The Role of Agriculture in Bermuda's Future

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Disclaimer:

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Executive Summary

Bermuda has lost an estimated 87% of its agricultural land in the last 85 years. Of the 735 acres of arable land available for agricultural use, only 360 acres are being actively farmed. Although an estimated 40% of the population is involved in backyard farming, there are only 18 full time farmers and 33 part time farmers in the industry today.

This report, endorsed by the Environmental Coalition (ECO), sets out to explore some of the reasons the agricultural industry and agricultural land are in the critical state they are in.

Chapter 1 focuses on the changing public and government perception of the agricultural industry and agricultural land throughout Bermuda's history. The chapter does this by exploring the evolution of the Bermuda economy from success as an agrarian based exporter to tourism and international business and the effects of these shifts on both the agricultural industry and agricultural land.

Chapter 2 explores agricultural policy and legislation in an attempt to show the benefits and limitations of these in promoting the agricultural industry and protecting agricultural land throughout the Island's history.

Chapter 3 looks at the issue of food security and how both the current critical state of the agricultural industry and lack of agricultural land are having a negative impact on the future sustainability of the Island's food systems.

A series of recommendations conclude each chapter. These are suggestions adopted from previous studies and from other jurisdictions as well as new recommendations that are deemed practical and directly applicable to Bermuda.

The Aim of the Report

This report is not intended to be a comprehensive analysis of either planning or agricultural policy or a complete assessment of public perception of agriculture. There have been extensive studies done on these subjects already and these would be outside the scope of this body of work. The aim of this report is to summarize some of the historic and modern challenges facing the agricultural industry which affect the protection and use of agricultural land. The report attempts to do this by providing an analysis and summary of the some of the relevant information revealed in previous studies whilst highlighting this information with opinion from key stakeholders. It is hoped that the report will be used to inform the educational and advocacy work of relevant private or public sector organisations in sustaining the agricultural industry and protecting agricultural land, whilst raising the general public's awareness of the importance of both of these actions.

Methodology

The primary data for this report was gathered through a series of face to face interviews, telephone interviews and email correspondence with key stakeholders in the areas of development planning, farming, real estate and building development. The secondary data was garnered from Government and non-government reports, plans, issue papers, books and contemporary academic papers and articles. These are referenced in the References/Bibliography section at the end of the report.

Definitions

This report uses two key definitions:

Agricultural Land

As defined and used throughout the Bermuda Government's plans, reports and strategy documents. This is land that is "capable of supporting horticulture, dairy farming, the breeding, keeping and grazing of livestock, market gardens and nursery grounds, or is capable of growing fruit, flowers, forage or vegetables, regardless of the use to which this land is being put**."** (Government 2008, 201)

Agricultural Industry

This refers to all farmers, farm workers and Government and non-governmental service providers associated with the practice of farming.

Introduction

Agriculture has played a crucial role in Bermuda's history forming an essential part of both the Island's cultural and natural heritage. Despite this broadly recognized role, the agricultural industry and agricultural land have been in a steady state of decline over the last 90 years.

Although Bermuda still has an agricultural industry and some agricultural land to support it, there is a general agreement that both are in a critical state and are fast becoming obsolete. Bermudians themselves have played an active role in the decline of agriculture, whether as agricultural land owners or as consumers. Over time, Bermudians' diminishing appreciation for the agricultural sector has caused it to become undervalued and neglected.

The challenges the potential collapse of the agricultural industry and the loss of agricultural land pose to Bermuda are far greater than just the loss of commercial farming. There are other significant challenges to which most Bermudians are indifferent, the most important of which is food security.

This report intends to explore some of these challenges by examining the changing values of Bermudians over time and by analysing the policy and legislation created to protect agricultural land and promote the agricultural industry. Via the reference to previous studies' results and the insights of key stakeholders in the agricultural sector, the report sheds some new light on these challenges. Furthermore, new recommendations are proposed as to how Bermuda can successfully address them.

1. The Changing Value of Agriculture

1.1 Introduction

During the latter part of the 19th century agriculture supported the Island's economy through a successful export market to the United States. Today agriculture continues to supply up to 100% of certain seasonal vegetables for local consumption. Despite these accomplishments there are only 735 acres of land designated as agricultural on the Island, less than one-quarter of the total amount of agricultural land that existed at the start of the 20th century. Of these 735 acres only 360 are actively farmed by approximately fifty farm workers today (Government, 2009).

Throughout Bermuda's history the changing appreciation for the agricultural industry and the shifting perception of the relative value of agricultural land have contributed to the changing status of the industry and continued loss of agricultural land.

1.2 The Public's Perception of Agriculture

During the first century of settlement Bermudian interest in farming was limited due to the lack of skills and experience in farming and management of agricultural land. Although early settlers experimented with growing cash crops for export such as tobacco and corn, much of what was produced with success was limited to basic subsistence crops (Hughes, 1969).

In 1615 the Somers Island Company was created under a Royal Charter to control Bermuda as a commercial venture. The Company imposed an official ban on ship building in 1663 in order to enforce Company control of maritime trade with Bermuda. With the demise of the Company in 1684 and the assertion of Royal control over the Island, the ban on ship building was lifted (Jarvis, 2010). The resulting Bermudian ship building boom, depletion of Bermudian soil and rise of the Virginian tobacco industry hastened the decline of agriculture in Bermuda. The subsequent development of the lucrative industries of shipping, whaling and privateering further diminished the settlers' interest in farming (Jarvis, 2010). With greater opportunities and profits being derived

from the sea, the Island's economy shifted from being a largely agricultural subsistence and export economy to one driven by commercial maritime successes.

With the shift in the economy came a change in the public's appreciation for farming and consequently in the value they placed on the preservation of agricultural land. The land held some monetary value for growing the endemic cedar, essential for the building of ships, as well as for construction lumber (Hughes 1969). However, the inherent practical value of agricultural land in growing subsistence food stuffs was largely forgotten. This resulted in the lack of sufficient local food production and near starvation for the Island's population on several occasions, despite the regular importation of food from the United States (Jones, 2005).

Both the collapse of Bermuda's ship building industry, due to the invention of the steam ship, and the introduction of new farming techniques under Governor William Reid in the beginning of the 19th century reinvigorated Bermudians' interest and enthusiasm for agriculture. Governor Reid is credited with introducing new farming methods and techniques whilst also encouraging the growing of new varieties of fruits and vegetables such as arrowroot, tomatoes, citrus and the Bermuda lily bulbs and onions for which the Island became famous. He facilitated the hiring of experienced Portuguese farmers from Madeira, the Cape Verde Islands and the Azores, whilst also establishing the first Agricultural Exhibition on the Island to celebrate the industry. By the middle of the 19th century agricultural production doubled, stimulated by the re-establishment of a buoyant export market to the United States (Hughes, 1969).

