Mangifera indica), coconuts (Cocos nucifera, and breadfruits (Artocarpus altilis) are the species most commonly found. Nevertheless, a considerable amount of other fruit trees such as pawpaws (Carica papaya), citrus (Citrus spp.), soursop (Annona muricata), sugar apple (A. squamosa) and golden apple (Spondia cytherea), can be found growing and bearing well.

In Nevis, scattered or sometimes small orchards of tree crops are spread over the entire island. Large scale coconut plantations still occupy a significant area, but the trees show signs of neglect. This is probably due to the low price of and difficulties encountered in selling the copra. The rapid expansion of the construction industry is mainly responsible for the significant reduction in acreages of coconut plantation found today. Fruit trees of mangoes, breadfruit, pawpaws, soursop, tamarind (Tamarindus indica), guineps (Melicoca bijuca), plums (Spondias spp.) and cashew (Anacardium occidentale) are found throughout the island growing and bearing well, despite the minimum, if any, care provided.

The present land tenure system in St. Kitts, where more than 95% of the land is owned by the state, has been identified as one of the main reasons for the lack of private commercial fruit tree orchards. Farmers are reluctant to plant fruit trees or do any long term investment under the present short term rental agreement with government (SSMC). Although a comprehensive long term land lease programme planned in the 1986-1990 National Development Plan, the long awaited law necessary to ensure its implementation has not yet been passed. In Nevis, where the government owns 30% of the lands, the main constraints seem to be the extreme dry condition, the limitation of water for irrigation, the scarcity of labour, the limited market and a low farmer interest due to the lack of promotion programmes such as demonstration plots and incentives.



In most countries of the Caribbean, there is a tradition of planting a few fruit trees in almost every home. This tradition has contributed not only to reduce normal city noises, beautify the cities and purify the air, but has also proven to be an excellent source of vitamins and minerals for the family at a very low cost. It is noticeable that this tradition is not as popular in Basseterre as it is in other Caribbean urban areas. This was quite noticeable especially in new housing development areas. The lack of promotion programmes to motivate residents to plant fruit trees in their back garden or yard, as well as a severe shortage in the supply of planting materials are among the two major causes for this situation. However, it is also recognized that there is a limitation on the land area available for cultivation and water for irrigation purposes. On the other hand, in Nevis almost every house has a few fruit trees in their backyard, despite being drier than St. Kitts.

For both islands the rapid expansion of the tourism sector has created additional demand for fruits in the hotels and open new market possibilities for local production of fruit crops.

3.1.3.2 St. Kitts

(a) Ecological considerations

Although separated by only 2 miles at their nearest point the two sister island have some major differences in their ecology.

The soils of St. Kitts are of volcanic origin and range from sandy to loamy in surface texture. These textures provide a relative low moisture holding capacity and rapid drainage, factors which make the scarcity of water in the island a critical constraint. Under these conditions, mulching and the application of manure and crops residues, are strongly recommended for fruit trees production since these practices contribute to improve the soil retention of water.

Most soils of St. Kitts are low in nitrogen and organic matter, and fall within Class I-VII of the eight "Soil Capability Classes". In general, the limitation on use and the risk for soil damages, become progressively greater from Class I to Class VII. The first four Classes (I to IV) are capable of producing a wide range of fruit crops, as well as other crops, but Classes V and VI requires higher soil conservation management. Nevertheless, some fruits species could be successfully grown on a commercial scale in these soil classes. Class VII is not suitable for commercial fruit production.

St. Kitts has a typical maritime climate influenced by the easterly and north-easterly trade winds and the core of



volcanic mountain peaks. The leeward coast is much drier than the windward slopes. Annual average rainfall, range from 1250mm (50") in the low land (less than 76m - 250 ft.), 2000mm (80") about 610m (2000ft) to over 3000mm (120") at higher altitudes. St. Kitts has two rainy seasons: April to June and August to October.

The mean monthly evapotranspiration rate is 132.5mm (5.3") with an estimated loss of (64.2") per year. Temperature decreases by approximately 1°C. per each 305m (1000ft) rise above seal level. Near to the coastal area, the average temperature is 20°C. With maximum mean of 31°C and minimum mean of 21°C. Average relative humidity ranges from about 75% in January to March to about 80% during September and November. Prevailing winds are easterly with velocities that range from 18 to 25 km/hr. In exposed areas the establishment of wind breaks is essential for the production of fruit tree. During the hurricane season (July to September) winds may blow at 70km/hr. Lowest wind velocities are experienced during the period October to November. Sea blast salt could be a major problem especially in coastal areas of the Eastern side of the island.

(b) Pre-production

The propagation of fruit trees in St. Kitts is carried out at a government propagation station (La Guerrite). Under a CIDA/SPIF project, this station was recently rebuilt and equipped with new facilities such as seedbins, raised propagation tables, irrigation equipment and storage room.

Some design faults were noted in the new facility which may limit space for hardening, budding and grafting. The tables were also constructed too high and too broad which will affect efficient use by the propagators.

The irrigation system provided is an overhead system. This system may prove cumbersome and impractical for the ground bins, mist beds as well as other areas where plants are to be propagated vegetatively. As designed, the system will not only contribute to the waste of water, but also promote continuous mold growth mold and thus making it difficult to maintain good sanitary conditions in the nursery.

It is expected that additional space for hardening of plants such as mangoes which require full sunlight can be found in an area adjacent to the nursery. Basic equipment for soil and seed sterilization is expected to be supplied from the UNDP/FAO project due to start shortly as well as training in propagation techniques and other aspects of nursery management.



Although the cost of producing a seedling or grafted tree at the La Guerrite is not known, it is well known that the production cost is well above the subsidized sale price of EC\$5.00 for each plant. These plants are sold on a "first come first serve" basis. The system of recording of plant sales and distribution is for all practical purposes non-existent.

The demand for all the species of fruits presently being propagated at the nursery has outstripped supply.

The high demand for planting materials from neighbouring islands have created additional pressure on the capacity of domestic supply from the nursery to satisfy national demand.

Since the price of EC\$1.00 per plant paid by a neighbouring island is considerably higher than the subsidized price paid by local farmers. The export of planting material is an attractive venture and provides the nursery with a valuable source of revenue. However, the reality is that these export sales are affecting the achievements of national planting targets with respect to fruit sub-sector. In addressing this excess demand the government could provide the necessary incentives for the establishment of one or more private nurseries, or provide additional financial resources to expand the present capacity of its nursery to supply the overseas demand without affecting the supply of planting materials available on the local market.

Nursery management is weak. No production plan is in place and, generally, the propagation officer decides on the species, cultivars and quality of plants to be propagated. According to the propagation officer the nursery annual target for the past three years has been 3000 citrus, 2500 mangoes, 300 avocados and 550 miscellaneous fruit species. The nursery budget is fixed annually by government and bears no relation to the quantity of plants to be propagated as determined by demand. Record keeping is, in general, very limited.

No "quality standards" are set for the release of plants by the nursery. Consequently, a high mortality rate of young plants results in the field.

Nursery staff at La Guerrite are in need of training in the various aspects of plant propagation methods, decontamination practices (tools sterilization and soil and seed treatments) and management.

The method of collection as well as the sourcing of planting material (seeds and budwood) need to be improved in both St. Kitts and Nevis. There is a need to establish well maintained germplasm banks of all priority species of fruit trees. The



Wingfield fruit orchard could have been used as a main source of planting materials, but most trees there are neglected, and unsanitary conditions make them unsuitable for collection of budwood. Due to the shortages of supply and high price of avocado fruits, planting materials are obtained from any available source. The practice of buying avocado seeds of unknown source and sanitary condition may be contributing, or in the long run will contribute to the distribution of the root rot disease (Phytophthora sp.) from field to field.

It is expected that once approved, the UNDP/FAO project, now in the pipeline, will address some of the constraints listed above.

Main fruit species and cultivars propagated by the La Guerrite nursery are listed in Table 3.14.

Table 3.14
Main Fruit Species and Cultivars Propagated
at "La Guerrite" Nursery

SPECIES		CULTIVARS
Common name	Latin Name	
Sweet Oranges	<u>Citrus sinensis</u>	Valencia, Parson Brown, W. Navel, Pineapple
Sour Orange	<u>Citrus aurantium</u>	Common
Limes	<u>Citrus aurantifolia</u>	West Indian & Tahiti (persian).
Grapefruit	<u>Citrus paradisi</u>	Marsh seedless white & pink
Rough Lemon	<u>Citrus</u>	Rough Lemon
Pummelos	<u>Citrus grandis</u>	Unknown
Avocados	<u>Persea americana</u>	Lula, Pollock, Simmonds
Mangoes	<u>Mangifera indica</u>	Julie, Graham, Irwin, Haden Bombay,
Other miscellaneous trees eg. Soursop, breadfruit, cherries, plums, etc.		From Local non-selected

(c) Production and Harvesting

The growing of fruit trees in the backyards of private homes, something that is very common in other islands of the Caribbean, was not noticeable in St. Kitts. The commercial production of fruit trees on small farmers plots is practically non-existent with the exception of a few scattered



plots or papayas now being established. However, a relatively large commercial fruit project was developed by the St. Kitts Sugar Manufactory Company (SSMC). The main components of this project are "The Wingfield Tree Crop Project" located at Wingfield Estate, the pineapple project at Molyneaux Estate, and the Coconut orchards at West Farm & Dieppe. Additionally, four commercial demonstration plots of papayas (approx. 1/4 acre each) have recently been established under a Republic of China (Taiwan) cooperation project.

The great majority of fruit trees in St. Kitts are found growing wild in the ghauts. These fruit trees are in very poor condition because of limited care provided. In 1989 a significant number of these trees were severely damaged or destroyed by hurricane Hugo. Table 3.15 summarizes the estimated number of fruit trees in St. Kitts prior to hurricane Hugo.

Table 3.15
Permanent Crops on all holdings by
type and tree population (St. Kitts)

TYPE OF TREE CROPS	NO. OF HOLDING	NO. OF TREES			
		COMPACT		SCATTERED	
		F.B.	NON F.B.	F.B	NON F.B
Coconut	464	989	127	1945	400
Sweet Orange	148	1013	435	398	87
Grapefruit	72	383	13	102	23
Avocado (pears)	433	683	74	755	242
Mango (grafted)	224	1398	212	537	767
Mango (others)	349	734	12	786	200
Lime or Lemon	301	769	82	381	141
Other Citrus	170	108	229	200	240
Breadfruit	327	739	17	544	183
Sugar Apples	144	51	20	273	179
Guineps	75	18	8	91	2740
Coffee	7	60	4	17	17
Banana & Plantain	777	20659	7947	4799	2835
Other	289	535	67	671	1766

SOURCE: 1987 Census, St. Kitts and Nevis

The experience with commercial production and harvesting of fruit trees in St. Kitts is limited to the SSMC project.

With the exception of breadfruits (root cuttings) most fruit plants found in the ghauts grew from seedlings. Avocadoes are of the West Indian race and most mangoes are of the local "types". Due to the poor agronomic practices and limited attention provided, yield from these trees is low, and fruit quality is poor. No selection has been done on local clones of breadfruits,



soursop, golden apple, mango or any other fruit crop available.

The seasonality of production of fruit trees in St. Kitts and Nevis is presented in Table 3.16.

Table 3.16

Seasonality of Fruit Crops in St. Kitts and Nevis

CROP	SEASON		
	START	END	PEAK
COCONUTS	-----YEAR ROUND-----		
ORANGES	Jul	Apr	Nov-Dec
GRAPEFRUIT	Dec	Mar	Feb
LIMES	-----YEAR ROUND-----		
MANGOES	May	Sep	Jul-Aug
AVOCADOES (Pollock) (Lula)	Jul Nov	Aug Jan	Jul Dec-Jan
PINEAPPLE	-----YEAR ROUND-----		
PAPAYA	-----YEAR ROUND-----		
BREADFRUIT	-----YEAR ROUND-----		
GOLDEN APPLE	Aug	Jan	Jul
SOURSOP	-----YEAR ROUND-----		
TAMARIND	-----YEAR ROUND-----		
PLUMS	May	Sep	Jul

Source: Personal communication with growers and technicians.

Statistics on total production, yield, imports and exports are scarce. However, the last Agricultural Census in 1987 gives some estimates of the production and sales from farmers holdings. These are presented in Table 3.17.



Table 3.17

**Production and sale of permanent crops
during a twelve month period 1986/9187**

TYPE OF TREE CROP	UNIT	HARVESTED	SOLD
Coconut - Dry	No.	35458	2113
Coconut - Jelly	No.	7743	415
Coconut - Copra	Tons.	7	0
Sweet Orange	No.	46437	4500
Grape Fruit	No.	83172	13586
Avocado (Pears)	Lbs.	139161	34790
Mango (Grafted)	No.	167828	78958
Mango (Others)	No.	101474	10540
Lime-or Lemon	Lbs.	85367	26621
Other Citrus	No.	26669	460
Breadfruit	No.	42364	9411
Sugar Apples	Lbs.	8594	60
Guineps	Bnch.	19744	2068
Coffee Beans	Lbs.	126	0
Banana & Plantain	Lbs.	34101	17012

SOURCE: St. Kitts and Nevis Agricultural Census 1987

Field observations in both St. Kitts and Nevis and interview with CARDI's professionals suggest that there may be a high incidence of pests and diseases of potential importance which may reduce yield, affect fruit quality or occasionally kill the trees. Fruit flies, sucking insects such as thrips, mites and aphids, as well as diseases such as anthracnose, root-rot - fruit rot, and dieback are found with a significant frequency in the majority of fruit tree orchards found in St. Kitts. This of course is not a surprise, with the present neglect to which most orchards are subjected. Table 3.18 summarises the main pests and diseases affecting fruit trees in both St. Kitts and Nevis.

The orchards at the SSMC Wingfield Project is presently neglected and in the best of cases (e.g. mangoes, limes and bananas) receive insufficient inputs to support production. Cultural practices at this project site are limited to weeding, fertilizing of mangoes and limes, and in some cases (e.g. limes) an inefficient pruning. The lack of crop care and the high incidence of pests and diseases have resulted not only in very low yields and poor quality fruits, but also a rapid deterioration in the orchards.



Table 3.18

Pests and Diseases of potential economic significance affecting the production of fruits in St. Kitts and Nevis.

CROP	PESTS	DISEASES
CITRUS	Beetles, scales, mites, aphids, mealy bugs.	Root and foot rot, melanoses, greasy spot, whiter tip, anthracnose.
MANGOES	Fruit flies ¹ , scales, mites, thrips, aphids, mealy bugs, monkeys.	Anthracnose, cercospora, leaf spots.
AVOCADOS	Thrips, scales, termite and mites	Root-rot, anthracnose.
PAPAYAS	Mites, leaf-hoppers, aphids	Bunch top, anthracnose, foot-rot.
PINEAPPLE	Mealy bugs, nematodes, scales	
SOURSOP	Scales, aphids, mealy bugs	Anthracnose
CASHEW	Mites, aphids, thrips, scales	Anthracnose, cercospora
GOLDEN APPLE	Aphids, mealy bugs, scales, mites	Gumming, anthracnose.

Source: Interviews with plant protection staff, field personnel and personal field observations.

A profile of the main commercial fruit projects in St. Kitts is presented in Table 3.19 including agronomic data, main problems, cultural practices, harvesting & post-harvest methods and final destination of the production.

¹ Although a detailed survey has not been conducted. Preliminary observations indicate that Nevis has very little, if any, fruit flies affecting their fruits.



TABLE 3.19
PROFILES OF THE MAIN COMMERCIAL FRUIT PROJECTS IN ST. KITTS

PROJECT:	WINGFIELD							REP. OF CRIMA	PINEAPPLE ORCH.	COCONUT ORCH.
	ORANGES	LINES	GRAPEFRUIT	MANGOES	AVOCADOES	PAPAYAS	PINEAPPLE				COCONUTS
DETAILS CROPS:										
LOCATION	Wingfield	Wingfield	Wingfield	Wingfield	Wingfield	Wingfield	Fabies, green-hill Fountain	Holyneaux Estate	West Farm & Dieppe.	
VARIETIES	Valencia V. Navel	V. Indian Tahiti	Marsh Seedless	Julie, Graham Haden, Irwin, Bombay	Pollock, Lula, Simmonds	Tainung 2 Sunrise	Smooth Cayene Antigua Black			
ACREAGE	15.7	4.0	5.0	9.4	5.0	2.2	1.5		>100	
AGE	>12 years	>12 years	>12 years	>12 years	>12 years	4-7 months	>3 years		>40 years	
PLANT DISTRIBUTION	20' x 20'	15' x 15'	25' x 25'	22' x 22'						
MAIN PROBLEM	Management	Management	Management	Management	Management	(#1)	Management		Totally neglected	
CULTURAL PRACTICES										
- Irrigation	Rainfed	Rainfed	Rainfed	Rainfed	Rainfed	Rainfed	Rainfed	Rainfed	Rainfed	Rainfed
- Weed control	Nil	Merchan/Chem	Nil	Merchan.	Mechan.	Hand/Chem.	Hand/Chem.	Hand/Chem.	Nil	Nil
- Pruning	Nil (#2)	Nil (#1)	Nil	Nil	Nil	NA	NA	NA	Nil	Nil
- Spraying	Nil (#3)	Nil (#3)	Nil	1lb/1/Y	Nil	Nil (#5)	Diazinon	Diazinon	Nil	Nil
- Fertilization	Nil (#4)	Nil (#4)	Nil		Nil		Nil	Nil	Nil	Nil
HARVESTING										
- Method	Hand shaking	Hand/pole shaking	Hand shaking	Hand, climbing, shaking, pole	Hand/pole shaking	NA	Hand	Hand	Nil	Nil
- Tools	NA	Pole & hook	NA	Pole & hook	Pole & hook	NA	Knives	Knives	NA	NA
POST HARVEST HANDLING										
- Level	NA	Very low	Very low	Very Low	Very low	NA	Very low	Very low	NA	NA
MARKET	Local	Local fresh Few exported to St. Maarten	Local	Local fresh Few exported to St. Maarten	Local fresh Few exported to St. Maarten	Local fresh	Local fresh	Local fresh	Local fresh	NA

*1: Plants too young virus and virus like. Weed competition has been the main problem.
 *2: CARDI just started some experimental pruning in a few plants.
 *3: Chinese doing experimental spraying with malathion.
 *4: For the first time they have applied 1/4 lb of 15-15-15 twice to a few plants.
 *5: Pen manure at planting but nothing else after.



Fruit trees in St. Kitts are subjected to high intensity winds which affect tree development, flowering and fruit setting. In few cases windbreaks are used. However, it is absolutely necessary that orchards be protected by windbreaks. The use of productive species or windbreaks could provide an additional source of income for the farmers. Jamoons and breadfruit are recommended. However, Trees of Cassuarina (*C. equisetifolia*) provide an excellent hedge. Note that each row of windbreaks can provide protection for an area 6 to 10 times the height of the protective tree used.

Inter-cropping systems of fruit crops with vegetables and/or root crops do not exist in St. Kitts. This absence is due mainly to the short term nature of rental schemes under which farmers lease land from government which do not permit the establishment of long term crops. The establishment of fruit trees among vegetables and/or root crops in an intercropping system would be advantageous in preventing wind damage to the later crops.

The current methods and tools used for harvesting fruits in both St. Kitts and Nevis is partially responsible for a significantly high percentage of bruising, cut and breakage of fruits, Where fruit cannot be reached by hand from the ground, traditional methods of shaking the tree is utilized to harvest the fruit or in the best of cases a person would climb the tree, pick and throw the fruit to the ground. The use of poles with hooks are also commonly used but the fruit is allowed to fall to the ground. New harvesting methods and tools will have to be introduced and farmers trained in their use. Some recommendations on harvesting methods is provided in Table 3.20.

Table 3.20
Recommended Picking Methods for Fruit Crops
growing St. Kitts and Nevis.

FRUIT TREE	RECOMMENDED METHODS AND TOOLS
ORANGES	Hand picking, pole-hook and bag
GRAPEFRUIT	Hand picking, pole-hook and bag
LIMES	Hand picking, pole-hook and bag
MANDARINES & TANG.	Hand clippers, Pole-clipper-bag
MANGOES	Hand clippers, Pole- "U" wire-bag
AVOCADOES	Hand clippers, Pole-"U" wire-bag
PINEAPPLE	Hand & Knife
PAPAYA	Hand picking, Thailand Harvester
BREADFRUIT	Pole-Clipper-Bag
GOLDEN APPLE	Hand, Pole-clipper and bag
SOURSOP	Hand & knife
TAMARIND	Pole and clippers
PLUMS	Hand, pole-bag



(d) Post-Harvest Handling

Although the production of fruits in St. Kitts is quite limited, post-harvest losses seem to be significantly high. Major problems are bruising, cuts, crushing, and scars caused by pests and diseases. However, in many instances the post-harvest losses can be traced to poor techniques during the production and/or harvesting operations. There is no well defined or organized production-harvesting - post-harvest system. Any serious attempt to develop the fruit industry, as contemplated in the diversification programme should have a strong element of training of farmers and technicians in effective harvesting and post-harvest handling processes.

(e) Agro-processing

No fruit is being processed in St. Kitts and none of the projects in pipeline, include components for the development of this agro-industrial sub-sector. The local market for fresh fruit production on a commercial scale is very limited. A few acres of production are enough to glut the local market. On the other hand, the supply of most of the fruits with market potential are restricted by their seasonality. Therefore, it is recommended that any attempt to develop the fruit sub-sector must include a component for the development of processing facilities.

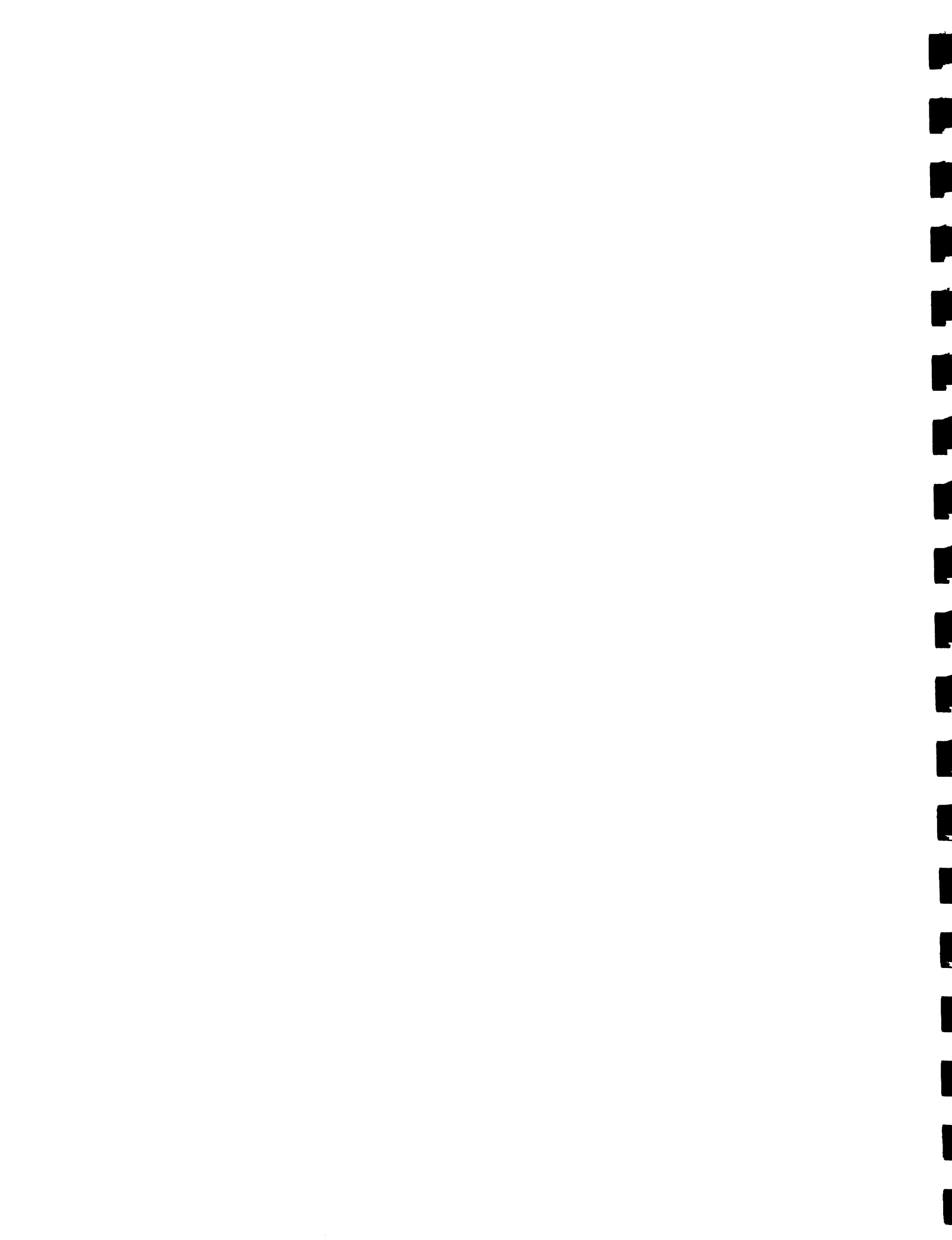
(f) Services

ST. KITTS AND NEVIS

1. Extension and Research

The extension officers of both St. Kitts and Nevis, although very knowledgeable in other crops, are not well-trained in the technical aspects of fruit production. They have had little, if any, exposure to commercial production systems, or problem identification and solution for fruit crops. Any effort to develop a sustainable fruit crop industry will require intensive training of MoA staff as well as farmers.

CARDI is mainly responsible for fruit crop research in St. Kitts as well in Nevis. Trials and observations in St. Kitts are limited to pests and diseases of mangoes and the pruning of limes at Wingfield, and adaptability of papaya varieties at CARDI field. In Nevis observation demonstration plots are established for pineapples and papayas at Prospect (CARDI), and for citrus at Cades Bay (MoA).



Demonstration plots are important not only to promote the commercial production of particular crop or crops, but also to show farmers how and when to implement the different operational procedures required. Therefore, in effecting this, the institution(s) involved should ensure that the most appropriate site is selected and demonstrate the effective application of the necessary inputs required by the crops. The pineapple plot established at Prospect Agricultural Station is a good example of how a demonstration plot should be maintained. Unfortunately, the low levels of management at citrus demonstration plot at Cades Bay and the papaya plot at Prospect and the consequential poor conditions of these plots will only discourage farmers from getting involved in the production of these fruits. Note that citrus, more specifically oranges and mandarines, are not adapted to the low, hot dry areas such as Cades Bay. They could do much better at higher elevation.

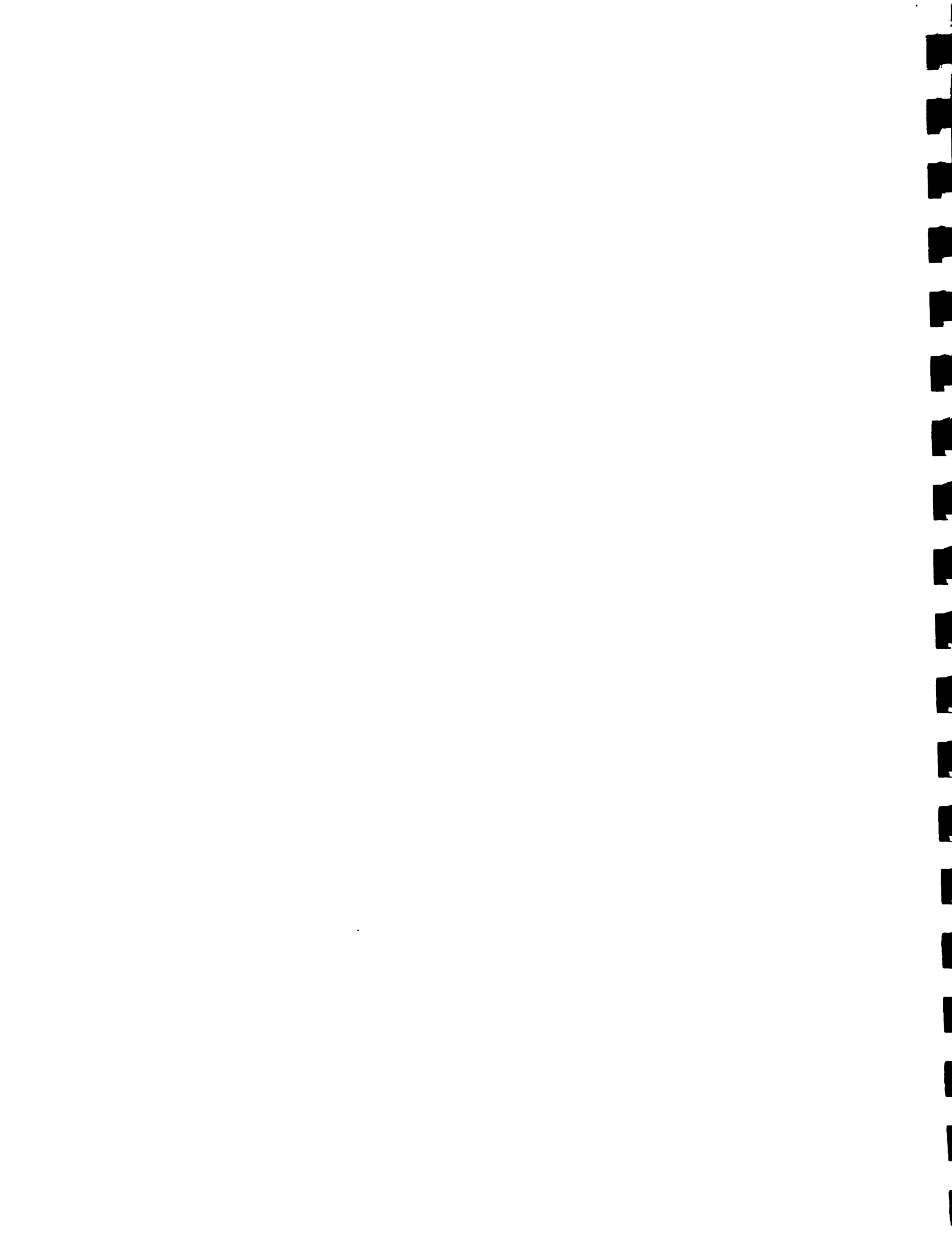
Some fruit species have similar ecological requirements, but some others do not. It is imperative that rather than establishing mixed orchard for demonstration or germplasm purposes, fruit species be grouped according to their ecological requirements, among other factors, and that different demonstration sites be selected for each group. This will help to prevent the rapid demise of some fruit species within the plots, as is the case at the Cades Bay citrus plot.

(2) Credit

Due to the long term nature of most fruit crops any expansion programme will require special credit schemes for farmers involving a grace period related to the time when the trees are not productive. Due to the conservative nature of commercial financing institutions in St. Kitts and Nevis and as commercial fruit production is not a traditional activity in both islands this credit scheme would have to be implemented through the development banks.

(3) Marketing

Most farmers describe marketing systems for fruits as deficient. The small size of the population of St. Kitts and Nevis limit the capacity of the local fruit market which in most cases can be supplied from the production of a few acres. The competition from imported fruits and products from other CARICOM countries complicates even further the domestic supply potential. As an example, the owner of one of the largest grapefruit orchards in Nevis lost most of his fruits because of his inability to



compete in the local market with grapefruits imported from other neighbouring islands. Nevertheless, the tourist industry is being targeted as a potential market for locally produced fruits. As is the case for most fruits, the flow of tourists into St. Kitts is also seasonal and utilises only fruit trees with bearing coinciding with the December-April peaks. The tourist season can be targeted at this particular market. It is therefore obvious that for any significant development of the fruit industry to take place, emphasis will have to be placed on exploiting the potential of regional or extra-regional markets for fresh or processed fruit products. Selection criteria and priorities should therefore be established for adaptability as well as export competitiveness.

(4) Transportation

Both islands have well developed and maintained road network systems and therefore no serious constraints for the movement of produce from farms to the markets. Nevertheless, the potential exists to develop fruit orchards on lands at higher elevations which presently are somewhat inaccessible to vehicular traffic because of poor quality or non-existent roads.

Due to the perishable nature of most fresh fruits, air transportation is the preferred means, for produce to reach overseas destinations in the minimum time. The available capacity of carriers is very limited, especially for produce originating from Nevis. The opportunity exists however, in both islands to tranship to larger carriers in Antigua as well as other neighboring islands.

(5) Agro-forestry

Due to the high risks of erosion and the relative scarcity of water, both islands should ensure the implementation of programmes to improve soil conservation practices and maintain the water sheds. There are several agro-fruit species that are well adapted to the ecoclimate of both islands and they provide the opportunity for the establishment of large scale agro-forestry production in some of the high risk areas that have soils classified as classes V and VI. Among these species tamarind, cashew, mangoes are recommended because of their adaptability to poor soils and dry conditions and their potential to produce agro-industrial products. However, the areas in question are inhabited by a large population of monkeys which will make it practically impossible to harvest any mangoes. Although monkeys eat



the cashew fruit, the cashew seed will still be available for processing. Monkeys will not reach the tamarind. Both cashew nuts and tamarind have a relative large and growing market in the USA and Europe.

3.1.3.3 Nevis

(a) Ecological Considerations

The soils of Nevis are also of volcanic origin but the surface texture ranges from loamy sands to heavy clay. These types of textures provide a relative high holding capacity for water and nutrients, a very important consideration in Nevis, because of the scarcity of water and the exposure to erosion of most soils in the island.

Although in most of the soils organic N is relatively low, the soils of Nevis are much more fertile than those of St. Kitts. Most soils are saturated with cations in which Ca and Mg dominate, and exchangeable K and available P, although variable, are generally high. As a result of these inherent soil characteristics the application of manure and crop residues is highly recommended. Additionally, it is expected that most crops will respond significantly to the application of fertilizers with a high nitrogen content.

Drainage conditions runs from slow in soils with heavy clay, to rapid in sand areas. Although soils with slow drainage are more susceptible to erosion, sandy soils are generally less fertile and hence less capable of supporting a dense vegetative cover to prevent soil erosion. Soil erosion risk exists in the Pinneys loamy sand and in Lavience loam and clay loam, where the water table is high. The soil pH for surface layer varies from 5.4 to 7.4 is suitable for a wide range of fruit crops.

The soils of Nevis can be placed within the eight "Soil Capability Classes". In general the limitation on use and the risk for soil damage become progressively greater from Class I to Class VIII. The first four Classes (I to IV) are capable of producing a wide range of fruit crops, as well as other crops, but Classes V and VI require effective soil conservation measures and good management if crops are to be successfully grown on a commercial basis in these classes. Classes VII and VIII are not suitable for commercial fruit production.

Due to an inadequate source of water for irrigation purposes combined with the relative low rainfall, experienced in the lower elevations, mulching is a recommended practice for most crops in Nevis. The humidity varies from 70% in March to 78% from September to November, with an annual average of 76%.



This relatively dry atmospheric condition is ideal for the prevention of diseases such as anthracnose, but increases the risk for other pests such as mites.

As in St. Kitts, wind velocity is one of the main constraints to the production of fruit crops in Nevis. Wind breaks are recommended in all cases.

(b) Pre-production

In Nevis, nursery infrastructure is practically non-existent and nursery operation is limited to occasional propagation of a few seedlings. Although "Prospect Agricultural Station" has been selected as a site for a propagation unit the construction of the facility and the purchase of equipment have not yet taken place under the UNDP/FAO project. This project due to commence shortly, includes the construction of a 15,000 plant nursery at Prospect, with the basic facilities for propagation (sheds, mist and humidity beds, storage room, etc). Presently, fruit crop seedlings are obtained from "on site" farm grafting, but this service is very limited in scope due to the lack of propagators. There are no private nurseries in St. Kitts or Nevis.

Although staff from the Ministry of Agriculture of Nevis have received training in Barbados under the Canadian Training Award Programme (CTAP) for Plant Propagators, the three persons trained have since left the Ministry of Agriculture Propagation station.

(c) Production and Harvesting

Cultivars used, planting distances, fertilization rate, and pests and diseases problems are the same as in St. Kitts. There are a few small-commercial mixed orchards to be found on farmers plots and demonstration fields (citrus, pineapple, papaya). The trees in these orchards, although neglected in most cases, produce relatively well and are in fact demonstrating the potential of the island to produce a wide variety of fruit crops for the local and export markets. The production and harvesting system for fruit crops in Nevis are basically the same as that described for St. Kitts.

Most farmers interviewed agreed that the main factors limiting the expansion of fruit trees in Nevis are: (i) difficulties experienced in marketing some fruits such as grapefruits, (ii) scarcity of good planting materials, (iii) the lack of technical assistance for the identification of fruit tree problems and the development of solutions to these problems.

Table 3.21 summarize the estimated number of fruit trees in Nevis prior to Hurricane Hugo.



Table 3.21

Permanent Crops on all Holdings by Type and Tree Population (Nevis)

TYPE OF TREE CROPS	NO. OF HOLDING	NO. OF TREES			
		COMPACT		SCATTERED	
		F.B.	NON F.B.	F.B.	NON F.B.
Coconut	759	6266	532	24813	7829
Sweet Orange	202	295	6	281	270
Grapefruit	138	223	2	222	101
Avocado (pears)	436	44	8	720	347
Mango (grafted)	391	266	4	934	834
Mango (others)	638	352	18	2771	1641
Lime or Lemon	465	71	14	843	1121
Other Citrus	344	30	5	614	125
Breadfruit	482	304	32	878	365
Sugar Apples	521	358	28	2923	353
Guineps	402	63	35	929	351
Coffee	16	0	0	78	36
Banana & Plantain	695	3493	2294	5865	3089
Other	173	15	20	499	141

SOURCE: 1987 Census, St. Kitts and Nevis



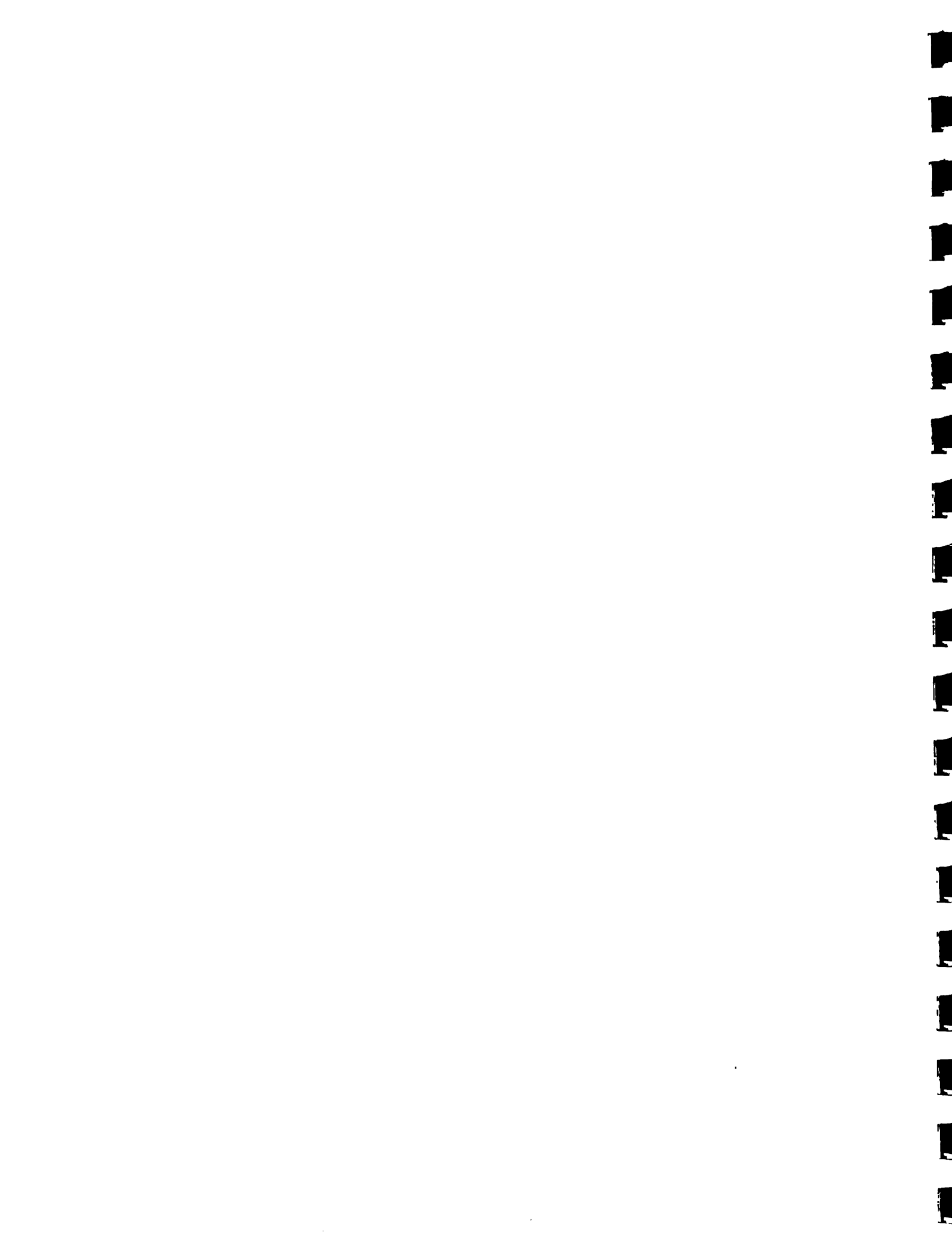
Statistics on total production, yield, import and exports are limited for Nevis. However, the last census in 1987 gives some estimates of the production and sales from farmers' holdings. These are presented in Table 3.22.

Table 3.22

All holdings by production and sale of permanent Crops during past twelve months

TYPE OF TREE CROP	UNIT	HARVESTED	SOLD
Coconut - Dry	No.	22193	760
Coconut - Jelly	No.	120047	69140
Coconut - Copra	Tons.	4558	4548
Sweet Orange	No.	18436	5514
Grape Fruit	No.	14038	5592
Avocado (Pears)	Lbs.	27450	6978
Mango (Grafted)	No.	91237	13191
Mango (Others)	No.	424629	29840
Lime or Lemon	Lbs.	223029	90688
Other Citrus	No.	39785	5413
Breadfruit	No.	61226	4590
Sugar Apples	Lbs.	55164	4904
Guineps	Bnch.	126701	11466
Coffee Beans	Lbs.	707	0
Banana & Plantain	Lbs.	11089	2422

SOURCE: St. Kitts and Nevis Agricultural Census 1987



A profile of the main fruit crops/projects in Nevis is presented in Table 3.23, including agronomic data, main problems, cultural practices, harvesting and post harvesting methods and final estimation of production.

Table 3.23

Profile of Pineapple and Papayas in Nevis

PRODUCT:	CARDI	CARDI
DETAILS CROPS:	PAPAYA	PINEAPPLE
LOCATION	Prospect and Cades Bay	Prospect and Cades Bay
VARIETIES	Tainung, Sunrise Solo, Solomon, Barbados Yellow	Montserrat
ACREAGE		1/3 acres
AGE	4-6 months	6/12 months
PLANT DISTRIBUTION	8' x 6'	Undetermined
MAIN PROBLEM	Management	Mealybugs Neglected
CULTURAL PRACTICES		
- Irrigation	Drip	Sometimes overhead
- Weed Control	Manual & chemical: Paraquat chemical: Hyvar & Diuron	
- Spraying	Nil	Duazinon
- Fertilization	Manure at planting	NPK+Superphosphate
HARVESTING		
- Method	Not available yet	Not available yet
- Tools	" " "	" " "
POST-HARVEST HANDLING		
- Level		
MARKET	Local	Local

SOURCE: Personal contact with CARDI staff and field observation



3.2 Livestock Sub-sector

3.2.1 General Overview

In St Kitts and Nevis, up to 1989, Livestock remained the second most important agricultural economic activity. Of the 11.59% agricultural contribution to total Gross Domestic Product (GDP) at constant prices in 1989, the livestock sub-sector actually represented 1.99%. This is substantially less than that contributed by sugar (5.96%) but higher than fishing (1.87%), crops (1.64%) and forestry (0.13%).

The 1987 agricultural census shows that of the 2218 farm holdings in St Kitts and 1211 in Nevis approximately 50.5% (1,119 holdings) in St Kitts and 3.1% (37 holdings) in Nevis were wholly livestock enterprises utilizing mainly traditional subsistence production systems. The remaining holdings, 1099 (49.5%) in St. Kitts and 1174 (96.9%) in Nevis, were involved in mainly crop production but inclusive of livestock (mixed holdings).

