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Perspectives on Planning for Agriculture and Food Security in the Commonwealth

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Acknowledgments

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Contextual Discussion

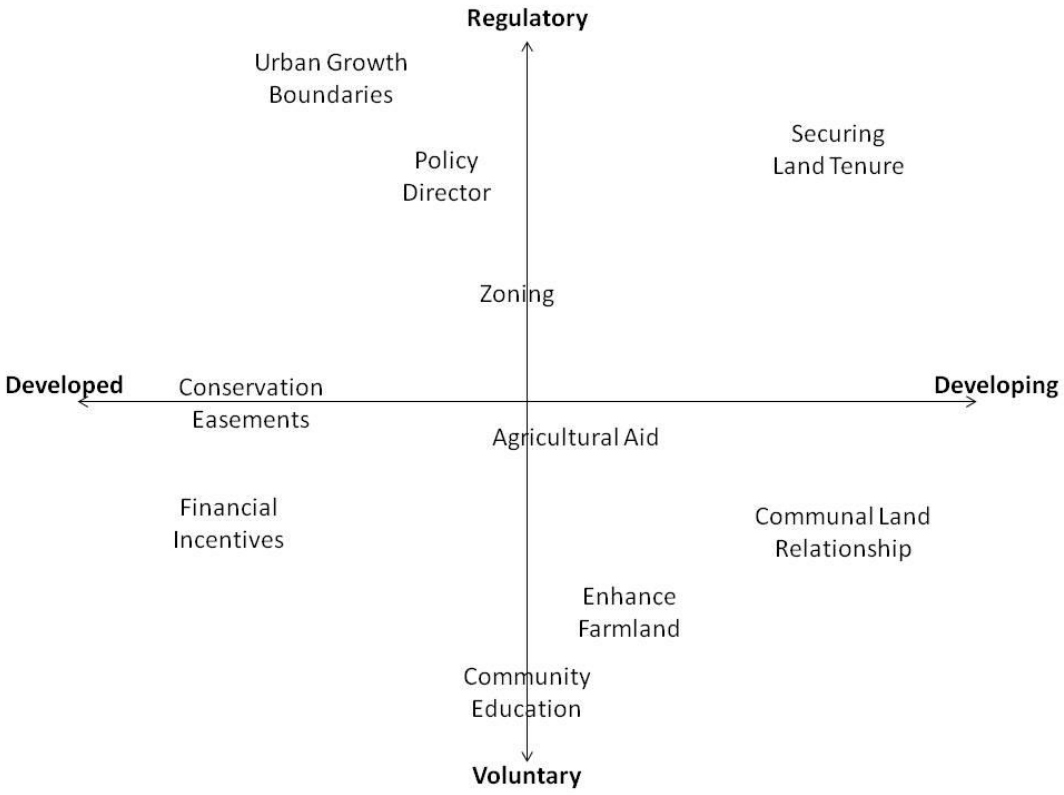
Planning for food security in the Commonwealth is a unique task that covers many subjects, faces many challenges, and has many inspiring opportunities for success. A number of perspectives on these challenges and opportunities are covered in this document. These topics are evolving and represent a snap-shot in time. This compilation of documents contains a top ten list of tools and strategies that any Commonwealth planner could use to move forward in planning for food security. This is followed by five info-sheets to give the basic facts about five tools Commonwealth Planners could use in their practice. These tools are discussed in more depth in the case studies, where each tool is brought to life with the details of a practical example. Finally, this is all brought together in a literature review which contextualizes the planning issues surrounding food security. Some key topics discussed include:

- Climate change - While a number of models exist, current weather patterns continue to be unpredictable and often have negative consequences for food production. Additionally, further research is required to determine the impact of climate change on crop production, predicted yields, and the possible replacement of selected crop types with alternatives. **National food policies (info-sheet 4) could be used to help deal with these changes, and are discussed further in case 4 on Australia's experience.**
- Land degradation - Land degradation can occur in any area and is defined as a "reduction or loss of biological productivity [that] is caused, worldwide by poor agricultural and land stewardship practices"; these practices "include inadequate water and soil resource management, veld management, salination due to over-irrigation, erosion, and reduction or loss of pollinator species" (Caldwell, et al., 2011).
- Population growth and shift - As urban numbers increase and become wealthier, dietary choices tend to shift from cereal-based to meat-based diets, and the importance of agriculture is reduced (Fischer, et al., 2012). As the social importance of agriculture is reduced, the population tends to move away from agricultural employment and focuses more on industrial and manufacturing employment opportunities. **National food plans (info-sheet 4) can be useful for dealing with the place of agriculture in society, and are discussed further in case 4 on Australia's experience.**
- Agricultural system change - During the last 50 years, agricultural technology has undergone significant changes. Yields and scales that were unimaginable in our grandparent's generation are now common. In the developed world, farms continue to grow in size and decrease in number. This trend is aided by increased farm mechanization and tools such as herbicides, pesticides and fertilizers that allow farms to produce large amounts with fewer people. Additionally, genetically modified seeds are available and have dramatically changed the way certain products are produced.