The resulting significant increase in agricultural production led to the start of Bermuda's 'Golden Age of Agriculture' in 1890 (Hughes, 1969). Dairy farms, poultry farms, piggeries and slaughterhouses were all put into production across the Island and a successful export market with the United States was reestablished (Hughes, 1969). Bermudians' appreciation for farming and the value they placed on agricultural land both remained very high during this period as an estimated three thousand farm workers cultivated close to three thousand acres of agricultural land (Jones, 2005, 117).

With greater competition from American farmers due to importation duties and improvements in domestic commercial transport, the export market with the United

States soon began to subside. By the 1930's the mechanization of the American agricultural industry and the improvement of refrigeration and transportation links from the southern States to the north posed major challenges to the Island's farmers. As a result, American labour and transport costs were reduced and Bermudian farmers were no longer able to compete with their American counterparts. The introduction of the Smoot-Hawley tariff, a protectionist US importation tax, proved to be the proverbial 'nail in the coffin' for Bermuda's agricultural export industry. The Island's residents were forced to reevaluate their interest in the agricultural industry and the value they placed on agricultural land (Hayward *et al.*, 1981).

Faced with the collapse of the Island's leading industry, the Government had to come up with a viable alternative. Making use of the Island's natural beauty and proximity to the United States the Government through the Trade Development Board began to promote the Island as an exclusive tourist destination for affluent Americans. Americans were encouraged to visit the Island throughout the 1920's and despite the Great Depression, the 1930's. As that industry grew, more Bermudians were enticed to give up their agrarian past in the hopes of securing a simpler and more lucrative future (Jones, 2005).

The new tourism industry created not only a demand for labour but also for land to build hotels, golf courses, lawns and tennis courts. As a result, more pressure was placed on agricultural land owners to sell their property for development. These included the large Munro and Vesey farms which make up the Port Royal golf course, the Southlands Farm, Southdown farm and the agricultural land holdings of the Cooper family which form part of the Southampton Princess golf course (Hughes, 1971, 5). These land owners were enticed by the potential significant profit they could gain from selling their land. The value of agricultural land had eroded further in the public's perception.

> *"Agriculture suffered because it was deemed no longer necessary, due to the prosperity generated from the tourist industry. Farming became a limited occupation*." (Government of Bermuda, 2005, 106)

By the end of the 1930's and with the advent of World War II the Island's residents were presented with yet another lucrative employment and business opportunity. They were

enticed to join the fledgling construction industry in helping build and maintain the United States Naval military bases. Farming was no longer seen as essential to meeting the Island's economic needs, and people were more able to buy rather than grow their food. Public support diminished further for local farming and with it the appreciation for the need to preserve agricultural land.

With the end of the War regular commercial airline service to the Island brought thousands of tourists and rejuvenated the stagnant tourist industry. The tourism industry continued to grow as the 'main pillar' of Bermuda's economy into the late 80's and early 90's.

Farming was a well respected and essential industry 100 years earlier but by the latter part of the 20th century this status had changed significantly. This change is reflected in the loss of an estimated 2100 acres of agricultural land between 1910 and 1981 as well as a reduction of the total number of those employed in the agricultural industry by an estimated 600 employees (Government of Bermuda, 1983).

The most recent shift in the focus of the Island's economy from tourism to international business has arguably had the greatest impact on the public's changing perception of the value of agricultural land. As more people have been encouraged to reside on the Island to support this industry more demand has been placed on the Island's limited housing stock. Bermudians have had to compete with foreigners for rental properties and have often lost out due to the excess in demand over supply of affordable housing (Government of Bermuda, 2008a). A demand for more housing has resulted and the pressure to develop open space including agricultural land to supply this demand has increased (Government of Bermuda, 2007).

The financial benefits derived from land ownership, especially of land that has development zoning or the potential to develop has resulted in a buoyant local real estate market over the last twenty years (Coldwell Banker, pers. comm.). As such the economic value of land in Bermuda continues to increase along with the negative perception amongst some agricultural land owners that their land has little value if not developed according to real estate agents (Coldwell Banker, pers. comm.). As a consequence some land owners have been tempted to halt agricultural production on

their land in the hope that this will lead to their property being re-zoned for development (Government of Bermuda, 1995).

Previous Government studies have shown that a large percentage (62%) of the remaining agricultural land across the Island is being used for non-agricultural production (Government, 2005). Faced with the denial of permission to develop this land, owners have explored other methods of generating greater resale and amenity value from it. For some landowners this has been achieved by turning their land into lawns or gardens. This trend continues to reduce the total amount of available land for commercial agricultural production.

In some extreme cases, landowners have removed and sold the soil in part or in whole from a plot of land. Attempts have then been made to have the land rezoned for development, as land owners or their agents would argue that the land no longer had any agricultural potential (Sinclair, pers. comm.). More recently, agricultural land has started to be used to grow horticultural products, such as trees, plants and grass for sale. Although permitted under present planning policy there is a concern amongst key stakeholders that this type of production will have long term damaging effects to the land if not monitored and managed effectively (Board of Agriculture, pers. comm.). Increased horticultural production on agricultural land also reduces the potential for that land to be used for food production. Additionally, agricultural land has also been used as a staging area for building on neighbouring plots compacting and in some cases polluting the soil to the point of making it unviable for further production (Sinclair, pers. comm.)[1].

Stakeholders argue that due to the lack of any substantial Government policies to encourage or to create incentives for the retention of agricultural land in active use, land has continued to lose its food-production value and has come under increasing pressure to be used for other purposes (Stafford, pers. comm.; Amaral, pers. comm.).

[1] This issue is directly addressed in the Bermuda Plan 2008 (Government, 2008b, 75)

The changing appreciation for the agriculture industry and value of agricultural land over time has resulted in a set of 'conflicting values' for the Island's residents today. According to the Government's Public Perception Study 47% of Bermuda residents believe that the agricultural sector is critically important to the Island's future, while 38% believe it to be important but not crucial (Government, 2005b, 15) (Figure 1.0). A clear majority of those surveyed believe agriculture has an important role to play in the Island's future, a sentiment that is also reflected in the Government's State of the Environment Report and Draft Bermuda Plan 2008. However, previous studies have shown that although supportive of the agricultural industry residents are largely intolerant of agricultural practices when they occur in the vicinity of their own property or neighborhoods mainly due to assumptions and misunderstandings of these practices (Government, 1995b, 7:Sinclair, pers. comm.).

In addition each year an average of 18 planning applications are received for development on land which has some form of agricultural zoning and over the last 12 years, 28% of planning appeals to the Minister have involved residential development on agriculturally zoned land (Government, 2007, 58). There is clearly a lack of appreciation by the Island's residents of the inherent link between the preservation of the agricultural industry and the protection of agricultural land.