The main livestock of economic importance found in St Kitts and Nevis are cattle, sheep, goats, pigs, poultry and rabbits. Other species are donkeys, horses, deer and monkeys. Monkeys are of growing concern in spite of their research resource potential, because of their increasing role in crop damage and as hosts for pests.

The Tropical Bont Tick, (*Amblyomma variegatum*) was recognized in St Kitts and Nevis in 1978. The incidence of acute dermatophilosis, a skin infection caused by the bacteria, (*Dermatophilus congolensis*) associated with the bont tick, increases dramatically following infestation with this tick. The bont tick is also an important vector of the rickettsia, (*Cowdria ruminantium*) the causative agent of Cowdriosis or Heart-water disease of ruminants which can result in high cattle mortality. Wherever the bont tick and its associated diseases are found producers have experienced high losses in livestock production. It has been estimated that at least one third of the cattle population in St Kitts and Nevis have been affected by Dermatophilosis. Losses have been particularly severe in fenced beef herds and this has forced some farmers to discontinue cattle production completely. Sheep and goats are also affected by bont tick but to a less extent than cattle.

These losses have contributed to the decline in economic performance of livestock, but to some extent, with the growing emphasis on tourism, have forced some interest in pig and poultry production.

The magnitude of the problem is demonstrated in the historical trends in livestock numbers in the Federation for cattle, sheep, goats and pigs as presented in Table 3.24 below.



Table 3.24

Livestock Population - St. Kitts and Nevis

COUNTRY	YEAR	CATTLE	SHEEP	GOAT	PIGS
St. Kitts	1984	5831	9254	7223	6885
	1987*	2627	1606	1896	1640
	1990**	400	803	958	-
Nevis	1984	1908	11135	6445	2839
	1987*	720	5165	3521	5000
	1990**	700	8000	8000	3000

* Census

** Estimate by D.O.AS.

As in many West Indian islands, livestock production in St Kitts/Nevis has played a secondary role to export crop development. The admitted neglect to the livestock subsector is manifested in the mounting costs for importation of livestock products in spite of the obvious interest and involvement of people in livestock production.

Livestock meat and meat product imports for St Kitts and Nevis as shown in Table 3.25 was valued at EC\$21.4 million dollars in 1989 and 25.0 million dollars if fish products are included.

In addition domestically slaughtered animals in the Federation between 1981 and 1989 are shown in Table 3.26. The table shows an annual slaughter of approximately 1000 cattle, 4000 sheep and goats and 2000 pigs. This slaughter rate has remained fairly constant over the last ten year period, but has resulted in a depletion of cattle stocks in St Kitts and Nevis. Furthermore government owned livestock stations in Nevis have suffered from reduced productivity for a number of reasons, which continue to frustrate the efforts of the Department of Agriculture in the development of this vital subsector. The factors mainly responsible for the decimation of the cattle industry are as follows:

- (i) effects of Dermatophilosis;
- (ii) consumer demand; and
- (iii) the low cattle productivity under traditional subsistence production systems.

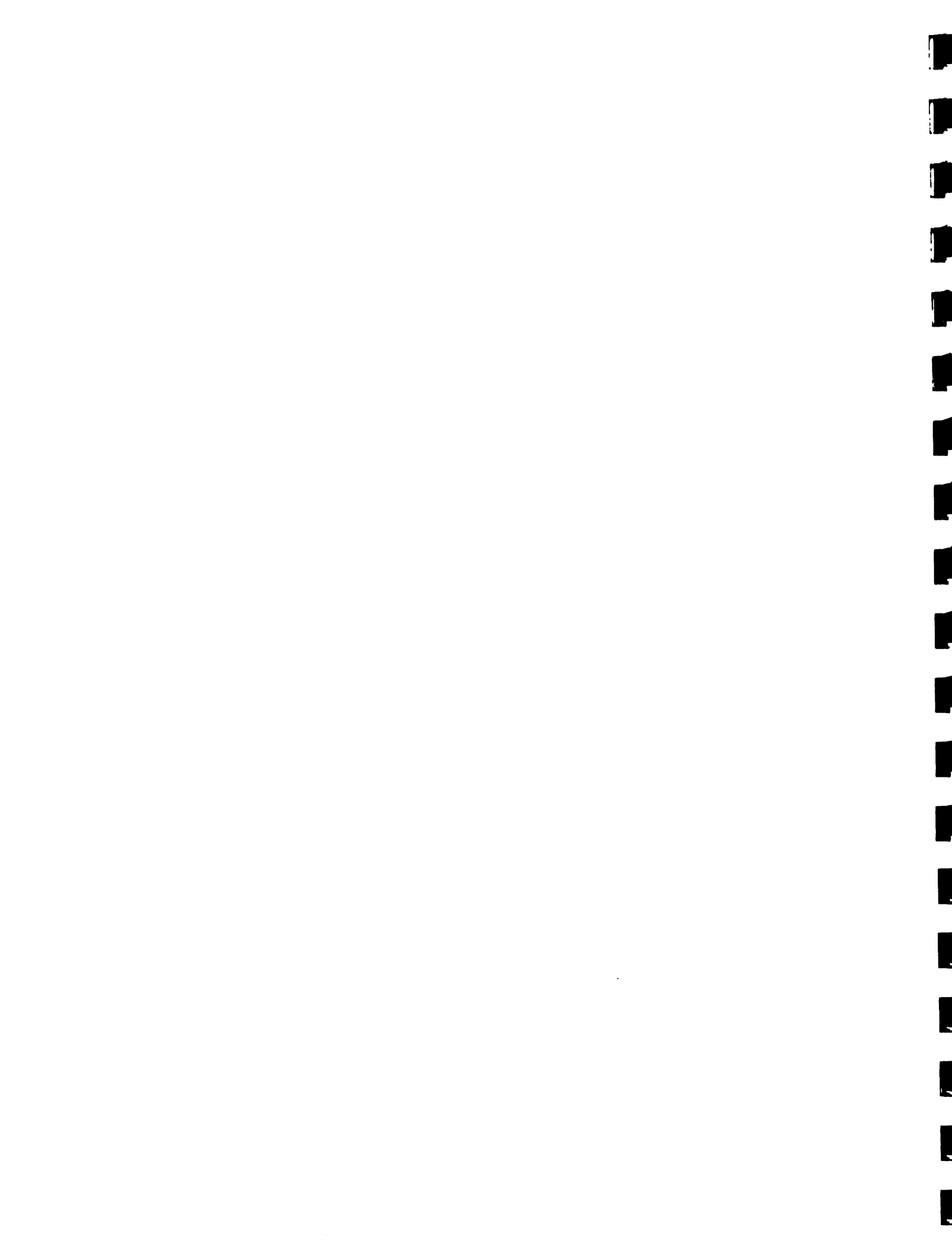


Table 3.25
Volume and Value Livestock Product Imports
(a) Value - EC\$ (b) Quantity (kgs)

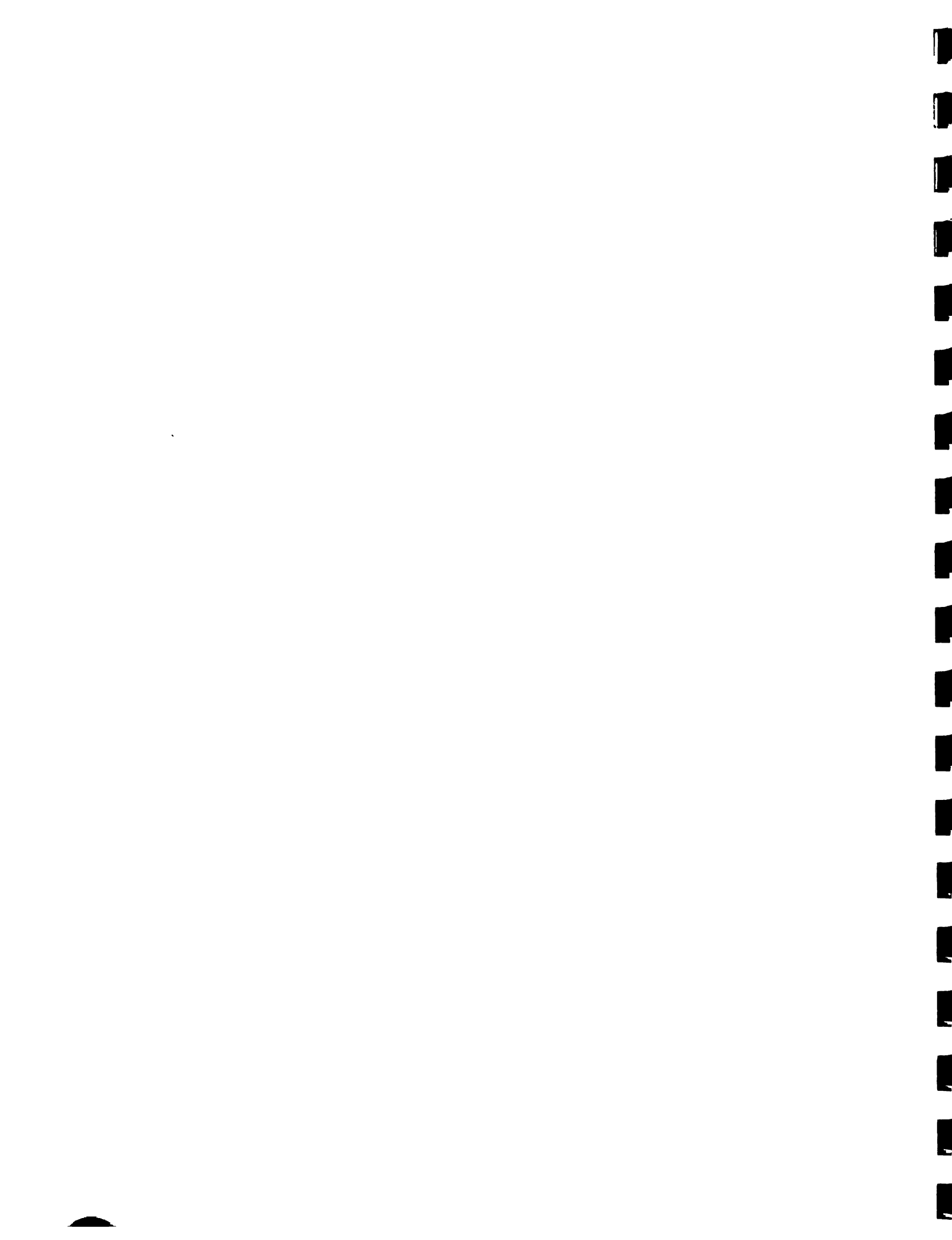
PRODUCT	1985		1986		1987		1988		1989	
	QUANTITY	VALUE	QUANTITY	VALUE	QUANTITY	VALUE	QUANTITY	VALUE	QUANTITY	VALUE
Meat of Swine	25240	107907	37893	162320	N/A	N/A	38365	281397	37652	290356
Whole chicken /parts	1368895	2896893	1808082	4311276	N/A	N/A	1705713	4281791	1687063	4739682
Other whole poultry and parts	19864	85111	23785	111593	N/A	N/A	43377	184750	39071	143712
Meat and bovine animals	61351	455364	68989	497772	N/A	N/A	89349	971187	56704	511275
Meat of Sheep	3616	35926	3680	31345	N/A	N/A	21752	172238	36484	263151
Meat of Goat	-	-	960	9188	N/A	N/A	9912	63006	7031	42827
Pig trotters	32299	49066	30061	52602	42638	92023	66429	117138	60205	322438
Sub Total	-	3630357	-	5176096	-	92023	-	6071507	-	6313441
Meat and Edible Meat offal soaked in brine, salted etc.	65850	303284	130147	526282	96000	508405	134166	612916	117014	577386
Preserved Meat and edible meat offal	309455	1624748	414454	204778	391219	2657624	469470	2604461	331508	9594302
Milk and Cream	2161958	2985897	1003237	2256025	699227	1801965	1340812	3417784	937999	3362584
Butter	12660	42504	42170	205109	29338	192632	28881	69244	26102	192587
Cheese and Curd	83481	440013	142482	977398	152223	1026582	131131	1072530	152028	1353557
Eggs, fresh or dried	9259	38535	256	8733	3257	16762	289	12364	12135	52783
Sub Total	-	5434981	-	4178325	-	6203970	-	7789299	-	15133199
Fresh fish	5100	82634	10682	134178	13967	154645	29147	278706	110960	147577
Dried or Salted Fish	221816	962952	168605	902124	87394	616795	160162	1113206	156118	1327940
Crustaceans and molluscs	1860	62311	2121	50185	11520	294915	10068	249928	7827	135645
Prepared/Preserved crustaceans	81526	494775	-	482953	108719	796847	110027	888388	98334	698563
Sub Total	-	1602672	-	1569440	-	1863202	-	2530228	-	3579725
TOTAL	-	10668010	-	10923861	-	8159195	-	16391034	-	25026365

US\$ 1.00 = EC\$2.7

Table 3.26
Animals Slaughtered in St Kitts-Nevis 1981-1989

YEAR	CATTLE	SHEEP	GOATS	PIGS
1981	1018	2546	1749	2232
1982	1031	2568	1896	2189
1983	950	2392	1870	2326
1984	1003	2368	1881	2082
1985	966	3096	1781	2016
1986	963	3096	1827	2016
1987	930	2702	1665	1882
1988	1000	2535	1414	2227
1989	866	2444	1146	2198
Average	970	2610	1692	2113

Source: Public Health Department - St Kitts



It must be fairly stated that there is nothing wrong with subsistence livestock systems which utilise crops and animal waste and other unutilised fodder. These systems are even to be encouraged as long as they remain within the available resources at the disposal of the farmers involved. These systems however do not provide consistent quantity or quality of animal products. Livestock are valuable economic assets that should be raised for profit with substantial investment in breeding, housing, production, feeding, and processing systems with investment in feeding systems that ensure qualitative and quantitative returns. Grass is a crop. Significantly, management of livestock production systems has been the area of gross neglect. A few initiatives have begun to introduce appropriate systems of management. But it is imperative that a modern livestock sub-sector be developed that can provide for the quality products to satisfy the needs of a growing market demand.

Livestock are kept for domestic use to feed the family or to supplement income. Poultry continues to be a backyard industry and birds are kept for the "dual purpose" of eggs and meat. In Nevis, landless farmers now herd large flocks of sheep and goats, often between 100 and 250 head. The accumulation of large numbers of sheep and goats by owners, who may even be reluctant to sell any, may be associated with reasons for pride of ownership and prestige. Much indiscipline is observed by several owners who utilise government lands and estates. Their actions have disrupted efforts by authorities to promote an orderly development of the livestock industry for the common good.

Tables 3.27 and 3.28 reveal a remarkable situation. The agricultural census provided estimates of losses due to theft disease, predators and other. As percentages of remaining 1987 population count, losses in St Kitts for cattle were 27%, sheep 59%, goats 23%, pigs 24.0%, poultry 6.4%, rabbits 19.0% while in Nevis, cattle were 55%, sheep 35%, goats 50%, pigs 4.6% and poultry 10.7%.

These figures highlight the tremendous reduction in potential income for farmers involved with traditional farming systems due to these causes.





3.2.2 Production Systems

3.2.2.1 St. Kitts

(a) Cattle

The main beef cattle breeds have been Senepol or crosses with Hereford, Jamaica Red poll, Santa Gertrudis, Zebu and Sahiwal. The milk breeds have been Holstein/Friesian or Jamaica Hope.

Before the advent of the bont tick there existed four commercial beef cattle farms that kept between 100 and 400 head. These have all gone out of production. The cattle industry today is comprised of a large number of small farmers on 1.5 to 4.0 acres or those who are landless and tether their animals on unutilised lands or allow them to roam freely on mainly crown lands. Generally speaking beef cattle production is heavily dependent on the sugar industry as a source of fodder.

These small farmers do milk one or two head for much of their own use or for sharing with neighbours.

Dairy farming is practiced on a commercial scale on one government owned farm, known as Bayfords' Dairy. The farm is located about 4.8 km north of Basseterre, the capital, at altitude of about 288 meters above sea level. The farm was established in 1943 and operated as a pig and dairy farm until March 1984, when the pig operations ceased though the physical facilities still remain.

A new milk production, Bayfords Dairy Company Ltd was formed through a joint venture between the Government of St Kitts and Nevis and a private investor. The company functions as a commercial operation controlled by the Government. The farm is on 166 acres with 100 acres under pasture but only 58 acres are reported in good condition.

Fodder species on the farm include grasses like African Star, Coastal Bermuda (*Cynodon* sp) Pangola (*Digitaria decumbens*) but Guinea grass (*Panicum maximum*) and Napier grass (*Pennisetum purpureum*) natural to the region are being used in the pasture rehabilitation programme.

The herd is pasture fed (allowed to graze) but is provided with some concentrate ration (2-4 lbs) plus molasses/urea and chopped fodder (mainly Napier and *Gliricidia*). Fodder production is severely affected during the dry seasons, July to September and January to March. Annual rainfall in the area varies from a low of 45mm per month to a high of 426mm per month during the year.



Calves are removed from dams 24 hours after birth and bucket fed. They are housed at night in cubicles, but during the day are turned out into a calf rearing area where concentrates, grass, water and minerals are fed. Calves graduate to pastures at 5 to 6 months. Bull calves are sold at 2 months.

Veterinary and herd health services are available and provided. These include dehorning, deworming, pregnancy testing, mastitis checks and treatments. Bayticol pour-on is used for tick control.

Inventory of cattle at the present time is 63 with 36 cows, 1 mature bull, 26 younger animals.

Cows are milked twice daily in stanchions by means of bucket milking machines (six are available) or by hand. Milk production averages 2 US gallons per milking cow per day based on 4lbs of concentrate per cow for the lactation period. A system was introduced in October 1990 in which 7lbs of concentrate were fed for the first 50 days and 2 lbs per day thereafter. Milk production was increased during these trials to 4 US gallons/cow/day.

Bayfords Dairy Company Ltd, installed a milk processing plant which was commissioned in 1985 and produces a pasteurized homogenized product, flavoured milk and juices.

The processed milk is packed and sold in supermarkets. A growing competition is reported from imported Ultra High Temperature (UHT) milk from Trinidad and Tobago, USA, Canada, St Vincent and the Grenadines, made from dried milk powder. Consumer demand for liquid milk is increasing especially for hotels and the School Feeding Programme users. During 1988, 250,000 litres of liquid milk were imported to augment the 103928 litres produced at Bayfords.

The overall operation at Bayfords shows a monthly financial deficit of around EC\$15000. This is attributed to high processing costs associated with low volume of supplies, poor conditions of existing processing facility and frequent malfunctioning of equipment.

A commercial ice cream operation exists in Basseterre. Milk powder is imported to satisfy needed input supplies.

(b) Sheep and Goats

Sheep and goat are of the local mixed breeds, originating from African and/or Europe. African dwarf is recognised while Barbados Black Belly sheep and Nubian goats are imported for upgrading the local stock which are later sold to farmers. This activity is being promoted by the Caribbean Agricultural



Research and Development Institute, CARDI, the lead agency for small ruminant development in the region. Under an IFAD funded project for livestock production, 10 small ruminant farmers in St Kitts have been targeted for observation and data collection during phase 1 of the programme. These mixed farms vary in size from 2 to 10 acres with animal numbers ranging from 5, 5 to 15, 15 to 25 and over 25 being monitored.

As elsewhere in the Caribbean, CARDI has promoted small ruminant development through programme activities such as forage development and storage, pasture improvement, provision of shelter and the sale of better genetic stock to farmers. What is now required is the demonstration of efficient small livestock (ruminant) management programmes to show that livestock enterprises can be profitable.

(b) Pigs

The main breeds are the large black and related native creole types. Recent introductions of breeds such as Duroc, Landrace and Yorkshire have been made by CARDI. Backyard operations prevail, utilizing open pens with little or no shelter. A few pigs are seen running loose but most are tethered. Some traditional units have as many as 15 to 20 sows, often kept to utilise vegetable and root crop waste from farms.

There are no modern piggeries in operation in St. Kitts. Neither are these systems using biogas digesters to convert pig waste into useful fertilizer or fuel as seen in St Lucia and Dominica.

The lack of investment in modern pig operation is attributed to an absence of labour and cheap sources of feed.

(c) Poultry

Five major layer operations ranging from 1000 to 7000 birds, supply St. Kitts with eggs. Additional demand, especially during Christmas is met by imports. This importation of eggs is licensed and obtained through the Ministry of Trade.

Day old chicks are purchased from Miami, USA. Feed imports come from Santo Domingo, Puerto Rico, and St Vincent and the Grenadines.

Broilerson Limited has established a modern broiler operation consisting of four (4) - 5000 bird houses and a modern slaughter/processing facility. This poultry operation together with other local producers supply approximately 10% of estimated domestic demand. Whole chickens are no longer imported into St. Kitts, but chicken parts are.



Backyard production of "dual purpose" poultry is reported to have declined considerably over the last decade.

(d) Rabbits

Substantial rabbit production has been carried out in St Kitts but not in Nevis. An enterprising rabbitry has been developed by a vegetable farmer, utilizing crop waste and concentrates as sources of feed. Nevertheless, rabbit production is reported to be diminishing in this island.

(e) Other Species

A small number of horses are kept for riding and recreational purposes.

Donkeys are still used as beasts of burden (means of transport) and an appreciable number (638) were recorded in 1987. Some are considered feral and their role as susceptible hosts for the tropical bont tick is of concern. Export of donkeys to the French islands is a common practice.

Wild Southern White-tailed deer (*Odocoileus virginianus*) exist, mainly on the Southern Peninsula, an area declared a wild life sanctuary. The deer are reportedly heavily infested with tropical cattle ticks (*Boophilus microplus*) but bont tick infestation has not yet been reported. They occasionally fall prey to dogs.

Green Monkeys (*Cercopithecus aethiops*) are found throughout St Kitts and Nevis and are considered serious destructive pests by the vegetable, root and fruit crop farmers. They have been exploited by three groups operating in St Kitts namely: The Behavioural Science Foundation; The St Kitts Biomedical Research Foundation and Caribbean Primates. A number of these primates are bred in captivity for export. A bounty is offered for the capture of monkeys, but at the present time exports have been curtailed.

The Agouti (*Dasprocta* sp) has been sighted at Frigate Bay in the Southern Peninsula, in recent years.

3.2.2.2 Nevis

A distinct dual system of livestock operation is recognised in Nevis. The Estate subsector and the Small Farm subsector.

Some 15 estates are owned by Government and a few are primarily involved with the production of livestock. Estates at Indian Castle, Maddens, New River are situated on the Eastern side of the island with common characteristics of dry, windswept conditions, and mainly unfenced and overgrazed pastures. Water



resources are normally adequate but may become insufficient if major irrigation system is developed, because of possible saline intrusion.

(a) Indian Castle Estate

Indian Castle Estate covers 499 acres with 326 acres available for pastures. The fenced pastures, about 70 acres, appeared to have a low production capacity. This is in contrast to a ten (10) acre sugar cane plot and a paddock of Napier grass recently established on the estate.

There is a very well conditioned herd of Brahmin cattle, consisting of 45 adult cows, 2 stud bulls, 17 heifers, 1 steer and 50 calves. No breeding problems were reported but calving rates recorded in 1987, 1988, 1989 were 45, 37 and 34 respectively. In the first quarter of 1991, 21 calves had been born.

The Manager, James Lanns, reported on stocking rates as high as 200 head in former years.

A purebred flock of Barbados Black belly sheep were in fair condition, with reported average lambing rate of 2. Recent imports of Black belly sheep were separated from the main herd during grazing. The flock of sheep however is run as one unit with the cattle.

The Manager considered general upkeep of pastures plus maintenance of fences, which had been erected in 1961 as highly desirable and essential. Three wells, with windmill power, served the estate. One, nearest to the sea, was reported to provide brackish water.

The British Development Division had established a spray race and holding facilities for the cattle herd under the Bont Tick Control Programme. It was noted that spraying was conducted in one of the holding pens, as the cattle refused to go through the spray race.

(b) New River Estate

New River Estate is comprised of 490 acres, which traditionally has been used for communal grazing. A large water tank has been constructed and filled with water originating from a spring. Some evidence of a USAID funded project, utilizing Neem trees as windbreaks still exists. A BDD funded dip tank built on this property is still being used. The pasture fences are broken in many places and the pastures are overrun with cattle, sheep, goats. These animals were reported to belong to varied owners.



(c) Maddens Estate

Maddens Estate has 300 acres, half of which are in pastures. The estate obtain it's water supply from spring sources. A large pond had been dug on the property but is having difficulty holding water. Senepol cattle, some crossed with charollais are maintained under the management of Mr. Edric Evelyn. Herd size was given as 35 cows, 3 bulls, 10 in-calf heifers and others making a total of 87 animals. Recently imported Senepol from St Croix, 14 females and 1 bull, were introduced to restock and upgrade the herd and all had survived the translocation.

(d) Private Livestock Producers

Private estate owners still herd a few head of beef animals, mainly Senepol or crosses, ranging in numbers from a few to 50 head. Most pastures appear neglected and overgrown with bushes. There is evidence of leucaena forage banks and fencing with Gliricidia.

A CARDI survey indicated that 51% of farmers keep 1 to 15 head of cattle.

(e) Sheep and Goats

Small ruminants are raised by 68% of farmers of Nevis. Goats are kept in small numbers, usually less than 5, but many are reported to have become feral as they were left to browse in the hills. Sheep flocks are many, with larger size herds than goats. Several sheep herds are between 100 and 250 head, but even more are between 40 and 80 head. Several owners are considered landless farmers and the difficulties with herding their flocks have created a stray animal problem. Most pastures are overstocked, have limited quantity of improved grasses, and are poorly managed. With lack of supplementary feeding, livestock output performance is poor. Animal breeding is uncontrolled, little selection is practiced and or few records are kept. Inbreeding is the order of the day under these traditional systems.

(f) Pigs

These are kept in typical backyard operations in open pens, with inadequate shelter and poor sanitation. Many are tethered but several roam freely. Some are kept in association with other pursuits e.g. poultry operations. In this case offals from old layers are boiled and fed to these pigs. Many pigs are typical black creole pigs. Duroc, Landrace and Yorkshire crosses were introduced by CARDI. Demand for Duroc breeding stock far exceeds supply. There are no modern piggeries in operation in Nevis.



(g) Poultry

One farmer has developed six units holding 300 layers each. He supplies a new Hotel complex, the Four Seasons. Another 1000 bird supplier was reported. Other smaller producers/suppliers exist. Those who have backyard poultry operations supply the home mainly. Nevis, like St Kitts, considers itself self sufficient in egg production.

Apart from one small broiler operation (200 birds) at a rudimentary level, there are no broiler flocks in Nevis.

(h) Other Species

A larger number of horses are kept on Nevis than St. Kitts. The 1987 Census recorded 68. A small racetrack is used occasionally.

A large number of donkeys are present on the island of Nevis and constitute a problem for crop farmers. "Minding donkey" at night is a common practice for farmers. Donkeys are used for riding and transport but many are now wild. The bont tick may infest donkeys and a case of Dermatophilosis was observed on a donkey (personal communication). Donkeys have been exported to some neighbouring islands, but some concern over the positive serology for Equine Viral Arteritis needs clarification.

Monkeys, like in St Kitts, are considered serious pests.

Deer are not fount on Nevis.

Several dogs can be found running wild in Nevis. This presents additional problems, as they act as predators and could host the bont tick.

3.2.3 Institutional Services

Meat Processing

Traditionally, butchers purchased livestock from farmers, slaughtered animals in a facility adjoining the municipal market where stalls were provided for display and sale. One such abattoir facility is located at Sandy Point Public Market in St Kitts. It is in very good sanitary condition, but has been reduced to the slaughtering of a few pigs and/or small ruminants only. Cold storage facilities have been provided but these have never been used, and presently require servicing.



(a) Abattoirs

Two modern, well located abattoir facilities have been built by CIDA and BDD in St Kitts and Nevis respectively.

The abattoir in St Kitts has a covered livestock pen which constitutes a lairage that leads into the facility for captive bolt stunning, bleeding, hoisting and processing. The carcasses are railed into a cutting room where they are cut to owners specification. Cattle, sheep and goats, pigs are processed on specific days of the week but there is appropriate flexibility in relation to satisfying processing needs.

The Butchers or owners of animals are charged slaughter fees for the service.

The Ministry of Health has overall responsibility for meat inspection which is conducted by Public Health technicians. This should be done by the Veterinary Division. At the retail market carcasses are further processed by butchers who then sell all meat for EC5.00/lb.

Selected cutting and grading of meat should be encouraged. This task can be performed by the abattoir Manager, Mr. Cecil Woodley, who has technical training in this vital area. The abattoir Manager reports directly to the Livestock Officer in the Livestock and Veterinary Division which falls under the Department of Agriculture.

In Nevis, a similar but differently designed abattoir facility is located close to the Veterinary Division office of the Department of Agriculture. It is equally an appropriate sized facility for the population of the island. It is also well managed. The abattoir Manager, Mr. Egbert Halliday received training in Saskatchewan, Canada in areas such as meat selection, grading, packaging and processing and proposes to implement a programme of cutting, grading and packaging of meat as well as the manufacturing of ham and sausage in an adjoining facility leased to the Nevis Meat Processors Ltd, a private company. He pointed out the need for weighing scales before and after processing. The facilities to clean the offals are to receive improvements. However, present facilities have considerably enhanced consumer acceptance of the product, has boosted interest in livestock production and stimulated the manufacture of meat products.

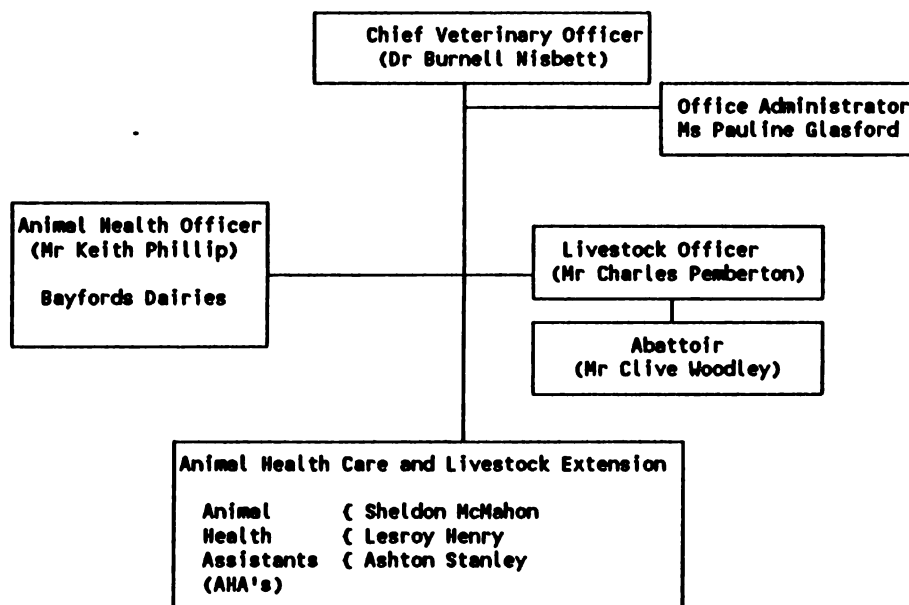
In addition to the Manager, the abattoir has a staff of one head butcher, 2 assistant butchers, 1 handyman/recorder and 1 cleaner attendant. The Manager reports to the Director of Agricultural Services in Nevis.



Fees are similarly charged as in St. Kitts as follows: Cattle \$30, Sheep and Goat \$5 and Pigs \$15, with the operations heavily subsidized.

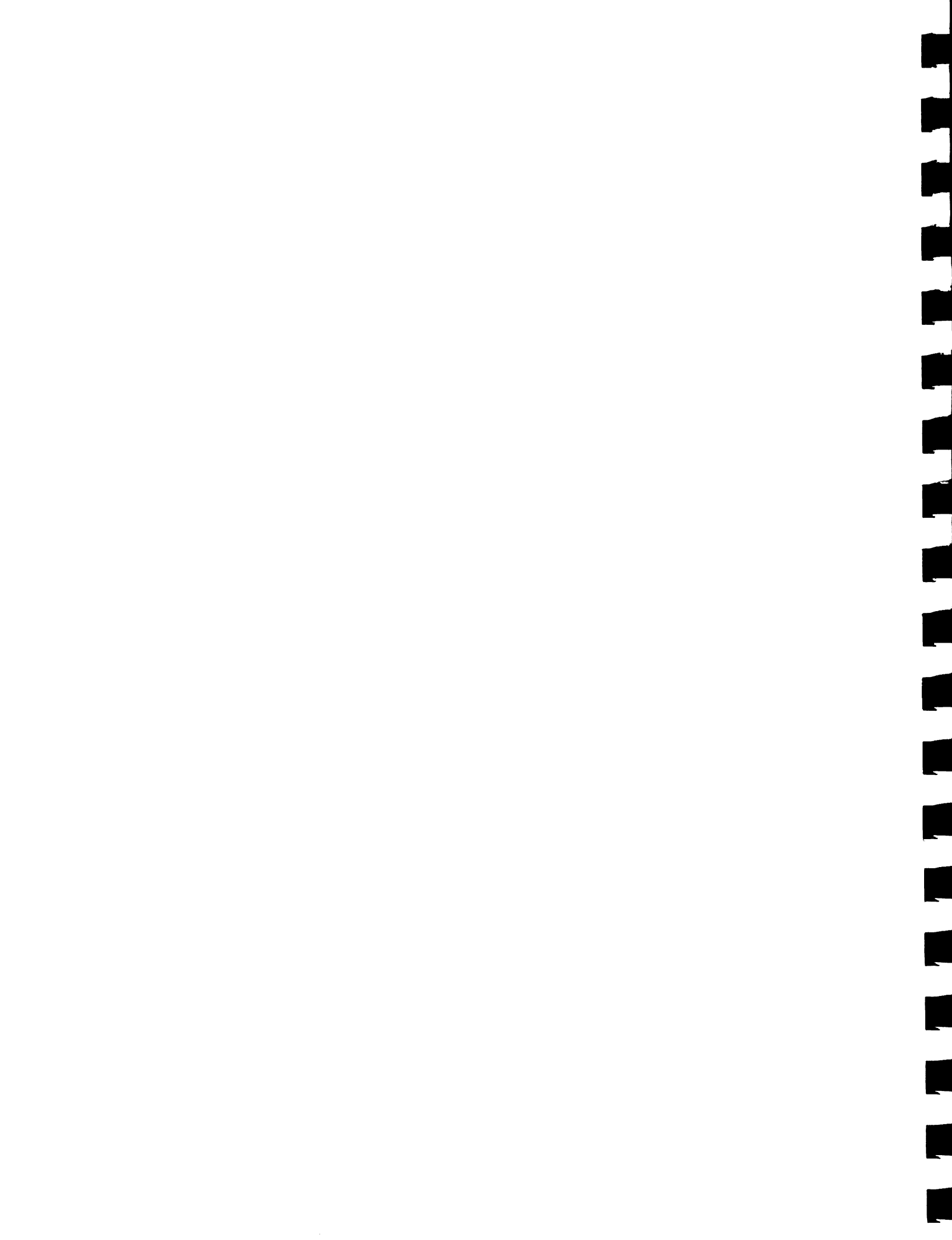
(b) Veterinary and Livestock Divisions

In St Kitts, the structure of the Veterinary and Livestock Division is as follows:

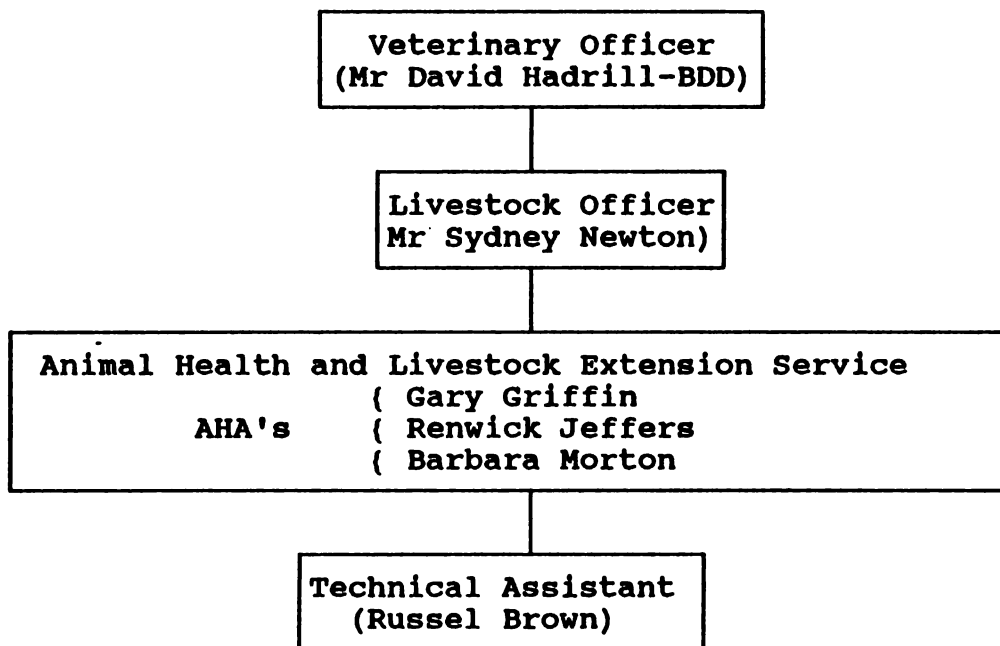


A Joint Animal Health and Livestock Extension Service is provided, usually during the visits under the bont tick control programme. The Veterinary Division office is located close to the Department of Agriculture. Simple laboratory tests, clinical examination and a small surgery services are provided to farmers.

The Ross School of Veterinary Medicine is now located in St Kitts. It has a student population of 150, who spend two years (3 semesters/year) in attendance at this institution. The school is affiliated to the Oklahoma University where training is later completed.



In Nevis, the structure of the Veterinary and Livestock Division is as follows:



Ms. Patricia Bartlett is receiving veterinary education at Tuskegee University, Alabama, USA and should qualify by July 1992.

ODVA - BDD

With the assistance of the British Development Division, the Veterinary/Livestock Divisions have been conducting a Bont Tick Control Project. The Project began after the Tick had been established and caused devastation and severe losses through its associated skin disease, Dermatophilosis.

The control project must be judged as successful in reducing the tick population and re-establishing confidence of livestock farmers in raising ruminants. This success was accomplished through the introduction of Bayticol Pour-On and the development of a spraying service with Cynalothrin in Nevis. Eleven dip tanks were built in St Kitts and four in Nevis in which Bovinox (Ethion), an organophosphate was used. This activity was largely ineffective because of poor logistics, the fear of spread of Dermatophilosis, and the voluntary nature of the programme. Nevertheless, it is argued that insufficient resources were available for eradication. Now that control methods have been effected, it is hoped it will still be possible to achieve eradication of this problem.



David Hadrill advised in a BDD report that one out of eight caprine blood samples from Nevis tested in Guadeloupe was serologically positive for Heartwater. If Heartwater is indeed present on both islands, confirmation should be established.

Both islands have a number of animals that are susceptible hosts which are living in a wild state. These are donkeys, deer, goats, pigs, dogs, monkeys. In addition to the problem they create with respect the control and management of the Tropical Bont Tick, these animals have caused considerable crop and livestock damage. Measures to ensure the best economic exploitation of these useful animals must be devised.

OTHER INSTITUTIONS

CARDI

The Caribbean Agricultural Research and Development Institute is leading research and extension support arm of the livestock industry. An IFAD funded project is presently being pursued the performance of 10 sheep and goat farmers are being monitored in both islands. CIDA has funded a regional small livestock project, which CARDI will implement and is expected to benefit the OECS in a few years time. Under this project CARDI is expected to develop and implement the farming systems that justify investment in small livestock ventures.

Republic of China

The Republic of China, Taiwan, has strong representation in St Kitts/Nevis and has already provided valuable assistance in vegetable production and livestock training. The successful experience of the Pig revolving scheme in St Vincent and the Grenadines may be transferred to and duplicated in St. Kitts and Nevis, and together with CARDI and other agencies, modern piggeries are expected to be established, especially those associated with biogas digesters to convert pig waste into fuel and fertilizer.

FAO

The Food and Agricultural Organisation, FAO has assisted the federation in the development of an Agricultural Diversification Programme awaiting signature for implementation. Important ventures are proposed to demonstrate and support profitable cattle production especially in the Con Phipps area in St Kitts. The FAO is also executing a Technical Cooperation Project (TCP) in support of the Tropical Bont Tick management programme for the OECS through Dr. Glen Garris, who is located in St Lucia. It is hoped that the regional tick eradication project will



receive substantial funding for the implementation of a programme aimed at not only removing this major deterrent to livestock production but of preventing the spread of the disease to the American mainlands. The results of initiatives such as "Small ruminants under Coconuts" being executed in St. Lucia are also awaited, and possibilities exist for the technology transfer to St. Kitts and Nevis.

IICA

The Inter-American Institute for Cooperation on Agriculture has recently begun activities in St Kitts/Nevis. Support for the survey and monitoring of pests and diseases will be provided through CARAPHIN, and a project to strengthen quarantine capabilities will be developed. These projects will also establish linkages with hemispheric projects for health information and quarantine. Through its ongoing projects for Technology Generation and Transfer and Strengthening of Farmers Organisation, further assistance can be provided in support of the livestock industry. A livestock production specialist is also implementing a Project "Strengthening of Livestock Production Systems" in Suriname and Guyana.

SSMC

The St Kitts Sugar Manufacturing Company, SSMC, has its mandate to produce 25000 tons of sugar on their available acreage. Their management skills, farm machinery pool, and industrial by-products produced could be utilised in a project to produce hay and silage for a feed-lot operation.

CREDIT AND INVESTMENT

Commercial banks, Development banks, and National Foundations exist with mandates to support agricultural investment. The track records show that very little is accessed and used by farmers who lack confidence, collateral, and economies of scale. These limitations can be overcome through strong farmer organisations and the demonstration of economically profitable livestock ventures.



3.3 Fisheries Sub-sector

3.3.1 General Overview

In St Kitts/Nevis the contribution of the fisheries subsector to GDP has varied from 1.06% in 1978 to 2.10% in 1988 based on factor cost at constant prices.

The fisheries subsector nevertheless plays an important role in the economy, providing employment and the cheapest source of protein for many. Further output could offset import costs with potential for export of highly valued species.

The Government of St Kitts/Nevis is committed to national development of the Fisheries Sector and supports fully the work programme of the OECS Fisheries Unit which was established in 1987.

According to the OECS Fisheries Development Officer, the island states have relatively small continental shelf areas which are essential for providing suitable habitats for demersal (bottom feeding), mollusc and crustacean (shellfish) species. These species are in danger of depletion due to over exploitation. The most abundant resources are the migratory pelagic species that move into the area from the Atlantic during January to June. The magnitude of the fisheries resources is, however, unknown.