Supportive agricultural policies (info-sheet 5) can be useful for navigating agricultural system change, and are discussed further in case 5 on Niagara Region's experience.

- Land use change - Land change is continual and can be both positive and negative. Positive land use changes include conservation development and the rehabilitation of abandoned sites, brown fields or aggregate pits, while negative land use changes include deforestation, unrestrained urbanization or mining and its related pollutants. **Agricultural plans (info-sheet 1) help tackle land use change, and are discussed further in case 1 on North Saanich's experience.**
- Land tenure - Insecure land tenure is cited as the main reason for farmers' inability "to improve their farming practices" such as resolving well and water contamination problems, as most government support is not available to those without formal long-term tenure agreements (McLees, 2011). **Supportive agricultural policies (info-sheet 5) can help solve land tenure issues, and are discussed further in case 5 on Niagara Region's experience and in case 3 on Trinidad and Tobago's experience.**
- Urbanization - Urbanization presents a constant challenge for agriculture in both the developed and developing world. In the developed world, despite numerous cost-of-community-services studies that show agricultural lands provides a higher net return than residential development, urban areas continue to expand into agricultural or forested land, while vacant city lots or brownfields are ignored (Freedgood, 2002; York, et al., 2011). U**rban growth boundaries (info-sheet 3) can be used to contain urbanization, and are discussed further in case 2 on Lancaster County's experience.**
- Farmland preservation - The land that remains is a valuable resource that needs to be managed and protected in order to sustain and increase the current amount of global food security. Complicating matters, is that productive agricultural land can be located in the same spot as valuable mining products, such as aggregates, coal, and phosphorous. The conflicting uses of agriculture and mining create challenges for government and industry, as rehabilitation potential is variable and any mining activity is likely to disrupt the local biodiversity. While it sounds alarmist, once agricultural land is developed or contaminated from pollution, that land is lost for agricultural purposes for the foreseeable, if not long-term, future. **Conservation easements (info-sheet 2) can be used to help preserve farmland, and are discussed further in case 2 on Lancaster County's experience.**
- Fisheries - Fisheries are an often forgotten component of food security, yet they make up "the main source of animal protein for about one billion people" (Bostock & Walmsley, 2009). Fisheries contribute to food security not only through providing nutrient dense food, but also through providing a source of income and economic growth opportunities. Unfortunately despite the importance to global trade, fisheries have been chronically mismanaged, and what should be a renewable resource now suffers from environmental degradation, illegal unreported and unregulated fishing, and the effects of climate change

(Bostock & Walmsley, 2009). Most fishers in developing countries participate in a combination of subsistence and for-profit fishing, with developing countries making up the majority of fishery exports. **National food plans (info-sheet 4) can highlight the importance of fisheries to food security, and are discussed further in case 4 on Australia's experience.**



A cross section of potential tools and strategies for agricultural planning in the Commonwealth.

10 Strategic Directions for Commonwealth Planners

Planners across the Commonwealth are dealing with a number of different situations, contexts, and challenges. However, despite the many differences in geographies, legal regulations, and food security issues that planners may be dealing with, we present ten strategic directions that would be beneficial steps for planners in any situation.

1. **Evaluate the agricultural resources in your jurisdiction.**
   What agricultural resources are present in this area? What are the strengths and weaknesses of local agriculture?

2. **Determine the role of agriculture in the local economy.**
   How does agriculture contribute to the local economy? In what way does it contribute?

3. **Evaluate the land tenure system.**
   Are farmers able to access the land they need? Can a farmer be confident in making investments, improvements to the land, or developing new infrastructure?

4. **Evaluate the status of farmland.**
   Is farmland being lost? If so, to what cause?

5. **Open the lines of communication with the farm community and all levels of government.**
   What does the farm community need? What are current projects and priorities of other levels of government? Who will address the needs of the farm community?

6. **Determine which tools for working towards food security are most appropriate for the local political and social context.**
   Which tools work best in your social and political context?

7. **Determine what resources are needed to support food security.**
   What does your jurisdiction need to support food security? What are possible ways of attaining this?