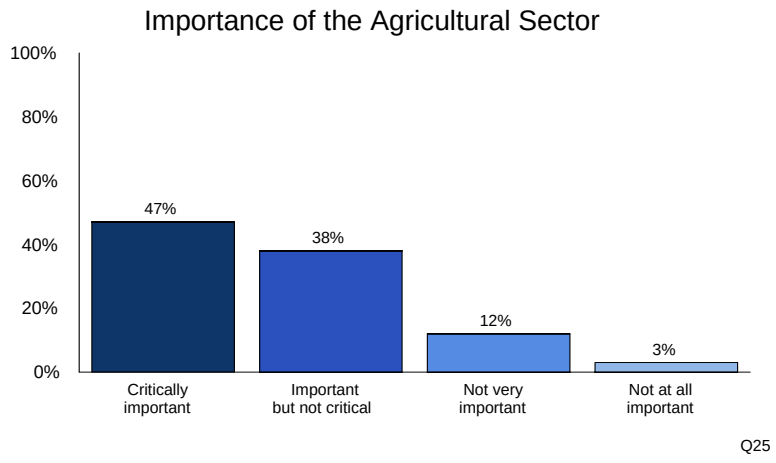


Figure 1.0 Source: Government Public Perception Study 2005

1.3 Government's Commitment to Agriculture

Contemporary Government mission statements, reports and studies, continue to acknowledge the importance of both the agricultural industry and the protection of agricultural land. The Sustainable Development Strategy and Implementation Plan states that the Government's goal is to, "maintain a viable agricultural sector" (Government, 2006, 76). The State of the Environment Report acknowledges that the inherent value of agriculture and agricultural products goes beyond the immediate dollar value placed on these (Government, 2005, 110). The Draft Bermuda Plan 2008 recognizes the need to assure food security on the Island by preserving the agricultural industry and agricultural land (Government, 2008, 127).

Government has shown support for the agricultural industry in the past by developing agriculture plans and strategies, including the establishment of the Board of Agriculture in 1875, the Department of Agriculture in 1912, the creation of the Agriculture Act 1930 that set standards and protection regulations and the Fruits Vegetables and the Flowers Act 1961 that sets embargoes to protect local production against imported products.

However, more recently the perception of some stakeholders is that Government's interest in agriculture has waned. The reorganization of the Department of Agriculture, Fisheries and Parks in 2002 into the Departments of Conservation Services, Environmental Protection and Parks is, according to some farmers, evidence of Government's disinterest in agriculture today (Amaral, pers. comm.; Wadson, pers. comm.). The agricultural responsibilities were split amongst the Departments of Conservation Services and Environmental Protection. Although the decision to restructure the Department was made to meet changing demands of the community, some farmers feel they continue to be negatively affected by this decision (Ward, pers. comm.).

Despite the Government's reassurances that their role in advising, researching, promoting and educating for the farming community and general public would not be affected, farmers feel that since the Department of Agriculture, Fisheries and Parks was reorganized, many of these responsibilities have not been carried out as effectively

as they once were[2] (Wadson, pers. comm.; Amaral, pers. comm.). The agricultural industry and farmers have suffered as a consequence, with farmers often feeling neglected and undervalued, developing the impression that the agricultural industry was not “high on the pecking order of the Government” (Amaral, 2010).

Since 2002 the restructuring of the Department of Agriculture, Fisheries and Parks has led to the confusion of farmers and the general public as to which services the new Departments provide (Ward, pers. comm.). Although the Department of Environmental Protection is responsible for the implementation and enforcement of the Agricultural Act 1930, the Department of Conservation Services is solely responsible for the provision of services to the agricultural industry through the Agricultural Officer and the Marketing Centre (Ward, pers. comm.).

As farming as a profession is no longer promoted this has led to a diminishing appreciation for the agricultural industry by younger generations of Bermudians according to some farmers (Amaral, pers. comm.). Young Bermudians no longer consider farming as a valued and respected profession raising a concern amongst farmers that the profession will soon be lost for good if this is not rectified.

The Department of Agriculture was responsible for encouraging young Bermudians to enter the agricultural industry through its once well-respected apprenticeship program (Sinclair, pers. comm.). However, since the closure of the Department there has been no replacement of agricultural technical training for new apprentices. The lack of promotion of farming as a profession through an apprenticeship program is viewed by some farmers as another indication of the Government’s disinterest in the agricultural industry (Wadson, pers. comm. Amaral, pers. comm.).

1.4 Recommendations

Throughout the Island’s history, the perceived applied value given to agricultural land has fluctuated consistently with changes in the Island’s economy. This has led to a

[2] The reduction of ‘extension work’ by the Department of Environmental Protection was cited most often by farmers.

fluctuating appreciation for the inherent value of agricultural land, the consequence of which has been the loss of a large percentage of this invaluable resource.

There is a need to consider all of the ecosystem services provided by agricultural land, something which is missing in current policy and decision-making. This could be achieved through the implementation of an environmental economic evaluation of agricultural land as has been recently carried out on the coral reef system in Bermuda[3]. This would enable the true inherent value of the goods and services provided by agricultural land to be calculated more accurately.

Government can play a more active role by implementing the many recommendations already advocated in both the Bermuda State of the Environment Report (Government, 2005) and the Review of the Bermudian Agricultural Sector report (Spreen *et al.,* 2002). Some of these recommendations include creating tax incentives for land owners who keep their land in production, providing financing to farmers for the purchase of agricultural land, improving the allowance for duty free imported agricultural equipment, improving the embargo system and helping raise public awareness as to the many benefits of having a local agricultural industry and preserving agricultural land. The Government should also lead by example by making certain that all agricultural land in their ownership is being actively farmed (Government, 2002; Government, 2005).

Current agricultural policies and legislation, including the Agricultural Act 1930, are considered obsolete by some stakeholders and would benefit from a review and update (Ward, pers. comm.). All support services for farmers and the agricultural industry should be consolidated under one Department. This would build greater efficiency in the provision of these services as well as restore farmers' confidence that they were being supported to the best of the Government's ability (Ward, pers. comm.).

Most importantly there needs to be a collaborative strategic planning exercise carried out by all stakeholders to determine the future role of agriculture on the Island (Spreen, 2002). This could be in the form of an agricultural summit or series of 'town hall meetings' (public forums) which were used successfully during the development of the

[3] Total Economic Value of Bermuda's Coral Reefs Valuation of Ecosystem Services, Government of Bermuda, 2009

Government's Sustainable Development Strategy and Implementation Plan. These forums should include as many members of the community as possible in order to encourage ownership and responsibility for implementing and achieving the objectives of any strategy that may result.

2. Agricultural Policy and Legislation

2.1 Introduction

The need for the protection of agricultural land is advocated in many contemporary documents, including the Bermuda Biodiversity Strategy and Action Plan (Glasspool, 2003), the State of the Environment Report (Government 2005) and the Sustainable Development Strategy and Implementation Plan (Government, 2008). Although there are numerous agricultural policies and legislation which have been implemented by Government over the years, many of these are focused primarily on the control and protection of animal and plant species. Bermuda's Development Plans [4] have managed agricultural land use through policy whilst the Planning Act through its legislation has provided the authority to the Development Plan to protect agricultural land.