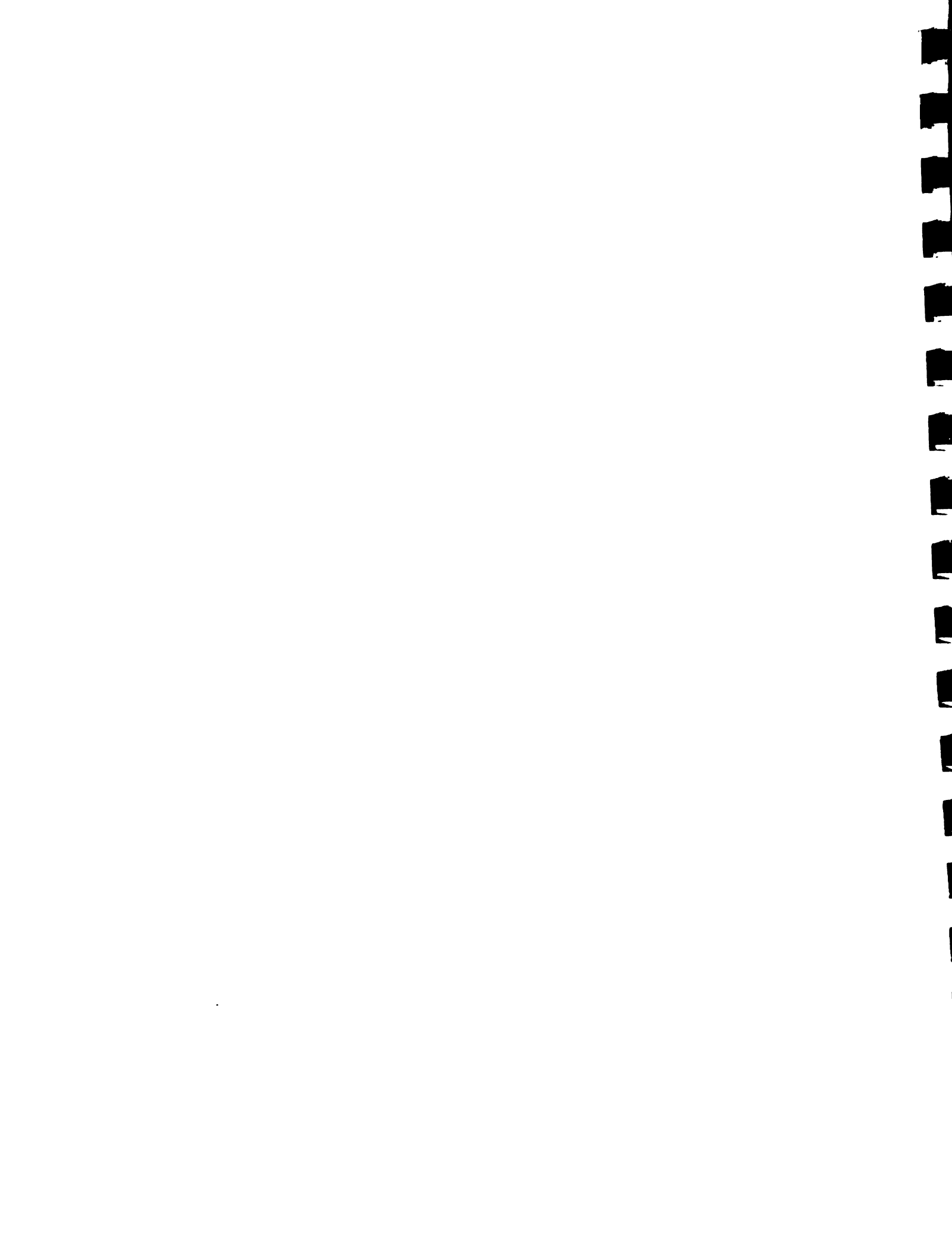
Mainly artisanal, the fisheries sectors suffer from lack of adequate infrastructure for the fleet of predominately small boats and canoes and for the distribution, storage and marketing of fish. It is considered that a combination of biological, economical, sociological and institutional factors have hampered development.

Only 50% of the demands for fish is routinely provided.

Fisheries management is still in its infancy however, manifested by limited licensing of the artisanal fleet, ineffective control of threatened stocks, poor data collection for biological and economical reasons. Nevertheless, harmonization of fisheries legislation coordination of coast-guard activities and establishment of the OECS Fisheries Unit have been undertaken to address some of these deficiencies, as well as to foster greater integration in the region.

Traditional technology is considered the main constraint as yields decline progressively as stocks are over exploited with increased effort while valuable pelagic resources are under exploited.

The Government of St Kitts and Nevis is also looking to the Government of Japan for fishing vessels to upgrade its fleet but similar assistance given to St Lucia has disclosed disquiet about the sea-worthiness of the vessels in the rougher Atlantic. CIDA is



expected to provide on-shore infrastructure as part of a Leeward Islands Fisheries Project.

The Fisheries Act 1984 governs the Federation of St Kitts/Nevis and covers general issues as well as Fisheries Management and Development Marine Resources and Conservation Measures.

3.3.2 St. Kitts

The Fishery industry in St Kitts is mainly artisanal, using (1) pot fishing for species like turbot, parrot, angel, doctor, goat, (2) hook and line for snapper, mackerel, jack, grunt, (3) trolling for dolphin, king, sword fish, tuna. Seine Nets are traditional for bait and sprats on the shallow coasts while Gill nets and longlines are now being introduced for snapper, grouper and pelagics.

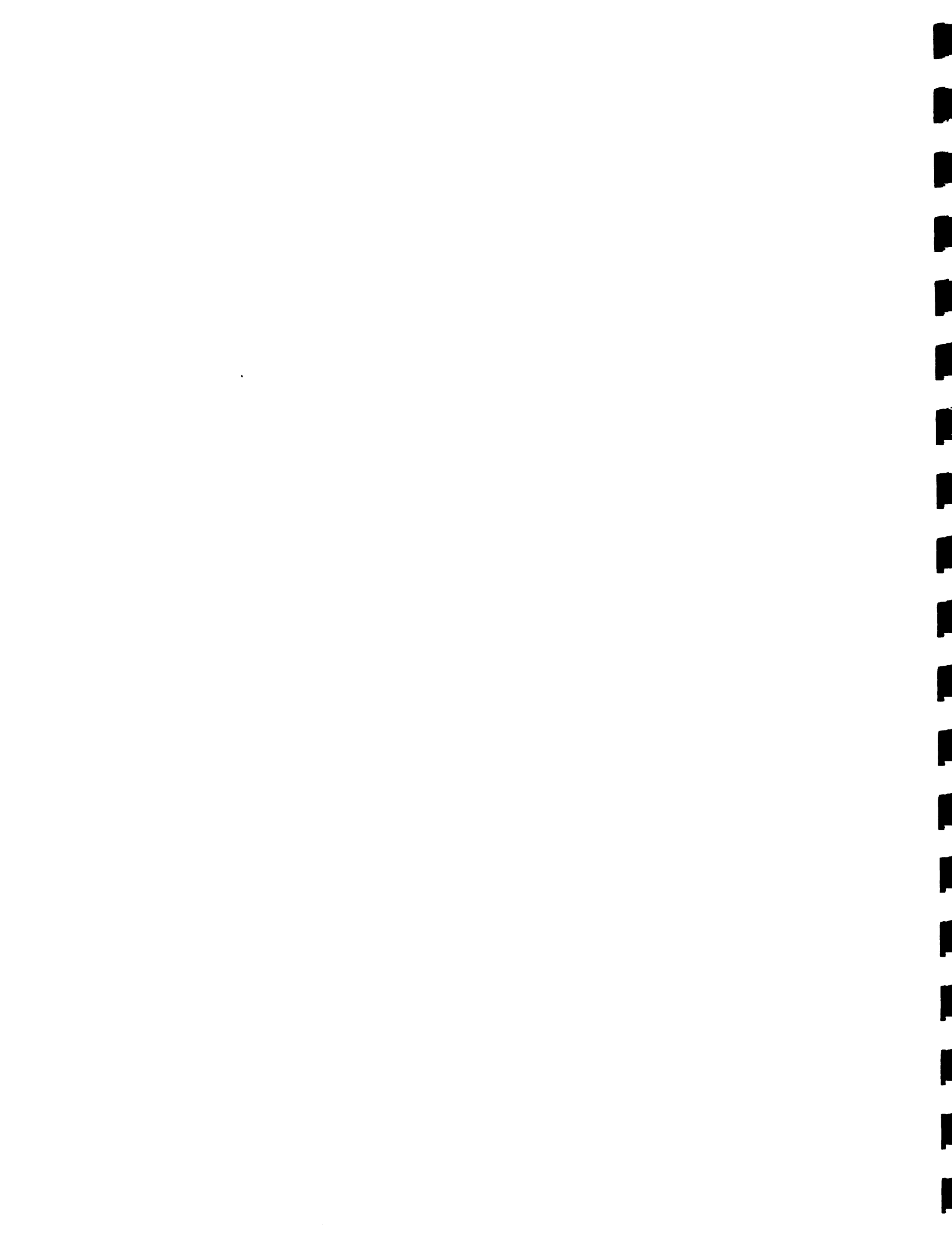
The majority of fishermen are considered part-time.

The Foundation of National Development (FND) was established in 1985 as a private non-profit development organisation to assist small scale business with credit and management expertise. The fishing subsector is a beneficiary and additionally obtained assistance from the Inter-american Foundation (IAF) - US\$ 102,000 - to improve technical capability within the fishing fleet.

A locally constructed 25ft fiberglass fishing vessel with foredeck, has been equipped with two 65 hp outboard engines and used by a Naval Architect and a Master Fisherman for testing and training of local fishermen.

Several fishing Cooperatives have been formed in St. Kitts. The three most actives one are located at Sandy Point in the North West, Old Road in the West - North West and Dieppe Bay in the North East. Two others, New Town and Irish Town Cooperatives near Basseterre are allegedly less active. Registered fishermen participate mainly to obtain duty free purchase of equipment (engines, fishing gear) and supplies (gas, rope, buoys, wire). Cooperatives also provide training benefits especially for longliners, and facilities exist for storage of surplus catch.

The Fisheries Division is presently headed by the Director of Agricultural Services until such time when a Chief Fisheries Officer is appointed. The Division's role is to manage the fisheries stocks, and includes presently a Fisheries Officer who has recently returned from training in the USA (University of Rhode Island) an Assistant Fisheries Officer who was on study leave on Fisheries Technology in England (Hunter College) and a Fisheries Assistant who was away attending a workshop in aquaculture in Taiwan.



The need for appropriate data collection was highlighted, especially with respect to such aspects as catches, type species and weight. A Fisheries Information system is required for management of resources and appropriate planning. Prescribed landing sites and domestic markets are proposed.

The need for a vehicle and additional personnel for monitoring and surveillance were identified. Present office facilities required upgrading, and additional facilities are needed to provide for the ageing of fish, the identification of strange species, the determination of the causes of fishes death and the exploration of ciguatera poisoning in fishes.

Government should continue to provide support for training in improved fishing technology, fish processing, repair of engines and tackle, safety at sea measures.

The Private Sector should be encouraged to increase investment in areas such as modern pelagic exploration, fish processing and marketing.

3.3.3 Nevis

The fishery industry in Nevis is traditional and artisanal. The methods of fishing are:

- Pot fishing
- Line fishing
- Spear fishing
- Beach fishing
- Trolling

The most important practice is that of pot fishing. In 1990 there was approximately 250 fishermen operating 131 fishing boats.

Fishermen are mostly part-time, going out at least twice weekly for durations of 8-9 hours. The fishing boats are carvel built with local timber and ranged between 12 and 35 feet long. They are powered by outboard engines of 20-40 HP.

The major fishing resources are the continental shelf which stretches from approximately nine miles in the south to 2 to 3 miles around the rest of the island.

The areas exploited by the fishermen of Nevis are the on-shore regions.

Production and sales performance of marine commodities in Nevis vary tremendously over the past 10 years (Table 3.29). The major types exported are conch, fish and lobster of which conch constitutes over 80% by weight.

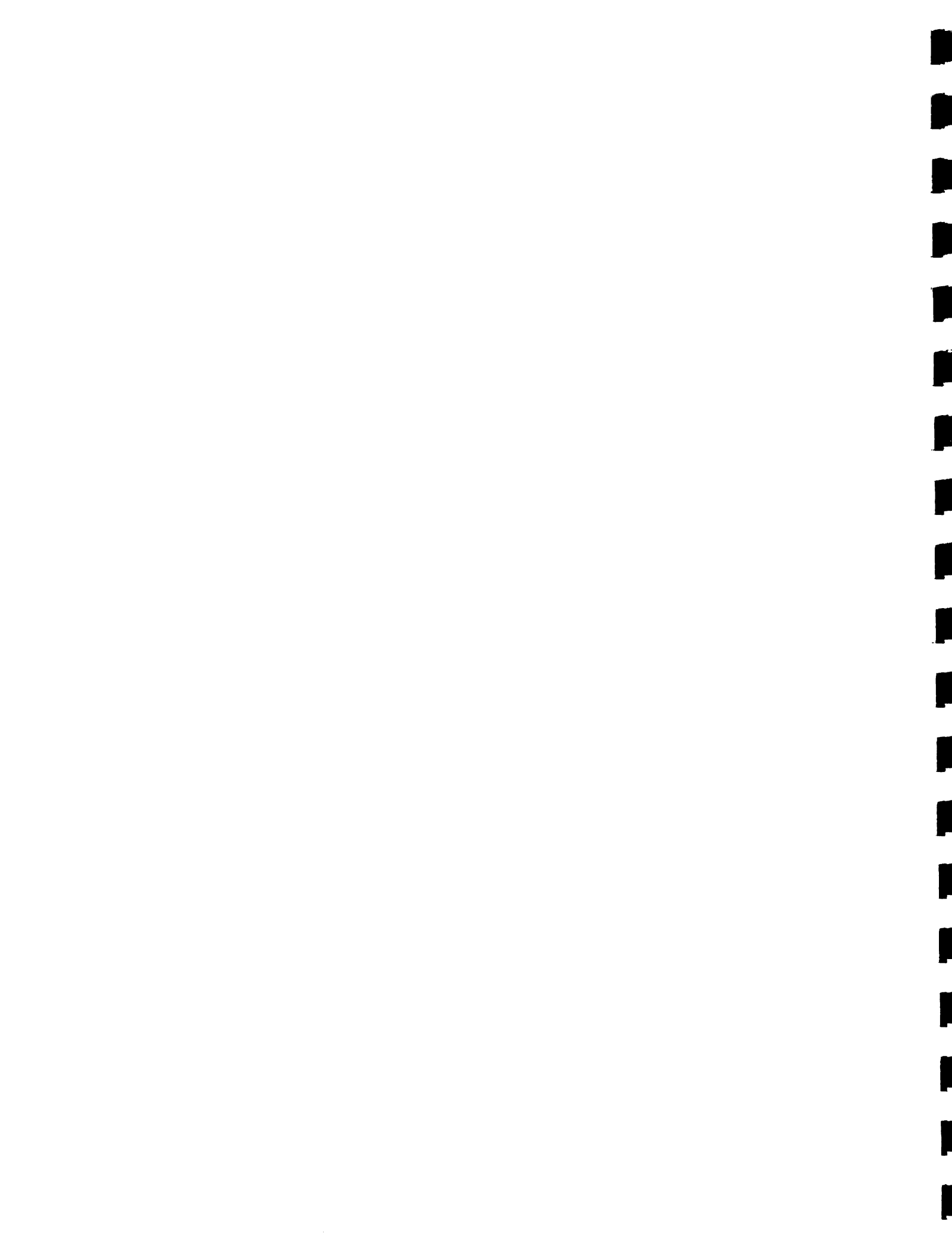
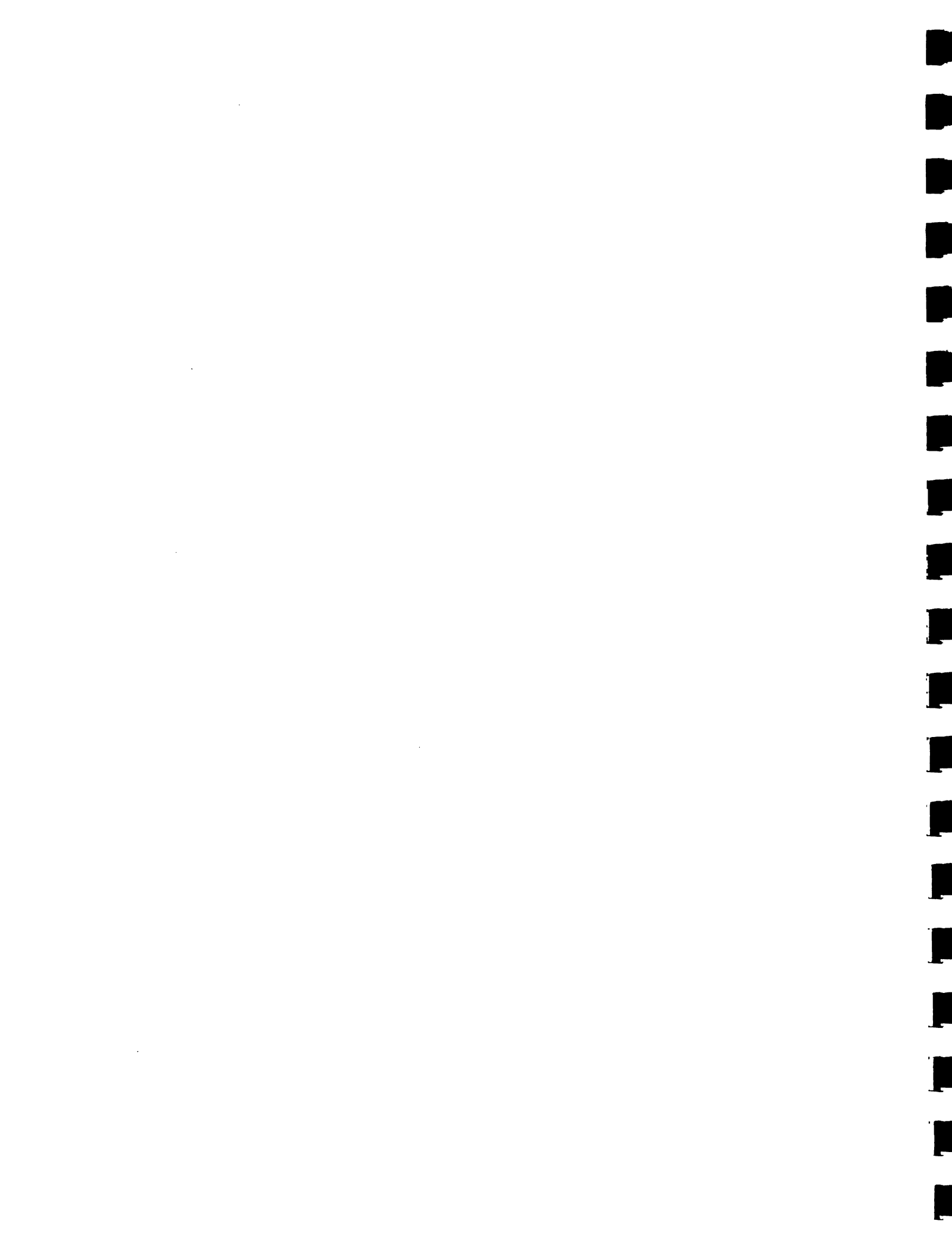


Table 3.29
Seafood Export 1980 - 90 (kgs)

YEAR	FISH	CONCH	LOBSTER
1980	4987.80	46959.30	9540.00
1981	3188.70	46861.20	56394.90
1982	877.50	45990.00	45.90
1983	1666.35	72945.00	-
1984	11524.95	107392.50	15.30
1985	18478.35	99528.75	2336.40
1986	5377.95	87702.75	4086.90
1987	6528.65	73871.20	5337.00
1988	11409.75	94428.00	3696.75
1989	5814.45	81929.70	3529.35
1990	3794.85	36351.00	7644.15
TOTAL	73649.25	792959.40	41871.15

Table 3.30
Seafood channelled through Fisheries Complex
1987 - 1990 (kgs)

YEAR	FISH	LOBSTER
1987	15291.90	-
1988	11178.90	206.10
1989	8713.35	1236.15
1990	8305.20	5510.70



Most of the seafoods are exported to Guadeloupe and St Croix, though sales have been made to St Bartholomew, St Thomas, Montserrat, St Eustatius, Martinique, Puerto Rico and Trinidad and Tobago (Table 3.31).

Members of the Nevis Fishermen's Marketing and Supply Cooperative Society Ltd and personnel of the Ministry of Agriculture and Fisheries stated that there is a good demand for marine commodities. It is felt that with an increase in the number of hotels in Nevis there would be a sustained need for larger quantities of these products.

Institutionally, the fisheries industry is made up of the following components:

1. Fisheries Unit of the Ministry of Agriculture
2. Nevis Fishermen's Marketing and Supply Cooperative Society Ltd
3. Fishermen
4. Middlemen - Persons (not many) who purchase marine products directly from fishermen and sell locally or export)
5. Consumers - local (St Kitts and Nevis) and foreign.

The Ministry personnel, the Fisheries Officer, offers technical resources to the industry and is the source of data collection, analysis and recommendations. It is through this Officer that general training is organized and on whom Government depends to explain, inform and implement its fishery policy.

The Fisheries Division works closely with the Cooperative Division, the Fisherman's Cooperative and some of the customers.

Other important organizations that collaborated and are linked with elements closely with the fisheries industry are:

- Development Bank of St Kitts-Nevis (local)
- Foundation for National Development (NDF) (local)
- CIDA (foreign)
- OECS Fishery Unit (Regional)
- Nova Scotia School of Fisheries (Canada) - International

The industry obtains duty free concessions on the importation of fishing gears and outboard engines. Concessionary interest are given on loans by the local development bank and the NDF.



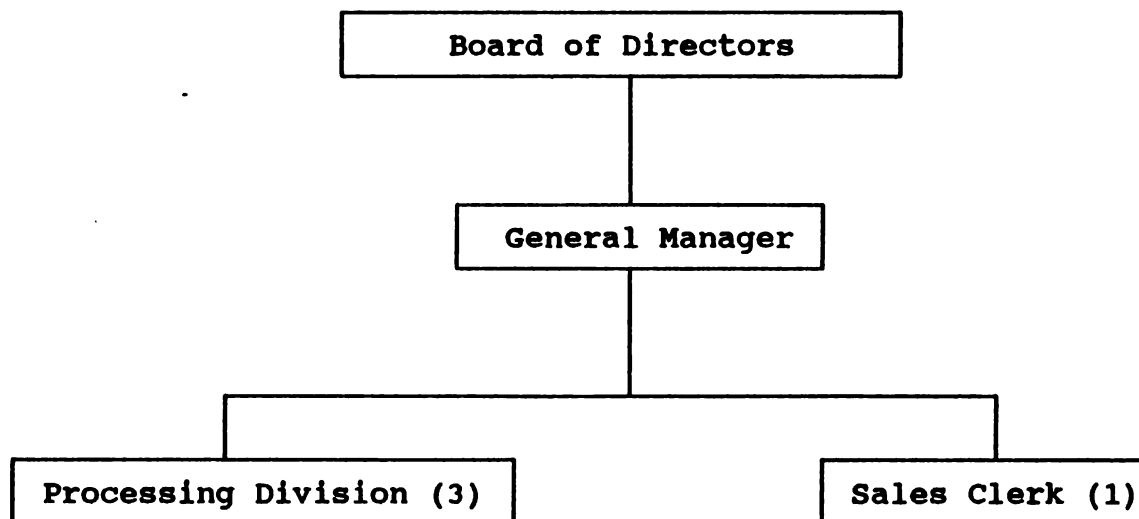
Table 3.31
 Destination of Seafood Export (figs) for January - December 1990

MONTH	ST CROIX		GUADELOUPE		MONTSERAT		ST MARTEEN		ST BARTHOLOMEW		TOTAL	
	Fish	Lobster	Fish	Lobster	Fish	Lobster	Fish	Lobster	Fish	Lobster	Fish	Lobster
January	116.55	182.25	-	-	-	-	-	-	-	-	116.55	182.25
February	217.80	98.10	-	436.50	-	-	-	-	-	-	217.80	534.60
March	233.55	316.80	-	1313.55	-	290.25	-	-	-	-	233.55	1920.60
April	524.25	104.85	-	396.00	-	-	-	-	-	-	524.25	500.85
May	391.05	55.35	-	366.30	-	-	-	-	-	-	391.05	421.65
June	458.55	58.05	-	646.65	-	-	-	-	-	-	458.55	704.70
July	261.45	405.00	-	504.90	-	-	-	-	-	-	261.45	909.90
August	481.05	314.55	-	-	-	-	-	-	-	-	481.05	314.55
September	587.70	215.55	514.80	-	-	-	189.45	90.90	-	-	777.15	921.15
October	117.45	156.60	109.80	-	-	-	-	-	18.00	9.00	135.45	275.40
November	155.70	333.90	-	-	-	-	-	-	-	-	155.70	333.90
December	140.85	85.95	540.00	-	-	-	-	-	-	-	140.85	625.95
TOTAL	3685.95	2326.95	4828.50	3663.90	-	290.25	189.45	90.90	18.00	9.00	3893.40	7644.15



The Nevis Fishermen's Marketing and Supply Cooperative Society Ltd is a registered Cooperative that is a non-governmental organization. It has a well developed constitution that is adhered to by members. The management structure comprises a nine man Board of Directors who are elected at the Annual General Meeting. The Board governs the affairs of the Association. The Society has five permanent employees.

The management structure of this Marketing and Supply Cooperative Limited is shown below.



The Society is a limited liability company, with shares held by members. It carries out both commercial and development activities.

A grant was obtained from the Cooperative Development Foundation (CDF) of Ottawa, Canada to build a Fisheries complex that is now functional. The compound comprises the following:

- Offices
- Sales section for equipment
- Sales section for marine products
- Processing section (preparation of seafoods for sale to customers)
- Machine repair and maintenance workshop
- Ice making facilities
- Seafoods storage facilities

Table 3.32 indicates the quantity of fish and lobsters that was channeled through the Society in 1990. The infrastructure has the capacity to handle 10,000 lbs of fish per month.



Table 3.32

**Monthly Fish and Lobster Sales of the Nevis Fishermen's Marketing
and Supply Cooperative Society Ltd (kgs) 1990**

MONTH	FISH (lbs)	LOBSTER (lbs)
January	510.75	58.95
February	564.30	929.70
March	375.30	1065.15
April	282.15	602.55
May	1007.55	546.30
June	891.90	490.95
July	819.00	640.35
August	1126.80	227.70
September	1064.25	456.30
October	761.40	443.25
November	717.30	16.65
December	180.45	32.85
TOTAL	839.15	5510.70

A study of the accounts and balance sheets for the Cooperative for 1986-88 is shown in Tables 3.33 and 3.34. It is to be noted that purchases, sales and returns from fish products do not give enthusiastic figures.

Table 3.33

**General Trading in Fish Products by the Nevis
Fishermen's Marketing and Supply Cooperative Society Ltd (EC\$)**

YEAR	PURCHASE	SALE
1986	2029.76	2427.12
1987	90051.38	96884.58
1988	75439.07	82601.77



Table 3.34

**General Trading Statement of the Nevis Fishermen's Marketing
and Supply Cooperative Society Ltd (EC\$)**

YEAR	TOTAL EXPEND.	INCOME		SURPLUS/ DEFICIT
		TOTAL	FISH PRODUCTS	
1986	15169.62	19934.56	2427.12	4764.94
1987	68285.40	176340.47	96884.58	108055.00
1988	66570.16	190862.57	82601.77	124292.41

3.3.4 Constraints

Constraints encountered by the Fishery industry can be summarized into four categories:

- Technology generation
- Technology adaptation
- Technology transfer
- Training and information

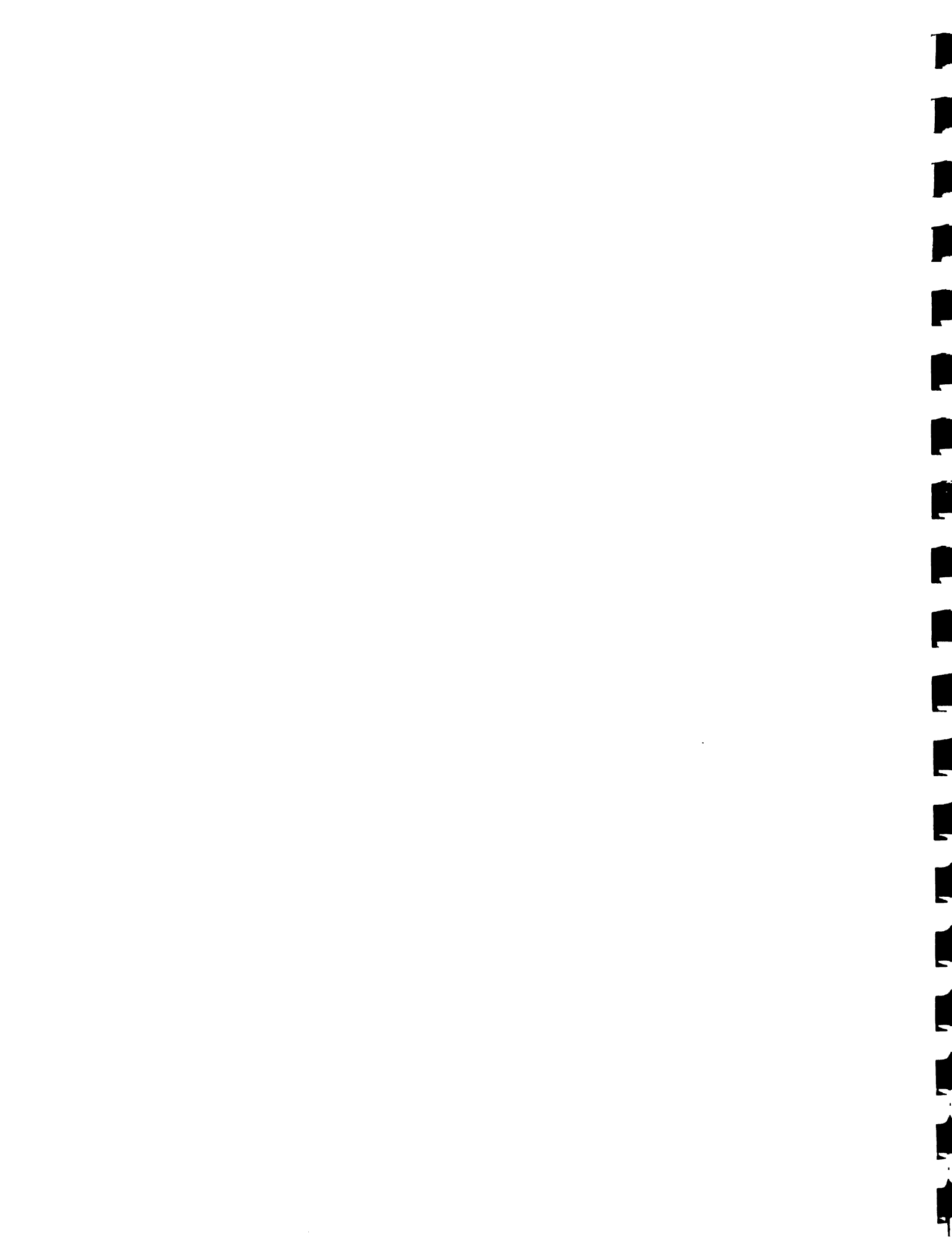
Under the following heads the sub-categories have been identified as the major components.

(i) Technology Generation

- Biological interaction and legislation (especially conch and lobster)
- Species field book guide
- Stock location and biology

(ii) Technology Adaption

- Modern fishing methods and techniques
- Modern storage technique at sea
- Modern packaging and display
- Marketing techniques



(iii) Technology Transfer

- Increase size of boats
- Increase in landing and storage facilities
- Improvement in landing facilities
- Fish products as a business
- Systems for utilizing fish by-products (agro-processing) and for other sectoral linkages to the general economy (animal production, tourism)

(iv) Training and Information

- Data collection
- Safety at sea strategy
- Education of fishermen
- Training of Fisheries Officers of the Ministry
- Training of Cooperative Manager
- Production of fact sheets for fishermen and consumers (radio, video and posters)

3.3.5 Conclusions

The structure of the fisheries sector in Nevis appears to be best served by Government providing technical resources of 2 to 3 Technicians that would be the link between Government Policy and the fisherman.

The production, marketing and commercialization would be best served by the fishermen and the private sector. Government should continue to give the necessary concessions.

Credit can be encouraged through the private sector, non-government organizations and the Cooperative sector.



3.4 Forestry Sub-sector

3.4.1 Introduction

The government of St. Kitts and Nevis has adapted the 20 year Development Plan for the Forestry Industry, developed by Mr. M. Lochan, Forestry Advisor, within the framework of the Tropical Forestry Action Plan (TFAP). Activities proposed contain common elements for St. Kitts and Nevis. However, there are some activities that are specific to either St. Kitts or Nevis.

3.4.2 TFAP Activities - St. Kitts and Nevis

(a) Survey and Demarcation of Forest Reserves

All lands above the 20° slope be surveyed and legalized (enactment of legislation) as forest reserves for the following usage:

- Soil and water conservation
- The preservation of wildlife habitats
- The provision of timber and other forest products

(b) Forest Inventory

- To learn what growing stock exists
- To record the increment of forest trees and the whole forest
- To establish permanent sample plots to monitor future growth of the forest crop.

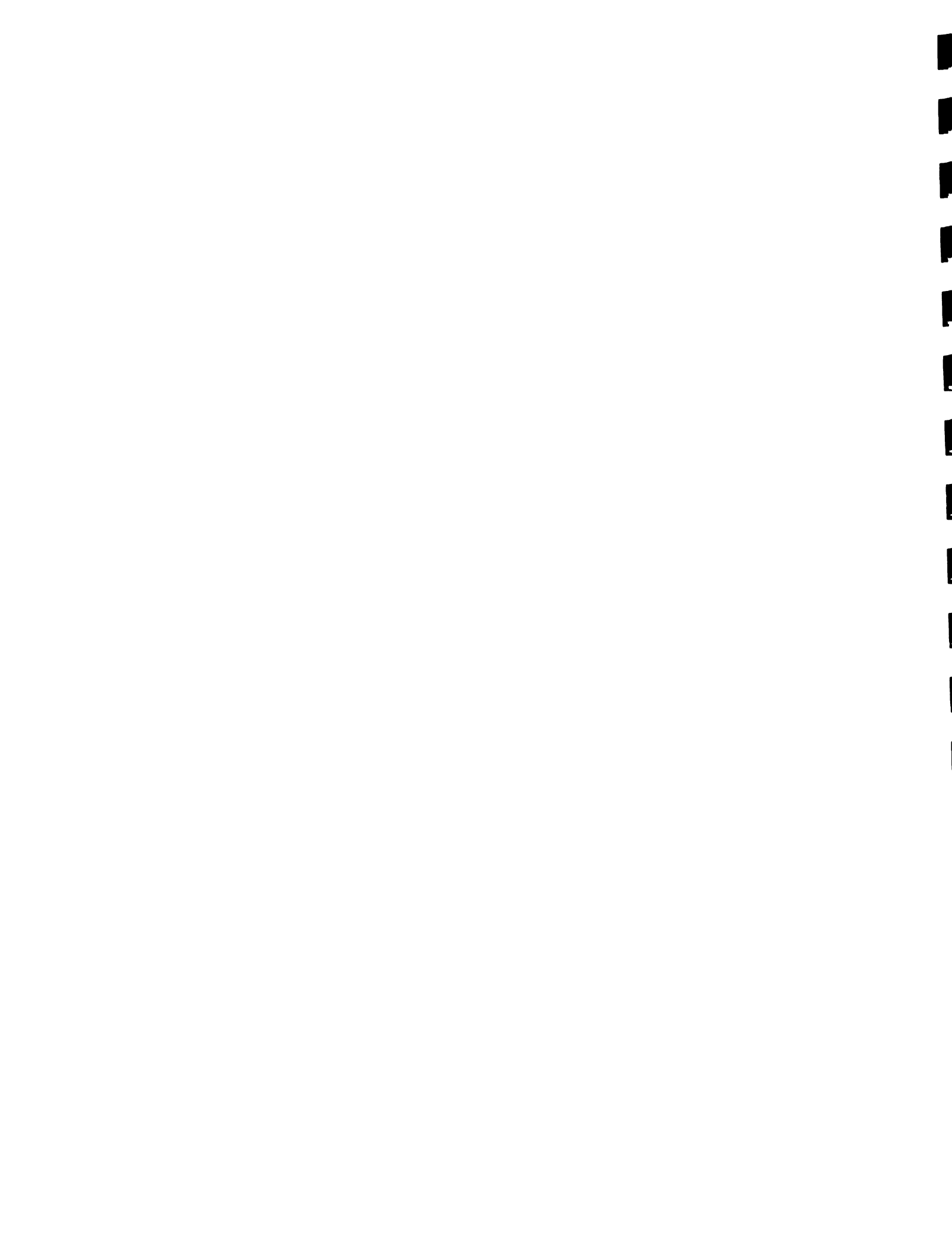
(c) Preparation of Forest Management Plan

Following from (2) above.

(d) Other Activities Coming out of Established Trial

In St Kitts and the other Leeward Islands more specifically Montserrat.

- Establish industrial plantations to provide quality timber for the furniture market. The proposed species are Mahogany (*Switenia macrophylla*) and (*Switenia mahogani*) (var. *hondurensis*); White Cedar (*Tabebuia pallida*), Red Cedar (*Cedrela odorata*) Teak (*Tectona grandis*).



(e) Infrastructure

- Expansion, rehabilitation and upgrading of the existing nursery facilities at La Guerrite and St Kitts.

(f) Institutional Strengthening and Training for the Implementation of the Proposed Forestry Development Plan

- Institutional strengthening and training - 36 mm
- Technical assistance for forest reservation - 24 mm
- Nursery and plantation expert - 36 mm
- Forestry inventory/management expert - 24 mm
- National parks and wild-life expert - 24 mm

(g) Contracting Local Counterparts

- Existing Forestry Officer
- A graduate (1st degree) Forestry Officer
- Three Forestry Assistants (Diploma, 2 year ECIAF)
- Four Forest Rangers (1 year certificate ECIAF)
- Three Forest Guards

(h) Other Training Needs

- Being assessed at present.

3.4.2.1 St. Kitts(a) The Establishment of bamboo and rattan plantations

To provide material for the furniture and handicraft industries (ref. Louis Berger Associates Intl. Inc. June 1983 report)

(b) Beautification of south east Peninsula

A forestry extension activity to provide the private owners/entrepreneurs with extension information and training in the maintenance of the existing forestry vegetation, fire protection and the aesthetics of landscaping.



(c) Ghaut stabilization protection and the establishment of agroforests

A 20 metre buffer zone to be established on either side of the ghauts.

3.4.2.2 Nevis

(a) Establishment of fuel wood, fence posts, and forage plantations

The proposed species, Leucaena leucocephala (Var R8).
Gliricidia (Gliricidia sepium) Acacia - Acacia mangium

(b) Linking fuel wood and fence posts

The production of split fencing to control animal grazing and control unlawful grazing.

(c) Preservation of fence posts and split fencing

By the use of a hot/cold mix and dip of diesel fuel and creosote.

(d) Establishment of industrial plantation on Government

Lands (above the 20° slope) on Ghaut sides and unutilized Government lands.

SECTION IV

MARKETING AND DISTRIBUTION

4.1 Marketing

4.1.1 Marketing Policies

As of April 1991, there was no clear definition of marketing policy in either St. Kitts or Nevis. Since 1973 when the Central Marketing Corporation was created and empowered to attend to all the marketing problems of St. Kitts and Nevis, no serious efforts have been made to formulate a comprehensive agricultural marketing policy. The need for such a policy has been defined, however, and the FAO Diversification Project includes short-term technical assistance to help formulate such a policy.

4.1.2 Marketing Systems

4.1.2.1 Marketing Channels and Participants

The marketing channels followed by fresh produce in St. Kitts and Nevis are shown in the following diagram. Although there are differences between the systems used in the two islands, in general they are quite similar.

Fresh produce originates either on one of the two islands or is imported, primarily from Miami (Tropical shipping to St. Thomas and barge transport to St. Kitts and Nevis).

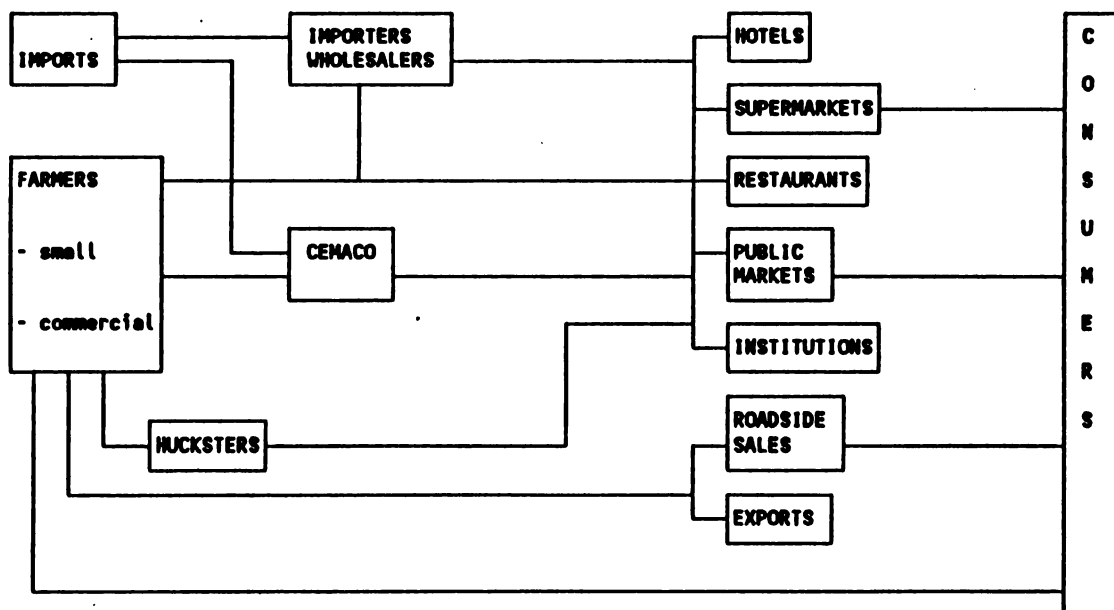
Most fresh produce is imported by three importer/wholesalers (RAMS, CEMACO and ?), all of which also have supermarket retail outlets. These importers are the principal suppliers of produce to supermarkets, restaurants, hotels and institutions. In the case of Nevis, the only variation is that some transshipment is required from St. Kitts to Nevis, using the local ferry service.

In the case of domestic production, the farmers themselves do most of the marketing. Significant amounts of production are consumed by the farm households or sold to friends and neighbours in the community. Small amounts may be sold by farmers or housewives to consumers outside the farming community. In some cases, hucksters (turnhands) make purchases directly from the farmers at the farm gate and transport to town on public transportation or with someone having their own vehicle. They in-turn sell in one of the public markets (most common practice) or less frequently sell to hotels, restaurants or other domestic buyer. There are also a number of hucksters who are regularly involved in inter-island trade. They purchase directly from the farmers, or grow the produce themselves, and transport it to one of the neighbouring islands by air (normally Liat) or by sea (on one of the irregular inter-island schooners).



Of the more commercial farmers, sales are often made directly off their vehicles parked along the roadside (common practice in Nevis) or by delivering the produce on a regular basis to hotels, supermarkets, restaurants and the public markets (more common in St. Kitts). While in St. Kitts it is the individual farmers selling to the respective outlets, in Nevis the DOA/CARDATS project is assisting a group of farmers to produce and market directly to the Four Seasons Resort Hotel. It is generally agreed that sales to CEMACO are undertaken as a last resort. Occasionally, farmers may export directly to one of the neighbouring islands.