2.2 Agricultural Land Use Policy

The need to conserve agricultural land was first acknowledged under the Building and Land Development (Conservation of Arable Land) Rules 1956. However, not until the passage of the Development and Planning Act 1965 and the Bermuda Development Plan 1968 were formal land use policies and legislation enacted to protect and conserve agricultural land. From the days of original settlement through the mid-20th century, the Island's development was carried out without any formal land use management planning or regulation, with nothing more than common agreements ('an unwritten law') affecting the protection of agricultural land (Hughes, 1969).

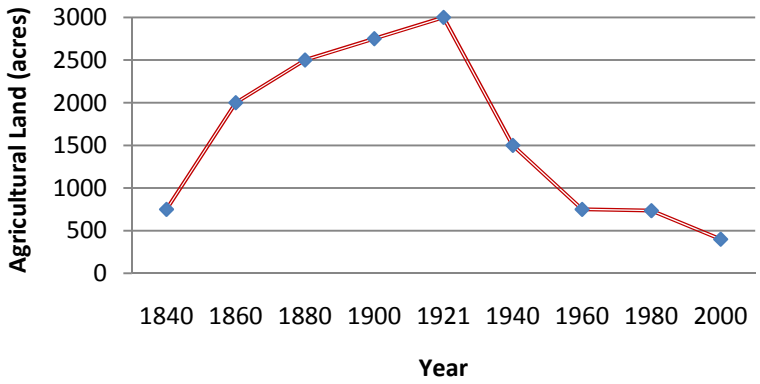
The 1968 Bermuda Development Plan was based on *the Next 20 Years Report*, a U.N. study commissioned by the Government of Bermuda in 1963 to look at the Island's land use. The report is considered the first formal attempt at modern land use planning and management based on contemporary land usage (Hayward *et al.*, 1981, 74).

The 1968 Plan acknowledged the importance of agricultural land "for the welfare of and benefit of visitor and resident" and as a "national asset and important amenity" essential

[4] There have been a series of five national development plans 1968, 1974, 1983, 1992 and 2008. (Government of Bermuda, 2008, 11)

to the preservation of the agricultural industry (Government, 1968, 41). Although the 1968 Plan advocated the preservation and improvement of all open spaces, including agricultural land, it also permitted building on non-productive-agricultural areas and sanctioned the subdivision of agricultural land (Government, 1968, 42). Despite these apparent contradictions of policy, the Plan was effective in slowing the sharp decline in agricultural land that had occurred in the forty years prior to its introduction (Figure 2.0).

Figure 2.0 Agricultural Land



Source: Adapted from the State of the Environment Report
Note: Data for years 1834–1931 represent land in cultivation.
For years 1941–1970 the data is based on total amount of agricultural land

Not until the 1974 Development Plan for Bermuda was the need to protect agricultural land formally recognised through its classification as an Environmental Conservation Area (Government, 1974, 25). Despite making protection of these areas a priority the agricultural land continued to come under threat from development as it did not benefit from any specific protective planning policy (Rowlinson, pers. comm.). The 1974 Planning Act reflected the limitations of the Development Plan as the derived agricultural legislation focused solely on the protection of soil (Government, 1974b, 74).

The 1983 Bermuda Development Plan introduced more clearly defined land zonings by designating two distinct areas, Broad Development Areas and Environmental Protection Areas. Under Environmental Protection Areas the 1983 Plan designated agricultural land as Arable Land Reserve Areas. Although more explicit in the designation of

agricultural land, the Plan's policies duplicated some of the inherent contradictions of the 1968 Plan, advocating both the protection of this valuable resource but also allowing for the development of these lands (Government, 1983a, 53). The Plan made provisions for the development of neighboring plots of land that compromised the viability of the agricultural land itself. Under the Plan an estimated 90 acres of agricultural land were lost to development (Government, 1991b, 5).

The 1992 Bermuda Plan adopted a sustainable development approach to land use management, acknowledging the need for greater restraint of resource use, but also emphasizing the importance of economic growth as the source of the Island's prosperity, affluence and developmental progress (Government, 1991a). By adopting this approach the Plan attempted to strike a balance between the demand to develop land and the need for land protection. The 1992 Plan was an attempt to try and "change direction from a development oriented plan to one promoting environmental management" (Government, 1991a, 6).

Despite this progressive shift in land use management approaches there were some inherent weaknesses with the 1992 Plan. There was no correlation between the Plan's goals, objectives and directives and the policies themselves. This resulted in the creation of some ambiguous policies which either had unclear objectives or no objectives attached to them at all (Government, 2007, 91). The result was that the 1992 Development Plan permitted the reduction in the total amount of agricultural land by an additional 114 acres (to 696 acres) more than any other Development Plan before it (Government, 2007, 58).

2.3 The System of Subdivisions

From the first attempts to survey and manage land use in Bermuda, some wasteful and impractical planning mechanisms have been used. The original land survey of 1616 by Richard Norwood partitioned the Island into nine Parishes (defined as Tribes) and subdivided these into 25 acre lots. Norwood was directed by Governor Daniel Tucker to create even partitions of land with coast-line, hill and valley areas incorporated into each

lot. In attempting to ensure this Norwood's survey paid little attention to the contours or physical features of the land and created "without doubt the most disastrous thing that could have ever happened to the development of Bermuda" (Hayward et. al., 1981, 72).

The Building and Land Development (Control) Rules 1948 introduced the process of subdivision of land through Zoning Orders.[5] These individual pieces of legislation resulted in well known and large tracts of agricultural land such as Garthowen Estate in 1963, Jennings Land and Tamarind Vale both in 1952, being subdivided for development (Government, 1989, 2). The system of subdivision was formalized under the Bermuda Development Plan 1968 with the intent of providing for broader ownership of land and the development of housing and to begin to regulate and control both of these (Government, 1968).

The system of subdivisions perpetuated the fragmentation of once significantly sized plots of agricultural land making them impractical for agricultural production. Subdivision resulted in farmers being reduced to farming several smaller plots in different parishes across the Island, decreasing their capacity to cultivate them efficiently (Figure 2.1). This situation increased their transport and harvesting costs making farming less economical in the face of increasing competition from cheaper imported produce from the United States (Government, 2005a, 112).