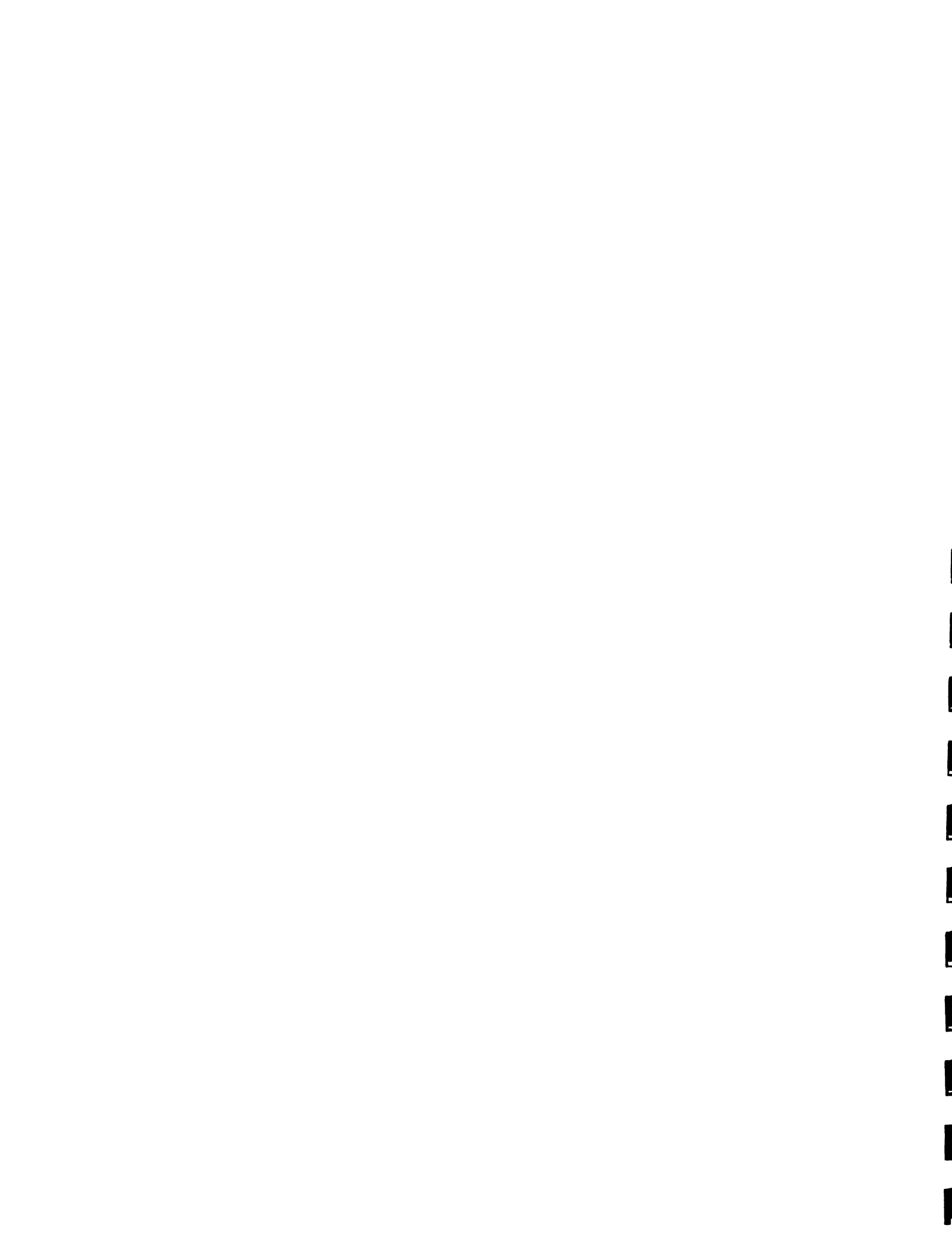
In analysing marketing channels in St. Kitts and Nevis, one must conclude that the systems are direct and relatively efficient in terms of speed and costs. In fact, if the objective were to only supply the domestic market then few recommendations could be made for improvement. However, given Governments interest in export development, modifications will have to be introduced to prepare the marketing systems for larger scale operations.



Any attempts to change the existing marketing systems in St. Kitts or Nevis must involve the active participation of the key players. These are: farmers, farmers organisations (particularly in Nevis), CEMACO, hucksters, importers and the larger hotels.

4.1.2.2 Infrastructure

Marketing Infrastructure in St. Kitts and Nevis is limited, however, what does exist is of recent construction or renovation and well maintained.



There are public markets located in Basseterre and Sandy Point in St. Kitts and Charlestown and Gingerland in Nevis. Over the past two years renovations have been made to these four markets at a total cost of approximately EC\$0.5 million, financed by CIDA/BDD. The renovation at Sandy Point included the installation of a small cool room, however, for lack of economic demand this unit is not used. The Market Manager reports that he turns it on periodically to keep it operational (At the time of the visit the cooling unit was not operational for lack of freezer gas or some other minor problem, however, the quality of market administration appeared very efficient). While some slaughtering of animals for local use still takes place at the Sandy Point marketplace, nearly all slaughtering of animals has been centralized in modern facilities at Buckley's Site in St. Kitts and Prospect in Nevis.

A modern, small-scale, abattoir was completed at Buckley's Site, St. Kitts, with funding from the Canadian International Development Agency in 1990. The abattoir is now the sole venue for animals being slaughtered, and provides a hygienic location for the slaughter of livestock and storage of meat. Meat can be sliced into acceptable commercial cuts. An insulated truck has been provided to transport the meat to the public market for sale.

A new abattoir was completed at Prospect, Nevis in 1987. In 1990 it was expanded with a meat cutting facility. Although on a smaller scale than that of St. Kitts, the Nevis abattoir is providing high quality meat.

Both abattoirs are well staffed, well maintained and seem to meet the respective demands of the local populations and the tourist industries.

CEMACO is centrally located in downtown Basseterre, St. Kitts, where it maintains its central offices, supermarket and corresponding cool and dry storage facilities. Cool storage is very limited and most perishables are maintained in 4-8 refrigerated containers.

CEMACO constructed a small cool room (10 x 10 x 8 ft) at Charlestown, Nevis. This facility is like new but rarely used.

Storage sheds for white potatoes and onions at Fahies Settlement, St. Kitts, were completed in March 1990. These facilities were provided by the ROC Agricultural Mission.

4.1.3 Domestic Demand, Imports and Exports

It is generally recognised that the combined domestic market in St. Kitts and Nevis is very small (less than 50,000 persons) with limited growth potential, even including a vibrant growth in the tourist sector. For example, the 1986-90 National Development Plan set a target of reducing fresh vegetable imports by 50%.



Assuming a growing economy, it was estimated (page 16, Annex 8A, Marketing, Volume 3, St. Kitts and Nevis Agricultural Diversification Study) that the target could be reached with an additional 1.9 million lbs annually by 1990. Assuming low average yields (10,000 lbs/acre), it was estimated that an additional 189 harvested acres and approximately 90 field acres of new crop land for vegetables would be required. Using improved technologies and irrigation it was anticipated that 50 acres would adequately satisfy the target requirements.

During the period September 1989 - August 1990, CARDI monitored sales of fresh produce to hotels, supermarkets, public market and CEMACO in St. Kitts (Table 4.1). Total throughput (local production plus imports) handled by wholesalers and retailers during this period was calculated at 1,238 tonnes of which vegetables represented 43%, root crops 23%, fruit tree crops 23%, spices & condiments 10% and pulses & grains 1%.

In respect to the source of each group of products; 92% of spices & condiments came from extra-regional sources, 76% of fruits came from that same source as did 75% of pulses & grains, 66% of vegetables and 58% of root crops. In total, 67% of the 1,238 tonnes came from extra-regional sources. The bulk of the difference came from local production. This emphasizes the lack of imports from regional sources as well as continued scope for import substitution.

Table 4.1

Total Commodity Off-Take in St. Kitts by Commodity Group and Source of Supply (kg)

SOURCE	VEGETABLES	ROOT CROPS	FRUIT TREE CROPS	SPICES CONDIMENTS	PULSES & GRAINS	TOTAL
Local:						
kg	180,805	118,253	59,237	9,421	4,578	372,294
% commodity	49	32	16	2	1	100
% source	34	42	20	8	25	30
Intra-regional:						
kg	731	569	10,651	257	0	12,209
% commodity	6	5	87	2	0	100
% source	<1	<1	4	<1	0	1
Extra-regional:						
kg	346,575	163,606	218,170	111,800	13,439	853,591
% commodity	41	19	26	13	1	100
% source	66	58	76	92	75	67
Total						
kg	528,111	282,428	288,058	121,478	18,017	1,238,094
% commodity	43	23	23	10	1	100
% source	100	100	100	100	100	100

Source: CARDI data, report for 1989-90 in preparation.



The information in Table 4.2 indicates that the total purchases in Nevis represents 27% of the total, or about what one would expect since Nevis has approximately one-fifth of the Federation's population. This data again is useful in stressing the smallness of the combined market of these two islands.

Further, if we analyze acreage requirements to supply one of the crops shown, e.g. tomato, we find that between January and December no more than 1.5 harvested acres are required in any one month. This would be equivalent to between 4 & 5 acres under tomatoes at any one time. Since tomatoes, as other vegetable crops, tend to be planted in micro size plots, at any one time there might be as many as 100 farmers growing tomatoes. This fact gives some indication of the difficulties to be expected in trying to organize farmers to move their produce through one central location.

Considerable attention is given to the hotel industry and its potential for increasing demand for locally produced vegetables and fruits. By analyzing actual hotel purchases of selected commodities by the larger hotels in St. Kitts (CARDI data) and actual purchases by Four Seasons Resort Hotel in Nevis, it is possible to get a good indication of volume of purchases of each commodity by room (Table 4.3). Whereas average monthly purchases per hotel room varies considerably from month to month and by commodity, the range, in all cases, is between 0.11 lb and 14.7 lbs per room. Using the maximum amount (high season), i.e. 15 lbs per room, for every 100 additional rooms, hotel purchases could be expected to increase by a maximum of 1,500 lbs/month of a given product. During the low season the maximum per room/month purchase of most vegetables and fruits is 5 lbs, equivalent to an increase in demand of 500 lbs for every 100 new rooms. Assuming six months of high season and six months of low season, an increase of 100 new hotel rooms would mean a maximum increase in demand for commodities such as tomatoes, white potatoes, cabbage, carrots, cucumber, and lettuce (those items of greatest consumption) on the order of 12,000 lbs per year. This is equivalent to the production from one harvested acre. Therefore, it is apparent that even with a very vibrant tourist industry the increase in demand represented by this sector will be marginal.

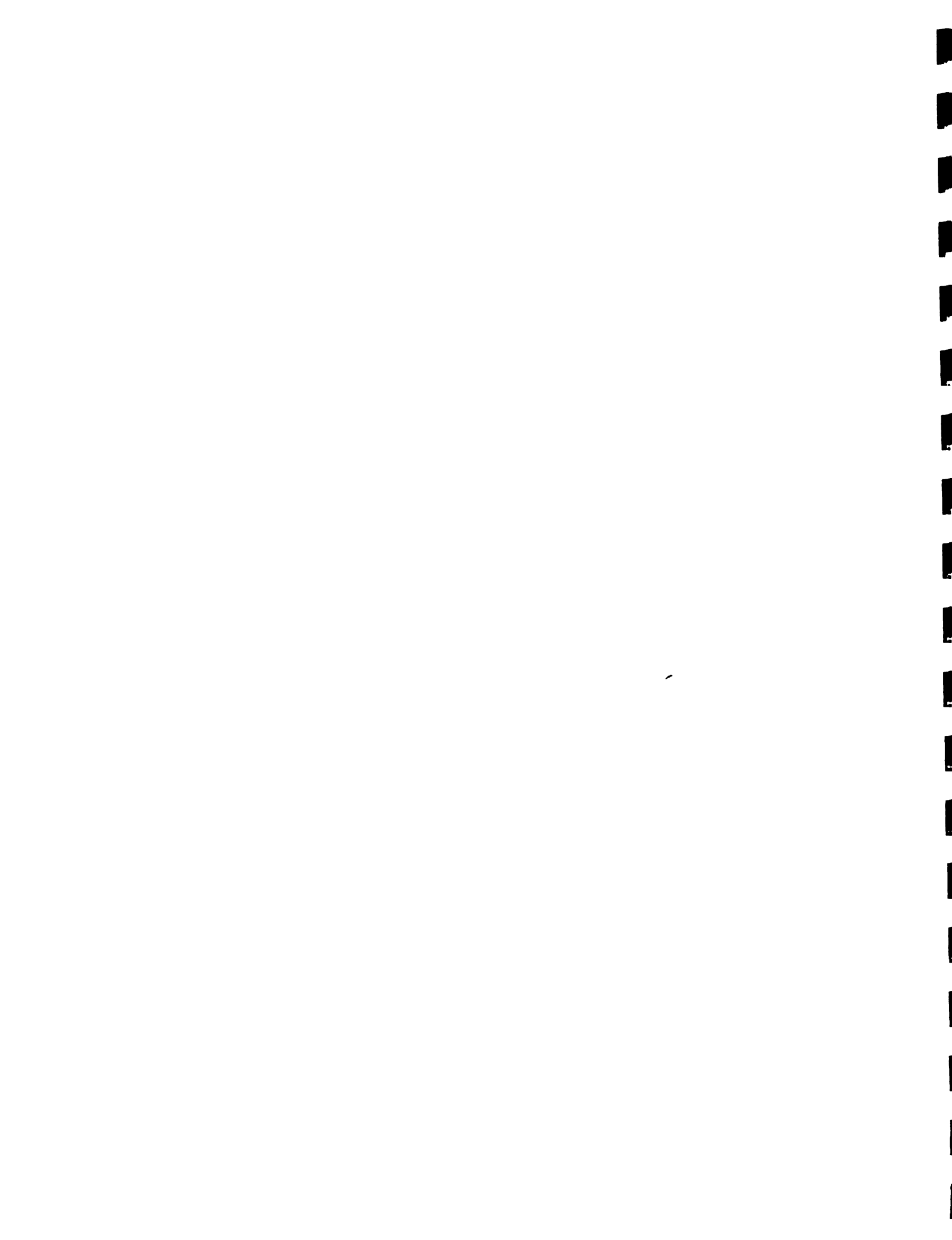


Table 4.2
Total Purchases of Selected Crops made in Principal Markets
in St. Kitts & Nevis (kgs)

CROP	St. Kitts 1/	Nevis 2/	Total
Cabbage	69306.75	7031.25	76338.00
Carrot	69438.15	20430.00	89868.15
Cucumber	15484.50	14436.00	29920.50
Lettuce	40271.40	24399.00	64670.40
Stringbean	7992.45	10030.50	18022.95
Sweetpepper	21434.40	8156.25	29590.65
Sweetpotato	63184.05	5625.00	68809.05
Tomato	51269.40	24153.75	75423.15
Watermelon	20204.10	8889.75	29093.85
Whitepotato	<u>9435.55</u>	<u>43245.00</u>	<u>13760.55</u>
TOTAL	452940.75	166396.50	619337.25

Source: CARDI data.

- 1/ Purchases made by supermarkets, public markets, hotels and CEMACO in 1988.
- 2/ Actual purchases made by hotels and supermarkets in 1989 plus anticipated purchases of Four Seasons Resort Hotel based on their own estimates.

Table 4.3
Average Monthly Consumption (kgs) of Hotels
for Selected Vegetables and Fruits by Room,
Low Season and High Season, in St. Kitts & Nevis (1989)

COMMODITY	ST. KITTS		NEVIS	
	Low	High	Low	High
Cabbage	0.15	1.93	0.86	7.20
Carrot	0.46	1.84	3.00	4.14
Cucumber	0.93	1.49	1.79	3.93
Lettuce	1.64	5.68	2.26	4.26
String bean	0.05	0.14	0.72	1.96
Sweet pepper	0.15	0.98	0.41	1.92
Sweet potato	0.19	0.76	0.55	1.82
Tomato	0.21	3.83	1.89	5.85
Watermelon	0.32	3.29	0.67	2.64
White potato	0.90	5.19	1.92	6.62

Source: Calculations made based on information collected by CARDI in St. Kitts and Nevis.

Note: The relatively larger averages in Nevis are due to the fact that the information comes from Four Seasons Resort Hotel which has a much larger permanent local staff and tends to overpurchase supplies to ensure that its guests will not go without.

It is generally recognized that exports from St. Kitts & Nevis are relatively insignificant. Available export statistics are shown in the Appendix. Since most exports are made by hucksters



to neighbouring islands, it is quite possible that the official statistics are underestimated. Some farmers have also reported making exports directly to neighbouring islands using small aircraft or available inter-island schooners.

There are reports of some exports of yams in 1989 to Montserrat and St. Kitts. In 1989 exports of livestock to St. Barths and St. Eustatius included 20 cattle, 83 sheep and 24 goats. In 1989 Nevis exported to St. Kitts: 6 cattle, 1,462 sheep, 500 goats and 510 pigs.

The most significant export of non-traditional crops in recent years was undertaken in 1990 through the Trade Agreement between St. Kitts and Antigua. Under this arrangement both countries would impose extra-regional trade restrictions on white potatoes in the case of Antigua and onions in the case of St. Kitts. After a series of negotiations involving wholesalers, farmers, CEMACO, officials of the respective Ministries of Agriculture and Trade, three shipments totaling 40,000 lbs of white potatoes and 1,000 lbs of pumpkin were made from St. Kitts to Antigua. Two shipments of onions were received from Antigua, totaling 91,050 lbs. Although there exists a desire on the part of officials to continue this inter-island trade, given the present price structure it is anticipated that such trade will not take place in 1991.

4.1.4 Price Formation and Regulations

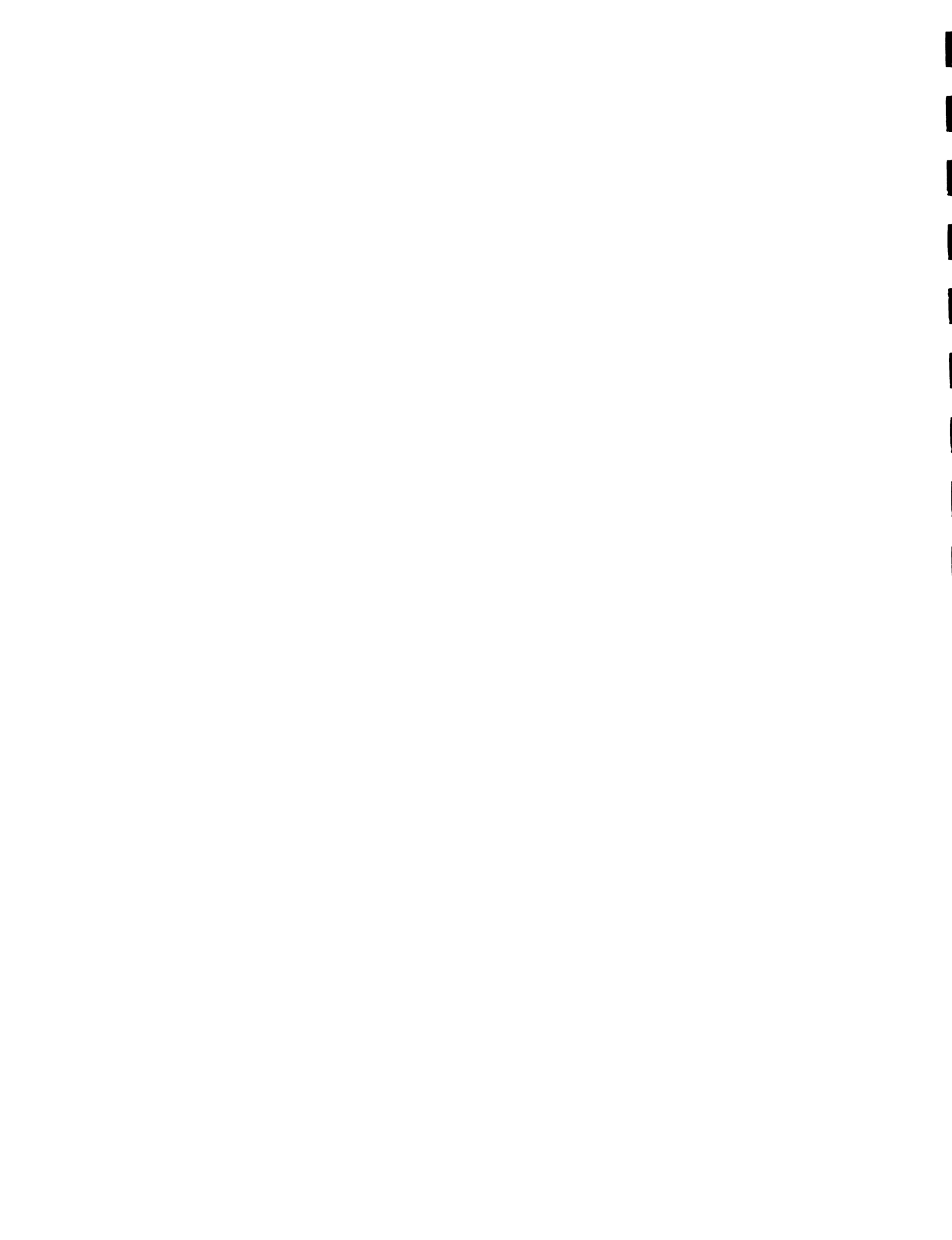
According to the Agricultural Diversification Study (Volume 3, Annex 8A, page 9), price elasticity of food supply in St. Kitts tends to be inelastic, that is, as supply changes significantly, price changes very little. It seems that even when local production increases substantially, market prices remain fairly constant. This is probably a reflection of the relatively stable market conditions in the USA (principal supplier to St. Kitts and Nevis) and the control of domestic market prices by two major importers who are relatively free to set prices as high as the market will bear. A comparison of import prices and retail prices will show that marketing margins are very wide. Statements have been made by market vendors that indicate that their procurement prices from local farmers were higher than the wholesale prices of importers (Agricultural Diversification Study, Volume 3, Annex 8A, page 9).

The lack of farmer response to high market prices has been explained by stating that farm production is not commercially oriented. A more realistic explanation is probably the farmers awareness of his lack of control of the market and his understanding of the high risk involved in expanding the production of produce which can often be imported at a cost below the farmers costs of production.



4.1.5 Conclusions

1. The DOA, Nevis is taking a practical approach to working with farmers in specific production areas through farmers organizations.
2. Rural Development policies and strategies, as part of a systematic plan, are not clearly outlined in any public document.
3. All farmers organizations, and most likely all co-operatives in Nevis, have been formed with strong input from Government and, in many cases, from expatriate volunteers. This is to say that the motivation for organization has come from the top down rather than from the intended beneficiaries themselves.
4. Of the four registered farmers co-operatives, three (Potworks, New River and Cades Bay) are in various stages of dormancy. Nisbett is the most vibrant although commercial production is relatively small and organizational and managerial skills are limited.
5. The organizations which have proven the most viable are those providing important services, e.g. Credit Union, School Co-ops, and Nevis Fishermen or those which have become self-sustaining economic enterprises, e.g. Newcastle Pottery, Nevis Handicraft. Nevis Beekeepers has and continues to have a full-time volunteer who holds the group together therefore its sustainability remains to be seen.
6. Market uncertainty and weak organization and management are the major problems impacting Nevis farmers organizations. It should be pointed out that these are the same priority problems identified by rural organizations throughout the Eastern Caribbean.
7. There have been a number of very good initiatives to promote rural development in St. Kitts and Nevis, however, the follow-through on these actions has been deficient. For example, the Youth Training Programme has not been sufficiently integrated with market development, small business co-ops have not developed the necessary managerial and marketing skills and farmer co-ops have been promoted and registered but not really developed. It would be more productive to have one good working co-op than several paper co-ops.



SECTION V**POLICY AND PROJECT IDENTIFICATION****5.1 Development Potential**

St. Kitts and Nevis in spite of its small size, in terms of territorial area population and markets, still has development potential of its agricultural sector.

Despite the fact that the agricultural sector has continuously declined over the last decade it still remains among the most important sectors in the economy of St. Kitts and Nevis. It contributes 8.9% of GDP, 30% of merchandise exports originate in the sector and it employs about 30% of the labour force. Within the agricultural sector, the sugar industry is by far the most important activity, generating about three-quarters of the value of agricultural output, and providing the largest source of wage earning labour, employing some 2,300 workers.

The potential for the development of non-traditional agriculture is very good. There are more than 15,000 acres of idle agricultural land that can be put into agricultural use.

Official data on unemployment in St. Kitts and Nevis, but unemployment and underemployment is estimated at 15%. There are therefore many idle hands, especially among the youth who, with the right incentives, can be trained in the areas of need. There are a number of well qualified people in different positions of government and in the private sector who can contribute to the agricultural development process.

Financial resources for agricultural development do not seem to be a major constraint in the short run. On the contrary, there appears to be a significant amount of credit available to St. Kitts and Nevis. However, because of the prevailing land use policy and present land tenure and land filling systems, many farmers cannot readily access this credit facility. What is required, therefore, is the rationalization of the land policy, identification and preparation of sound projects, and the coordination of actions of the different agencies operating in the twin island Federation.

St. Kitts and Nevis has, as do other islands in the OECS, a number of bi-lateral, multilateral and regional and international organizations operating there. They are an important source of technical and financial resources for technical cooperation and development cooperation projects.

On the economic side, a policy oriented toward export promotion and import substitution especially agriculture, and linked with tourism has been adopted. This has been the main plan



of the Agricultural Diversification Programme. It is, therefore, necessary to identify the commodities in which St. Kitts and Nevis has a comparative advantage and determine the degree of competitiveness. To do so, a thorough study of financial and economic costs of production, and the capacity of each potential crop to generate/save foreign exchange for each dollar invested, would have to be undertaken.

5.2 Development Constraints

5.2.1 Summary of Main Constraints

Below is a summary of the main constraints affecting agricultural development in St. Kitts and Nevis.

- (i) The failure of the government to resolve the land tenure problem, particularly in St. Kitts. Although the sugar estates have been fully taken over in 1989 and the government had proposed to address the land tenure question for several years, very little progress has been made on this¹. As long as St. Kitts lacks a clear land tenure policy, the incentive is reduced for long term investments in non-sugar agriculture and the agricultural diversification programme will be affected. Certain tenurial aspects of land, namely inheritance and fragmentation can also be potential constraints to agricultural production.
- (ii) As indicated before, farmers are relatively advanced in age. This factor limits motivation for medium and long term investments in the sector, whether by farmers financing themselves or being financed from institutional sources. This in turn will affect productivity in the sector.
- (iii) The sector is characterised by a large number of part-time and subsistence farmers. Small farmers also dominate the sector with almost 80% of farms being less than 1.2 hectares (3 acres). With the advanced age of farmers and low levels of technology employed, small farms do not provide sufficient income and alternative employment opportunities have to be pursued.
- (iv) The low profitability of small peasant-type farming is not conducive to sustained development of the

¹. It is expected that the land tenure issue will soon be resolved by the government to facilitate the externally funded agricultural diversification programme.



sector. The constraints discussed above contribute to a low economic viability of farming; alternative strategies which consolidate farms into more economically viable enterprises should therefore be considered. A few intensive and well-managed farming operations in both islands could almost certainly satisfy all their requirements of eggs, poultry and vegetables. However, such operations will not contribute to creation of employment opportunities in farming nor will it provide equal opportunity for small farmers, which is the focal point of the government's development strategy. Nevertheless, larger and more efficient farms should be encouraged if there is to be increased capitalisation of the sector and if agriculture is to reactivate its role in the economy.

- (v) There are constraints in both the internal and external markets for the country's agricultural products. Although tourism has expanded, the size of the internal market still limits its capacity to absorb agricultural output, especially during peak production periods. In addition, the cyclical nature of production provides supply problems for the tourist sector as well as to meet external demand requirements throughout the year.
- (vi) The physical infrastructure, particularly feeder roads is not adequate to support agricultural production and postharvest handling of products. Much damage is done to equipment and vehicles; both the DBSKN and FND experience persistent repayment problems for loans provided to purchase vehicles and equipment because of their "short" life.
- (vii) The availability of water is insufficient to meet the demand needs of both islands. While there is much potential for vegetable production, the lack of irrigated water is a major constraint. Efforts to diversify agriculture particularly intensive vegetable production will require additional water. The competition for water is likely to intensify as future demands for water come from an increasing population, urban development and an expanding tourist sector.
- (viii) The agricultural institutions, particularly the DOA's of both islands are not sufficiently strong to have any major impact on agricultural development. They are affected by a shortage of funds and skilled personnel which constrain

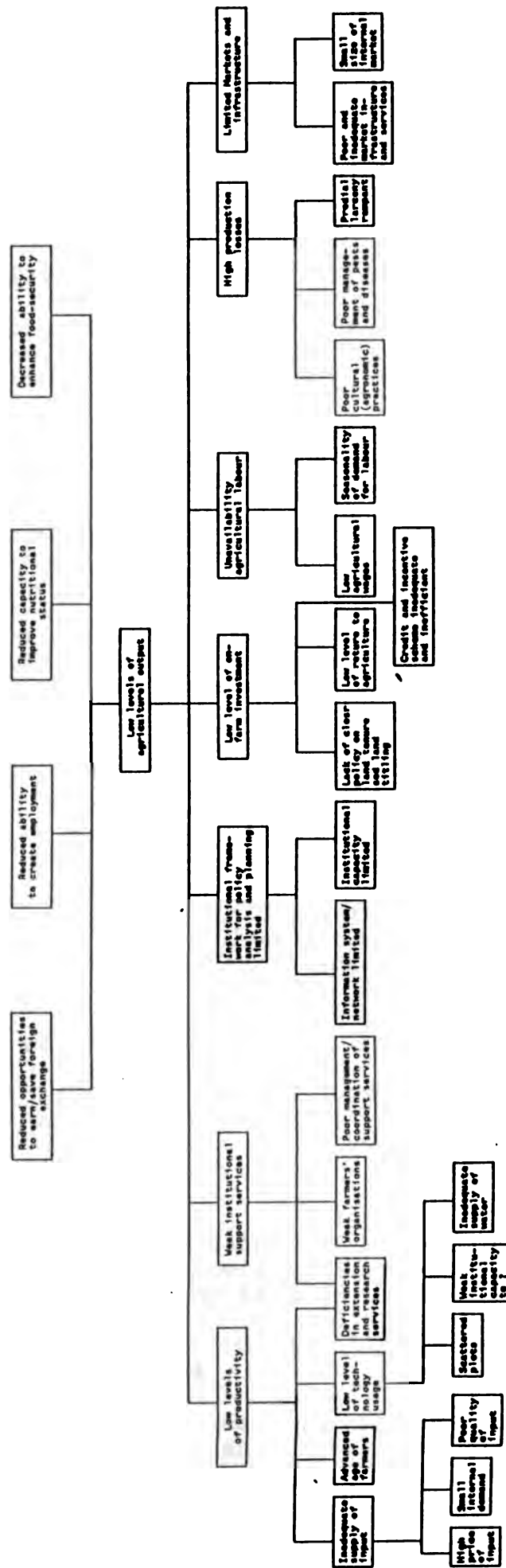
agricultural planning and execution of development activities. In addition, the institutions are unable to effectively integrate externally funded projects with their development efforts.

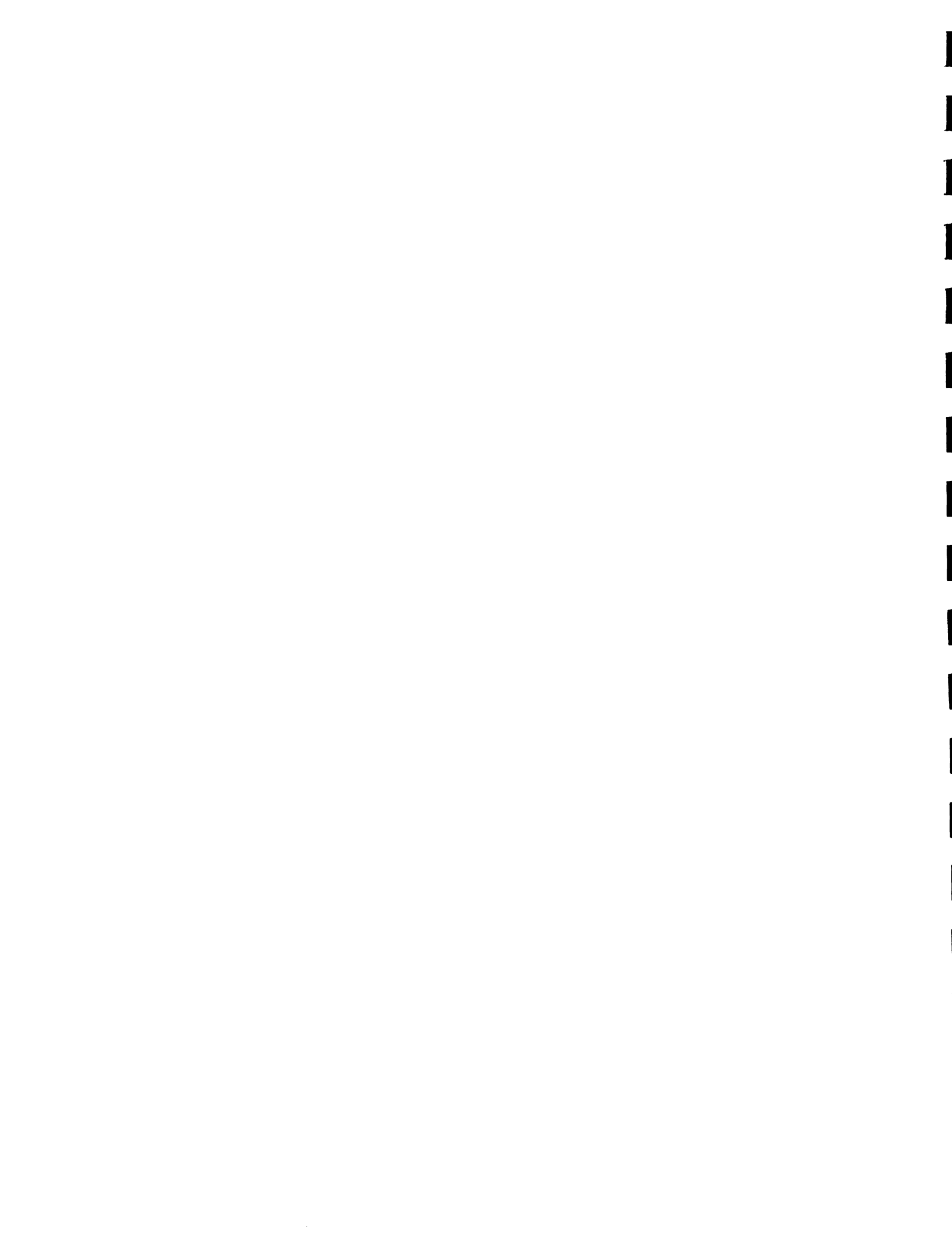
- (ix) There are serious deficiencies in the extension area research services to generate and transfer technology to farmers.
- (x) For various reasons, the government's policy goals and targets for agriculture have not been achieved. For example, most of the targets for the sector in the last development plan (1986-91) have not been realised and little has been done to implement an agricultural diversification programme. Sugar is still important to the sector and the economy, but its poor performance has been a financial burden on the government and this may have affected the development of non-sugar agriculture.

Figure 5.1 present these problems in hierarchical arrangement, depicting a cause-effect relationship. The figure should be read from bottom to top. In essence, the problem (core) of low agricultural output in St. Kitts and Nevis cannot be solved if, first the lower case problems are not solved (high production losses, limited markets, low productivity, etc.) In its turn, these cannot be solved if the problems under them are not solved.



FIGURE 5.2: SUMMARY OF MAIN CONSTRAINTS - COME-EFFECT





5.2.2 Main Sub-sectoral Constraints

5.2.2.1 Institutional Constraints

5.2.2.1.1 Policy Analysis and Planning

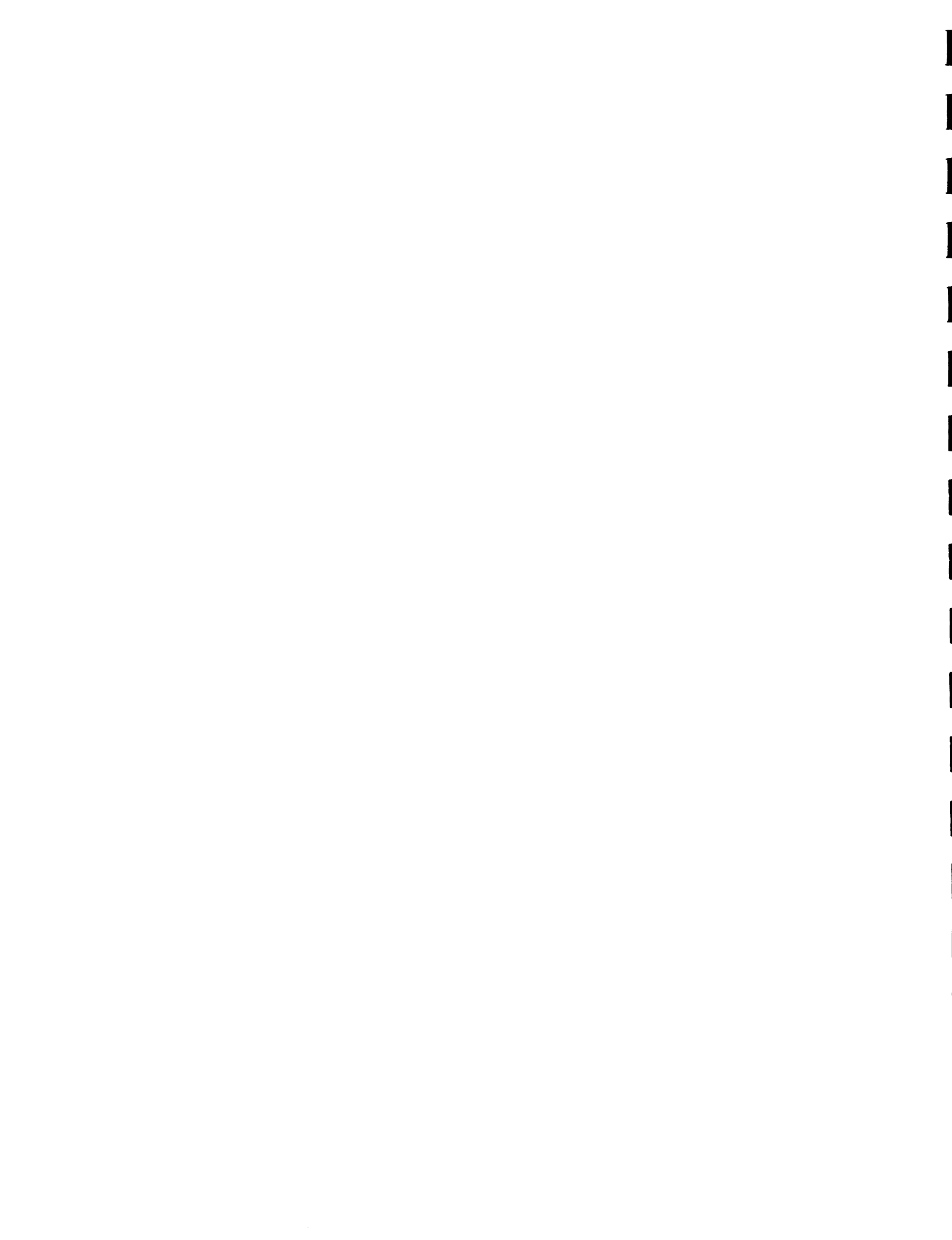
- (a) Information system/network to guide decision-making and planning as there is limited up-dated information on the agricultural sector and related areas.
- (b) Limited institutional capacity for macro-economic and sector-wise policy analysis and planning owing to insufficient manpower.
- (c) Inadequate planning, programming, management, monitoring and evaluation systems.
- (d) Poor land tenure and land titling systems due to skewed distribution of lands and numerous small holdings which result in difficulties in accessing credit and limitations in technology usage.
- (e) Credit and incentive schemes to stimulate agricultural diversification inadequate and ineffective.

5.2.2.1.2 Collection, Processing, Analysis and use of Agricultural Statistics

A great deal of highly disaggregated agricultural data are being collected on an on-going basis by the various agricultural agencies in St. Kitts and Nevis. However, a few gaps exist in the data.

The main data gaps are in the following area:

- a) livestock numbers, production and disposal for all classes of livestock
- b) use of agricultural inputs in the various sub-sectors
- c) volume and value of the huckster trade between St. Kitts and Nevis and between the Federation and the neighbouring islands
- d) estimates of local demand for agricultural commodities
- e) daily catches and disposal of fish and other seafood and an inventory of fishermen's equipment



- f) socio-economic data of farming population
- g) temperature, wind speed and relative humidity for selected sites in Nevis
- h) agricultural credit in the various sub-sectors of agriculture in Nevis and statistics on default ratings among agricultural loans in both islands.
- f) socio-economic data of farming population
- g) temperature, wind speed and relative humidity for selected sites in Nevis
- h) agricultural credit in the various sub-sectors of agriculture in Nevis and statistics on default ratings among agricultural loans in both islands.
- i) inventory of forestry resources in the Federation and production data on forestry products.

Data for non-sugar commodities are unreliable. In the case of the main vegetable crops, visual estimates are made of commercial holdings to predict production. This method tends to over-estimate production as post-harvest losses are not considered. Tree crop yields are even more inaccurate as they are determined as a proportion of the yields recorded by the SSMC tree crops.

Except for the Planning Unit, the other data collecting agencies have no system in place for data cleaning.

There is need for training, care and storage of diskettes and the use of appropriate software.

Data analysis is minimal. It is limited to simple descriptive statistics. Estimation is mainly subjective except in the case of forecasts of white potato production. No further analyses are used to determine the accuracy of the estimation procedures. Regression and correlation analysis are not used for estimating the relationship between variables.

Although reports are generated annually, and, in the case of price and crop forecasting data, weekly, the dissemination of this information among divisions and agencies is poor. One of the main reasons for the breakdown in communication is the frequent breakdowns and large backlog of the government printery.

The Planning Unit is overburdened with the task of data collection for National Accounts. The system is very inefficient as data for the previous year is requested at the end of the year instead of an on-going weekly or monthly basis. Consequently there is a backlog of data to be entered into the computer for



processing. In addition to the backlog, problems with the government printery lead to the untimely delivery of information.

5.2.2.1.3 Technology Generation and Transfer

The institutional weaknesses in technology development and transfer identified by UNDP/FAO/CDB study (Nurse et al, 1988) have not subdued. Together with those observed during this Assessment Mission, they can be grouped into four basic constraint areas in St Kitts and Nevis separately.

St Kitts

(a) Policy-Making

Being the core institution in the local TDTS, the DOA needs to guide the availability and transfer of valid technologies consonant with the national policy for agricultural development and diversification. Although implicit or diffused throughout different documents produced by or related to the MOA, no technology policy seems to have been clearly stated, logically articulated and officially established by the DOA. No documented TDT plan and programme could be found either.

(b) Functional Organization of TDT

For effective and efficient TGT action, the basic functions of the DOA can be divided into three broad groups:

- 1) Developing for and transferring to targeted farmers valid modern technologies
- 2) Providing general support services to facilitate adaption by farmers of recommended technologies, and
- 3) Monitoring and enforcing technical regulations to ensure agro-ecological and socio-economic sustainability of agriculture in the State.

As the DOA seems to have chosen to operate on a commodity mode, those functions should go horizontally across commodity groups (crops/livestock). Its current structural organization spreads all of its seven division in no apparent hierarchical order, hampering streamlined TGT planning and operational processes.

The functional and operational linkages between the DOA and the external cooperating institutions (principally SSMC/ARD, CARDI ROC) although considered satisfactory at the necessary institutional level, leave room for request disruptions. Also,



horizontal or vertical cooperation with Research/Development (R/D) institutions based outside the OECS region (CATIE, CIAT, CIP, CIMMYT, ISNAR) is not clearly organized and firmly established in the DOA'S structure.

(c) Management of TDT

The managerial short-comings which surfaced in previous assessments of the DOA and this one is common to any similar organizations in the OECS. Usually TDT Managers have not gone through the necessary training in Business Management in general and TDT management in particular. But even when they would have, administrative peculiarities of the Civil Servant System leave little room for free-hand management, which should result (achieved objectives) rather than amount of activities/tasks carried out.

The DOA's major managerial constraints include:

- 1) Insufficient participation of relevant professional staff in management and decision-making processes which directly affect their assigned responsibilities
- 2) Insufficient frequency of business meetings to guide, harmonize, coordinate, and support TDT actions at different structural and functional levels
- 3) Absence of a formal communication process and hierarchical channels (to make-up a dynamic reporting system) for supervision, monitoring and evaluation of TDT action and performance
- 4) Mostly re-active rather than pro-active (planned and programmed) training of professional staff

These and several operational constraints, such as insufficient transport and office/field facilities, tend to lead not only to reduced institutional performance but worse, to accelerated degradation of staff morale, motivation, ethics and institutional allegiance.

(d) Project Identification and Preparation

The identification and preparation of well conceived projects must respond to expressed farmer's needs and allow for greater effect and efficiency in the use of scarce physical, financial and human resources.

However, the TGT tasks undertaken by the DOA, funded through



the national budget, are not arranged into defined projects which would establish specific objective, measurable outputs, physical and financial resources (inputs).

Moreover, the current Planning structure in the MOA seems to deal only with projects which are externally funded, since apparently its major objective is to monitor cash flow and financial status of these.

Nevis

(a) Policy-Making

As in St Kitts, a sound policy statement on TGT has not been officially established by the DOA of Nevis for agricultural development and modernization in the State. No documented TGT plan and Programme have been prepared either.

(b) Functional Organization of TDT

The structural organization of the DOA in Nevis seems amorphous and tangled. Technical Units (e.g Animal Production) are placed at the same hierarchial level as Technical Divisions (Crop), Infrastructure (Abattoir) and Administrative Office (Executive Officer). All seven operational sub-structures in the DOA report independently to the Director of Agriculture, rendering streamlined TGT planning and operational processes difficult. External linkages for cooperation in TGT are not functionally structured, as in St Kitts.

(c) Management of TDT

Fewer TGT management constraints were observed in Nevis than in St Kitts. But the absence of an established reporting system and reactive professional training are common to the DOA in both States.

(d) Project Identification and Preparation

The constraints observed in Nevis are quite similar to those found in St Kitts in TGT projecting. Although the activities conducted by the TDT staff of the DOA in Nevis have achieved remarkable results in boosting production of some commodities, they have not been organized into defined projects. The absence of logical frameworks hampers effective monitoring and objective evaluation of the DOA's TGE performance.

5.2.2.1.4 Farmer Organisations/Cooperatives

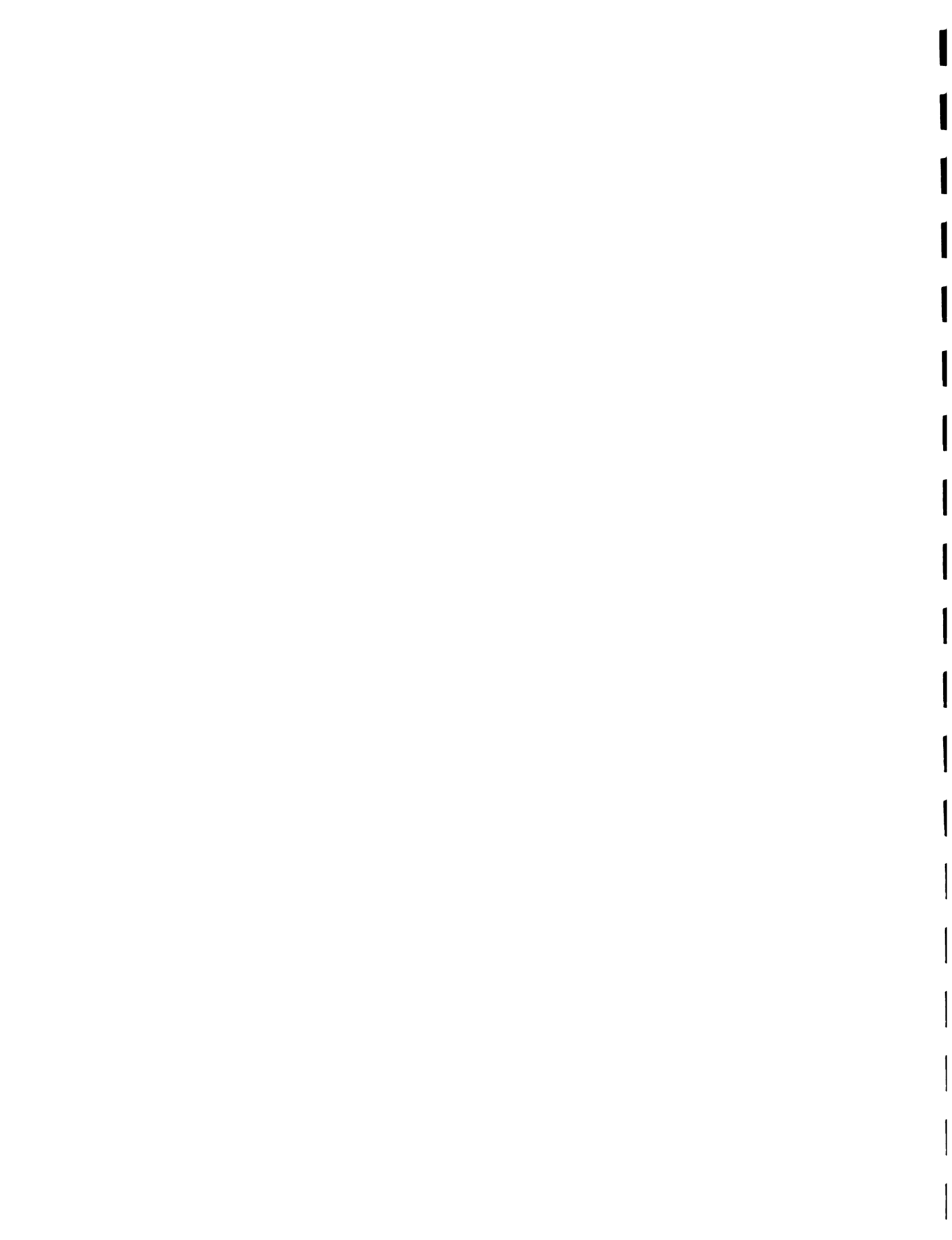
- (a) Information base for the formulation of rural development policies, programmes and projects limited.
- (b) Institutional systems for strengthening of farmers and rural development organizations deficient. Limited organizational and management skills among members.
- (c) Institutional capacity and technical capability for identification and formulation of programmes and projects limited.
- (d) Scarcity of resources for investment and working capital.
- (e) Deficiencies in farm and enterprise management practices.
- (f) Under utilized agricultural land and labour.
- (g) Increasing age of farmers and inability to attract women and youth in agriculture.
- (h) Difficulty in obtaining the best quality seeds and other farm inputs on a timely basis.
- (i) Inability or uncertainty of getting land preparation services on a timely basis from the small farm equipment pool.
- (j) No centralised point for assembly, grading and short-term storage of produce.
- (k) Insufficient capacity to identify and develop market opportunities.

5.2.2.1.5 Marketing Constraints

The CORE problem in respect to marketing can be stated as the following: **The marketing systems in St. Kitts & Nevis are inadequately developed to efficiently handle anticipated increased production under the agricultural diversification programme.**

This assumes that under the Diversification Programme, production and productivity will expand beyond the capability of being absorbed by the domestic market. This implies that increased production will have to be transformed, through agro-processing, or exported to regional or extra-regional markets in the fresh form.

Analysis of documentation and interviews with farmers, intermediaries and professionals identified five (5) major causes of this CORE problem. These are:







- 1) Subsistence level of production.
- 2) Weak rural organisations.
- 3) Smallness of market.
- 4) Difficulty in getting produce to market, and
- 5) Deficient infrastructure and postharvest handling.

Subsistence Level of Production

The main factors contributing to the subsistence level of production are:

- low levels of technology used;
- highly seasonal nature of production;
- small domestic market;
- small farm size, and
- uncertain land tenure.

Weak Rural Organisations

The weak nature of rural organisations pertains to all types including farmers co-operatives, fishing co-ops and other rural groups, cottage industries, etc. The causes of their weakness can be summarized as:

- relatively few commercial farmers;
- weak leadership;
- weak management due to scarce resources and insufficient training, and
- insufficient institutional support in such areas as credit, information, technical assistance, import controls and regulations, and infrastructure; these deficiencies are a result of limited human and financial resources and lack of clearly defined policies, goals and strategies.

Smallness of Market

The major factors contributing to the smallness of the market are:

- small domestic population (50,000);
- tendency to import a high percentage of food needs from Miami (this is done due to an insufficient regular domestic supply of quality produce and the security provided by the fast and regular service out of Miami);
- undeveloped export market as a result of no reliable means of transport, small scale of production, poor quality of produce and uncompetitiveness of prices, and



- undeveloped agro-industries as an alternative market. Agro-industries have not developed due to small volume of production of non-traditional commodities, relatively high costs of production, incipient nature of cottage industry and scarcity of risk capital.

Difficulty in Getting Produce to Market

This is a serious problem for domestic as well as regional and extra-regional marketing. The causes of this problem relate to:

- insufficient resources at the farm level to purchase a vehicle. This is caused by the low level of returns from farming and difficulty of the farmer in accessing credit since he doesn't own property nor is he a member of a farmers organisation which could assist him by facilitating credit;
- there is no dependable inter-island means of transport, either by air or by sea;
- farmers organisations are weak and therefore cannot purchase co-operative transport.

Deficient Infrastructure and Postharvest Handling

The major causes which have prevented the proper development of infrastructure and expertise have to do with the following:

- there is no clearly defined agricultural marketing policy or strategies for development;
- scarce resources at Governmental level;
- insufficient economic incentives to stimulate farmers and intermediaries to invest;
- no organized training programme to develop a critical mass of human resources in postharvest handling and marketing.

Figure 5.2 presents the CORE problem and its causes as described above. It also diagrams the effects of these problems if they are not resolved. Due to the deficient marketing system, there will be annual scarcities and gluts of food supplies which will produce farmer uncertainty and in turn produce a negative impact on the agricultural sector. Simultaneously, imports will continue to increase, leading to loss of foreign exchange. Low levels of exports will demise the opportunity to earn foreign exchange. Both increasing imports and low levels of exports will lead to an overall negative impact on the agricultural sector and the expansion of a vicious circle.

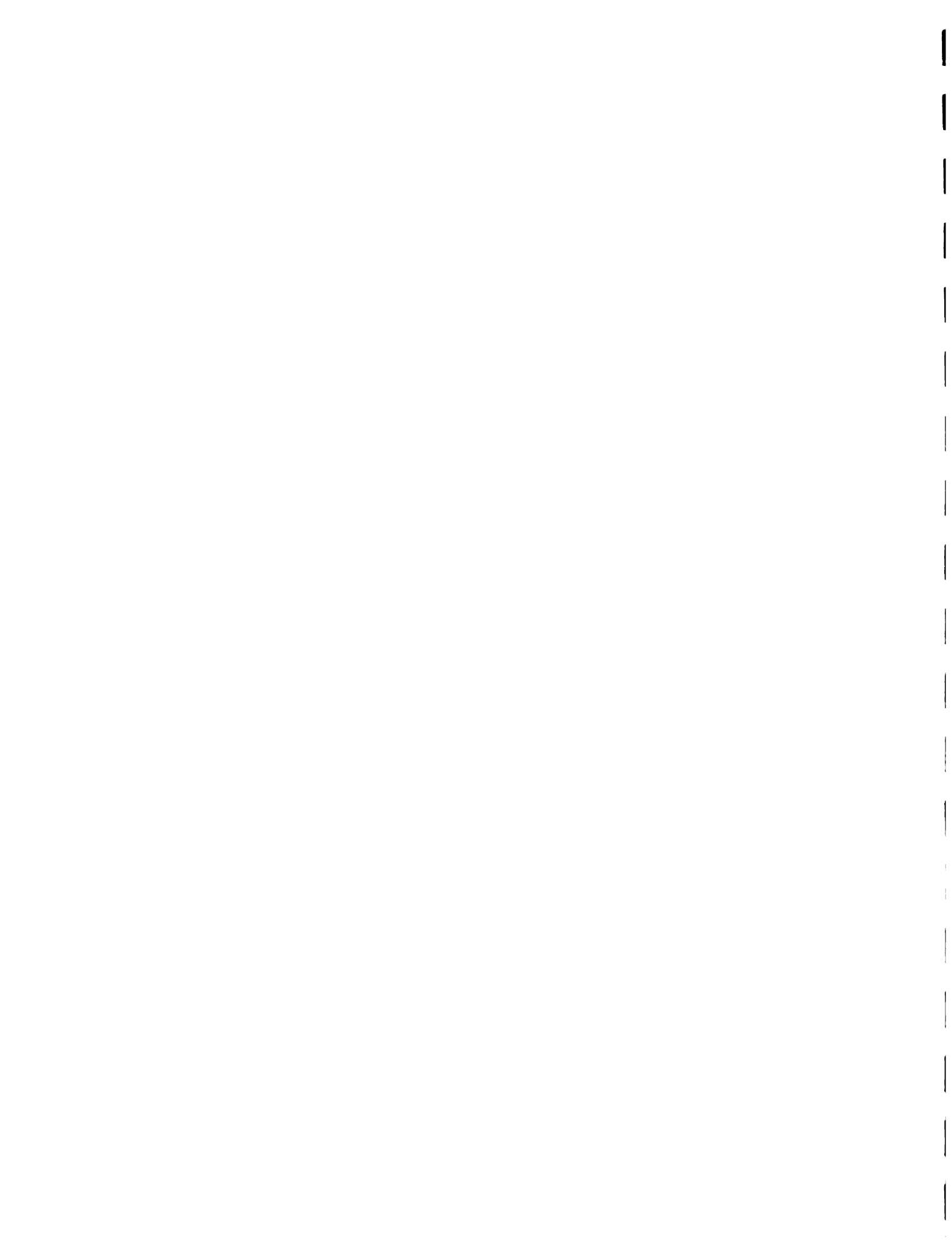
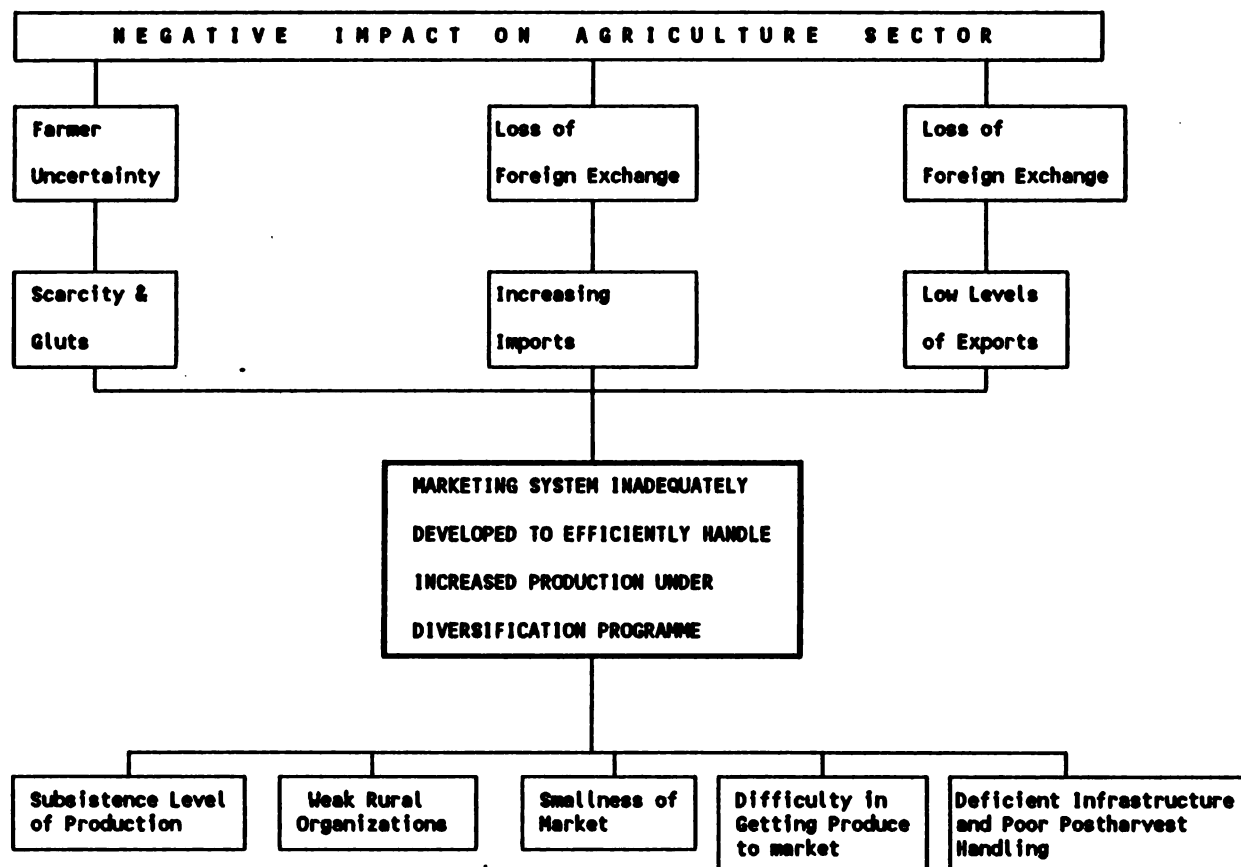


Figure 5.2: Core Problem in Respect to Agricultural Marketing, its Causes and their Effects



5.2.2.1.6 Crop Protection Services Constraints

St. Kitts

(a) Personnel

The CARDI entomologist attached to the IPCU, terminates her contract and leaves St. Kitts at the end of April, 1991.

Also, the other CARDI technician working with the Unit is presently out on a one-year study course. This means that from May 1991, the IPCU will be down to a staff of one technician, and effectively, be unable to perform most of its duties.

It is not certain whether CARDI will put in a replacement entomologist or pathologist, but SSMC is unlikely to.

There are at least two officers of the DOA who did courses in crop protection as part of their graduate studies. However,



these officers are responsible for Crop Research and Extension respectively, and though they may provide some crop protection advice in the course of their duties, it is not a major activity of theirs.

The Plant Protection Officer has to perform his plant quarantine duties together with those of managing the plant propagation unit. Very often he is called to perform inspections and issue phytosanitary certificates after normal working hours, on weekends and holidays.

Since the visit of the FAO consultant, two other technicians of the DOA have been informally designated as plant quarantine inspectors - that is in addition to their present duties.

The Plant Protection Officer attended the USDA Plant Quarantine Training Course held in Maryland, USA in 1990, but the two new inspectors have received little or no training in plant quarantine, therefore they rely heavily on Mr. Thomas.

Also some officers of the DOA, besides the plant protection officer and the two inspectors, issue phytosanitary certificates with apparently little or no inspections of the produce. This practice can compromise the authority of the plant quarantine service and the acceptance of its certificates abroad.

(b) Facilities

The office and laboratory space of the IPCU is adequate for its present operational programme. Equipment and supplies are satisfactory for the entomological work being done.

It has been recommended under the FAO project, that the laboratory be moved to a larger room in the same SSMC building in order to accommodate a plant pathology as well as an entomology laboratory. The equipment presently at the IPCU plus what will be provided by the FAO project should be adequate.

However, to date, the renovations to the new room that were required to be made by the DOA, have not been done, these include: cleaning, painting, sealing and air conditioning.

The IPCU performed its field work using transportation provided by CARDI. With the departure of Mr. Pricard-Leach, this facility may no longer be available.



Nevis**(a) Personnel**

The DOA in Nevis presently has no staff member qualified in plant protection or quarantine.

The four extension officers are the ones who issue phytosanitary certificates also with questionable inspection procedures.

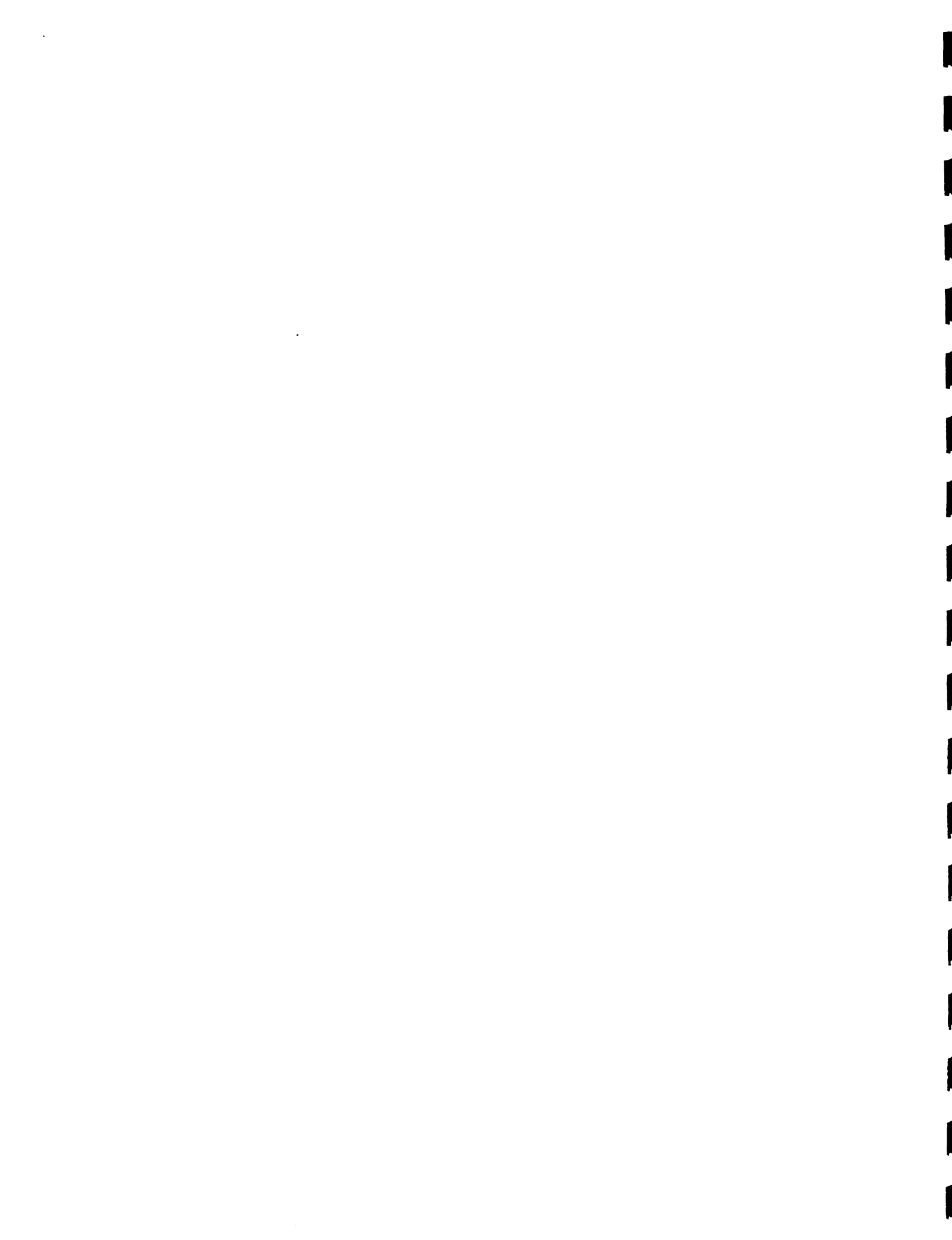
One member of staff, Mr. Hector has been identified to be the plant quarantine officer under the FAO project.

(b) Facilities

Presently, there are no office or laboratory space or equipment dedicated to plant protection and quarantine. Under the FAO project, a room in the building of the DOA is to be prepared for the location of a laboratory facility.

5.2.2.2 Commodity Programmes Constraints**5.2.2.2.1 Food Crops Production Constraints**

- (a) Scarcity of good planting materials.
- (b) Inadequate infrastructure for the production of planting materials.
- (c) Inadequate and unreliable rainfall and lack of irrigation facilities.
- (d) Wind blast conditions, particularly on the windward side of the island of Nevis.
- (e) Soil in Nevis is stoney and bouldery for root crop cultivation and presents a difficult proposition for land preparation.
- (f) Unreliable services for land preparation from the small machinery pool.
- (g) Shortage of labour for cultural practices.
- (h) Timeliness in affecting cultural practices not observed.
- (i) Limited access to available credit.
- (j) Inadequate market infrastructure for grading, packaging and storage.



- (k) Inadequate and inappropriate pre- and post-harvest technology and delivery system.
- (l) Inadequate marketing services.

5.2.2.2.2 Vegetables Production Constraints

- (a) Low unpredictable and poorly distributed rainfall.
- (b) Limited soil moisture holding capacity in St. Kitts.
- (c) Clayey and bouldery soil conditions in Nevis, with low rate of water infiltration on heavy soils, resulting in a high level of surface run-off and erosion during heavy downpours.
- (d) Level of soil management among producers leaves much to be desired. Mulching is rarely practiced, and anti-erosion measures on sloping land are inadequate.
- (e) Absence of commercial production of vegetable seedlings.
- (f) Inadequate seed-bed preparation and low levels of management at DoA nursery facility in St. Kitts.
- (g) Limited size of the domestic market.
- (h) Inadequate programming of production at the farm level.
- (i) Inadequate market infrastructure for grading, packaging and storage.
- (j) Inadequate and inappropriate pre- and post-harvest technology and delivery system.
- (k) Inadequate marketing services.
- (l) Lack of agro-processing facility.



5.2.2.2.3 Fruit Tree Crops Production Constraints

CONSTRAINTS, CAUSES AND PROPOSED ACTIONS

CONSTRAINTS	CAUSES	SOLUTIONS
1. PRE-PRODUCTION		
1.1 Supplies of fruit planting materials do not satisfy farmer demand.	<p>Poor (St. Kitts) or lack (Nevis) of infrastructure.</p> <p>Nursery staff in need of training in propagation methods and nursery management. (St. Kitts & Nevis)</p> <p>Nursery operate without propagation plan and budget is not adapted to target number of plants to be propagated. Consequently there is an scarcity and/or untimely supply of inputs and material for propagation (St. Kitts).</p> <p>Sale of plants in a first to come first to serve basis (St. Kitts)</p> <p>Sale of plants to other islands in detriment of local supply.(St. Kitts)</p> <p>Nursery operate without plant "standards" eg.plants are released while too tender, budding is done too low in the stock, etc.</p>	<p>St. Kitts: Modify infrastructure to maximize efficiency. Rehabilitate bins in old shed and use as seed-bins. Adapt two beds in new shed into a mist and humidity bed.</p> <p>Nevis: Speed up construction of proposed propagation unit at Prospect.</p> <p>Organize training event and in-service training of nursery staff. Send overseas if necessary. Use the capability and resources available in institutions such as UNDP/FAO, IICA and CARDI.</p> <p>Prepare yearly budget and propagation plan ahead of time. Secure funds and modify plan accordingly. Prioritize species and cultivars and contract inputs. eg. seeds ahead of time.</p> <p>Enforce the booking of plants. Give priority to those farmers willing to establish commercial plots.</p> <p>Promote and give incentives for the initiation of private nurseries) to supply the demand for plants from overseas.</p> <p>Develop and enforce standards for the propagation and release of each species of plants to be propagated in the nursery including: Varieties, propagation methods, stock to be used, height of budding, decontamination practices required, etc.</p>
1.2 Poor condition and/or quality of the planting materials produced by the nursery.	<p>Poor Nursery management: -Monthly and daily planning -Cultural practices -Pest and diseases control Decontamination practices eg. soil</p>	<p>Train nursery staff and propagation officer on different aspects of nursery management and develop appropriated forms for follow up.</p> <p>Design, establish and maintain germplasm banks with species and cultivars set as priorities.</p>



2. PRODUCTION

2.1 Low fruit production, yield and fruit quality.

sterilization, seed treatment, etc.
-Inefficient use of the infrastructure available.
-Bad sources of seeds and budwood and lack of own organized germplasm.

Introduce disease free material and select local clones where possible.

Poor orchard management, and common negligence of fruit crops.

Organize specific commodities training and establish demonstration plots.

Shortage of waste in some areas.

Prioritize crops and do more practical zoning.

Orchards not been protected from high intensity of wind which caused significant amount of damages (windcane, defoliation, flower and fruit drops, etc)

Plant windbreaks against direction of wind. Use species such as jamaon, breadfruit, and casuarina.

The lack of technological packages validated in St. Kitts and Nevis.

Introduce, adapt and validate technological packages developed in countries with similar conditions to St. Kitts and Nevis. Support the work of CASDI in the two islands.

2.2 Lack of farmers interest in growing fruit crops.

The few farmers willing to plant fruit trees cannot get sufficient planting material of desired quality.

Establish the booking of plants at the nursery and give preference to those farmers establishing commercial plots.

Under the present land lease system, (one year lease) farmers are reluctant to do long term investments such as permanent crops.

Approval of the land development act for long term land leasing (35 years).

Government lack promotion programmes and incentives to fruit growers.

Establish demonstration plots, and develop a promotion programme including incentives, market information, better marketing channels, and technical assistance services to farmers. Prepare leaflets, and organize conferences, field days, and other promotion events. Involve all institutions with expertise in these areas.

3. HARVESTING AND POST-HARVEST

3.1 High post-harvest losses

Extension officers and farmers need training on production, harvesting and post-harvest practices.

Improve the knowledge of both technicians and farmers on post-harvest handling practices following a commodity systems approach.

- Inefficient use of harvesting methods
- Poor knowledge of maturity index
- Rough handling of produce
- Overloading of containers
- Over-exposure to high temperatures
- Production and postharvest pests.

4. MARKETING

4.1 Short supply seasonality

Concentration of production to a short period due to a narrow selection of cultivars and unavailability of early and late cultivars.

Introduce and give priority to the propagation and distribution of late and early cultivars.

Bulk of production still comes from volunteer seedlings which are mainly harvested during the mid-season period.

Initiate top-working programmes especially for mangoes.

4.2 Difficulty to sell large production

- Small local market and unexplored potential for processing

Make better use of the experience on fruit processing available in the region.

Provide incentive to maintain and create new cottage industries.

Identify marketing niches.

- Competition from overseas suppliers

Prioritize crops offering competitive advantage and those with potential but that are not included in "expansion projects" of neighbouring islands.

4.3 Poor quality of the supply

- Most fruits coming from "seedling trees"
- Few organized orchards
- Poor management of existing orchards

Promote the establishment of organized orchards with high quality cultivars. Improve production, harvesting and postharvest practices.

5.2.2.2.4 Livestock Production Constraints

- (a) Lack of a systematic well organized animal breeding programme.
- (b) Low levels of technologies employed in the livestock production systems.
- (c) Low level of investment in modern operations due mainly to a lack of confidence in the sub-sector as well as a lack of collateral to obtain the necessary credit.
- (d) Poor management and control of pests and diseases of animals. Serious problem with the tropical bont tick, *Amblyoma variegatum*.
- (e) Prevalence of several species of wild animals that can act as predators as well as host of the tropical bont tick.
- (f) Praedial larceny.
- (g) High cost of grain concentrate and poor quality of locally produced forage.
- (h) Limited institutional support for the production and marketing of livestock products.
- (i) Poor management practices.

5.2.2.2.5 Fisheries Constraints

- (a) Deficiencies in fish handling, storage, distribution and marketing.
- (b) Limited management and extension capabilities of the Fisheries Division.

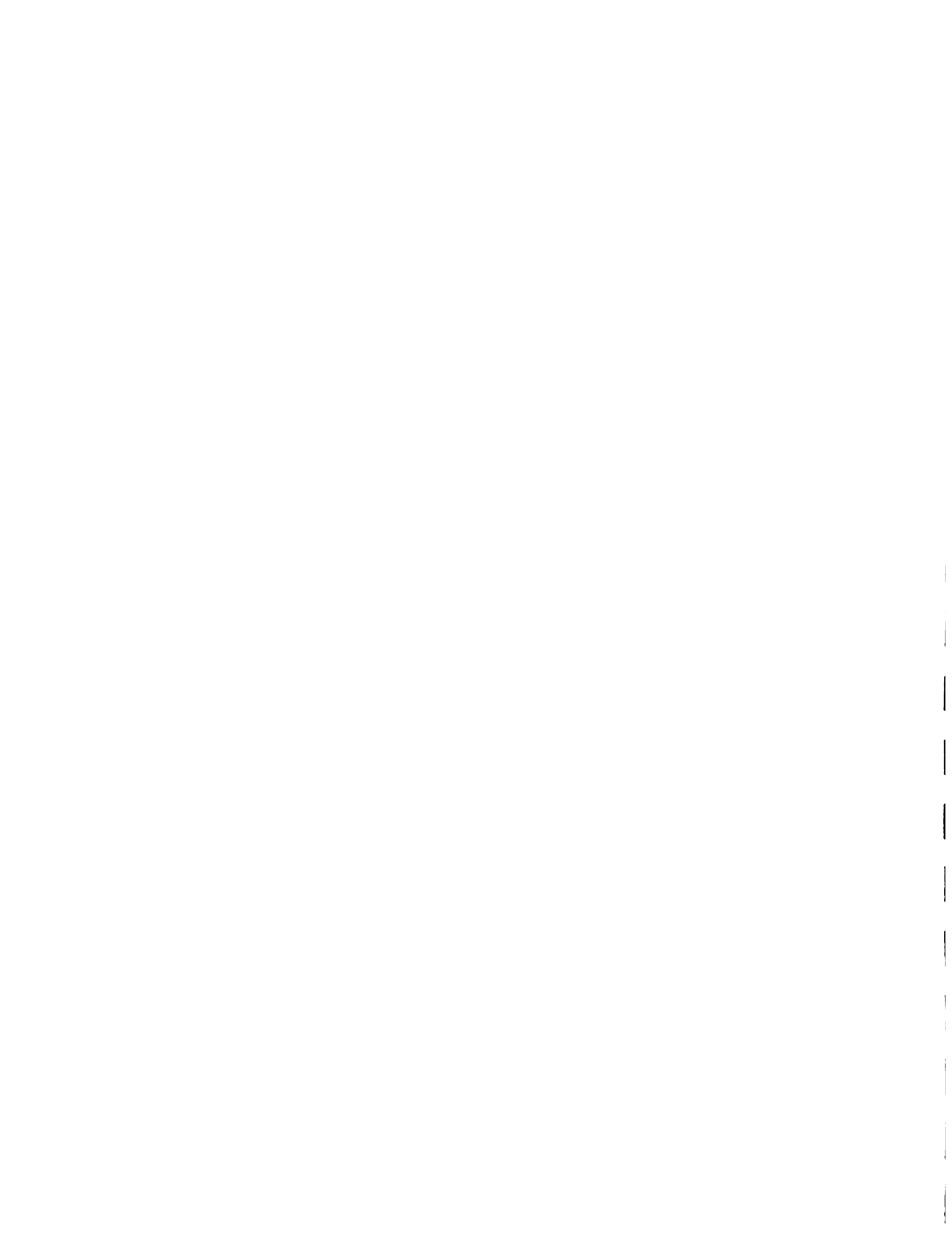
5.3 Development Goals

In defining the specific goals of the agricultural sector of St. Kitts and Nevis, it is important to bear in mind the development goals for the national economy as well as the overall goal for the agricultural sector. The Federal Government Development Programme is aimed at the structural adjustment of the economy to ensure an increase in earning/saving of foreign exchange, and the creation of additional employment opportunities. The overall agricultural goal is to revitalize and diversify the production base from a basically monoculture sugar sub-sector to the production of other agricultural commodities.

Within this context the following specific objectives were identified:

POLICY OBJECTIVE	TARGETS/STRATEGIES
To increase food production in order to improve the nutritional status of our community.	Improve land tenure and land rationalization. Introduce modern and appropriate cultural and managerial techniques.
To increase net foreign exchange through agricultural production for import substitution and export.	Reduce imports of tomatoes, carrots, white potatoes, cucumbers by 50%. Increase citrus, banana and coffee production. Increase rice, peanut and cotton acreage. Increase productivity of coconut. Reduce importation of meat products by ruminant animals, double production of pasteurized milk and increase production of fish.
To generate employment opportunities and increase income	Conserve and replenish forestry resources.
To increase food reserves thereby improving local capability to cope with disasters	Improve marketing facilities and introduce marketing surveillance system
	Introduce duty free concessions on equipment and implements. Make provisions for interest free loans, input supplies, improved extension and research services.

In order to define the specific targets and strategies in much more detail it will be necessary to develop specific studies for the various commodities or groups of commodities. This exercise can be effected through a project preparation exercise or further detailed studies of the various commodities.



5.4 Recommended Programmes and Projects

The following specific actions and projects have been recommended to remove some of the principal constraints identified under section 5.3 above.

5.4.1 Institutional

5.4.1.1 Policy Analysis and Planning

There is no formal mechanism or institutional responsibility in the DOA of the Ministry for agricultural planning in either St. Kitts or Nevis. Within the DOA, planning is limited to formulation of a work plan and an annual budget for each Division and contribution to the national development plan. At the Ministry's level, the planning function is discharged by a Planning Unit/ Because of the multi-sectoral role of the Unit, it has no specific responsibilities to plan for the sector besides liaising with the DOA on budgetary allocations and approvals, development projects and agricultural statistics. Its role in planning for the sector is also not well defined. Furthermore, the Planning Unit in both islands is severely constrained by the lack of budgetary resources and personnel and support facilities to provide sufficient support to agricultural sector planning.

The absence of any formal planning mechanism in the agricultural sector gives rise to several constraints. These include weak budgeting practices, inadequate programme and project planning, monitoring and evaluation, weak methods to collect agricultural data, an inadequate information base to support sectoral planning and the absence of adequate mechanisms to coordinate development activities with regional and international organisations.

The government of SKN has committed itself to a major programme of agricultural diversification. Furthermore, tourism has rapidly expanded linkages between agriculture and this sector. Based on these factors, as well as the importance of agriculture and the need to reactivate its role in the economy, there is a critical need to strengthen the planning capabilities for agriculture in SKN.

Objectives

- (a) To establish a statistical unit in the Department of Agriculture that will provide relevant and timely information for policy making and planning.
- (b) To train staff in the statistical unit and the DOA in methods of data collection, its organisation and management.

- (c) To introduce methods of annual budgeting, activity programming, monitoring and evaluation in the DOA.
- (d) To strengthen mechanisms of coordination between the DOA and the Planning Unit in the area of agricultural planning.

Outputs

- (a) A unit established in the DOA to collect pertinent information and data to support agricultural planning, programme and project monitoring and evaluation.
- (b) Staff in the DOA trained in improved methods of data collection.
- (c) Methods of annual planning and budgeting improved.
- (d) Coordination between the DOA and Planning Unit in sectoral planning strengthened.

Strategy

The strategy of the project is two-pronged: (a) to optimise the use of existing manpower resources within the DOA and the Planning Unit by improving their skill level through relevant training; (b) strengthen existing planning methods and establish more permanent planning mechanisms. This strategy should be executed through a programme which combines both technical and managerial training. Furthermore, since the size of the sector in both countries preclude establishment of a specialised agricultural planning unit, efforts should be directed at providing "hands-on" training to personnel currently involved in various aspects of planning (e.g., Division Heads in the DOA).

Development of an information system within the DOA is critical if the Department is to plan effectively and execute its programmes. A small statistical unit should be established to provide this support. With adequate training, this unit can be sufficiently staffed by non-technical and clerical staff, supervised by the Director of the DOA. This unit should then liaise on a continuous basis with the Planning Unit of the Ministry.

5.4.1.2 Collection, Processing, Analysis and use of Agricultural Data

Agricultural Input Data

An officer should be assigned to collect and collate the weekly and monthly sales of agricultural inputs from CEMACO, TDC and the Department of Agriculture. Alternatively, CARDI's

marketing technician could collect the information when he makes his weekly visits to the various marketing agencies.

Livestock, Socio-economic and Farm Equipment Inventory Data

Scales must be purchased and installed at the St. Kitts and Nevis abattoirs so that the weights of slaughtered animals can be recorded.

Livestock numbers can be determined at the same time that the Livestock Division visits farms to treat the animals for the Dermatophilosis. Alternatively, annual or 6-monthly surveys can be conducted by the Livestock Division, with the assistance of the Extension Division. Socio-economic data and an inventory of farm equipment can also be collected on these surveys so that the statistical needs of both division are satisfied simultaneously.

Fisheries and Forestry Data

The Fisheries Division is not yet fully organized or equipped to handle data collection on a daily or weekly basis. It is therefore, recommended that the Fisheries Cooperatives be coopted to assist the Division in this exercise. The cooperatives are currently doing a good job of recording data on the catches channelled through the Fisheries Complex and they may be able to provide additional man power to assist in conducting surveys of the various sites where fish are sold.

An inventory of the Forestry Species is currently being planned by FAO. Recommendations cannot be made for the collection of data on production of charcoal and fencing posts until the Forestry Division increases its manpower resources. At present, the Division comprises one person.

Huckster Trade Data

It is recommended that an Extension Officer be assigned to the plots at St. Kitts and Nevis on the main market day(s) (usually hucksters as they load their produce as well as making visual estimates of the volumes of commodities traded.

Local Demand

Local demand can be divided into domestic and tourist components. Domestic demand is influenced by the size of the population and can be determined from the quantity of produce sold by the supermarkets, public market and CEMACO to non-hotel customers. Tourist demand, on the other hand, is based on occupation rates at the various hotels and the quantities of each commodity which are purchased by the hotels. All these data are attainable from the CARDI data set. They can then be

used to derive indices of consumption for each commodity and hence local demand for various times of the year.

Environmental Data

Data on temperature, wind speed, relative humidity and evaporation for Nevis can only be obtained if weather stations are established at strategic locations on the island. Funds, therefore, need to be sought to establish these stations.

Employment Data

Since the larger commercial farmers are more likely to hire additional farm labour, it is recommended employment data be collected monthly during the crop forecasting visits.

Credit Data

Detailed information on the sub-sectors in which the agricultural loans were used, their purposes and default rates can be obtained from the Development Bank and the FND. It is recommended that the authorities at these agencies be informed of the need for this additional information so that they could adjust their recording system accordingly.

Data Cleaning

Two data cleaning systems need to be established - one for the detection of errors made in recording field data and entering them into the computer and the other is for detecting errors owing to double counting. The first system may be a manual screening of the data by at least two different persons, or the system may be computerized. The computer program to do the screening consists a file of all possible maximum and minimum values for each variate to be entered. Thus, if usually high or low level values are entered, the computer operator will be alerted to the aberrant value.

This computer check of the data would not be able to detect errors among data which lie within the acceptable range of values. In such cases, it is suggested that one or more persons be assigned to compare the raw data with that which entered in the computer to determine if any errors were made in entry.

The probability of committing an error in data entry increases each time the data have to be transcribed. With this in mind, the database system should be set up in such a way that there is easy transfer of data files among users of the system. Thus, the same computer program should be used and the fields set up in such a way that data can be easily imported and exported within the system.

Checking for double counting can only be done by someone who is knowledgeable with the methods of data collection and data sources. It is, therefore, recommended that the head of each Division be responsible for checking the data collected by his/her unit before it is forwarded for entry into the database.

Data Storage, Analysis and Interpretation

Shortcomings in these areas are best addressed through training courses to educate database users and managers. It is recommended that seminars and/or training courses be conducted in the following areas:

- a) Care and storage of computer diskettes
- b) Survey methodology
- c) Estimation of crop production and area and crop forecasting
- d) Statistical analysis for decision-making
- e) Interpretation and Presentation of Statistical Results

Inter-institutional Communication

The OAS project proposal for the establishment of an Agricultural Database promotes an excellent system which has the following advantages:

1. It is simple and can be implemented without the injection of large sums of money or drastic staff changes in the various agencies.
2. It incorporates all producers and users of agricultural statistics.
3. It takes most of the burden of data collection off the already over-taxed Planning Unit.
4. Data for decision-making are readily accessible by its users.
5. It facilitates the timely exchange of information among agencies.

The implementation of this project should be given the highest priority.

The Proposed Database System

Essentially, it comprises 5 agencies - SSMC, CEMACO, the Statistics Office of the Planning Unit, the Department of Agriculture and CARDI. Each agency is responsible for the maintenance of its own database of information relevant to its

needs. Thus, for example, CEMACO's database will contain marketing and price information, SSMC's will contain data on the sugar industry as well as the non-sugar commodities for which it is responsible, etc. Monthly summary reports will be generated by each agency and these will be circulated to the other members of the system. These monthly reports will be assimilated into annual reports which will not only be circulated among the various agencies, but will also be made available to interested persons.

A few modifications to the OAS system are, however, suggested:

1. For this system to work smoothly, the current backlog of the Planning Unit must first be eliminated. This can be achieved by hiring additional short-term data entry clerks and renting additional machines for a period of not more than 6 months to work exclusively on entering the accumulated data.
2. Once the backlog has been eliminated, a more efficient system must be implemented to avoid the recurrence of the backlog. To this end, it is recommended that a number of staff from the Planning Unit be assigned to collect the customs warrants with the trade data on a weekly basis and enter the data weekly into their database. The monthly summaries of these trade data can then be sent to the Department of Agriculture database for use in the Crop Forecasting exercise.
3. Since the database in the Department of Agriculture will be the main database of the system, it is recommended that one person be specially assigned to the Department to work full-time on the maintenance of the database. That person should have extensive training and experience in database management as well as knowledge of statistics and agriculture.
4. In addition to the data on crop, livestock, fisheries and forestry; socio-economic data in the form of a farmer's register should also be maintained by the Department of Agriculture. This aspect of the data will be updated by its main users, the Extension Division.
5. The same database program should be used by all agencies and files should be set up in such a way that data files can be transferred directly from one database to the other. This would eliminate the need for additional data entry and so reduce the

chance of committing further errors.