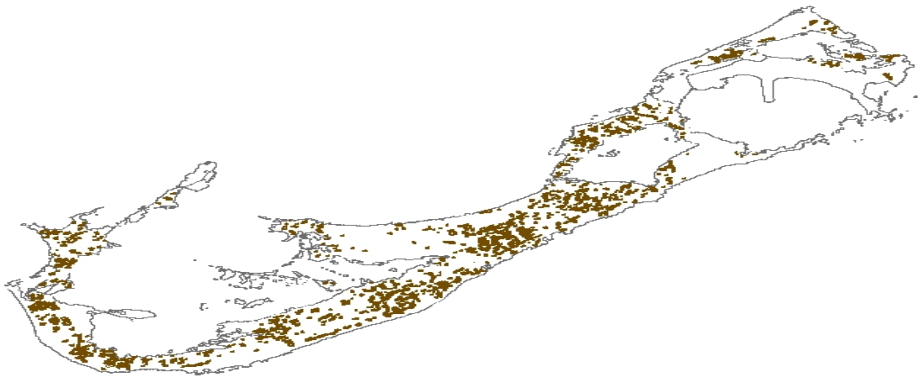


Figure 2.1 Agricultural Reserve Zoned Land 2008. Source: Department of Planning

[5] There are 35 Zoning Orders dating back to the 1940s, 1950's and 1960's (Government of Bermuda, 1989, 2).

The eventual result was that famers no longer renewed their leases on this land. The land was left fallow and would eventually be perceived as unproductive or 'non-agricultural' by land owners (Government of Bermuda, 1995, 4). By 1991 the system of subdivision and subsequent fragmentation of the land resulted in 73% of all agricultural land being 0.5 acres or smaller in size (Government, 1991, 7). With an estimated 375 acres of agricultural zoned land not being actively farmed, the fragmentation and restrictive size of this non-active land is acknowledged by farmers as one of the main reasons for land remaining fallow today (Amaral, pers. comm.; Wadson, pers. comm.)[6].

Despite a moratorium being placed on the subdivision of land between 1974 and 1991, 2,129 previously granted subdivisions (an estimated 900 acres) remained undeveloped up until 1991 (Government, 1991a, 38).The Department of Planning has acknowledged that the mechanism of subdivisions was ineffective in providing more land for housing development in the past, as it had led to the "wasteful use of Bermuda's finite and most valuable resource" (Government, 1991, 38).

Although some land owning families had subdivided their estates to provide future development opportunities for family members, other land owners had subdivided their land with no intention of development. Speculation is that land owners had simply used the mechanism of subdivision to increase the land's monetary value, leveraging the land as a 'currency' to secure loans or other financing (Government, 1991, 38). The Department of Planning has recognised that subdivision, as a means of providing more land for housing development, is no longer needed as "……there is ample land available within the existing residential zones to allow for further infill development to meet the immediate and future housing needs of the Island." (Government, 2008, 39)

2.4 The Multi-Layered Zonings System

Although greater restrictions were placed on the issuing of subdivisions after the 1983 Plan, development pressure on agricultural land continued as demand for housing increased and the perceived amount of available land for development was reduced.

[6] Only 360 of 735 acres of agricultural land are being actively farmed in 2010 (Government, 2010).

This pressure ultimately resulted in the creation of a multi layered land zoning system under the 1983 amendment to the 1974 Development and Planning Act (Government, 1983). The intention by the Department of Planning of using this system was to try and reach a compromise between the need to conserve vital environmental resources such as agricultural land and the growing demand by land owners to realize the developmental potential of their land (Government, 1992).

Despite the best intentions of the Department of Planning to try and create a fair and balanced system of land use management over the years the multi-layered zonings system adopted in the past created confusion for some land owners especially under the 1992 Plan (Marshall, pers. comm.). The system created the perception by land owners that agricultural land was protected until such times as desired for development, at their discretion, as part of their perceived 'right' or 'entitlement' to develop their land regardless of the land's zoning. According to the State of the Environment Report this has made agricultural land "vulnerable to the risk of development for other uses" (Government, 2005a, 115).[7]

Although the 2008 Development Plan has not done away with the system of multi layered zonings altogether it has simplified and clarified the system, prioritizing the protection of agricultural land (Government, 2008b). Despite the Plan's clearly stated objectives to preserve this resource, provisions are made for the development of agricultural land when there is both a Development Base Zone and Conservation Area (under which agricultural land is designated) (Government, 2008b). This provision makes an estimated 364 acres of agricultural land potentially vulnerable to development at the discretion of the Development Applications Board (Figure 2.2).

[7] As a matter of practice, discretionary powers are given to the Development Applications Board who are responsible for reviewing and approving a planning application and to the Minister of the Environment who can grant planning approval on appeal.

Total Amount of Agricultural Land with a Development Zoning

All Base Zones	Agricultural Reserve (acres)
Residential 1	82.50
Residential 2	123.18
Rural	149.45
Tourism	4.00
Commercial	0.00
Mixed Use	0.00
Industrial	0.04
Institutional	5.31
Airport	0.00
Total	364.44

Figure 2.2 Source: Draft Bermuda Plan 2008

The perception amongst some real estate agents is that greater financial return can be leveraged by agricultural land owners using the system of multi-layered zonings to develop their land. They believe that the system represents a “chink in the armour” of even the latest Development Plan (Coldwell Banker, pers. comm.). According to 2008 market values, on average agricultural land was worth an estimated $200 - 400k per acre, but $1.5 – 3 million per acre if sold with a development zoning. Consequently the perceived incentive for land owners to try and develop agricultural land under the multi-layered system is often considered too great to ignore (Coldwell Banker, pers. comm.).

The planning system of multi-layered zonings has only served to reinforce the perceived ‘development right’ of landowners. The system has created greater uncertainties, misunderstandings and number of false assumptions amongst land owners and the general public about the opportunities available to them to develop their land (Government, 1990b: Government 1995). The dual zonings system, according to the Government’s State of the Environment Report, has been partly responsible for the steady reduction in the total amount of agricultural land in active use since the systems introduction. (Government, 2005a, 115)

2.5 Special Development Orders

According to local environmental groups the disregard for Planning policy and regulation has the potential to be exacerbated by the application of Special

Development Orders (Greenrock, 2007). Although an SDO can only be granted by the Minister of the Environment as a form of alternative planning permission for a development of national significance or importance, it circumvents the Planning process. The argument of environmental groups is that SDOs have been leveraged by land owners and developers in the past to gain the approval of a development that does not comply with the policies and regulations of a Development Plan. This process also allows land owners and developers to by-pass the scrutiny of the Department of Planning and the Development Applications Board making all conservation areas, including agricultural land, potentially vulnerable to development (Greenrock, 2007).

Environmental groups argue that SDOs have been granted inappropriately in the past due to the lack of any direction or guidance provided by the Development Plan or the Planning Act of when and how an SDO should be granted (Greenrock, 2007). Twenty four SDOs have been granted since 1997 and according to environmental groups such as BEST, they have facilitated the 'ad hoc' development of the Island undermining the very purpose of the Planning Act itself (Bermuda Laws, 2010; BEST, 2010). A recent case of significance was the granting of an SDO by the Minister of the Environment for the Southlands estate in 2007 which contained several acres of agricultural land in active production in addition to other protected areas.