6. The system should be expanded to include the Planning Unit and Department of Agriculture in Nevis so as to facilitate easier exchange of information between the two islands (see Figure 2 for the proposed system).

Because of the Department's limited resources, it is suggested that priority should be given to the following areas:

- a. Improving techniques for estimating and validating crop production and productivity data, as well as local demand.
- b. More detailed analysis of crop forecasting data to determine effects on process and to develop better forecasting methods.
- c. Clearing the backlog in the Planning Unit and Implementing a more efficient system of data collection especially of the trade data.
- d. Training of staff in statistical analysis for decision-making.
- e. The establishment of a proper marketing and price database.

5.4.1.3 Technology Generation and Transfer

To boost its impact on sustainable agricultural development, diversification and modernization in the Federation, the DOA should effectively guide the technology development and transfer system in each State. Taking into account the current sector policy, as set out in the most recent national development plans (St Kitts and Nevis, 1986-1990; Nevis, 1987-1991) this institutional mission could be carried out within the framework of the following set of objectives, outputs, inputs and basic activities.

Sector Objectives

- 1) To achieve food self-reliance, through increased domestic production and consumption of targeted commodities in the plan
- 2) To increase foreign exchange earnings, through aggressive and competitive agricultural exports
- 3) To generate gainful employment, by attracting a new generation of entrepreneurial farmers as well as



increasing job opportunities through agriculture-based or related secondary tertiary activities (including agro-processing and tourism).

- 4) To ensure continued socio-economic growth, by sustaining contribution of agriculture to GDP and fiscal revenues, through sound management of the country's natural resources, especially lands and water.

Outputs of the TDTS

- 1) Valid improved or innovative technologies transferred to and incorporated into target farming systems, through enlightenment and empowerment of farmers.
- 2) Relevant technologies produced by the TDTS, resulting from stronger operational linkages among research/development institutions, extension services, marketing agencies and farmers (especially organized farmer groups).
- 3) Organized and dynamic access of TDT professionals to modern scientific, technical and technological information and materials, through strengthened or broadened horizontal/vertical cooperation with relevant R/D institutions or agencies within and outside the OECS region.
- 4) Increased institutional capability of the DOA to identify, formulate, and implement core or externally funded TDT projects, through appropriate training of relevant personnel.

Inputs (Human, Financial and physical Resources)

- 1) National
 - Public sector (including non-profit autonomous entities)
 - Private sector (profit-led enterprises including farmer organizations)
- 2) Extra-national
 - Regional
 - Bilateral
 - International

Basic Activities

The DOA in each State should address urgently the setting of technology priorities (including biotechnology) functions reorganization of its TDT structures and external linkages, upgrading of the managerial capability of the relevant staff, and assembling of its TDT activities into well formulated projects within clearly established crop/livestock development programmes.

5.4.1.4 Farmer Organisation and Related Institutions

5.4.1.4.1 St. Kitts

(a) Co-operative Division - Ministry of Agriculture

Given the importance of having strong rural organisations as part of the agricultural diversification programme, the Co-operative Division should take the leadership in the design of a concise rural development strategy within the framework of the Diversification Programme.

The Co-operative Division should prioritize co-operatives and support actions and develop a realistic work plan based on available resources.

Technical assistance should be solicited from OAS, FAO, IICA, ILO and others for the identification and formulation of projects to strengthen specific co-operative organizations.

Regional, international and NGO institutions interested in the support of rural organisations in St. Kitts & Nevis should be identified and development projects, based on their respective criteria, formulated and submitted to them for funding.

The Division should initiate a series of meetings with farmers interested in forming some sort of farmers organisation to openly discuss problems, needs and alternative organisational structures. If considered positive a project should be formulated to obtain the necessary technical and financial assistance.

The Co-op Division should require organisations to pass through a more stringent period of training and development as pre-co-operatives. This would increase the probability of their achieving self-sustaining capability.

(b) Central Marketing Corporation (CEMACO)

The image of CEMACO should be changed so that it is seen not as "The Agency" responsible for all marketing activities but

as a facilitating agency supporting the development of production and marketing activities.

A multi-disciplinary and multi-institutional team should be formed to define the Federations Agricultural Marketing Policy. Members of the team should include farmers from St. Kitts & Nevis, CEMACO, DOA St. Kitts, DOA Nevis, Ministry of Trade and SSMC. This policy document should identify priority problems as well as the principal participants in the marketing system. It should define sector objectives and should describe the policy elements and the strategy for implementation. (Note: a similar exercise was recently completed in St. Lucia with assistance from CARDI and IICA).

Based on the new Federation Agricultural Marketing Policy and the respective role to be played by CEMACO, the same interinstitutional team should prepare a plan of action to strengthen CEMACO and develop those necessary facilitating services.

Until the Agricultural Marketing Policy is clearly defined any further restructuring of CEMACO or investment in new infrastructure could result in an inefficient use of scarce resources.

(c) School related Cooperative

Obtain grant funding to hire a full-time manager for two years to put APEX on a self-sustaining basis.

Promote cottage industries to produce school uniforms and other supplies which can be sold through the APEX network.

Establish linkages with other OECS islands and promote similar programmes which could be partially supplied from St. Kitts & Nevis cottage industries.

APEX has scope for developing into a regional project to supply school uniforms, textbooks and other school supplies to school systems throughout the region. A feasibility study for such a regional project should be undertaken under the direction of the OECS.

(d) Fishing Co-ops

A meeting should be organized with representatives of the three active fishing co-ops with the purpose of evaluating the feasibility of formulating one joint project to support the development of market opportunities for fish.

If the fishermen are willing to work together, a project with the following characteristics should be formulated:

- a) Training to develop leadership and management capabilities.
- b) Grant funding for hiring of a Marketing Manager for a three year period, after which the project should become self-sustaining.
- c) Renovation of walk-in freezer at Fisheries Department in New Town and lease to Co-operative group.
- d) Purchase of means of transportation of fish and organization of marketing network.
- e) Bulk purchasing of fishing supplies for three co-ops and organization of distribution network.
- f) Establishment of production and market information system.
- g) Market demand study in neighbouring islands.
- h) Sourcing of line of credit for fishermen to purchase larger size boats.
- i) Intensive training programme for fishermen in modern fishing and postharvest handling techniques.

In the organizational stage of the above project, linkages should be established with the fishing project in Nevis.

(e) Home Industries Co-op

Before any further development activities are initiated with this group the first step should be to undertake a market feasibility study (if a market for the potential output cannot be identified then any further promotion of this group would be a waste of resources).

The market study should contemplate such opportunities as the traditional domestic market, production of school uniforms under the APEX project, tourist market in both St. Kitts and Nevis, value added to agricultural products, e.g. cloth decorations for beehive products (honey in jars, beeswax candles), and export potential of selected items, e.g. bed spreads and pillow cases, to regional and extra-regional markets.



(f) Farmers Organisations

Meetings should be held with those farmers interested in forming a farmers organization with the intention of identifying the best model for such an organization, i.e. association, farmers union, company, co-op, other;

Assistance and training in selected areas should be offered to the farmers as needed to initiate the organization based on the model of their choice, e.g. St. Kitts Crop Growers Association;

Assistance should be provided to the group of farmers in the formulation of a project to generate the necessary resources for them to resolve their priority problems; components of such a project might include the following:

- a) Multi-purpose centre for assembly, grading, storage and retailing of farm supplies.
- b) Tractor and equipment for land preparation.
- c) Operating capital for farm input supplies.
- d) Packaging materials for export to neighbouring islands.
- e) Training in postharvest handling of fresh produce, business management and farmer organizations.
- f) Linkages with the multinational Caribbean Farmers Development Company (CFDC).
- g) Others to be determined.

5.4.1.4.2 Nevis**(a) Co-operative Division - Ministry of Agriculture**

The Co-operative Division, in close collaboration with other units of the DOA, should design and formulate a concise rural development strategy within the framework of the Diversification Programme. The strategy should include detailed project profiles which will impact upon primary societies. Each profile should include resource requirements and an indication of sources of technical and financial assistance.

Technical assistance should be solicited from OAS, FAO, IICA, ILO and others for the identification and formulation of projects to strengthen specific co-operative organizations.



The Division should actively support the strengthening of the Nevis Growers Association which is presently supplying the Four Seasons Resort Hotel with handson assistance from DOA/CARDATS project. The Division should evaluate the eventual conversion of this loose knit group into a formal Nevis Crop and Livestock Producers Co-operative and make recommendations accordingly.

The Co-op Division should require new organizations to pass through a more stringent period of training and development as pre-co-operatives prior to registration. This would improve the likelihood of their achieving self-sustaining capability.

Given the organisational and managerial weaknesses of the New River, Potworks, Cades Bay, Nisbett and Nevis Beekeepers co-operatives, an indepth evaluation of needs and potential of each group is recommended. Following such an evaluation an intensive training programme should be carried out to strengthen the respective groups in their areas of weakness.

(b) Nevis Co-op Credit Union

Bad debts resulting from old loans not having collateral will be written off.

More promotional activities should be developed to stimulate new membership and increased savings.

New services should be added as managerial capacity improves and expands.

(c) School Co-operatives

Methods need to be found to increase the economic returns of the APEX co-operative structure so that it can eventually become self-sustaining.

At least one full-time staff member should be put in place to manage this project, with the ongoing support of the Co-op Officer.

A marketing programme should be initiated to expand the volume and number of items sold to students and to improve economies of bulk purchasing.

(d) Nevis Handicraft

With the potential demand from the Four Seasons Resort Hotel for arts and crafts, a project document for the improvement of this business was prepared and submitted to government but no action has been taken. This project document should be

recuperated and modified and presented to NGOs for funding.

This co-op may have scope for producing value added items for the agricultural sector, e.g. painted wooden boxes to retail different types of bush tea produced by Nisbett Co-op and containers and gift packages of beehive products produced by the Nevis Beekeepers Co-op. A market feasibility study should be undertaken.

An evaluation of this business should be undertaken to determine its competitiveness with other craft businesses in Nevis and St. Kitts and recommendations made for increasing volume of sales. Export of selected items should be considered, particularly those produced by Magic Toy Company.

(e) Newcastle Pottery

An indepth evaluation of this business needs to be undertaken and a strategy developed for turning it into a self-sustaining economic enterprise.

A training programme must be executed to improve the technical and administrative skills of the members of this group. The training should not be of an ad hoc nature but designed to meet the specific needs of the group, including such things as: glazing and mixing of glazes, quality control, packaging, marketing and improved pottery methods.

A project should be prepared with the active participation of the members of this business to upgrade the quality of the products produced, expand the number of items produced and expand the volume of production. Components of such a project may include the following:

- a) Market study (domestic, hotel industry and regional) to determine the products with the best margins and market opportunity.
- b) Improved kiln facilities for both large and small items.
- c) Expansion of working and storage facilities.
- d) Training programme for management and staff.

Assistance in conducting a study of market opportunities should be requested from EXSEDA in Dominica.

Assistance in the preparation of a comprehensive development project could be solicited from the OAS and IICA.

(f) Nevis Fishermen's Co-op

A comprehensive evaluation of this project should be undertaken with the active participation of DOA staff, Co-op staff, selected fishermen and representatives of the OECS Fisheries Desk.

Based on the findings of the evaluation a project document should be prepared to put the Fisheries Complex on a long-term self-sustaining basis.

Components of the New Project may include the following:

- a) Purchase of larger size boat(s) to be owned by a small group of fishermen and paid off over a period of time through sales of fish through the Complex.
- b) Comprehensive education and training programme to cover needs of fishermen for technical (navigation, deep sea and longline fishing, safety, quality control, postharvest handling and marketing) and organizational aspects, and staff in business management, storage, quality control and marketing.
- c) Operating capital to expand retail fishing supplies operations.

Close linkages should be established between this Co-op and the Fishing Co-ops in St. Kitts.

Technical and financial assistance should be solicited from governments of Taiwan, Japan, Sweden, OECS and others.

(g) Nevis Beekeepers

Formulation and execution of a project for the organized expansion from 80 to 300 beehives.

Obtain reliable transport services for members of the Nevis Beekeepers Co-operative.

Develop the managerial capabilities of the Co-operative.

Assist selected members of the Co-operative reach economically self-sustaining levels of production of hive products.

Promote the development of a cottage industry in hive products such as beeswax candle making, pollen and others.

Satisfy the needs of the Nevis population and the hotel industry for beehive products and initiate organized exports to St. Maarten and Anguila.



Establish a retail outlet to provide Nevis beekeepers with beekeeping supplies and to offer beehive products to the tourist industry.

(h) Nisbett Plantation Farmers

Continue to improve the land and irrigation system and increase garden productivity.

Install drip irrigation systems with assistance from CARDATS/CARDI.

Improve the technical ability to produce, process and market fruits and vegetables.

Develop a cottage industry with the necessary infrastructure and equipment for producing high quality bush tee and home canned fruits and vegetables for sale to Nevisians and the hotel industry.

Strengthen the managerial capabilities and organization of the Co-operative.

Establish line of credit to meet the needs of the individual farmer and the co-op for farm inputs, processing inputs and marketing.

(i) Potworks Farmers Co-operatives

Line Potwork dam to reduce water filtration.

Install drip irrigation systems on all commercial farms.

Strengthen the co-operative's abilities to deal with fencing, water supply and land problems and with the coordination of production and marketing activities.

Organize the distribution of farm inputs through the co-op.

Build appropriate demonstration storage facilities for onions.

Support the formation of the Nevis Crop and Livestock Producers Association which will be the umbrella organization responsible for the coordination of marketing services.

(j) Cades Bay Farmers

An organized effort should be made to lobby Government to clarify land policy in Nevis and seek more secure tenure arrangements in Cades Bay.

A comprehensive evaluation should be made of this farming area and Co-op and a project formulation for its development. Components of the project may include the following:

- a) Strengthening of the organizational and managerial capability of the co-op.
- b) Secure area with fence to keep animals out.
- c) Lease tractor from government to be managed and operated by Cades Bay Equipment Committee.
- d) Development of production/marketing planning system to meet the needs of selected markets.
- e) Facilitate drip irrigation systems to all commercial farmers within the co-op.
- f) Construction of new building or renovation of Government buildings (old cotton and rangers house at Cades Bay) to provide space for: meetings, storage, grading, packing and retailing of fresh produce and farm supplies.

Support the formation of the Nevis Crop and Livestock Producers Association which will be the umbrella organization responsible for the coordination of marketing services.

(k) New River Farmer's Co-operative

Lease tractor from government to be managed and operated by New River Farmers Equipment Committee.

Expansion of the CARDATS/CARDI project to project drip irrigation systems to all commercial farmers in the Co-op.

Expand the water storage capacity with additional earthen dams.

Strengthen the organizational and managerial capability of the group.

Support the formation of the Nevis Crop and Livestock Producers Association which will be the umbrella organization responsible for the coordination of marketing services.

5.4.1.5 Marketing

Being a Federation, St. Kitts and Nevis have a particular need for close coordination of their agricultural production and marketing programmes. Since produce moves freely between the two islands, import restrictions imposed by one island can be



circumvented if not also imposed by the second. Agricultural strategy and policies should be developed in tandem and closely monitored to avoid negative impact. Mutually complementary production and marketing information systems need to be put in place.

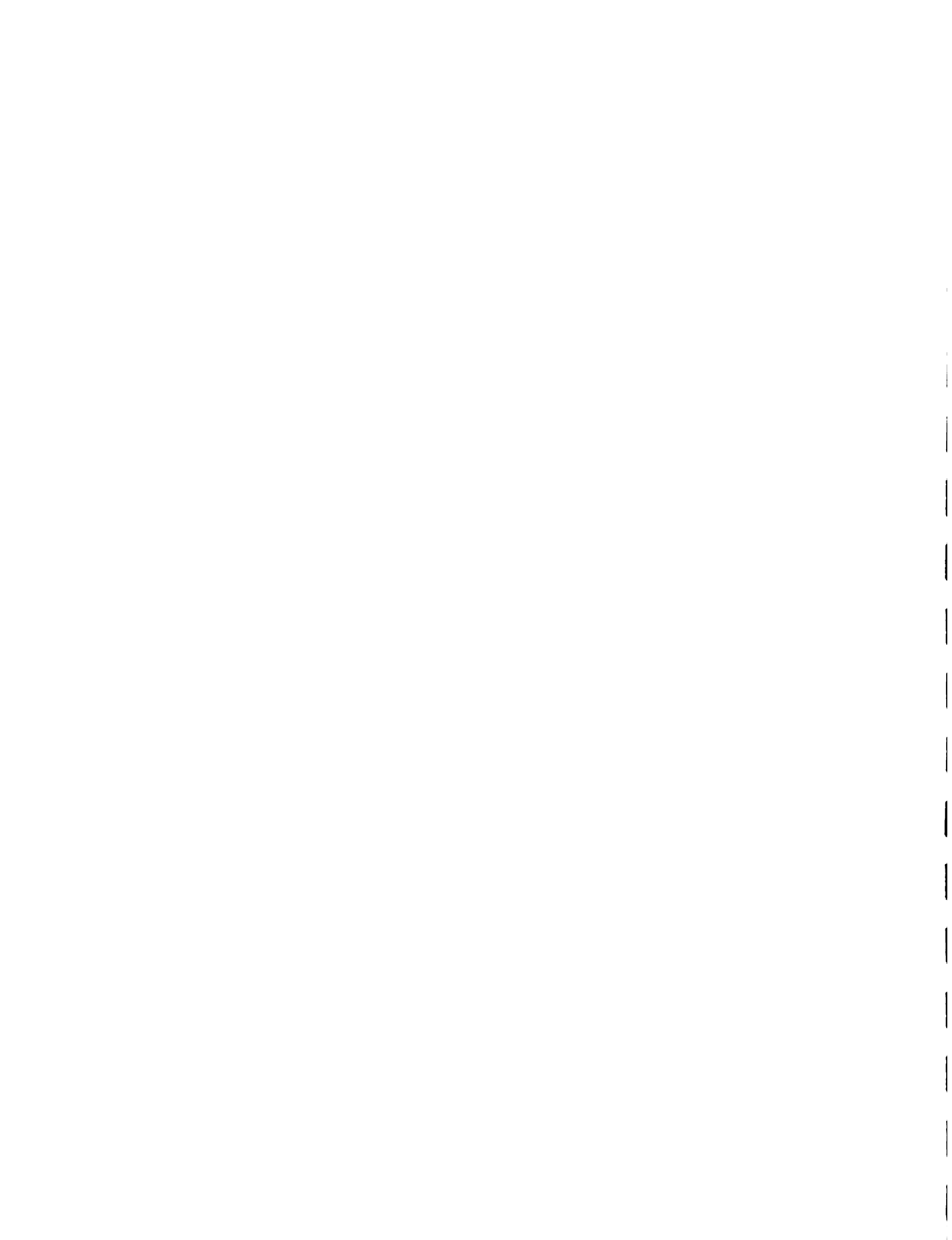
Domestic marketing channels are relatively short and the number of participants few. While the small domestic market does not stimulate capital investment, the predominance of one major importer raises the possibility of price fixing. Government has a key role to play in monitoring of prices and imports, and establishment of controls where necessary for successful import substitution. The strategy of the respective DOAs in St. Kitts and Nevis to control imports, while stimulating domestic production, should be continued and expanded to meet production capabilities.

Given the limited potential of the domestic market, including the tourist sub-sector, to absorb increased production under the diversification programme, export market opportunities must be identified and developed. Priority attention should be given to getional markets where prices are often highest and packaging requirements are less severe.

A sustainable export programme cannot be developed based on the concept of exporting surplus. Therefore, the development of exports required the use of a system's approach which is market led, i.e. developing production programmes based on identified market opportunities. St. Kitts has already developed an excellent prototype with the production and marketing of white potatoes to Antigua in 1990. This model needs to be refined further --- to the point where farmers in St. Kitts will be willing to regularly service the export market even when export prices are below domestic market prices.

For many corps which production potential for export, St. Kitts and Nevis do not have competitive advantage in comparison with countries such as the Dominican Republic, Cuba and Central America, due to the relatively low costs of labour in those countries. Consequently, efforts need to be made to increase productivity and reduce production and marketing costs for specific commodities. Marketing efforts, therefore must go hand in hand with development of appropriate technologies.

RAM markets much larger volumes of fresh produce than CEMACO yet only has one small (10' x 12') cool room of its won for fresh fruit and vegetables. While RAMS feels no need for additional storage space, CEMCO reports the lack of cooling space as one of its major constraints. Prior to any heavy investment in storage infrastructure, CEMACO should first compare its marketing strategy, e.g. percent of produce pre-sold, to that of RAMS and other private sector entrepreneur.

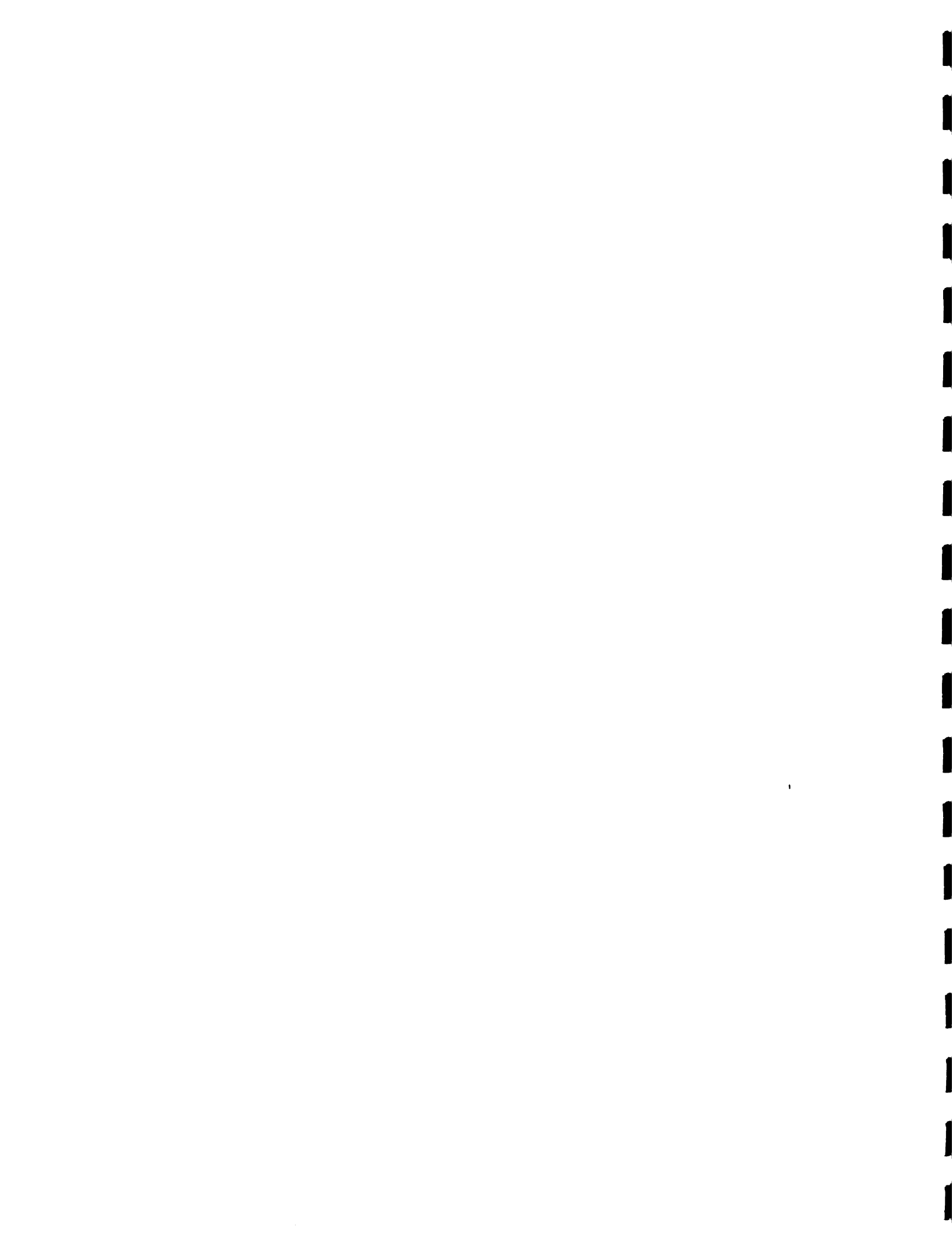


The proposed Marketing Strategy presented in the Agricultural Diversification Study (ADS) remains valid, however, time and new information may warrant the following modifications.

- (a) In addition to identification of market opportunities, removal of production constraints and strengthening of weak links in the marketing system, priority attention must be given to the building of human resource capability to undertake the necessary marketing functions.
- (b) Consequently, one additional element to the marketing strategy should be efforts to create and/or strengthen managerial capabilities of farmers organisations.
- (c) In respect to market identification, the ADS gave priority to root crops and fruit because of their production suitability and "price advantage". CATCO experience has shown that most root crops produce marginal returns or losses. Therefore, very careful attention must be given to the selection of priority crops in the diversification effort.
- (d) Since the Agricultural Diversification Study was undertaken, both St. Kitts and Nevis have executed several actions and projects. The priority measures identified in the ADS must, therefore, be reviewed and updated. Some of the measures made redundant are the following:
 - improvement of abattoirs and meat cutting facilities;
 - renovation and improvement to public markets;
- (e) In light of new experience and advancements since the completion of the ADS the following suggestions are made for modification of the proposed marketing strategy:
 - The collection and dissemination of market information should be restricted in the first instance to specific crops with identified market opportunity. this will minimize costs and facilitate the design of an effective model which can later be expanded to their crops.
 - Investments in marketing infrastructure should be kept to a minimum until clear national marketing policies and strategies have been defined and accepted by the kept participants.



- Before initiating activities to strengthen CEMACO, a clear statement of CEMACO objectives within the New Marketing Policy/Strategy should be made and agreed upon by the key players in the marketing system.
- The establishment of a "market terminal" in St. Kitts should be re-evaluated. It is felt that such an initiative would not make the best use of the scarce resources and based upon experiences within the region, could increase rather than decrease post harvest losses.
- Rather than create an "Export Division" to carry out all export functions, it is suggested that export opportunities be identified by an ad hoc committee and then an Export Division be allowed to evolve over time to meet the needs of producers, intermediaries and external markets. The institutionalization of an Export Division, a priori, stands the risk of creating another bureaucratic structure which may not satisfy the real needs of the market. Any Export Division should not be created until a comprehensive marketing policy/strategy has been defined.
- The proposed Marketing Service Unit (MSU) should start small and be allowed to evolve over time to meet the needs of farmers and marketing intermediaries. It should concentrate on one or a few crops until an effective system has been developed.
- Emphasis should be given to the organization of one farmers organisation in St. Kitts and one in Nevis to coordinate marketing activities.
- Efforts should be made to gather baseline decision making information on huckster systems, agro-processing potential and on-going regional marketing efforts as inputs into the design of national marketing policy/strategies.
- The Marketing Advisory Committee, with representation from farmers, CEMACO, SSMC, MOA, Ministry of trade and others, should be organized immediately and assigned the responsibility of preparing an integrated and comprehensive marketing policy/strategy document for St. Kitts and Nevis.



5.4.1.6 Crop Protection

With the implementation of the FAO/UNDP Diversification Programme imminent, two of its major objectives are:

- (a) to develop a viable small farmers sector through the vehicle of land settlement
- (b) to increase production of food crops and livestock and the productivity of farms in St. Kitts and Nevis.

The intention here is to increase production of food and vegetable crops by (a) improving the productivity of existing farms, and (b) the addition of new farmers and more acreage under production.

As a result of this, there will be a greater possibility of higher incidence of pests and diseases which could hamper the achievement of production targets.

At the same time, the increased demand for fresh fruit and vegetables due to the expanding tourist industry and lucrative overseas markets, has resulted in a significant increase in the importation of these commodities to satisfy the tourist demand and germplasm material for cultivation. When this is viewed in the light of the inadequate plant quarantine procedures obtaining presently, the tremendous risk of the introduction of exotic pests and diseases which would nullify the diversification efforts becomes evident.

St. Kitts and Nevis

It is recommended that the Department of Agriculture of both St. Kitts and Nevis take steps to develop their own capability in plant protection and quarantine. This can largely be accomplished by:

- (a) The appointment of a staff member to be responsible solely for plant protection and quarantine; this person need not now be a qualified entomologist or plant pathologist, but rather someone who is interested in the field, has basic qualifications (GCE 'O' Levels, Diploma) and most important someone who is trainable.
- (b) Expediting the implementation of the FAO Plant Protection and Quarantine TCP which will provide the basic laboratory equipment to get the crop protection work going and training for the plant quarantine inspectors.

It is recommended that priority be given to the updating of the Plant Quarantine Act of 1923 and the Pesticides Control Act of 1973.

As a corollary to this recommendation, efforts should be made at the revitalization of the Pesticides Control Board.

It is recommended that the recommendations made by the FAO consultant Dr. Hernandez, following his visit in December 1990, be implemented in timely manner.

Nevis

It is recommended that the DOA seek assistance to mount a Fruitfly Survey and Detection Programme that is USDA/APHIS approved in order to verify the reports that no fruit flies have been found on the island.

This is particularly important because of the brisk trade between Nevis and other islands that have reported the fruitfly e.g. St. Kitts and Dominica, and also the large amount of fruits and vegetables imported from the USA for the tourist sector.

5.4.2 Commodity Programme

5.4.2.1 Food Crops

With supplemental irrigation, improved quality of planting materials, better production planning and improved cultivation practices and marketing facilities, Kittitian and Nevisian farmers are capable of making their countries (separately or together) self-sufficient in most of the food crop commodities currently cultivated on the islands. Additionally, as has already been demonstrated, St. Kitts and Nevis are capable of producing selected food crop commodities (white potato in St. Kitts and yam in Nevis) in sufficiently large quantities for export; and development of a subsidiary food crop based agro-processing industry is a strong possibility.

Recommendations for stimulating the food crop subsector are presented separately for St. Kitts and Nevis, as follows:

St. Kitts

1. Establish a national policy with respect to water resource development for irrigation purposes.
2. Seek technical and financial assistance to exploit, for agricultural purposes, the ground water shown to be available through test drilling in north-western St. Kitts.
3. Determine the economic feasibility of irrigating certain food crops - banana, plantain and white potato.

4. Ensure that provision is made at the new (La Guerrite) propagating station for propagation of selected food crop commodities (tannia and eddoe).
5. Undertake the characterization and selection of local sweet potato and yam varieties.
6. Request CARDI to expedite the process of introduction, testing and multiplication of anthracnose disease tolerant yam cultivars (Oriental, Belep, Kinabayo and Plimbite).
7. The local Department of Agriculture (DOA) should become actively involved in the recently established OECS Food Crop Development Network through which planting material and technological information could be accessed.
8. The DOA should promote and encourage the establishment of windbreaks (using recommended fruit trees) and contour barriers (using khus khus grass - vetiveria zizanioides) as well the use of mulches and organic manures.
9. There is a need to reorganize and upgrade the management of government's Farm Machinery Pool, putting in place a system to ensure equipment maintenance on a scheduled basis.
10. The DOA should seek to introduce, adapt (where necessary) and promote the use of appropriate technology for mechanical planting and harvesting of root tubers.
11. CEMACO should be requested to access the economic feasibility of establishing produce collection depots, and installing needed appropriate storage facilities, especially for white potatoes.
12. Consideration should be given to the development and implementation of a "food crop production for export" programme, and the encouragement of cottage-type, food crop based agro-processing activities.

NEVIS

1. The propagation station to be established at Prospect should include adequate and appropriate facilities for rapid multiplication of yam, tannia and eddoe planting materials. Land space, with provision of irrigation, should also be provided for establishing a sweet potato nursery.
2. Plans to concentrate food crop production activities in selected locations (Potworks, Madens and Gineraland)

should be actively pursued. An appropriate programme should be developed and implemented with technical support from agricultural agencies/institutions involved in the OECS Food Crop Development Network.

3. Commercial cultivation of white potato should be de-emphasized, as indicated in the DOA's Extension Division's report for the period January to March, 1991.
4. The corn milling facilities at Hardtimes should be repaired and upgraded, and farmers should be encouraged to produce more corn - both for the fresh market and for processing. Plans to introduce "Sweet Corn" for the fresh market should be actively considered.
5. Request CARDI to expedite the process of introduction, testing and multiplication of anthracnose disease tolerant yam cultivars (Oriental, Belep, Kinaboyo and Plimbite).
6. The local Department of Agriculture (DOA) should become actively involved in the recently established OECS Food Crop Development Network through which planting material and technological information could be accessed.
7. The DOA should promote and encourage the establishment of windbreaks (using recommended fruit trees) and contour barriers (using Khus Khus grass - vetiveria zizanioides as well as the use of mulches and organic manures.

5.4.2.2 Vegetables

The DOA, working in close collaboration with CARDI, has laid a sound foundation for the continued technological development of the vegetable subsector in St. Kitts as well as Nevis. The production aspects are generally sound, but there is much room for improvement in the pre-production and postharvest/marketing aspects. CARDI's efforts with respect to the introduction (in St. Kitts) and expansion (in Nevis) of drip irrigation systems are worthy of special praise. Also, this Institute's collaboration with the DOA (in Nevis) towards promoting the establishment of on-farm storage sheds is a step in the right direction and, if backed by relevant training activities, can contribute significantly towards postharvest loss reduction.

Following are some recommendations which could help complement on-going developmental activities in the vegetable subsector in St. Kitts and Nevis.

St. Kitts

- While there are no reports of severe soil borne diseases (e.g. bacterial wilt in the solanaceous crops) and pest (e.g. nematodes) in vegetable crops in St. Kitts, it may be prudent to ensure that seedbeds are sterilized to facilitate production of healthy seedlings. For the same reason, soil used in vegetable seedling trays should also be sterilized. This is important not only because it will contribute to increase crop yields, but also from the standpoint of ensuring that, as vegetable cultivation expands, the spread and ultimate build-up of soil borne pests and diseases are not encouraged through lack of control measures at the nursery.
- The level of nursery management by vegetable producers in St. Kitts needs to be improved. Implementation on short courses in nursery management techniques is therefore recommended. The ROC Mission and CARDI may prove to be of great assistance in this area.
- The high demand for vegetable seedlings, especially during the period (July to September) when extremely heavy rains cause great loss of seedlings in unprotected nurseries, needs to be satisfied. The inadequacy of the La Guerrite vegetable seedling nursery needs to be addressed: Government should either expand its facility at La Guerrite or, preferably, remove the subsidy on vegetable seedlings and encourage the development of private vegetable seedling nurseries in the vegetable growing areas of the island.
- CEMACO's organisational, managerial and physical resource capabilities should be strengthened to enable it to provide needed marketing services to vegetable producers. Assistance to producers in the areas of produce collection and storage seems to be most crucial.
- In order to achieve its objective of year round self-sufficiency in vegetables, government should consider investing in the construction of dams and reservoirs, where feasible, to provide irrigation water. Relatedly, CARDI's current efforts at encouraging the use of drip irrigation systems by vegetable producers should be facilitated (by making irrigation water available) and expanded (by making credit for drip irrigation systems more accessible).
- The land tenure arrangements with vegetable producers should be reviewed with the objective of encouraging the implementation of soil conservation and soil improvement measures. A more secured land tenure may also encourage

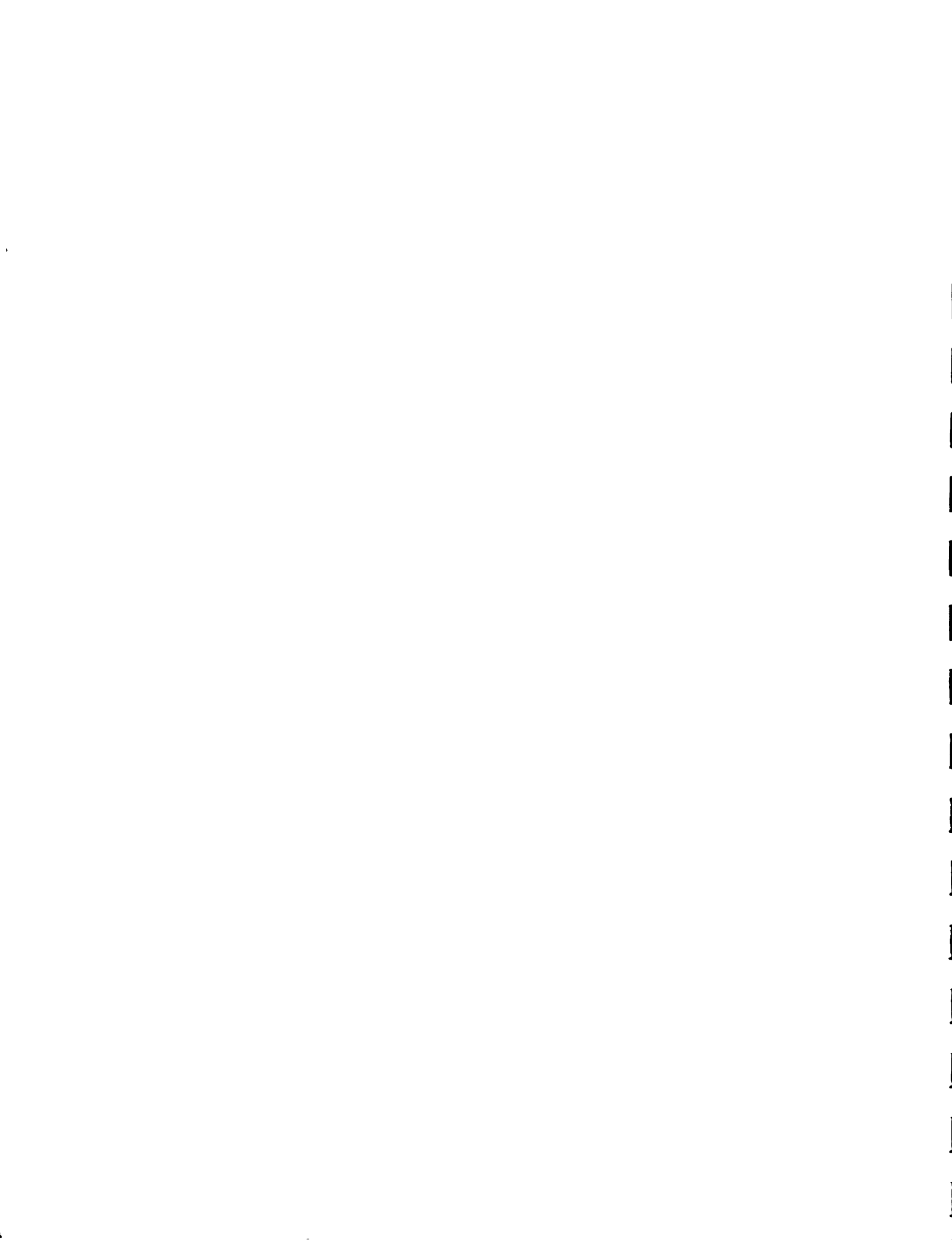


the establishment of windbreaks which will greatly assist in reducing the rate of evapotranspiration.

- DOA technicians should be provided with good quality Soil Test Kits to assist vegetable farmers in making crucial decisions related to soil fertilizer requirements.
- The DOA should ensure that the ROC Mission operating at Needmust stick to its original purpose of "training and demonstration" in vegetable production. Commercial production of easy-to-produce vegetable crops (e.g. tomato) by the Mission should be discouraged.

Nevis

- Training in vegetable seedling nursery management is a great need in Nevis.
- The viability of vegetable seeds kept in store by the Nevis Development Bank should be evaluated, and a decision taken to quickly dispose of seeds with declining viability levels.
- The Farm Machinery Service should be re-organized (or probably privatized) to increase levels of managerial efficiency. Vegetable producers should not be made to incur additional costs (for weed control) because of undue long delays between time of ploughing and time of rotavating.
- The DOA and CARDI/CARDATs, instead of becoming directly involved in the marketing of farmers vegetables, should consider facilitating and actively promoting the formation of a farm-controlled marketing institution.
- The DOA and CARDI should continue and expand their significant contributions towards reduction of postharvest losses in vegetables. In particular, they should continue their relevant training activities and their facilitation of the establishment of non-farm storage sheds.
- Provision of cool storage facilities for vegetables should be given priority attention.
- Government should seek necessary assistance to develop and implement a comprehensive onion production project aimed primarily at satisfying demand in both Nevis and St. Kitts.



5.4.2.3 Fruit Tree Crops

Prioritisation of Crops

Although ecologically, the two islands have potential to grow a wide range of tropical fruit crops, limited resources (human, economical, and physical) demand a practical prioritization of these crops for development. The government of St. Kitts and Nevis within the framework of the national development plan has prioritized citrus, coffee, bananas and coconuts among the tree crops for further development. Nevertheless, very little has been achieved in terms of the proposed targets. The following are a number of ideas for future prioritization taking into consideration a number of important factors which to some extent will continue to affect the development of fruit crops in St. Kitts and Nevis. Among these factors the most critical are:

- Scarcity of water for irrigation
- Scarcity and relatively high cost of labour
- Risk of soil damage and imperative need for soil conservation and protection of water sheds systems
- High wind velocity
- High population of monkeys and their damage to fruit crops
- Small and limited local market
- Unrestricted entrance of agricultural products from CARICOM countries and the competition with local products.
- Economic importance of pests and diseases present.
- Very limited availability of land and prevailing land policy.
- Lack of interest of farmers in the growing of fruit crops.
- Lack of experience and very limited human resource capability for the growing of fruit trees.

Therefore, any prioritization plan should focus on three different targets:



a) Supply of local market

Included here are fruit crops that presently have a good local demand for fresh and/or processed products and the potential of St. Kitts and/or Nevis to grow them is confirmed. The local production must be competitive with products coming from other islands both in quality and price. Acreage to be planted should be estimated based on survey of local consumption patterns and present production. Included here are citrus eg. Oranges, grapefruits, mandarines and limes, bananas, and pineapple.

b). Supply of overseas markets (regional or extraregional)

Fruits included here are characterized by having an unsatisfied demand in the overseas market and those for which St. Kitts and/or Nevis have comparative and competitive advantages in producing. Included here are crops such as papayas, mangoes, breadfruit, avocados, tamarind and cashew.

c) Protection of the ecology

Fruit trees included here are those with a known adaptability to poor soil, shortage of water during prolonged periods, high wind velocity, sea-salt blast, and low levels of management and input-labor requirement, and which have a high product demand in the overseas market. Also, due to the high population of monkeys in most of the target areas for the fruit product should not be susceptible to damage from them. Among the crops included here therefore are tamarind, cashew and breadfruits which have the larger potential.

Within the Agricultural Diversification Programme, other crops have been suggested for establishment on high elevation. Among these are mangosteen, macadamia nuts and carambolas. Some of the constraints listed above eg. Wind, monkeys, scarcity of labor and adaptability have led us to recommend against the production of these crops for St. Kitts and Nevis.

Zoning and Demonstration Plots

In both islands some significant mistakes have been made in site selection for fruit crop orchards. Based on the poor production results obtained, in several instances these mistakes are impacting negatively, and reducing the interest of farmers to grow fruit trees commercially. Apparently, the traditional practice has been to earmark an area for the

establishment of a demonstration plot not necessarily based on the criteria for crop requirements, but rather on the availability of this land. Demonstration plots are established to stimulate the interest of farmers in the growing of specific crops. Therefore, they must be sited in the best suitable area, where the potential for success is high. These plots should be maintained in the best condition to demonstrate to farmers the what, when, and why of fruit crop production. Most orchards at Wingfield Estate in St. Kitts and the citrus orchard at Cades Bay in Nevis are examples of "What not to do." On the other hand the pineapple plot at Prospect in Nevis is a good example of a well designed, well located and well maintained demonstration plot.

It is therefore recommended that an Inter-institutional team (Ministry of Agriculture, UNDP/FAO, IICA, UWI, and CARDI/CARDAT) work and develop a proposal for the zoning of priority fruit crops in St. Kitts and Nevis. Following this exercise, demonstration plots of crops selected as priority for development, should be established in those areas having the most potential for successful growth and production of their crops. This could be done on government or farmer plots.

Training of Staff and Farmers

Due to the limited development of fruit crops in both islands any serious attempt to develop the fruit sub-sector will require intensive training of extension officers, plant propagators and farmers. Although all areas from pre-production to marketing are important at this time, initially, the training priorities should focus on the following:

- Extension officers: Problem identification and control
- Nursery officer: Nursery management and planning
- Other nursery staff: Plant propagation methods and sterilization-treatment practices
- Farmers: Crop establishment and early care

In each case the best approach would be to develop training modules that could be used first to train the local staff e.g. extension officers and that these 'trainers' can eventually use these modules in the training of farmers. The Ministry of Agriculture of both St. Kitts and Nevis should capitalize on the available resources from UNDP/FAO, CARDI and IICA for these purposes in the Caribbean, and request their assistance for training in these crucial areas. The specific type of training events recommended by beneficiaries are:

- Extension officers:**
- Overseas training tours
 - Participation in regional seminars
 - Organization of national (federal) short courses.
 - In-service training and farmers visits with experts.
- Propagators**
- In-service training at the nursery and germplasm bank.
 - Field visits to see the result (good or bad) of the plants propagated by them.
 - Short (1 day) seminars.
- Farmers**
- Practical demonstration on their plots.
 - Visit to other farms along with extension officers.
 - Field days on demonstration plots
 - Short (1 day) seminars.
 - Overseas training tours.

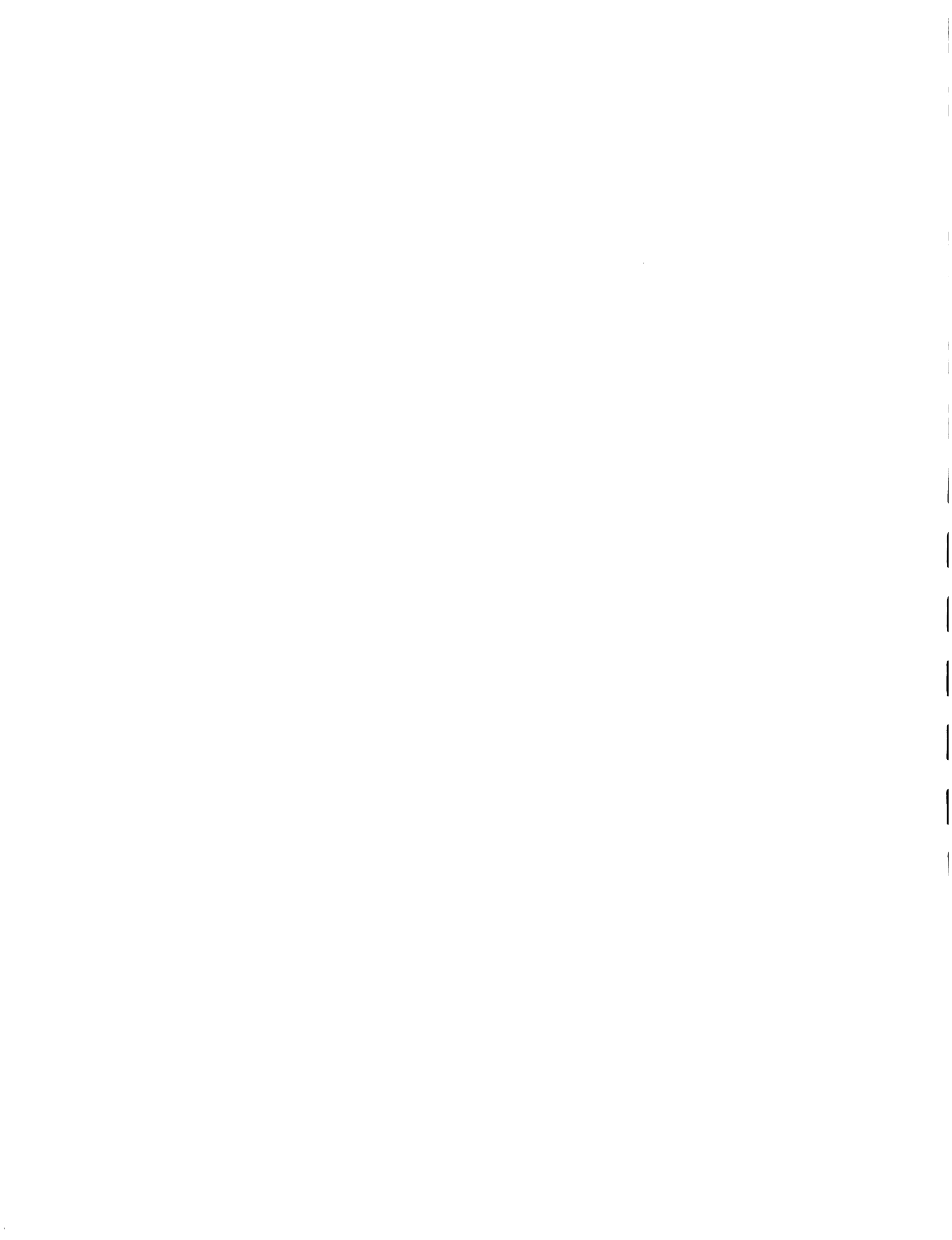
Introduction of Planting Material and Selection of Local Clones

For some fruit species e.g. avocados have a very narrow range of cultivars available for propagation in both islands. The seasonality of these crops, and/or their susceptibilities to different kinds of pests and diseases have combined to limit their availability. On the other hand, for some species growing almost wild e.g. tamarind and spondias a wide range of local clones or seedlings can be found scattered in ghauts and other areas. These local materials are well adapted, and have produced and performed well even under marked stress conditions, and the best selections from this source should therefore be included in any germplasm development programme.

Recommended introductions

Potential Sources

Citrus:	Rootstocks: Citrus volkameriana Swingle citrumelo Carrizo citrange Cleopatra mandarine Rangpur lime, & others	Barbados & Martinique
Scion: Oranges:	Other clones of Valencia California eg. Olinda	Citrus Budwood Registration Programme



Lime:	Seedless W.I.	
Papayas:	Barbados collection	Barbados
	Barbados Yellow	
	Barbados Pink	
	RM-1, RM-2	
	Kapoho, Waimanalo, Sunrise	Hawaii, Jamaica
		Brazil
Avocados:	Semil 34, 31, and 43	Puerto Rico
		Dominica
Mangoes:	Tommy Atkins	Florida
	Keitt	Florida, Antigua,
		Barbados
	Kent	Florida
	Sensation	Trinidad
	Imperial	St. Vincent
	Madame Francis	Haiti, Nevis
Breadfruit:	Cocobread	St. Vincent
	Dwarf clones	Fiji,
Tamarind:	Dwarf tamarind	Mexico
W.I. Cherries:	Florida Sweet	Barbados
	B-17	Barbados
	Jumbo	Barbados
Guava:	Patillo, Supremme, etc	Florida
	Hybrid materials	Hawaii
	Centeno collection	Trinidad

5.4.2.4 Livestock

The livestock subsector is the second most important economic activity but traditional farming systems persist due to neglect and lack of modernization.

Diversification must include modern livestock ventures which are profitable within the policy of the Government for import substitution through non-sugar agriculture.

The strategy for development of the industry must be based on investment in livestock ventures which requires confidence based on demonstration of profitable farming systems, control of pests and diseases and market demand.

Traditional farming systems, though desirable on a small scale to satisfy certain opportunities must be conducted within the resources and control of the producers.

The devastating disease Dermatophilosis associated with the tropical bont tick, Amblyomma variegatum has diminished cattle numbers and small ruminants. Nevertheless, control measures have been developed, are available and there is promotion of an eradication project.

Major programmes are hereby recommended for support which are inclusive of ten projects which have been identified and supported by the Department of Agriculture and numerous agencies and institutions operating in the federation of St. Kitts and Nevis.

The programmes are:

- (a) Eradication of Amblyomma variegatum in St. Kitts and Nevis
- (b) Control of Feral Animals in St. Kitts and Nevis
- (c) Promotion of Investment in Livestock Ventures including projects:
 - In Con Phipps Area - Agricultural Diversification Programme (FAO)
 - Dairy Farm Module - 10 acre unit
 - Beef Module - 25 acre unit
 - Feed Lot Cattle - Hay, silage, Feed Lot Production in association with SSMC.
 - Bayfords; Dairy Development Project
 - Pig Development Unit Bayfords (ROC)
 - Pig Development Scheme - Rotational System (ROC)
 - Small Ruminant Production System - IFAD/CARDI
 - Broiler Production System
 - St. Kitts/Nevis Meat Processors Development Project
 - Promotion of St. Kitts/ Nevis Livestock Farmers Association



TITLE: PROGRAMME FOR THE ERADICATION OF AMBLYOMMA VARIEGATUM**1. Rationale**

- Regional Scope
- Hemispheric impact
- Required basis for the revitalisation of the Cattle Industry and investment

2. Objectives

- Eradication of *A. variegatum* and *Cowdria ruminantium* from all Caribbean Islands
- Restore confidence in cattle production ventures
- Investigation of Heartwater*

3. Strategy

- Survey and distribution of Tick
- Public information and training measures
- Mandatory systematic acaricide treatments
- Quarantine procedures
- Monitoring and surveillance

4. Cost

St. Kitts/Nevis component - US\$2.0 million dollars

* This investigation could be conducted under present projects, funded by BDD and FAO

TITLE: PROGRAMME FOR THE MANAGEMENT OF FERAL ANIMALS IN ST. KITTS/NEVIS

1. Rationale

- Control and economic exploitation of valuable species of livestock
- Promotion of tourist industry
- Reduction of crop and livestock damage
- Eradication of *Amblyomma variegatum*

2. Objectives

- Reduce number of feral animals to manageable levels
- Exercise control over locations and production capacity

3. Strategy

3.1 Agouti

- Conduct investigation to provide information on location, numbers, habits
- Adopt appropriate measures in relation to bont tick project
- Compulsory examination by Veterinary Division

3.2 Donkeys

- Registration and control of domestic donkey
- Information and training measures
- Collaborate with World Donkey Society, Wild Life Associations, Ross School of Veterinary Medicine
- Promote export of donkeys, elucidate health status
- Promote tourist related enterprises
- Enforce stray animals legislation

3.3 Deer

- Conduct investigation to provide information on location, numbers, habits

- Compulsory investigation of snared or dead animals by veterinary division
- Appropriate measures in relation to bont tick project
- Promote tourist enterprises

3.4 Dogs

- Registration and control of domestic dogs
- Information and training measures
- Introduce dog catching measures
- Euthanasia under veterinary division control

3.5 Goats

- Livestock production systems to reduce feral development, promote confinement or compulsory tethering
- Information and training measures
- Declaration of locations off limits for livestock
- Population reduction measures especially freely roaming livestock
- Appropriate bont tick control measures
- Compulsory examination by veterinary division of carcasses or snared stock
- Promote tourist attractions
- Enforce stray animal legislation

3.6 Monkeys

- Investigation of location, numbers, habits
- Collaboration of two foundation groups, Caribbean Primates, Ross School of Veterinary Medicine, Wild Life Groups
- Elucidate health status and regulations for export
- Promote capture of monkeys with bounties
- Appropriate measures under Bont Tick Projects

- Promote crop protection measures

3.7 Pigs

- As for goats

TITLE: PROGRAMME FOR THE PROMOTION OF INVESTMENT IN LIVESTOCK VENTURES

1. Rationale

- Attractive profitable enterprises made available for entrepreneurs
- Promote investment especially into livestock projects by those who profit from agricultural imports
- Convert the livestock producer from traditional subsistence systems to modern practices for better products, reduced losses and increased profits
- Controlled livestock production systems beautify the countryside, promote environmental protection and support the tourist industry
- Better utilisation of resources

2. Objectives

- Development of livestock production/marketing systems for economic assessment, demonstration, training
- Provision of improved genetic stock and promotion of its supply through the private livestock sector
- Take inventory and promote utilization of all available resources
- Promotion of St. Kitts/Nevis Livestock Association

**TITLE: AGRICULTURAL DIVERSIFICATION PROGRAMME
ST. KITTS/DOA/FAO CON PHIPPS AREA DEVELOPMENT SCHEME**

Project: 1 Title: Dairy Module Development

1. Rationale

- Dairy products in demand
- Zoned cattle development land available
- Dairy expertise limited in federation for appropriate management systems
- Appropriate farm family economic unit
- Milk processing unit available and market outlets
- Tick control measures available

2. Objectives

- Establishment of ten acre dairy module for monitoring economic returns, farmer demonstration and training
- Supply of genetic stock for farmers and provision of bull calves for raising

3. Strategy

- Develop design and plan module
- Establish and fence (perimeter) pastures
- Build dairy, calf pens, holding barn
- Purchase and import appropriate dairy stock, dairy equipment, internal solar fence system
- Conduct training sessions for livestock officers and workers
- Develop herd health programme and record keeping system
- Design and introduce milk delivery system

Project: 3 **Title:** **Feed Lot Cattle, Hay and Silage
Production through SSMC**

1. Rationale

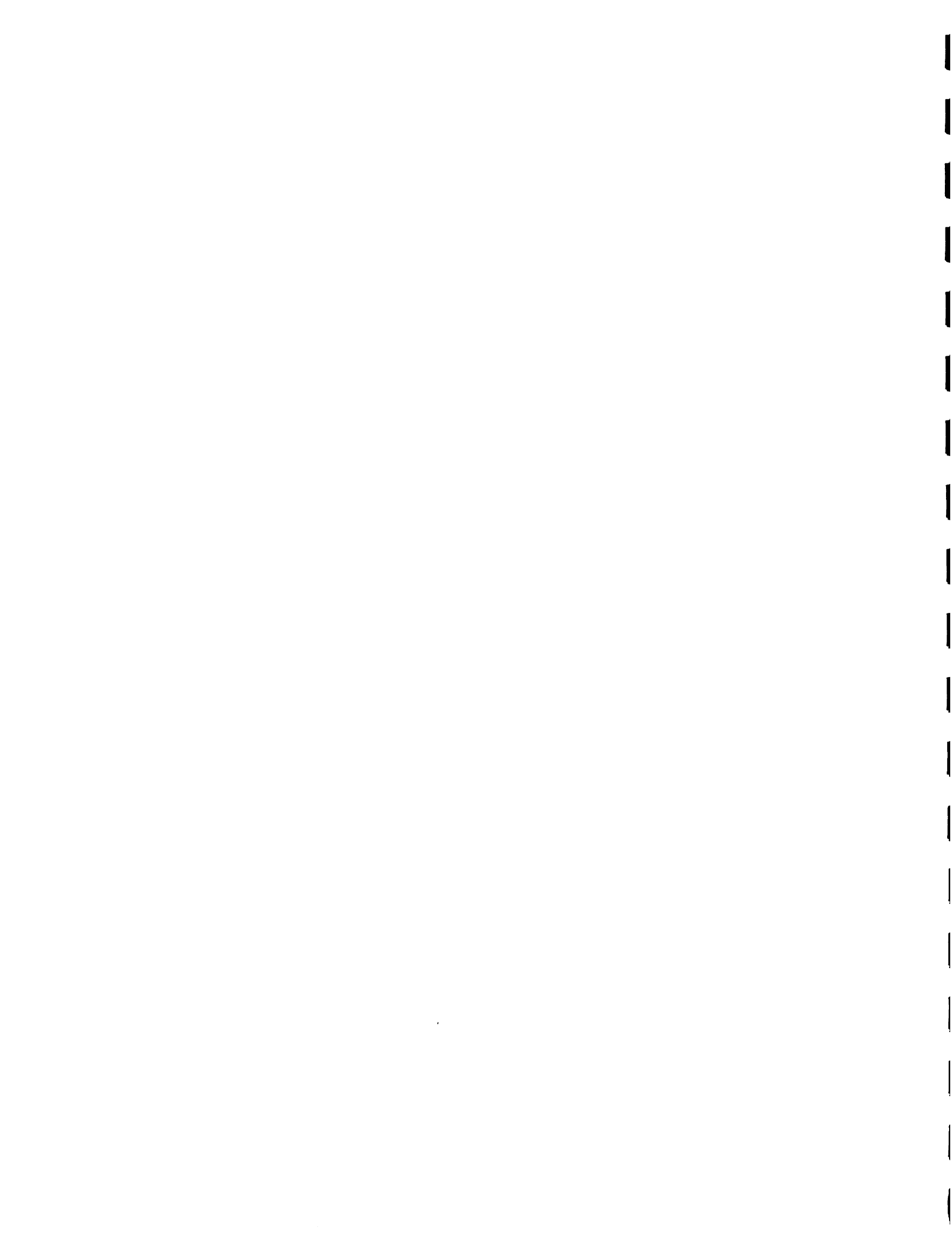
- Beef products in demand
- Meat processing and market facilities established
- Possible meat export possibilities to neighbouring countries
- Supplementary feeding with hay and silage demand for livestock industry
- Land availability and utilisation of acreage out of sugar cane production
- Tractor equipment, machinery and management expertise available
- Provide outlet for bull calves and finishing operation
- Available feed by products from sugar industry
- Reduce meat import costs and supply tourist industry

2. Objectives

- Establish feed lot system based on available cattle from projects to replenish beef industry
- Establish hay and silage supplies for livestock industry and feed lot system

3. Strategy

- Carry out feasibility study and develop project
- Obtain funding
- Train personnel - pasture management feed lot cattle production system, hay and silage making
- Build hay silage storage system
- Build feed lot holding facilities
- Develop supply system for stock
- Rationalise offtake
- Promote exports - meat processing products



Project: 4 **Title:** Increased Milk supply through Bayfords Dairy Development and Milk Processing Facilities

1. Rationale

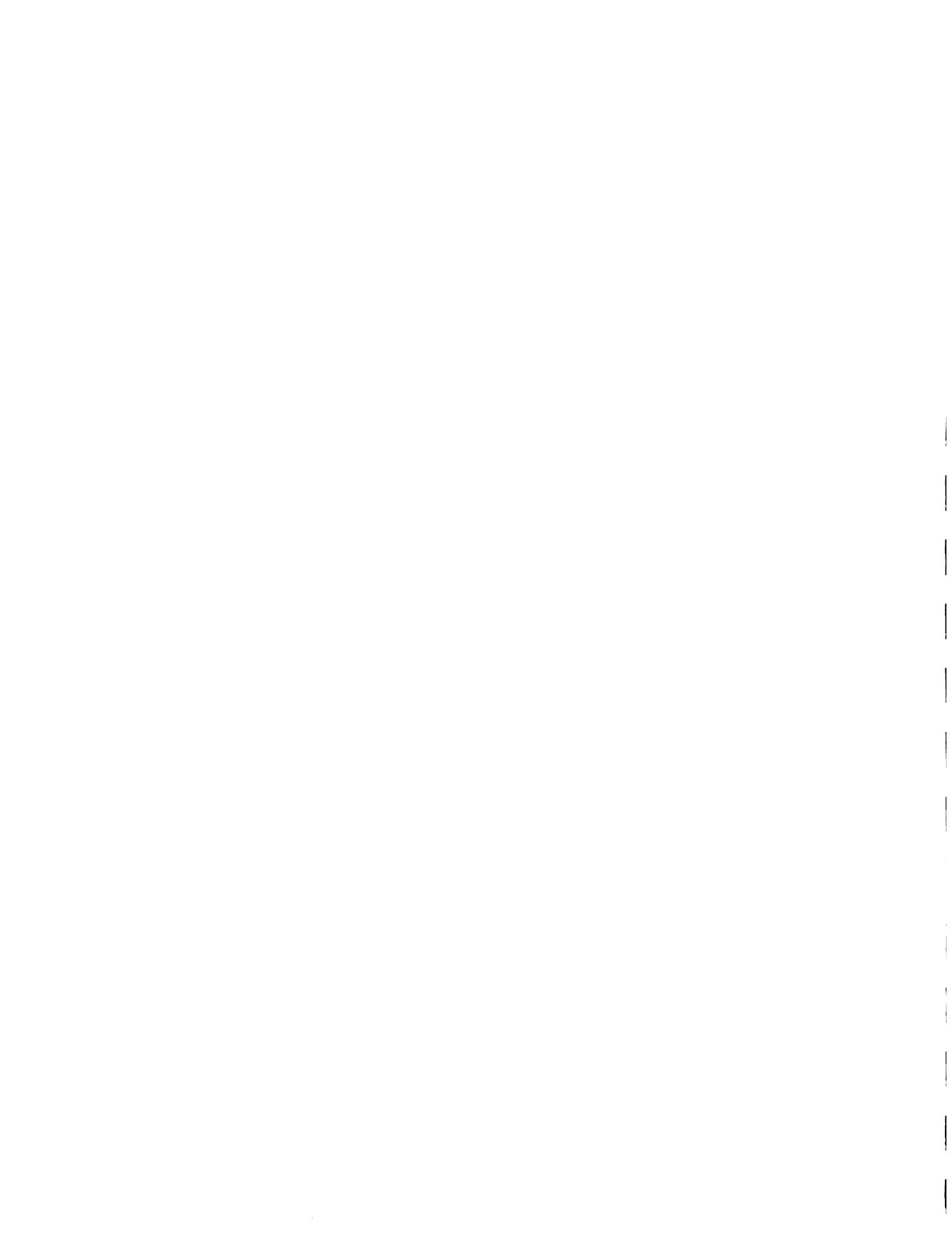
- Established dairy available
- Milk supply demand
- Reduce import costs
- Reverse present operational losses, associated with low production and processing
- Demonstrate dairy production expertise and provide processing outlet for dairy units

2. Objectives

- Double livestock and milk production through better pasture and dairy management in 5 years
- Increase volume and product quality to offset losses and generate revenue

3. Strategy

- Prepare project document - cash inputs; cash flow; estimated returns
- Establish management team for Bayfords Dairy comprising
 - Managing Director supported by Accountant and Administrative Secretary
 - Fodder and pasture development manager
 - Herd Health Programming and Artificial insemination (AI) manager
 - Pig Development Unit *(separate project) manager
 - Processing, marketing and sales manager
 - Design measures to develop 100 acres of improved pastures
 - Improve livestock husbandry, pasture management, AI



- **Increase milk production through improved practices**
- **Rationalise milk processing facilities and sales**

Project: 5 **Title:** Pig Development Unit - Bayfords

1. Rationale

- Absence of modern piggery with biogas digesters generating methane as fuel and fertilizer
- Need to demonstrate modern breeding sow/store pig operation
- Need to demonstrate biogas digester system
- Abattoir facilities exist for processing
- Opportunity to utilise Constructed Unit at Bayfords

2. Objectives

- Establish 12 sow unit to produce pigs for sale to farmers or market
- Develop biogas system for methane production for dairy milk processing use
- Fertilizer for pastures
- Additional - Revenue for Bayfords farm

3. Strategy

- Design construction required and develop plan of operation
- Purchase large white (Yorkshire) sows for breeding purposes
- Purchase Yorkshire, Hampshire and Duroc boars for cross breeding
- Install wash down biogas digester system with linkage to milk processing unit
- Purchase feed supplies
- Train technicians in husbandry and management
- Collaborate with ROC - Taiwan

Project: 6 Title: Pig Development Scheme - Rotational System

1. Rationale

- Supply of pigs available for Bayfords' Unit
- Farmer development scheme based on rotational system, multiplier effect
- ROC Taiwan Pig Development Scheme transferred to St. Kitts/Nevis

2. Objective

- To support Pig Development in St. Kitts/Nevis and to supply carcasses for meat, ham, sausage production

3. Strategy

- Technology for Pig Production transferred for ROC, St. Vincent to St. Kitts/Nevis
- Upgrade backyard operations for better quality hogs
- Promotion of modern piggeries for pork supply with biogas digesters for fuel and fertilizer
- Provide supplies for meat processing facilities in St. Kitts/Nevis

Project: 7 Title: Small Ruminant Production Systems (IFAD/CARDI)

1. Rationale

- Sheep and goats are in greatest numbers in St. Kitts/Nevis
- Subsistence system limit quantity, quality and have increased losses
- Need to demonstrate production system with appropriate management of inputs and resources
- Need to demonstrate economic feasibility based on improved farming systems

2. Objective

- Validation of sheep and goat production systems on farmers holdings

3. Strategy

- Continue to monitor flocks in St. Kitts/Nevis under IFAD/CARDI Project
- Design and develop production systems for target farmers
- Implement economic monitoring and surveillance
- Demonstrate and train sheep and goat farmers in improved methods

Project: 8 Title: Broiler Production Systems

1. Rationale

- Under present conditions, 10% only of broiler meat market supplied
- Examples and processing facilities available
- Need to demonstrate profitable broiler operation

2. Objective

- Establish commercial broiler units to become more self-sufficient in broiler meat production

3. Strategy

- Design and develop broiler meat operation with economic evaluations to demonstrate profits
- Negotiate with Broilerson Poultry Meats Ltd for contracts to use slaughter facilities
- Promote investment for units among business clientele

Project: 9 **Title:** St. Kitts/Nevis Meat Processors
Cooperative Development

1. Rationale

- Two excellent abattoirs have been built and are well managed
- Cutting room facilities exist and expertise to process meat and meat products
- Market demand exists

2. Objective

- Commercial operation to prepare hams, sausages and meat cuts for domestic demand with potential for export to neighbouring islands

3. Strategy

- Contract pig producers for steady supplies
- Install appropriate equipment and train personnel in use
- Obtain materials and supplies
- Establish product and develop market contracts

Project: 10 Title: Promotion of Livestock Farmers Association

1. Rationale

- Need for association to protect interests and promote livestock venture investments
- Need for farmer association to control demonstration and teaching units for sustainability and state of art technology
- Need for association to collaborate with Government, regional farmer association and promote market opportunities

2. Objective

- Viable livestock farmer association for St. Kitts/Nevis

3. Strategy

- Review livestock commodity systems for farmers in the Federation
- Identify major constraints and needs
- Develop mechanism for cooperation to satisfy requirements and inputs
- Promote concern for modern technology and profitable livestock ventures
- Promote livestock shows and fairs

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A P P E N D I X

Gross Domestic Product by Economic Activity, at Factor Cost
in Constant Prices, 1977-1989
(EC\$ Million)

	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Agriculture:	13.10	13.70	14.86	13.44	14.09	14.09	11.50	11.99	11.72	11.53	11.97	12.06	11.59
Sugar Cane	8.31	8.54	9.07	8.03	7.97	8.25	6.52	7.05	6.21	6.15	6.15	6.40	5.96
Crops	1.42	1.62	2.09	1.99	2.05	1.74	1.25	1.17	1.34	1.53	1.83	1.50	1.64
Livestock	2.39	2.43	2.41	2.21	2.54	2.49	2.11	2.06	2.38	1.79	1.88	1.99	1.99
Forestry	0.05	0.05	0.06	0.07	0.07	0.08	0.08	0.08	0.09	0.10	0.11	0.12	0.13
Fishing	0.93	1.06	1.23	1.14	1.46	1.53	1.54	1.63	1.70	1.96	2.00	2.10	1.87
Mining & Quarrying	0.20	0.15	0.18	0.23	0.24	0.28	0.31	0.26	0.29	0.32	0.37	0.43	0.51
Manufacturing	12.54	13.15	13.31	13.53	12.15	13.17	11.72	13.15	12.44	13.46	13.23	13.68	13.86
Sugar	8.60	8.23	8.39	7.34	6.83	7.59	5.92	6.54	5.67	6.01	5.33	5.39	5.23
Other	3.94	4.92	4.92	6.19	5.32	5.58	5.80	6.61	6.77	7.45	7.90	8.29	8.62
Electricity & Water	0.61	0.71	0.74	0.88	0.94	1.00	1.01	1.07	1.16	1.27	1.36	1.50	1.54
Construction	6.59	4.94	6.09	7.72	7.99	9.49	10.44	8.72	9.81	10.30	12.47	14.47	16.93
Wholesale & Retail Trade	7.01	7.75	8.32	9.36	9.20	10.18	10.95	12.29	13.81	14.50	15.81	16.91	17.38
Hotels & Restaurants	1.42	2.21	2.78	2.61	2.91	2.50	2.48	3.68	4.64	6.22	7.59	7.66	7.56
Transport:	3.81	4.03	3.94	4.58	4.85	5.03	5.13	5.39	5.79	6.35	7.03	7.52	7.97
Road Transport	2.90	2.93	2.82	3.61	3.57	3.75	3.81	3.96	4.19	4.36	4.74	5.07	5.32
Sea Transport	0.41	0.43	0.42	0.47	0.52	0.55	0.58	0.61	0.68	0.90	1.04	1.10	1.21
Air Transport	0.50	0.67	0.70	0.70	0.76	0.75	0.74	0.82	0.92	1.09	1.25	1.35	1.44
Communications	2.05	2.15	2.35	2.57	4.44	4.38	4.51	5.09	5.67	7.39	8.19	11.53	14.17
Banks & Insurance	3.79	3.63	4.06	4.28	4.19	4.96	5.04	5.54	5.84	6.42	6.74	7.08	7.43
Real Estate & Housing	5.26	5.31	5.40	5.50	5.57	5.62	5.71	5.80	6.03	6.21	6.33	6.46	6.62
Government Services	11.75	13.07	14.95	15.69	16.58	17.75	18.50	22.40	23.52	23.33	24.39	24.64	24.81
Other Services	3.55	3.31	3.37	3.75	4.29	4.50	4.72	4.95	5.20	5.46	5.68	5.51	5.68
Imputed Service Charges	-2.48	-2.64	-3.10	-3.59	-3.06	-3.25	-3.30	-3.63	-3.81	-4.19	-4.40	-4.83	-5.07
Total	69.20	71.47	77.25	80.55	84.38	89.70	88.72	96.72	102.11	108.57	116.76	124.62	130.97
Growth Rate	3.28	8.09	3.92	5.11	6.30	-1.09	9.02	5.57	6.33	7.54	6.73	5.10	

Sources: (1) O.E.C.D. National Accounts Digest, 1985.
(2) ECLAC Document, Selected Statistical Indicators of Caribbean Countries, 1990.

Gross Domestic Product by Economic Activity, at Factor Cost
in Current Prices, 1977-1989
(EC\$ Millions)

	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Agriculture	13.10	12.18	13.64	16.51	13.83	20.31	16.19	19.22	16.44	21.84	25.97	27.52	27.70
Sugarcane	8.31	6.95	7.25	9.80	5.34	11.40	7.54	10.85	7.22	11.37	13.29	14.09	13.39
Crops (other)	1.42	1.62	2.28	2.45	2.28	1.70	1.36	1.68	2.90	4.52	4.49	4.79	
Livestock	2.39	2.36	2.53	2.62	3.43	3.48	3.47	2.91	3.15	2.51	3.00	3.09	3.26
Forestry	0.05	0.06	0.08	0.09	0.11	0.12	0.12	0.13	0.16	0.18	0.20	0.23	0.25
Fishing	0.93	1.19	1.50	1.77	2.50	3.03	3.36	3.87	4.23	4.88	4.96	5.62	6.01
Mining & Quarrying	0.20	0.26	0.24	0.32	0.33	0.41	0.45	0.38	0.45	0.50	0.64	0.86	1.08
Manufacturing	12.54	13.24	12.79	15.74	17.88	18.66	17.55	22.62	21.94	32.83	35.37	44.25	47.38
Sugar	8.60	7.26	7.22	7.87	9.16	9.00	7.22	9.59	7.51	10.35	9.73	10.96	11.70
Other	3.94	5.98	5.57	7.87	8.72	9.66	10.33	13.03	14.43	22.48	25.64	33.29	35.68
Electricity & Water	0.61	0.71	0.81	0.88	1.11	1.43	1.36	1.60	1.78	4.40	2.96	2.71	2.85
Construction	6.59	5.49	8.12	10.58	10.85	13.60	14.96	12.82	15.05	16.68	21.32	28.74	35.81
Wholesale & Retail Trade	7.01	8.25	9.80	12.99	14.09	16.53	18.27	20.69	23.95	27.96	32.99	35.36	38.19
Hotels & Restaurants	1.42	3.28	4.79	4.49	5.39	4.30	4.35	7.35	11.82	16.15	21.73	21.93	24.06
Transport	3.81	4.60	5.06	6.54	8.89	10.35	11.63	13.65	14.96	17.41	19.98	22.03	24.01
Road Transport	2.90	3.65	4.11	5.36	7.69	8.66	9.11	9.48	10.13	11.47	11.87	12.73	13.37
Sea Transport	0.41	0.51	0.50	0.62	0.76	1.19	2.00	3.58	4.17	4.85	6.17	6.74	7.64
Air Transport	0.50	0.44	0.45	0.56	0.44	0.50	0.52	0.59	0.68	1.09	1.94	2.56	3.00
Communications	2.05	2.72	2.78	3.46	6.53	7.10	4.79	5.89	6.16	8.88	9.84	18.48	19.50
Banks & Insurance	3.79	4.01	4.58	5.25	5.84	8.56	8.18	11.09	11.89	19.29	17.18	22.50	24.26
Real Estate & Housing	5.26	5.31	6.51	6.66	7.48	7.82	8.13	8.45	8.96	9.52	10.00	10.61	11.44
Government Services	11.75	15.97	18.25	19.20	26.64	28.55	29.93	36.08	37.33	41.23	44.64	49.54	54.49
Other Services	3.55	3.53	3.97	5.20	6.57	7.30	7.83	8.40	9.01	9.65	10.13	10.53	11.42
Imputed Service Charge	-2.48	-2.93	-3.48	-4.36	-3.99	-6.18	-7.13	-8.92	-8.02	-13.16	-12.94	-16.80	-19.92
Total	69.20	76.52	87.86	103.46	121.44	138.74	136.49	159.32	171.76	213.18	239.81	278.26	302.27
Growth Rate	n.a.	10.58	14.82	17.76	17.38	14.25	-1.82	16.73	7.81	26.12	12.49	16.03	8.63

Sources: (1) O.E.C.S. National Accounts Digest, 1985.
(2) ECLAC Document, Selected Statistical Indicators of Caribbean Countries, 1990.

Rate of Growth of
Gross Domestic Product by Economic Activity, at Factor Cost
in Constant Prices, 1975-1989

Sectors	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Agriculture:												
Crops	4.58	8.47	-9.56	4.84	....	-18.39	7.13	-2.25	-1.62	3.82	0.75	-3.90
Livestock	4.42	9.84	-10.22	....	-0.30	-22.22	8.11	2.62	13.21	19.61	-13.96	2.45
Forestry	1.67	-0.82	-8.30	14.93	-1.97	-15.26	4.74	15.53	-24.79	5.03	3.19	2.58
Fishing	....	20.00	16.67	....	14.29	....	....	12.50	11.11	10.00	9.09	8.33
	13.98	16.04	-7.32	28.07	4.79	0.65	5.84	4.29	15.29	2.04	5.00	-10.95
Mining & Quarrying	-25.00	20.00	27.78	4.35	16.67	-17.86	4.35	11.54	10.34	15.62	16.22	18.60
Manufacturing	4.86	1.22	2.03	-10.53	8.40	-11.01	9.47	-5.40	8.20	-1.71	3.40	1.24
Electricity & Water	16.39	4.23	18.92	6.82	6.38	1.00	0.99	8.41	9.48	7.09	10.29	2.67
Construction	-25.04	23.28	26.77	3.50	18.77	-18.12	3.99	12.50	4.99	21.07	16.04	17.00
Wholesale & Retail Trade	10.56	7.35	12.50	-1.71	10.65	7.56	2.74	12.37	5.00	9.03	6.96	2.78
Hotels & Restaurants	55.63	25.79	-6.12	11.49	-14.09	-0.80	9.68	26.09	34.05	22.03	0.92	-1.31
Transport:												
Road Transport	5.77	-2.23	9.39	12.53	3.71	1.99	1.95	7.42	9.67	10.71	6.97	5.98
Sea Transport	1.03	-3.75	11.35	13.69	5.04	1.60	1.57	5.81	4.06	8.72	6.96	4.93
Air Transport	4.88	-2.33	11.90	10.64	5.77	5.45	5.17	11.48	32.35	15.56	5.77	10.00
	34.00	4.48	....	8.57	-3.95	1.37	1.35	12.20	18.48	14.68	8.00	6.67
Communications	4.88	9.30	9.36	72.76	-1.35	2.97	2.88	11.39	30.34	10.83	40.78	22.90
Banks & Insurance	-4.22	11.85	5.42	-2.10	18.38	1.61	1.59	5.04	9.93	4.98	5.04	4.94
Real Estate & Housing	0.95	1.69	1.85	1.27	0.90	1.60	1.58	3.97	2.99	1.93	2.05	2.48
Government Services	9.28	14.41	5.17	5.50	7.12	0.46	0.46	5.00	-0.81	4.54	1.03	0.69
Other Services	-6.76	1.81	11.28	14.40	4.90	4.89	4.87	5.05	5.00	4.03	-2.99	3.09
Imputed Service Charges	-6.45	-17.42	-15.81	14.76	-6.21	-1.54	-1.52	-4.96	-9.97	-5.01	-9.77	-4.97
Total	2.95	8.07	4.03	5.01	6.31	-4.92	4.07	5.57	6.33	7.54	6.73	5.10

Sources: O.E.C.S. National Accounts Digest, 1985.

Selected Monetary Indicators, 1981-1990^a
(ECUs Millions)

	1981	1982	1983	1985	1986	1987	1988	1989	1990
Net Foreign Assets	6.1	2.7	2.9	36.7	42.7	64.8	70.3	68.6	72.9
Net Credit to Central Government	-2.9	1.2	6.2	15.3	29.2	28.5	27.8	44.2	53.3
Credit to Non-financial Public Enterprises	n.a.	n.a.	n.a.	56.2	58.2	2.3	8.5	19.8	34.5
Credit to Private Sector	51.9	60.2	69.3	105.0	102.9	125.4	179.7	244.7	232.1
Liabilities to the Private Sector ^{aa}	52.0	61.1	69.7	184.7	220.2	199.2	250.0	306.4	340.8
Demand Deposits	10.7	9.7	11.1	19.8	37.6	42.3	57.8	77.5	88.4
Savings Deposits	31.2	36.1	39.9	53.8	63.1	76.7	95.2	111.8	112.3
Time Deposits	9.8	14.8	17.3	103.4	109.6	63.6	74.8	82.4	96.3
Foreign Currency Deposits	0.3	0.5	1.4	7.7	9.9	16.6	22.1	34.6	43.9
Non-Resident Deposits	16.1	16.4	18.1	22.5	24.1	28.6	n.a.	n.a.	41.0

^a 1984 missing.

^{aa} For 1985-90 includes Non-financial Public Enterprises.

Sources: (1) Eastern Caribbean Central Bank, Report and Statement of Accounts, Various Issues.
(2) World Bank Document, St. Kitts & Nevis Economic Memorandum, 1985.



Loans and Advances by Commercial Banks, 1981-1990
(EC\$ Millions)

Sectors	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Agriculture	0.2	0.7	0.5	0.5	0.8	0.9	1.6	9.1	20.9	29.3
Fisheries	0.1	0.1	0.1	0.1	0.5	0.6	0.8	0.6	0.9	0.3
Manufacturing	5.7	5.3	4.4	4.5	6.0	4.9	6.2	12.0	14.7	14.9
Distributive Trade	10.7	12.2	13.6	14.6	12.8	17.0	21.3	27.5	37.5	37.8
Tourism	6.9	8.1	10.7	11.3	11.2	11.7	13.8	19.5	26.3	23.2
Entertainment & Catering	0.5	1.1	0.8	0.6	0.9	1.0	1.2	1.6	1.7	1.8
Transport	5.1	6.4	6.0	5.7	5.5	6.4	8.4	7.5	10.2	8.0
Public Utilities	...	0.1	...	1.7	1.6	0.4	2.2	10.6	12.1	10.6
Construction & Land Development	9.9	10.2	10.8	12.0	10.8	10.3	10.4	6.3	11.8	11.3
Gov't and Statutory Bodies	35.1	42.4	57.0	66.2	86.9	90.7	33.5	45.3	48.0	54.8
Professional & Other Services	4.9	5.1	8.1	6.8	1.7	1.9	2.8	6.4	7.3	6.9
Personal	18.7	23.7	27.7	34.6	40.6	48.7	55.5	78.9	101.1	126.6
House and Land	11.2	14.3	16.3	19.9	24.7	28.8	31.1	46.0	58.6	...
Durable Consumer Goods	3.1	3.6	5.5	6.1	7.7	7.8	9.4	15.4	19.4	...
Other Personal	4.4	5.8	6.0	8.5	8.2	12.1	15.1	17.5	23.2	...
Other Advances	7.2	8.6	7.6	7.5	4.1	4.2	2.8	1.1	3.1	...
Total Loans and Advances	105.0	124.1	147.4	166.1	183.3	198.7	160.6	226.4	295.6	325.5

Sources: (1) World Bank Document, St. Kitts & Nevis Economic Memorandum, 1985.
(2) Eastern Caribbean Central Bank, Report and Statement of Account, Various Issues.

Loan Approvals by St. Kitts & Nevis Development Bank, 1981-1990
(\$'000)

Activities	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Agriculture	2.0	25.7	34.8	143.5	230.2	375.5	253.9	245.0	479.7	82.8
Food Crops	...	...	5.0	12.7	33.1	97.7	96.4	194.5	192.6	59.5
Livestock	...	3.7	25.0	19.0	143.1	29.4	15.4	5.1	213.3	4.2
Poultry	...	...	5.0	...	128.2	28.5	8.4	...	197.9	...
Cattle	...	3.7	20.0	9.0	14.9	0.9	7.0	...	12.7	4.2
Other	...	...	...	10.0	...	...	...	5.1	2.7	...
Fishing	2.0	22.0	4.8	111.8	54.0	248.4	142.1	45.4	73.8	19.1
Industry	...	221.8	243.7	902.6	1540.7	2869.1	1970.3	2690.9	4040.9	1905.6
Industrial Credit	...	51.8	116.4	525.7	1540.7	2704.1	1970.3	2690.9	4040.9	1905.6
S.I.C.	...	170.0	127.3	376.9	...	165.0	...	...	...	...
Transportation	176.6	...	143.5	30.5	14.2	54.8	80.0	182.3	188.5	...
Education	39.2	284.5	346.7	517.8	515.2	811.8	1247.0	1252.0	1167.3	678.0
Housing-Mortgage Finance	304.5	891.8	843.6	1233.7	1691.3	1341.4	2208.9	1929.8	3768.2	2319.2
Others	...	30.7	57.6	71.1	157.9	241.0	418.0	228.3	224.1	199.5
Total	522.3	1454.5	1669.9	2899.2	4149.6	5693.7	6178.0	6528.3	9868.6	5185.1

Source: Annual Report of the Development Bank of St. Kitts & Nevis.

Summary of External Public Debt Operations, 1977-1989
(EC\$ Millions)

	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Outstanding Debt at End of Period	14.04	13.77	18.90	28.35	32.13	33.75	36.72	44.55	51.57	52.11	63.72	79.92	89.91
Debt Service Payments	1.89	1.89	2.43	1.35	1.35	2.16	1.89	2.97	4.05	12.96	4.59	4.86	5.40
Amortisation	1.62	1.35	1.62	0.81	0.81	0.81	0.81	1.89	1.62	10.26	2.43	2.43	2.70
Interest	0.27	0.54	0.81	0.54	0.54	1.35	1.08	1.08	2.43	2.70	2.16	2.43	2.70
Debt Outstanding/GDP (%)	58.05	49.14	63.99	57.78	55.35	56.70	60.48	50.36	47.5	48.07	54.74	64.14	68.69
Debt Service/GDP (%)	7.83	6.75	8.10	2.70	2.70	2.70	3.24	3.36	3.73	11.96	3.94	3.9	4.13
Debt Service/Export of Goods & MFS (%)	9.99	8.64	10.26	2.97	2.70	3.78	4.32	7.83	9.45	24.57	7.83	2.43	2.57

Sources: (1) World Bank Document, St. Kitts & Nevis Economic Memorandum, 1983, 1985 and 1986.
(2) Caribbean Development Bank, Annual Economic Report, 1985 and 1989.