2.6 The Bermuda Plan 2008

The most recent development plan, the Bermuda Plan 2008 acknowledges the increasing development pressure on open spaces that has occurred since the creation of the 1992 Development Plan due to Island's continued economic growth. Like previous plans the 2008 Plan emphasizes the need to preserve agricultural land. However, in order to overcome some of the confusion and limitations of the definitions and policies of previous plans which led to assumptions being made about the potential use of agricultural land, the 2008 Plan redefines agricultural land as Agricultural Reserve. (Government 2007, 62)

As part of its 'general aim' the 2008 Development Plan applies the principles of 'sustainable development'. The Plan does this by setting out three strategies, a Conservation Strategy, a Development Strategy and Social Strategy. The Plan clearly outlines its aims to protect agricultural land as part of its overarching Conservation Strategy;

> "……..to conserve Agricultural Reserve areas for their agricultural use as well as their natural and aesthetic value, and for providing a visual and amenity buffer between and within development areas. Priority shall therefore be given to protecting the integrity of Agricultural Reserve areas for their ecological, amenity and functional importance, and the presumption shall be that development is not permitted except in exceptional cases"(Government, 2008b, 127)

One of the most significant improvements over the 1992 Plan has been the recognition of the natural and aesthetic value of agricultural land, expanding the protection of this land regardless of its use (Government, 2008b, 127). Despite these improvements the 2008 Plan still permits the development of a single dwelling house on agricultural land (Government 2008b, 3)[8]. The Plan also makes previsions for encroachment onto agricultural land by a neighboring development if the maximum site coverage of that development is impeded by the development's size or configuration (Government 2008b, 31).

During the 2008 Bermuda Plan Objection process approximately 110 objections from land owners (an estimated 25% of the total number received) requested the rezoning of agricultural land (Marshall, pers. comm.). The pressure from land owners to use agricultural land for development has not subsided and the perception that they have an entitlement to do so still exists. It remains to be seen therefore, if the policy improvements made to the 2008 Plan will be sufficient to protect the little remaining

[8] The total size of the development can be up to 3,600sq.ft and be subject to Residential 2 development regulations.

agricultural land and how the Development Applications Board interprets and applies the provisions this Plan has made for the development of this territory.

2.7 Recommendations

Considering the continued steady loss of agricultural land due to development, agricultural land would benefit from more directly targeted agricultural policies and regulations as well as more collaborative efforts between the relevant Government Departments to enforce all of these. To help facilitate the development of these, an up to date and comprehensive agricultural land use survey should be considered a priority.

Policies and regulations could come in the form of financial or other incentives and disincentives, such as land swaps through the creation of a Government land bank and development density bonuses, as have been proposed in the Development Plan 2008. These have been used successfully in other jurisdictions (Hughes, pers. comm.; Government, 2008b).[9]

To encourage agricultural land owners to maintain their land in active production a disincentive could be used in the form of taxes levied on land owners whose land has been left fallow or used for non-agricultural purposes (Government, 2005a; Amaral, pers. comm.). The purchase of the development planning permission ('rights') for agricultural land should also be considered as an incentive to land owners to preserve land in perpetuity for agricultural use (Government of Bermuda, 1990b). Offering a tax incentive to agricultural land owners for those who are considered 'good custodians' of agricultural land, would encourage other land owners to become the same.

Although the recommendation that Conservation Management Plans be used for land management work is an added improvement to the 2008 Plan over the 1992 Plan, the use of Agricultural Land Management Plans to ensure that any change to the use of agricultural land will not diminish the existing or potential agricultural productivity may be more appropriate in the case of agricultural land. These Plans should be created in

[9] The example of the Land Bank in Martha's Vineyard is cited by several stakeholders.

consultation with a Conservation Officer who is trained and experienced in the implementation of these Plans to ensure more progressive land management and preservation techniques are used.

Consolidation of fragmented lots of agricultural land should also be considered where practically feasible. This would encourage commercial famers to make more effective use of this land. Whilst restricting the future development of any agricultural land a grading system could then be reintroduced to determine the most appropriate use of the land. This system could be expanded to help produce relevant policies to facilitate the effective management and the protection of agricultural land [10] (Drew, pers. comm.; Sinclair, pers. comm.).

Allowing for a more regular review of the legislation which affords the Minister of the Environment his discretionary powers, as well as more regular review and assessment of the Bermuda Plan to determine the effectiveness of its policies (as suggested in the Government's Review and Strategy Report 2007), may help to ensure planning policy remains progressive and reflects the demands of a rapidly urbanizing population (Government 2007). In order to challenge the continued assumptions and misunderstandings of Planning policy, ongoing education of the general public and land owners about the real opportunities versus the perceived 'rights' to develop land is essential. Greater enforcement of planning regulations is paramount if the management of agricultural land use is to be effective and any disregard for planning policy is going to be kept in check. A moratorium on the granting of Special Development Orders that affect conservation areas should also be considered if the Government is genuinely intent on the preservation of agricultural land.

[10] An Agricultural Land Classification or grading system was used effectively in the past. Grading **is** a method for classifying agricultural land by grade according to its physical or chemical characteristics.

3. Food Security

3.1 Introduction

Bermuda's relative isolation, the lack of a local sustainable food source and the resulting dependence on imports has created genuine challenges for the Island throughout its history. As the economy and the values of the population have changed agricultural skills have diminished. The amount of agricultural land has been reduced and ultimately Bermuda's ability to produce enough food locally to feed the population has been lost. This challenge has grown even greater by the steadily increasing numbers of residents and density of the population on the Island over time (Figure 3.1). Around the world today, countries are beginning to acknowledge the need for greater local food security and accept their responsibility to produce enough food in order to satisfy the needs of their own populations.

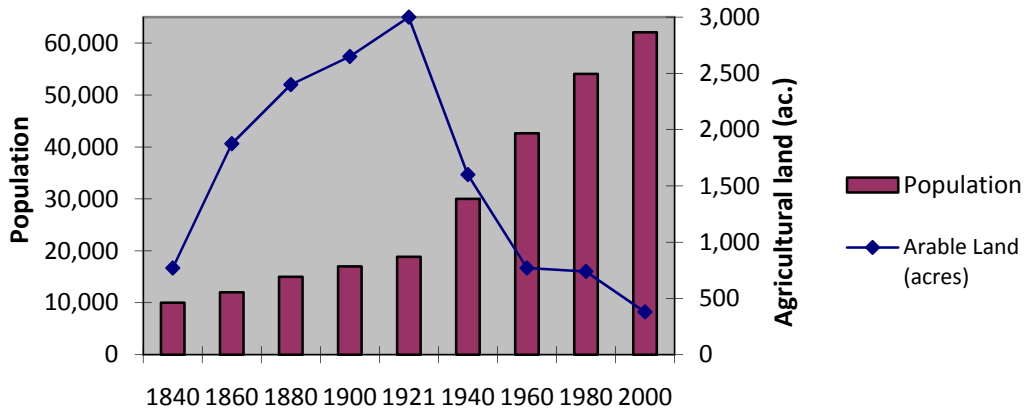


Figure 3.1 Agricultural Land vs. Population (by Year)