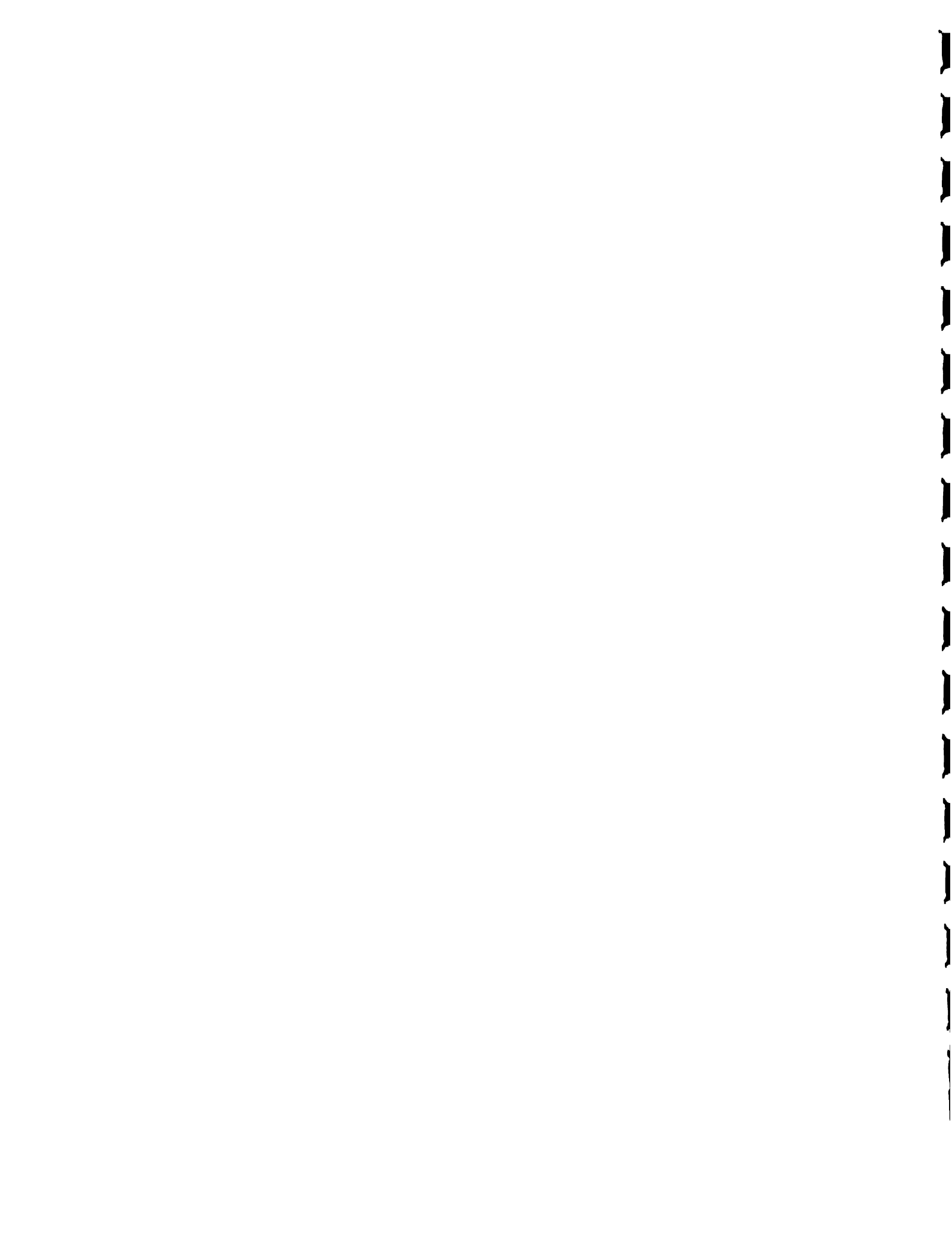


Central Government Operations, 1978-1989
(EC\$ Millions)

	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1. Current Revenue	34.6	40.1	50.9	55.1	49.0	49.4	50.5	49.1	59.2	71.0	79.0	90.2
2. Current Expenditure	30.7	36.2	44.9	56.8	58.5	58.0	54.1	56.6	58.3	66.6	75.0	81.0
3. Current Balance (1-2)	3.9	3.9	6.0	-1.7	-9.5	-8.6	-3.6	-7.5	0.9	4.4	4.0	9.2
4. Capital Expenditure (net)	8.5	14.0	29.1	11.1	10.5	11.3	...	...	...	...	...	...
5. Overall Balance (3-4)	-4.6	-10.1	-23.1	-12.8	-20.0	-19.9	...	...	...	...	...	...
6. Financing												
External Grants	4.6	10.1	23.1	12.8	20.0	19.9	...	...	...	...	...	...
External Borrowing	...	...	13.0	4.3	5.7	5.7	...	...	...	...	...	...
Change in Foreign Assets	...	...	10.6	1.4	3.1	2.5	...	...	...	...	...	...
Domestic Borrowing	...	...	-5.0	-0.2	1.8	-0.2	...	...	...	...	...	...
Memo Items (%)												
Current Revenue/GDP	45.2	45.6	38.0	35.0	30.2	29.5	31.7	28.6	27.8	29.6	28.4	29.8
Current Expenditure/GDP	40.1	41.2	33.5	36.0	36.0	34.6	34.0	33.0	27.3	27.8	27.0	26.8
Current Balance/GDP	5.1	4.4	4.5	-1.0	-5.8	-5.1	-2.3	-4.4	0.6	1.8	1.4	3.0
Capital Expenditure/GDP	11.1	15.9	21.7	7.0	6.4	6.7	...	...	...	...	...	...
Overall Balance/GDP	-6.0	-11.5	-17.2	-8.0	-12.2	-11.8	...	...	...	...	...	...

a/ Government operations refer to operations of the Central Government until September 18, 1983 and to the combined operations of the Gov't of the Federation of St Kitts & Nevis and the Nevis Island Administration thereafter. Public Utilities are included as departmental operations in the budgetary accounts (1980-1983).

Sources: (1) World Bank Document, St. Kitts & Nevis Economic Memorandum, Oct. 28, 1983 and 1985. (2) Eastern Caribbean Central Bank Economic and Financial Review, 1989.



Population Trends, 1976-1988

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Total Population (end of year)	42,861	43,284	43,014	43,050	43,963	44,923	45,300	44,130	43,205	42,290	43,700	43,410	44,380
Crude Birth Rate (per 1000)	26.9	24.4	21.3	24.4	26.7	25.6	29.0	24.1	25.3	23.7	23.0	21.8	21.3
Crude Death Rate (per 1000)	9.7	10.1	9.7	10.7	11.3	10.1	11.2	10.6	10.9	10.2	10.5	10.6	10.5
Rate of Natural Increase (per 1000)	17.2	14.3	11.6	13.7	15.4	15.5	17.8	13.6	14.4	13.5	12.5	11.2	10.8
Total Births	1,320	1,212	1,059	1,211	1,170	1,137	1,307	1,093	1,115	1,026			
Total Deaths	476	503	466	529	493	450	503	478	481	441			
Natural Population Increase	844	709	593	682	677	687	804	615	634	585			
Net Migration	(534)	(306)	(863)	(646)	(418)	273	(427)	(1,747)	(1,559)	(1,500)			
Net Population Increase	310	403	(270)	310	259	960	377	(1,132)	(925)	(915)			
Infant Mortality Rate (per 1000)	33.3	42.1	41.5	49.5	53.0	45.7	42.8	41.2	27.8	30.2	39.7	22.7	24.4
Neonatal Death Rate	...	...	...	...	...	29.0	26.0	20.1	18.8	20.3	28.8	16.9	14.8
General Fertility Rate	...	...	...	...	...	121.6	114.3	111.7	110.8	105.3	105.9	102.2	95.0
Total Fertility Rate	...	...	...	...	...	3.3	3.0	3.0	3.0	2.9	3.0	2.9	2.9
Gross Reproduction Rate	...	...	...	...	...	1.6	1.4	1.4	1.5	1.4	1.5	1.4	1.4
Expectation of Life at Birth (Yrs): Male	...	...	...	...	...	...	64.1	66.1	64.9	66.0	65.5	65.3	65.9
Female	...	...	...	...	...	...	68.5	69.8	68.5	69.7	69.9	70.8	71.0

N.B. Total population for 1986-1988 are mid-year estimates.

Sources: (1) World Bank Document, St. Kitts & Nevis Economic Memorandum, April 10, 1985 and 1986.
(2) Planning Unit, Ministry of Agriculture, Lands, Housing and Development.

Resource Gap and Indicators of Openess of the Economy, 1978-1988

	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
1. Exports of Goods & MFS	58.6	64.3	87.2	104.8	92.3	85.6	104.0	183.3	204.1	200.1	210.3
2. Imports of Goods & MFS	68.6	90.2	124.7	147.4	143.1	155.5	160.9	403.3	510.0	594.8	653.7
3. Resource Gap (1-2)	-10.0	-25.9	-37.5	-42.6	-50.8	-69.9	-56.9	-220.0	-305.9	-394.7	-443.4
4. Sugar Export Earnings	31.8	30.5	38.9	38.9	33.4	27.8	31.3	23.5	31.6	33.7	31.5
5. GDP at Current	76.52	87.86	103.46	121.44	138.74	136.44	159.32	171.76	213.18	239.81	278.26
6. (1+2)/5	1.662	1.758	2.048	2.077	1.697	1.767	1.663	3.415	3.350	3.315	3.105
7. (4/5)	0.415	0.347	0.376	0.320	0.241	0.204	0.197	0.137	0.148	0.140	0.113

Source: ECCB Economic and Financial Review, various issues.

Selected Tourism Data, 1978-1990

	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Total Number of Visitors	37,076	39,839	38,533	46,326	45,721	57,109	75,118	80,467	85,768	97,888	123,253	108,658	109,630
Cruise-ship	9,421	6,859	5,782	10,850	11,146	22,835	34,062	31,522	26,963	31,438	53,645	36,559	33,941
Excursionist	1,377	1,565	1,681	1,034	891	969	1,190	1,398	...	...	...	...	...
Stopover	26,278	31,415	31,070	34,442	33,684	33,305	39,866	47,547	56,805	66,450	69,608	72,125	75,689
Hotel	10,377	13,263	12,649	14,199	12,685	9,817	16,446	24,277	33,436	39,832	42,385	41,837	...
Private Homes and Others	13,544	15,192	15,074	16,660	18,115	19,882	20,404	22,217	23,369	26,618	27,223	30,288	...
Business	2,357	2,960	3,347	3,583	2,884	3,606	3,016	1,053	...	...	...	...	...
Average Period of Stay (days)													
Hotel	5.4	5.2	5.2	5.4	5.6	6.0	6.5	7.0	...	...	...	...	...
Private Homes and Others	12.0	12.0	12.1	12.2	12.4	12.5	12.5	12.5	...	...	...	...	...
Business	5.4	5.4	5.5	4.8	4.9	5.0	5.0	5.0	...	...	...	...	...
Average Expenditure/Day (EC\$)													
Cruise-ship	26.7	29.7	35.1	38.6	40.5	43.2	47.3	54.0	...	...	...	...	...
Excursionist	53.5	59.4	70.2	77.2	81.0	83.7	89.1	89.1	...	...	...	...	...
Hotel	133.7	148.5	175.2	192.8	194.4	205.2	228.2	228.2	...	...	...	...	...
Private Home	26.7	29.7	35.1	38.6	40.5	43.2	47.3	47.3	...	...	...	...	...
Business	142.8	158.5	187.1	205.7	216.0	226.8	238.1	243.0	...	...	...	...	...
Total Expenditure (EC\$M)													
Cruise-ship	13.9	18.4	21.7	26.7	26.5	28.0	41.7	54.9	67.4	90.2	101.4	106.7	...
Excursionist	0.2	0.2	0.2	0.4	0.5	1.0	1.6	1.6	...	...	...	...	...
Hotel	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	...	...	...	...	...
Private Home	7.5	10.2	11.5	14.8	13.8	12.1	24.4	38.8	...	...	...	...	...
Business	4.3	5.4	6.4	7.9	9.1	10.7	12.0	13.1	...	...	...	...	...
1.8	2.5	3.5	3.5	3.5	3.1	4.1	3.6	1.3	...	...	...	...	...
Memorandum Items:													
Stayover Visitors by Country of Residence (%)													
United States	...	...	...	34.8	31.4	28.8	36.6	33.2	34.5	41.7	42.3	38.7	29.4
Canada	...	...	...	5.8	7.1	6.0	6.1	16.3	18.9	15.9	12.3	16.3	11.9
United Kingdom	...	...	...	7.2	7.8	8.3	7.7	7.1	6.2	6.3	6.9	6.9	5.5
Caricom Countries	...	...	...	15.5	16.3	16.8	15.6	13.6	11.7	11.3	10.6	11.7	9.8
Others by	...	...	...	36.7	37.4	40.1	33.9	29.8	28.7	24.8	27.9	26.4	...
Yacht & Cruise-ship Calls (no.)	...	...	...	15.0	12.0	22.0	40.0	73.0	63.0	136.0	197.0	198.0	158.0

St. Kitts & Nevis
Balance of Payments, 1978-1989*
(ECG Million)

	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1. Exports of Goods & NFS	58.6	64.3	87.2	104.8	92.3	85.6	104.0	183.3	204.1	200.1	210.3	
2. Imports of Goods & NFS	68.6	90.2	124.7	147.4	143.1	155.5	160.9	403.4	510.0	594.8	653.7	
3. Resource Balance (1-2)	-10.0	-25.9	-37.5	-42.6	-50.8	-69.9	-56.9	-220.1	-305.9	-394.7	-443.4	
4. Transfers (net)	16.2	20.0	17.6	23.5	23.8	20.5	25.7	91.5	106.9	114.8	92.9	
5. Net Factor Income	-3.5	-3.5	0.5	2.4	1.9	2.7	0.3	93.0	125.3	122.9	157.7	
6. Current Acc't Bal. (3+4+5)	2.7	-9.4	-19.4	-16.7	-25.1	-46.7	-30.9	-35.6	-73.7	-157.0	-192.8	
7. Public Capital	5.9	10.5	23.5	8.1	7.6	10.3	9.7	-11.3	33.8	44.8	32.7	
8. Banking System			....	9.5	3.5	0.3	-4.3					
9. Private Investment & Errors and Omissions	-7.8	-0.8	-8.4	13.5	10.0	37.5	27.3	64.0	41.6	88.0	104.4	
Memoranda Items (%)												
Resource Balance/GDP	28.2	25.7	25.2	41.2	21.2	51.2	35.7	103.2	127.6	141.8	146.7	
Current Acc't Balance/GDP	14.6	9.0	11.4	29.0	9.7	34.2	19.4	16.7	30.7	56.4	63.8	

* 1985 missing.

Sources: (1) World Bank Document, St. Kitts & Nevis Economic Memorandum, Oct. 28, 1983, 1985 and 1986.
(2) ECGS Economic and Financial Review, various issues.

Budgetary Estimates, 1974-1988
(ECS'000)

	Approved Estimates	Revised Estimates	Actual
1974			
Recurrent Revenue	16232.3	20472.3	19959.8
Recurrent Expenditure	24713.9	16232.3	18418.9
Capital Expenditure	15058.4	8876.5	7698.8
1975			
Recurrent Revenue	17961.6	21988.4	22065.2
Recurrent Expenditure	24713.9	24150.9	21943.7
Capital Expenditure	12255.0	1572.1	4259.3
1976			
Recurrent Revenue	21027.5	23035.7	29374.2
Recurrent Expenditure	28656.2	29191.0	30373.3
Capital Expenditure	22803.5	6496.9	5577.7
1977			
Recurrent Revenue	23569.3	24453.2	27650.4
Recurrent Expenditure	29740.7	29099.6	28574.9
Capital Expenditure	25255.7	5998.6	4234.7
1978			
Recurrent Revenue	26678.0	31893.2	34602.1
Recurrent Expenditure	29732.4	32779.1	32490.9
Capital Expenditure	31057.1	7862.9	7862.9
1979			
Recurrent Revenue	31281.8	40086.8	40336.8
Recurrent Expenditure	36389.2	37692.7	39430.0
Capital Expenditure	45351.9	13958.5	12672.7
1980			
Recurrent Revenue	47053.9	58515.9	55752.3
Recurrent Expenditure	46987.4	48681.4	48137.5
Capital Expenditure	49143.9	21380.9	21918.0
1981			
Recurrent Revenue	46797.8	54549.1	55362.8
Recurrent Expenditure	46344.8	56667.6	58650.1
Capital Expenditure	58246.8	18712.6	10623.7

1962	Recurrent Revenue	53404.5	51672.5	51097.7
	Recurrent Expenditure	60506.7	63959.1	62606.6
	Capital Expenditure	110867.6	10613.0	10875.8
1963	Recurrent Revenue			47955.9
	Recurrent Expenditure			56608.6
	Capital Expenditure			13311.4
1964	Recurrent Revenue			50553.9
	Recurrent Expenditure			54112.4
	Capital Expenditure			9515.8
1965	Recurrent Revenue			49117.8
	Recurrent Expenditure			57706.2
	Capital Expenditure			16020.5
1966	Recurrent Revenue			62294.9
	Recurrent Expenditure			58854.2
	Capital Expenditure			16208.7
1967	Recurrent Revenue			73020.2
	Recurrent Expenditure			69518.5
	Capital Expenditure			69871.6
1968	Recurrent Revenue			80550.2
	Recurrent Expenditure			78008.6
	Capital Expenditure			42829.3

Source: Budgetary Estimates for St. Kitts & Nevis, various issues.

Approved Capital Expenditure for Agriculture, 1979-1990 (EC\$ '000)

	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Crop Production								15624.4	22716.2	23543.0	29514.0	30466.0
Livestock								561.3	561.3	617.2	621.9	621.9
Forestry								0.6	8.0	95.6	13.3	329.2
Fisheries								...	...	...	15.6	15.6
Markets								794.9	817.8	930.2	972.2	...
Research								...	...	77.4	81.4	...
Planning								...	1.9	7.0	298.7	595.9
Other								2942.0	1839.1	40.9	48.6	55.2
Total	6007.9	7142.2	2715.7	4783.8	4996.9	7281.4	14149.0	19923.2	25944.3	25311.3	31565.7	32083.8

Actual Capital Expenditure for Agriculture, 1979-1990 (EC\$ '000)

	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Crop Production								4400.0	6378.5	7401.1	12813.6	9969.2
Livestock								251.6	2206.8	2197.0	1604.1	315.0
Forestry								2423.4	2168.2	395.7	321.6	227.2
Fisheries								847.1	1013.4	909.9	23.2	68.6
Markets								425.0	119.4	25.6	142.8	...
Research								...	329.5	140.4	110.4	323.3
Planning								...	180.3	718.0	725.3	571.4
Other								435.3	53.8	12.7	11.5	11.5
Total	1645.7	1529.0	2575.8	4589.3	8925.4	7519.4	11617.1	8782.4	12449.9	11800.4	15752.5	11486.2

Note: Budget estimates provide information on sub-sectors only for 1985.

Source: Budget Estimates for St. Kitts & Nevis, various issues.

All Holdings* by Parish and Type

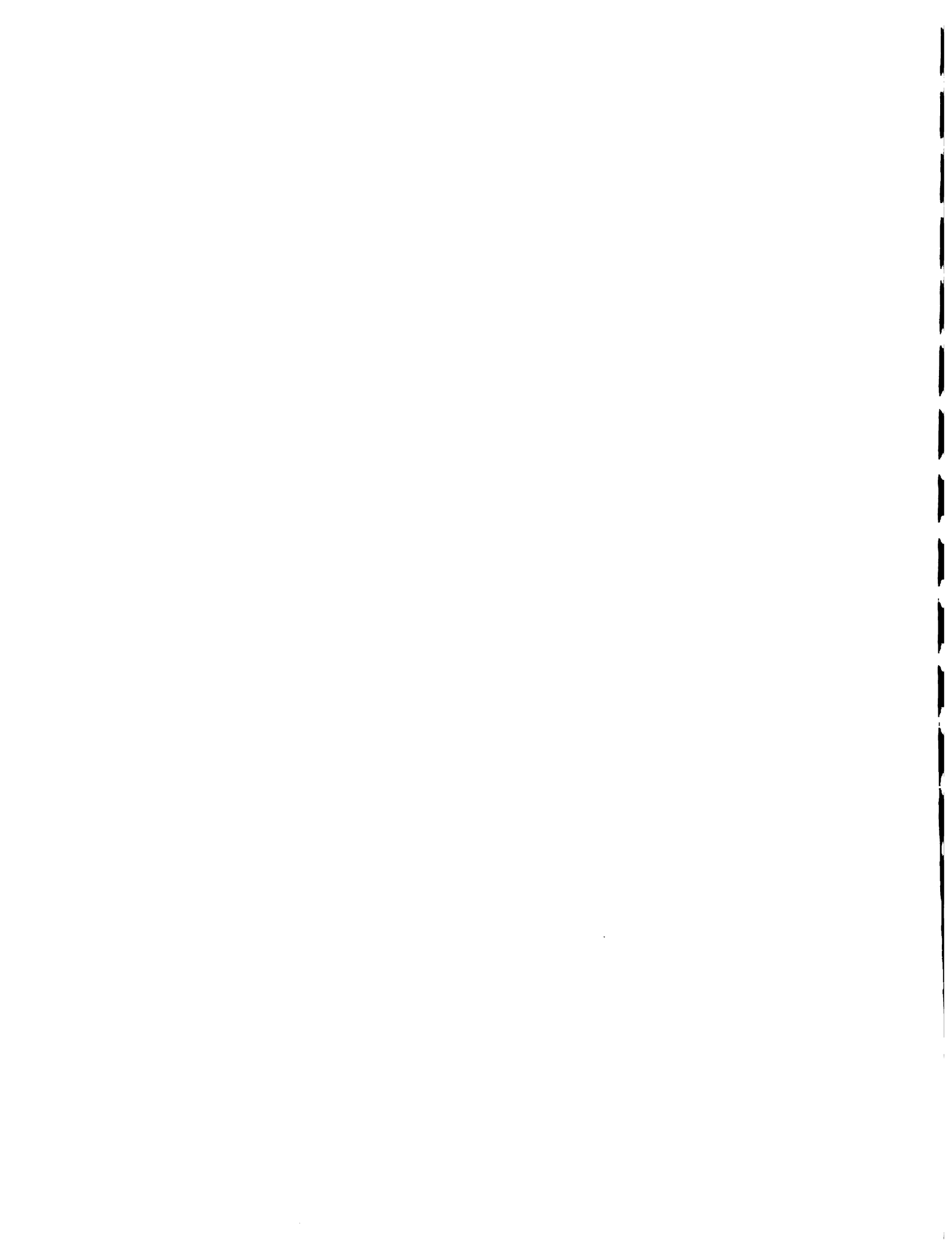
Parish	Total Holdings	Holdings with Crops		Holdings with Livestock only	
		Number	Percent	Number	Percent
St. George	454	154	33.9	300	66.1
Trinity	138	34	24.6	104	75.4
St. Thomas	179	122	68.2	57	31.8
St. Anne	254	119	46.9	135	53.1
St. Paul	270	177	65.6	93	34.4
St. John	241	144	59.8	97	40.2
Christ Church	183	115	62.8	68	37.2
St. Mary	235	113	48.1	122	51.9
St. Peter	264	121	45.8	143	54.2
Total: St. Kitts	2218	1099	49.5	1119	50.5
St. Paul	33	27	81.8	6	18.2
St. Thomas	141	117	83.0	24	17.0
St. James	281	278	98.9	3	1.1
St. George	380	376	98.9	4	1.1
St. John	376	376	100.0	0	0.0
Total: Nevis	1211	1174	96.9	37	3.1

* Includes holdings with both livestock and crops.
 Source: Agricultural Census of 1986.

All Agricultural Holdings* by Parish and Type of Tenure

Parish	Total		Owned		Rented/Leased						Operate for Free		Other Forms		
	No.	Hectare	No.	Hectare	No.	Hectare	No.	Hectare	No.	Hectare	No.	Hectare	No.	Hectare	No.	Hectare
St. George	161	660.10	107	286.9	29	12.7	4	0.3	8	112.4	13	5.1	7	242.7	
Trinity	37	795.73	17	777.9	8	1.7	0	0.0	1	0.2	11	3.9	1	12.0	
St. Thomas	157	402.47	45	301.1	42	16.9	1	0.1	0	0.0	71	27.2	4	57.2	
St. Anne	143	539.27	50	475.7	16	25.2	2	0.3	3	1.5	71	33.8	5	2.9	
St. Paul	210	1347.61	25	990.6	86	81.3	0	0.0	2	0.5	95	43.3	4	231.7	
St. John	188	406.74	68	339.2	95	56.7	6	4.0	1	0.0	20	6.8	0	0.0	
Christ Church	167	267.41	48	232.2	3	0.5	5	0.6	2	0.8	110	32.9	2	0.3	
St. Mary	149	1493.05	97	1474.0	3	1.8	2	0.9	3	0.1	45	13.8	3	2.5	
St. Peter	137	512.05	34	456.3	10	19.6	9	3.6	2	0.5	83	31.7	2	0.3	
Total: St. Kitts	1349	6424.43	491	5333.91	292	216.67	29	9.792	22	115.954	519	198.5072	28	549.6	
St. Paul	27	6.96	26	6.7	1	0.0	0	0.0	0	0.0	0	0.0	2	0.2	
St. Thomas	143	213.03	95	188.2	31	17.1	2	0.2	2	0.8	13	5.0	10	1.7	
St. James	399	775.04	279	642.9	108	47.4	5	5.1	4	49.1	14	12.4	3	18.2	
St. George	730	693.59	411	494.9	259	162.8	6	1.5	6	1.2	56	32.3	4	1.0	
St. John	547	673.67	390	525.2	98	63.0	4	2.0	7	3.7	26	10.2	25	69.6	
Total: Nevis	1846	2362.29	1201	1858.0	497	290.3	17	8.7	19	54.8	109	59.9	44	90.6	

* Excludes "landless" holdings.
Source: Agricultural Census of 1986.



Private Agricultural Households by Parish and Number of Persons per Household

Parish	Total Holdings	Total Population	Distribution of Agricultural Household by Number of Persons										
			1	2	3	4	5	6	7	8	9	10+ Stated	
St. George	452	1901	67	79	69	53	62	37	23	20	15	23	4
Trinity	136	659	20	14	13	18	21	13	12	8	5	11	1
St. Thomas	178	681	42	30	24	14	20	11	12	10	6	6	3
St. Anne	249	1064	52	32	22	36	34	20	22	12	6	12	1
St. Paul	266	1305	54	22	23	27	28	27	28	20	8	25	4
St. John	239	1047	41	39	40	25	23	20	14	15	5	18	0
Christ Church	182	791	29	25	28	19	18	20	14	11	6	9	3
St. Mary	232	1127	37	39	21	24	23	22	20	9	11	24	3
St. Peter	261	1184	39	43	27	35	26	34	23	13	5	15	1
Total: St. Kitts	2195	9759	381	321	267	251	255	204	168	118	67	143	20
St. Paul	33	107	10	5	6	3	2	3	3	1	0	0	0
St. Thomas	141	574	24	24	16	19	17	13	8	4	5	8	3
St. James	278	1035	59	44	39	40	35	25	17	5	4	8	2
St. George	379	1438	75	79	51	42	45	26	17	18	4	18	4
St. John	376	1443	67	79	48	52	37	36	29	13	5	9	1
Total: Nevis	1207	4597	235	231	160	156	136	103	74	41	18	43	10

Source: Agricultural Census of 1986.

Sugar Production, 1970-1969

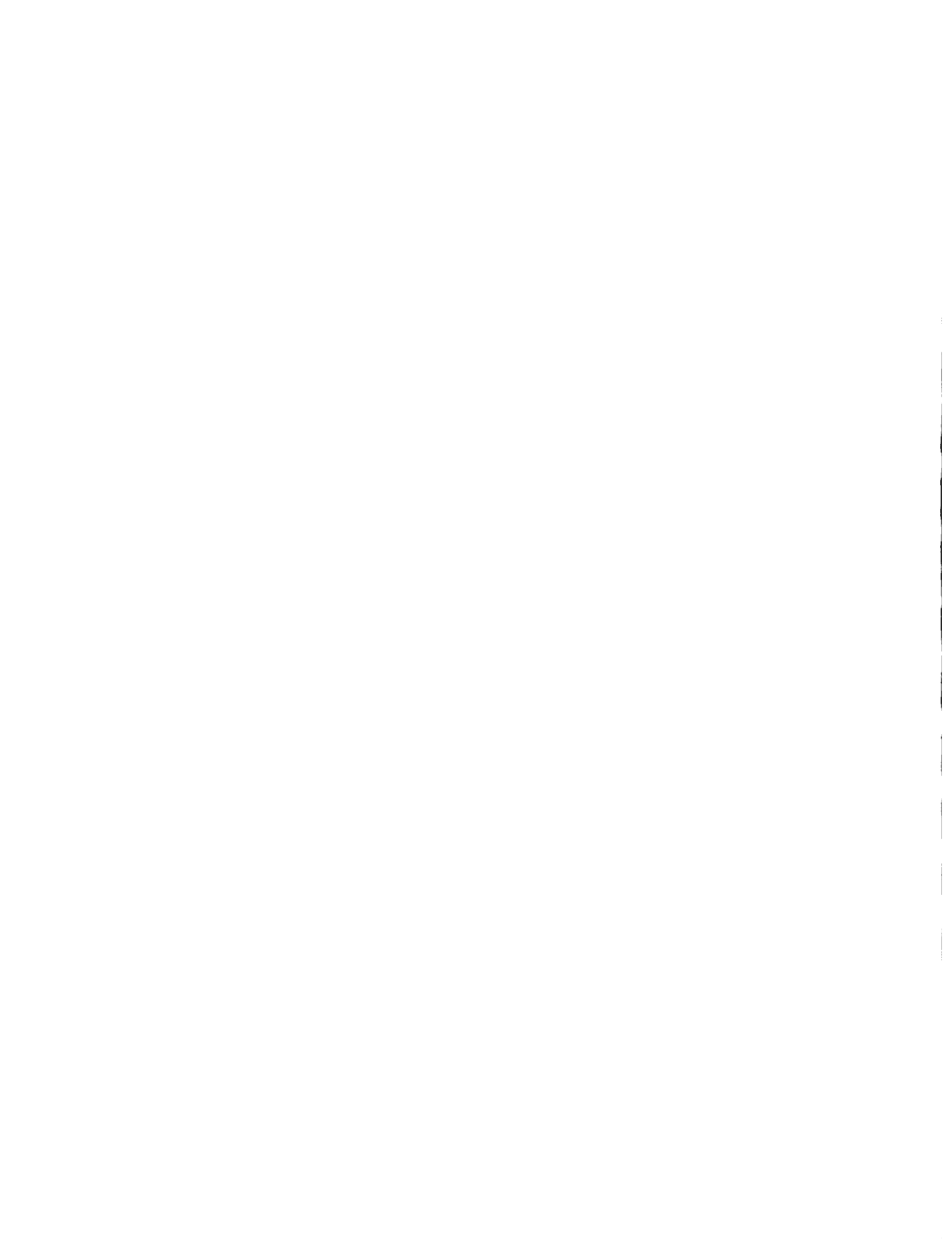
Years	Cane Ground 000 Ton	Sugar Made 000 Ton	Yield (Cane/ Sugar)	Ave. Tons Cane		Ha		Mean Rainfall (mm)	Ave. Sugar Price Per Tons Exp. US\$	Sugar		Molasses		
				Per Ha (reaped)	Sugar	Harvested	Cultivated			000 Tons	000US\$*	000 L	000US\$*	
1970	326	27	12.00	83.96	6.92	3,882	4,995.0	2,025	130	22	2,836	7,570	231	
1971	272	25	10.70	69.16	6.42	3,905	4,725.0	1,175	138	18	2,480	6,057	181	
1972	243	27	9.20	56.81	6.18	4,216	4,326.0	1,350	155	24	3,720	3,762	124	
1973	211	24	8.80	59.28	6.92	3,442	3,877.0	1,025	150	20	2,996	4,906	362	
1974	217	26	8.30	59.28	7.16	3,590	3,566.0	1,525	265	23	6,100	904	132	
1975	216	25	8.60	81.51	9.14	3,410	3,695.0	1,225	574	22	12,627	6,267	526	
1976	321	36	9.00	76.57	9.14	3,920	4,302.0	1,350	329	31	10,205	3,792	256	
1977	359	41	8.64	80.56	9.32	4,456	4,800.0	1,125	247	36	9,367	5,624	356	
1978	369	40	9.27	84.34	9.09	4,375	4,800.0	1,425	318	37	11,762	6,281	161	
1979	392	40	9.66	103.70	10.71	3,781	4,507.6	2,000	305	37	11,304	5,366	324	
1980	358	35	10.12	85.82	8.48	4,178	4,716.0	1,100	450	32	14,398	6,920	470	
1981	344	33	10.43	85.83	8.23	4,011	4,076.8	1,725	475	30	14,399	n.a.	499	
1982	356	37	9.72	89.61	9.22	3,979	4,126.0	n.a.	364	34	12,364	n.a.	328	
1983	282	28	9.95	69.34	6.97	4,064	4,272.0	n.a.	n.a.	n.a.	10,300	n.a.	n.a.	
1984	304	31	9.64	73.43	7.62	4,144	4,687.2	n.a.	n.a.	n.a.	11,600	n.a.	n.a.	
1985	268	27	9.79	66.05	6.74	4,063	4,571.2	n.a.	n.a.	n.a.	8,700	n.a.	n.a.	
1986	265	29	9.14	66.77	7.53	3,862	4,441.6	n.a.	n.a.	n.a.	11,700	n.a.	n.a.	
1987	264	26	10.24	80.22	7.83	3,289	4,420.0	n.a.	n.a.	n.a.	12,478	n.a.	n.a.	
1988	276	26	10.61	91.16	8.59	3,030	4,200.0	n.a.	n.a.	n.a.	11,685	n.a.	n.a.	
1989	257	25	10.19	86.94	8.54	3,605	4,258.7	n.a.	n.a.	n.a.	11,863	n.a.	n.a.	
1990	172	16				3,329	4,209.1							

Sources: (1) National Agricultural Corporation of St. Kitts and Nevis.
(2) St. Kitts & Nevis Agricultural Sector.

* From 1965 to July 1976 the East Caribbean dollar was tied to the pound sterling at the rate of L1.00 = EC\$4.8. In July 1976 the link with sterling was broken and the East Caribbean dollar was aligned with the U.S. dollar at US\$1.00 = EC\$2.70. In 1970 1L = US\$2.44, in 1971 1L = US\$2.44; in 1972 1L = US\$2.50; in 1973 1L = US\$2.34; in 1975 1L = US\$2.02; and in 1976 1L = US\$1.70.

Farmgate Prices of Domestic Agricultural Commodities, 1977-1988
(EC\$/KG)*

Commodity	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Asparagus	0.44	0.44	0.56	0.56	0.67	0.67	0.78	11.11	11.11	11.11	11.11	11.11
Avocado	0.67	0.67	0.78	0.78	0.89	0.89	0.56	1.56	1.56	1.33	1.33	1.33
Banana	2.11	2.11	2.22	2.44	2.44	2.56	2.22	0.89	0.89	1.33	1.33	2.22
Beet	0.44	0.44	0.56	0.56	0.56	0.56	0.56	4.44	4.44	5.56	5.56	5.56
Breadfruit	2.67	2.67	2.78	2.89	3.11	3.33	3.33	0.29	3.22	3.33	3.33	3.33
Cabbage	1.00	1.00	1.11	1.22	1.22	1.33	1.67	1.56	1.11	3.33	4.44	6.67
Carrotoupe	2.11	2.11	2.22	2.44	2.44	2.56	3.33	3.33	2.67	4.44	4.44	6.67
Carrots	1.00	1.00	1.11	1.11	1.22	1.33	3.33	0.56	1.11	0.56	4.44	4.44
Cassava	1.00	1.00	1.11	1.11	1.22	1.33	5.56	3.33	2.78	6.67	7.78	11.11
Cauliflower	1.44	1.44	1.56	1.67	1.67	1.78	1.11	1.67	1.67	5.56	5.56	5.56
Calery	6.11	6.11	6.67	7.22	7.56	7.78	7.22	4.44	4.44	8.89	8.89	4.44
Christophene	2.11	2.11	2.22	2.22	2.44	2.56	2.22	0.60	0.70	0.60	0.60	0.60
Cocoa	2.11	2.11	2.22	2.22	2.44	2.56	2.22	2.22	1.11	2.22	2.22	2.22
Coffee	1.00	1.00	1.11	1.11	1.22	1.33	1.11	0.45	0.45	0.50	0.50	1.00
Copra (tons)	0.40	0.40	0.45	0.45	0.50	0.50	0.40	3.33	3.67	3.33	3.33	3.33
Corn	1.22	1.22	1.33	1.44	1.44	1.56	1.11	2.18	1.56	2.22	2.44	4.44
Cotton	0.44	0.44	0.56	0.56	0.67	0.67	0.56	0.56	0.56	0.44	0.44	0.56
Cucumber	1.22	1.22	1.33	1.44	1.44	1.56	1.11	1.78	2.18	2.22	2.44	5.56
Deashen	1.22	1.22	1.33	1.44	1.44	1.56	1.11	2.22	2.36	3.00	3.00	4.44
Dried Coconut	1.00	1.00	1.11	1.11	1.22	1.33	1.11	1.33	1.33	13.33	13.33	13.33
Eddoes	7.11	7.11	7.22	7.78	8.00	8.33	7.78	0.45	4.44	0.50	0.50	1.00
Eggplant	1.00	1.00	1.11	1.11	1.22	1.33	1.11	0.45	0.45	0.50	0.50	1.00
Ginger	1.00	1.00	1.11	1.11	1.22	1.33	1.11	0.45	0.45	0.50	0.50	1.00
Grapefruit (No)	1.00	1.00	1.11	1.11	1.22	1.33	0.22	5.56	5.56	3.89	3.89	2.78
Herbs	1.00	1.00	1.11	1.11	1.22	1.33	0.22	0.50	0.55	1.00	1.00	2.22
Hot Pepper	1.00	1.00	1.11	1.11	1.22	1.33	0.22	0.50	0.55	1.00	1.00	2.22
Lettuce (heads)	1.00	1.00	1.11	1.11	1.22	1.33	2.22	2.22	2.22	4.00/2.00	4.00/2.00	3.50/1.00
Limas	0.20	0.20	0.25	0.25	0.25	0.30	2.05	0.21	0.35/0.15	4.00/2.00	4.00/2.00	3.50/1.00
Mango (No)	1.56	1.56	1.67	1.67	1.78	1.89	1.67	13.33	11.11	11.11	11.11	11.11
Mint Leaves	2.11	2.11	2.22	2.33	2.44	2.56	2.78	1.67	1.78	2.22	2.22	2.78
Onion	4.22	4.22	4.44	4.67	4.89	5.11	8.89	8.89	8.89	10.00	10.00	11.11
Parstley	0.44	0.44	0.56	0.56	0.67	0.67	1.78	0.67	2.78	2.22	2.22	2.22
Pawpaw	5.00	5.00	5.11	5.33	5.67	6.00	6.67	5.56	4.11	7.78	7.78	7.78
Peanut	1.67	1.67	1.78	1.89	1.89	2.00	2.00	5.56	1.78	5.56	5.56	5.56
Pigeon Peas	1.89	1.89	2.00	2.22	2.22	2.44	2.22	2.51	1.78	5.56	5.56	7.78
Other Peas & Beans	1.89	1.89	2.00	2.22	2.22	2.44	2.22	2.78	2.44	2.89	2.89	5.56
Pinapple	1.00	1.00	1.11	1.11	1.22	1.33	2.22	0.89	1.78	4.44	4.44	5.56
Plantain	1.00	1.00	1.11	1.11	1.22	1.33	2.22	0.89	1.78	4.44	4.44	5.56



Production Estimates of Main Agricultural Commodities, 1977-1990

Commodities	Units	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Traditional Crops															
Bananas	Mt	141.39	147.85	157.31	149.52	137.19	125.00	115.27	113.64	72.73	95.45	106.82	106.82		
Root Crops															
Beet	Mt	0.91	0.91	0.41	0.41	0.41	0.45	0.55	0.34	0.41	0.45	1.05	1.05		
Cassava	Mt	13.64	9.09	7.73	7.73	6.82	6.82	5.45	5.00	4.91	6.82	4.09	4.09		
Dasheen	Mt	18.18	18.18	17.73	17.73	17.73	18.64	15.91	11.82	11.95	9.82	14.09	14.09		
Eddoes	Mt	11.36	11.36	17.27	17.27	18.18	18.18	15.91	16.14	15.91	12.73	14.09	14.09		
Ginger	Mt	1.14	1.23	1.36	1.36	1.45	1.50	1.50	1.45	1.77	5.00	4.09	4.18		
Peanuts	Mt	5.68	5.68	204.55	203.36	203.05	134.09	60.55	58.64	61.36	30.00	32.50	36.36		
Potatoes (white)	Mt	275.95	335.43	359.30	272.31	315.56	315.56	218.18	172.73	172.18	16.14	35.23	111.14	300.00	304.51
Potatoes (sweet)	Mt	16.08	16.54	12.27	12.73	12.73	12.73	9.55	11.73	11.36	243.18	243.64	163.64		
Tennies	Mt										1,720	380	400		
Water Nuts (000)	Mo.														
Yams	Mt	231.00	232.65	151.94	124.73	105.41	87.23	84.52	61.82	62.00	27.27	23.64	36.36		14.54
Vegetables															
Asparagus	Mt								0.31	0.44	0.45	0.45			
Beans	Mt	2.05	1.82	2.32	1.82	1.82	2.05	3.68							
Breadfruit	Mt	170.45	147.73	170.45	170.45	170.45	170.45	170.45	165.00	159.09	68.18	105.91	105.91		
Cabbage	Mt	23.64	23.64	25.89	25.45	32.96	27.27	22.95	28.41	27.50	25.00	15.00	40.00	55.00	27.27
Carrots	Mt	12.73	15.10	14.77	14.43	13.18	14.09	15.91			26.82	61.36	61.36	60.00	56.81
Cauliflower	Mt							2.27	3.18	3.14	2.41	2.43	2.43	0.91	0.91
Celery	Mt								2.59	2.09	0.93	0.93	0.93		
Christophene	Mt	3.64	3.64	3.64	4.09	3.86	4.09	4.55	5.00	4.61	3.23	3.14	3.14		
Corn	Mt								3.18	3.27	0.45	0.55	0.55		
Cucumber	Mt	21.49	18.94	1.08		1.18		54.55	23.32	26.36	41.86	45.45	45.45	27.27	27.27
Eggplant	Mt	7.59	10.35	12.08	8.86	9.35	9.81	21.91	7.20	7.05	7.00	9.64	9.64		
Hot Pepper	Mt	2.05	2.05	2.77	2.05	2.05	2.05	1.14	0.61	1.32	1.61	1.59	2.50		
Lettuce	Mt								5.45	11.14	13.64	15.00	20.45	30.00*	30.00*
Ochroo	Mt	8.56	2.71	2.05	1.82	1.82	2.05	5.59			2.05	1.95	1.95		
Okras	Mt				2.00	2.00	3.00	6.00	2.98	2.95	3.18	3.41	6.36	4.54	4.54
Onion	Mt	8.35	8.34	10.61	9.99	9.68	10.59	6.82	3.86	6.14	0.50	0.52	0.80		
Parsley	Mt	0.14	0.14	2.27	1.82	1.82	2.27	0.23	0.23	0.25	0.68	0.45	0.45		
Peas & Beans	Mt								5.70						
Pigeon & Blackeye Peas	Mt	15.15	16.54	19.21	16.61	17.45	17.45	14.55							
Pigeon Peas	Mt														
Plantains	Mt	54.55	77.27	9.09	9.55	10.00	10.91	9.86	9.80	7.91	3.41	3.77	5.59		
Pumpkins	Mt	105.99	96.60	82.08	83.69	104.02	113.11	96.50	70.09	76.82	60.91	66.82	66.82		
Squash	Mt				0.45	0.55	0.68	0.68	0.55	1.86	4.77	4.91	11.82	6.82	4.54
String Beans	Mt									2.27	10.32	11.82	14.09	9.09	9.09
Sweet Peppers	Mt	30.49	90.89	7.33	5.07	8.50	8.72	6.36	8.18	9.09	11.82	11.82	9.09	22.72	11.36
Tomatoes	Mt	26.06	17.50	20.51	19.84	23.56	24.47	20.45	25.45	26.36	45.45	54.54	68.17	77.27	68.17
Thyme	Mt	15.00	13.68	12.73	13.18	13.18	13.64	13.64	0.84	0.89	0.73	0.74	0.74		