Source: State of the Environment Report Note:Data for years 1834 1931 represent land in cultivation. For years 1941–1970 the data is based on total amount of agricultural land

3.2 The Need for Greater Food Security

Despite the Island's famers providing only 20% of the Island's annual produce requirements, Bermuda today still has six dairy farms which provide 100% of the

Island's fresh milk requirement and one poultry farm which produces 15% of the Island's local fresh egg requirement. However during seasonal periods Bermuda's famers are able to produce almost 100% of the demand for certain produce. (Glasspool, 2008, 106)

With the decline of the agricultural industry and the loss of an estimated 2,300 acres of agricultural land to grow food over the last century Bermuda has become more and more dependent upon foreign sources of food to meet its needs. The rising affluence of some residents and the increasing local costs of farming over time have ensured that imports have steadily become a more regular substitute to locally grown food (Spreen, 2002). Combined with the lack of any detailed statistics of how much food is imported and stored on an annual basis, the previous facts demonstrate that there is a need to better understand the current state of the Island's food requirements in order to assess the Island's present state of food security.

Both the global rice crisis of 2008 and the 2010 European air transportation chaos, serve as reminders of how vulnerable global food markets and transportation links can be. In 2008 extreme weather and the change in vegetable production in Asia created significant shortages of rice supplies across the world. As demand outstripped supply many Asian countries responded by securing supplies to meet their own countries' needs. These events caused a reduction in the total quantity of rice available in international markets. A consequence of this hoarding was that the price of rice increased by as much as 50% across the world (Bradsher, 2008). With the complete shutdown of all commercial air transport in Northern Europe due to the ash from the Icelandic volcano in April 2010, supplies of fruits and vegetables from Africa and the Middle East were directly affected, with stocks predicted to completely diminish within a number of days (Collen, 2010).

As highlighted in the recent report *the Impact of Climate Change on Bermuda,* food security is considered as one of the most significant challenges facing societies today. (Glasspool, 2008) As a result countries around the world are actively considering the need to increase their own food security by not only sourcing alternative supplies of

food but considering how they can provide for themselves by growing more of their own food. For example Hilary Benn, British Environment Secretary stated, “Food Security is as important to this country’s (U.K.) future well being and the world’s, as energy security. We need to produce more food. We need to do it sustainably…….” (Vidal *et al*, 2010).

Bermuda’s increased lack of food security is not only due to the shrinking amount of agricultural land and the loss of skilled agricultural labour but also to the steadily growing number of residents on the Island. With 64,059 people living on 20.5 square miles, 2,992 people per square mile, Bermuda is one of the most densely populated countries in the world, a fact that affects our ability to produce enough food locally to feed ourselves. According to some estimates we would need to reduce the population by approximately 75% in order to feed ourselves at the current rate and quantities of food production (Anderson *et al.*, 2001, 4). [11]

Without specific policies to control immigration and local population growth Bermuda will need to rely on significantly increasing agricultural production if it is to become more food secure. In order to do so Bermuda will need to address the greatest challenge to achieving this goal, the need for more agricultural land in active production. Although several relatively large plots of land still exist and are being used for commercial farming most of the remaining land that could help make the Island more food secure is being used as residential gardens and lawns or for commercial horticultural purposes. As many larger plots of land have been permanently lost to development through subdivision or the multi-layered zonings system, these smaller plots, which amount to an estimated 140 acres of agricultural land, could contribute significantly to the production of food on the Island. (Spreen *et al.*, 2002, 86)

The process of conversion and utilization of smaller plots of land to supply a country’s food needs is not without precedence. In the well documented case study of Cuba’s modern day ‘Organic Revolution’, the country was faced with the possible starvation of

[11] According to the Bermuda Biodiversity Action Plan the Island has exceeded its carrying capacity by more than four and a half times (Anderson *et al.*, 2001, 59)

the population after the failure of the Cuban agricultural industry due to the cessation of essential oil supplies from the Soviet Union. In response, the country developed a low input national agricultural strategy, converting their unproductive large state run farm system and private plots of fallow agriculture land into collectives of smaller, local and more efficient farms. This was done in both the countryside and within urban centers. Cuba was able to successfully address the country's food insecurity by beginning to feed its population through the adoption of a more self reliant smaller scale model of food production (Rosset, 2000).

3.3 The Community's Role

A significant number of residents already contribute in some way or other to the total agricultural production of the Island through backyard or community garden initiatives. (Spreen *et al.*, 2002, 84) The growing of food in this way not only allows for greater food security but also encourages the development of flexibility in problem solving abilities of individuals and communities alike. Such social initiatives provide an opportunity for individuals to strengthen their capabilities by becoming reengaged in society (Hopkins, 2008).

As highlighted in the case of *Will Allen's Community Food Systems*, an American initiative which provides high-quality, safe, healthy and affordable food for all residents in a community, the adoption of community farming has not only resulted in the production of sustainable supplies of healthy food but has facilitated the reunification of communities by engaging individuals (Growing Power, 2010). In Bermuda, those individuals could well include Bermuda's young people who often feel excluded from their community. Such initiatives also allow for the re-establishment of the links between ecosystems and the local economic activities of society, building a greater respect of nature by humans (Hopkins, 2008). Some of these benefits are already appreciated by those residents involved in agricultural activity, as "the most frequently cited reasons for maintaining agriculture in Bermuda are: cultural, psychological and spiritual value due to maintaining wide spread connectedness to the cycles of food production" (Spreen, 2002, 121).

Although the adoption of similar local alternative methods of agriculture practice are unlikely to make Bermuda completely self sufficient and truly food secure in the immediate future, they will still help by building the capacity of residents to cope and adapt to change. Bermudians will become more resilient and their way of life more sustainable in the process. As Bermuda seeks practical solutions and strategies to combat the effects of the urbanization of the Island including the alienation of its youth, Bermuda may want to consider the benefits of the adoption of similar initiatives. (Hopkins, 2008)

3.4 Recommendations

As highlighted in the Review of the Bermudian Agricultural Sector report, Bermuda needs to develop a clear strategy outlining priorities and goals as to how to improve the local food system. To help facilitate a change in the public's perception of the value of local food production, the Island's stakeholders (farmers, government officials and the general public) should be encouraged to assume collective responsibility for developing a clear vision of what needs to be done to ensure greater food security for the Island (Spreen *et al.*, 2002).

Carrying out a community food assessment would be considered an appropriate first step. This assessment would entail developing a more comprehensive understanding of the current state of the Island's food system. This approach would increase residents' awareness and also help to inform decision making and public policy as it related to food security.

Bermuda may also consider adopting a Community Supported Agriculture (CSA) based initiative. Having been proven effective in other countries around the world CSAs involve the production of high quality local food but with a greater involvement of consumers and other stakeholders in the investment and marketing processes of farming. In most cases a consumer group helps directly fund a farmer's budget for growing a crop through the purchase of shares and in return the investor is rewarded with fresh produce for that season. (Community, 2010)

There have been proven advantages for both the famer and consumer in adopting CSAs. The farmer's financial risk is reduced while shared with the many subscribers. Farmers also have to spend less time selling their produce and more time ensuring the growth of quality product, often reducing the risk of the loss of a crop. The subscriber not only receives fresh local seasonal produce but develops a greater appreciation for the inherent value of locally produced food. The consumer or subscriber reduces their dependence on imported food and improves the country's food security as a result (Community, 201). A CSA based initiative may also encourage existing or new farmers to begin farming some of the 375 acres of agricultural land which are not in active use throughout the Island today.

Conclusion

Agriculture has played a vital role in Bermuda's history yet this role has largely been taken for granted. As the focus of the economy and the values of the population have changed throughout the Island's history, the agricultural industry and as a consequence, agricultural land, have been undervalued and neglected.

The unregulated development of Bermuda due to the lack of any formal effective planning legislation and policy before 1968 caused the greatest loss of agricultural land throughout the Island's history. Yet the shift from an agrarian based economy to one focused on the service industries of tourism and international business can be considered one of the main reasons for the diminished appreciation and support for the agricultural industry today.

With less than fifty famers left in the agricultural industry and less than 50% of agricultural zoned land being farmed today, both are considered in a critical state. Although the Government and the general public have expressed various levels of support for the protection of agricultural land and the promotion of the agricultural industry, most of this support has been largely ineffective. This is in large part is due to a set of conflicting values held by both parties when it comes to their appreciation of the benefits of agriculture.

Some seventy years after the 'Cornell Report' was carried out on the state of agriculture industry, Bermuda is still faced with the same challenge, determining the relative importance of agriculture to the Island (Government, 1939). Bermudians need to decide what role agriculture will play in the country's future and to consider the effects the loss of the industry and agricultural land will have on the Island when making this decision. As highlighted throughout this report, the continued loss of agricultural land and the industry will not only affect the quality of life of the Island's residents, by eliminating the aesthetic and amenity values associated with this territory, but limit any potential alternative employment opportunities, reduce the environmental services that agriculture supplies and make the Island completely dependent on external sources for its food.

There are deliberate steps that Bermudians can take to overcome some of the challenges agricultural land and the agricultural industry face today. Some of these have been highlighted throughout the Recommendations sections of the report and are summarized in Appendix A. Although a strategic planning exercise may be considered an obvious and essential first step by many stakeholders, Bermudians themselves need to take responsibility for not only ensuring that a strategic plan is developed but that they play some role in its implementation. This will increase the chances of its success. Bermudians need to become reengaged in the agriculture sector, only then will they start to appreciate the benefits associated with the preservation of the industry and the protection of agricultural land.

The issue of food security is another that Bermudians have long taken for granted but, due to the diminishing role of the agricultural industry and continuing loss of agricultural land as well as increasing population, will soon need to address. Bermuda, like other countries around the world, has a responsibility to produce enough food in order to satisfy the needs of its population. Harnessing the estimated 375 acres of agricultural zoned land not in active production and adopting some of the community farming initiatives highlighted in this report may not only help to make Bermuda more food secure but help to counter some of the challenges the Island faces due to urbanization. Taking responsibility will allow Bermuda to become more self sufficient, self reliant and ensure greater sustainability in the process.

Appendix A – Challenges and Recommendations

Ref.	Challenges	Recommendations
A. Agricultural Land		
1.	Lack of Agriculture Land in Active Production	• Conduct an up to date agricultural land use survey to determine present usage/quantity of this resource • Create incentives to encourage famers/land owners to use land (tax breaks/density bonuses etc.) • Encourage public to use land through community initiatives (Community Supported Agriculture/community gardens) • Govt. to place all its agricultural land in active production
2.	Lack of Agricultural Land	• Consolidate and rejuvenate fragmented areas • Amend Planning policy/legislation prevent development on any part of agricultural land • Create an Agricultural Land Bank • Enable and encourage land owners to sell development 'rights' on land
(i).	Lack of Appreciation for Inherent Value of Agricultural Land	• Carry out an Environmental Economic evaluation – to determine inherent value of services provided by agricultural land • Create Community Initiatives - encourage greater involvement of public in use of agricultural land e.g. - Community Supported Agriculture, parish farms
(ii).	Continued Pressure to develop Ag. Land	• Buy development 'rights' from land owners • Create agricultural land bank, encourage land swaps • Conduct more regular review of all policies and legislation to ensure most effective protection of land
B. Agricultural Industry		
1.	Lack of Public Support for Agricultural Industry	• Conduct a Strategic Planning Exercise – all stakeholders • Encourage public involvement in industry through community initiatives - Community Supported Agriculture, parish farms, community farms
2.	Lack of Government Support for Agricultural Industry	• Produce a National Strategic Plan for Agriculture • Consolidate relevant services under one Department • Conduct a comprehensive review and updating of existing policy and legislation
C. Food Security		
1.	Lack of Relevant Information/Data	• Conduct a community food assessment - comprehensive data is needed, to show patterns of importation, storage and consumption of food locally
2.	Lack of a Sustainable food system	• Encourage greater support of commercial farming (B1/B2) and more local initiatives (B1) • Increase amount of agricultural land in production (A1) • Ensure long term protection of agricultural land (A2)

Appendix B – Sample Interview Questions

Farmers

1. How long have you been a farmer?
2. How much land do you farm? How much of this land do you own? How long is your lease on land you don't own?
3. What Government support services do you use?
4. How effective is Government's agricultural extension (support) work today and prior to 2002 and the closure of the Department of Agriculture?
5. What more could be done to support the industry by the Government/the general public?
6. What do you think the public perception of farmers is today? How does this affect your business?
7. What is the single biggest challenge you face as a farmer today?
8. What suggestions do you have to try and overcome some of these challenges?
9. What future does agriculture have in Bermuda?

Ex. Agricultural and Fisheries Department Officials

1. What was your role in the Department of Agriculture and Fisheries?
2. How long were you an employee?
3. What services did/does the Department provide in the support of the agricultural industry? And for the protection of agricultural land?
4. What effect if any had the development of the tourism industry and international business had on the decline of the agricultural industry and loss of agricultural land?
5. What else can be done to support the industry by Government/the general public?
6. What are the challenges the Agricultural industry faces today?
7. What suggestions do you have to try and overcome some of these?

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