8. **Consider the issues, goals, objectives, and related policy of food security in the planning process.**
   How do planning issues and the planning process fit into the food security goals, objectives, and policy of the jurisdiction?

9. **Pull this information together, with the goals of the jurisdiction, to create an agricultural strategy.**
   What does the jurisdiction want to see happen in relation to food security? What would the steps be to support this?

10. **Work within the available resources to implement an agricultural strategy.**
    How can the jurisdiction take the high-level goals and turn them into action?

Part 1: Info-Sheets

(Retrieved April 21, 2014, from: http://gaiafoundation.files.wordpress.com/2011/12/groundnut-crop.jpg)

These info-sheets offer compact descriptions of tools or strategies that Commonwealth Planners can use in planning for agriculture and food security. Each description is followed examples from around the world.

1. Info-sheet for Agricultural Plans

1.1 Description of Agricultural Plans

Agricultural Plans are a tool that can be used by any level of government to solidify intentions towards protecting agricultural resources, facilitating a focus on food security, and linking goals with current governmental objectives. Many governments have undertaken the process of developing an Agricultural Plan in order to determine the current state of agriculture in the jurisdiction, develop goals that respond to and anticipate the needs of the community, and provide decision-makers with steps for moving forward. One government describes it as "a strategy and policy framework to guide ongoing agricultural-related decision making within [the area]" (Regional District of Nanaimo, 2014). The description goes on to say that the Plan identifies stakeholders who can help achieve the goals of the plan, recommends actions that support these goals, and informs local decision making processes (Regional District of Nanaimo, 2014). It should be noted that Agricultural Plans are suited to all types of agriculture and can include urban agriculture, as well as the processing, value-added, and retail components that work together with primary agriculture to form the agri-food chain. Agricultural Plans are adaptable to the circumstances of the community and are often guided by a committee of community stakeholders, including members of the agricultural sector; elements that are often included in Agricultural Plans are:

- A description of the area, including what agricultural lands and resources currently exist,
- The current policy context and framework, including any policies, by-laws, or objectives that relate to agriculture,
- A description of agriculture in the area, including the economic context, major players in the sector, common crops and livestock, and agricultural management practices,
- Current issues facing the agricultural sector, as well as the vision for agriculture in the jurisdiction,
- The goals for achieving the vision, with recommended implementation actions,
- Suggestions for implementation and evaluation.

Agricultural Plans are often followed by Agricultural Strategies, which go into further detail of implementation by attaching responsible parties and timelines to the goals.

1.2 Examples of Agricultural Plans

A detailed example of an Agricultural Plan and Strategy can be found in Case Study 1: The District of North Saanich. Other global examples of Agricultural Plans can be found referenced in the list below:

- Regional District of Nanaimo, Canada: http://www.rdn.bc.ca/cms.asp?wpID=2520
- Niagara Region, Canada: http://www.niagararegion.ca/living/icp/pdf/policy/agriculture-rural-areas-2011-Policy-Plan.pdf
- City of Baltimore, USA: http://www.baltimoresustainability.org/resources/homegrown-baltimore-grow-local-baltimore-citys-urban-agriculture-plan#
- Province of Manitoba, Canada: http://www.gov.mb.ca/ia/plups/pdf/prg_agri.pdf
- Yukon Territory, Canada: http://www.emr.gov.yk.ca/agriculture/pdf/yukon_multi_year_development_plan.pdf
- New South Wales, Australia: http://www.planning.nsw.gov.au/srlup

1.3 Works Cited

Regional District of Nanaimo. (2014). *Agricultural Area Plan*. Retrieved January 6, 2014, from Regional District of Nanaimo: http://www.rdn.bc.ca/cms.asp?wpID=2520

2. Info-sheet for Conservation Easements

2.1 Description of a Conservation Easement

A conservation easement is a legal tool used to restrict certain land uses on a property. Restricting urban development is the most common land use that is restricted, but depending on the property restricted land uses could also include mining, logging, or cultivation. With this tool the land owner is receiving compensation for forfeiting the ability to develop on their land. This ability to develop the land is held in trust by an outside organization which could be the government, a land trust, or a community organization. By doing this, the land owner retains the right to live on and use the land in any way that is not one of the restricted land uses, while the outside organization reserves the right to enforce the easement in perpetuity, regardless of land ownership transfer. There are many different approaches to implementing a conservation easement, as they reflect the legal structures of the county which they take place in, however the common process is described in figure 1. Each conservation easement is an individual process, which means that the exact land use restrictions that are put on the land can be tailored to fit both the land owner's and the organization's needs. This is an important advantage of using conservation easements, as many land owners who engage in this process have a specific vision and desire for the future use of their land.

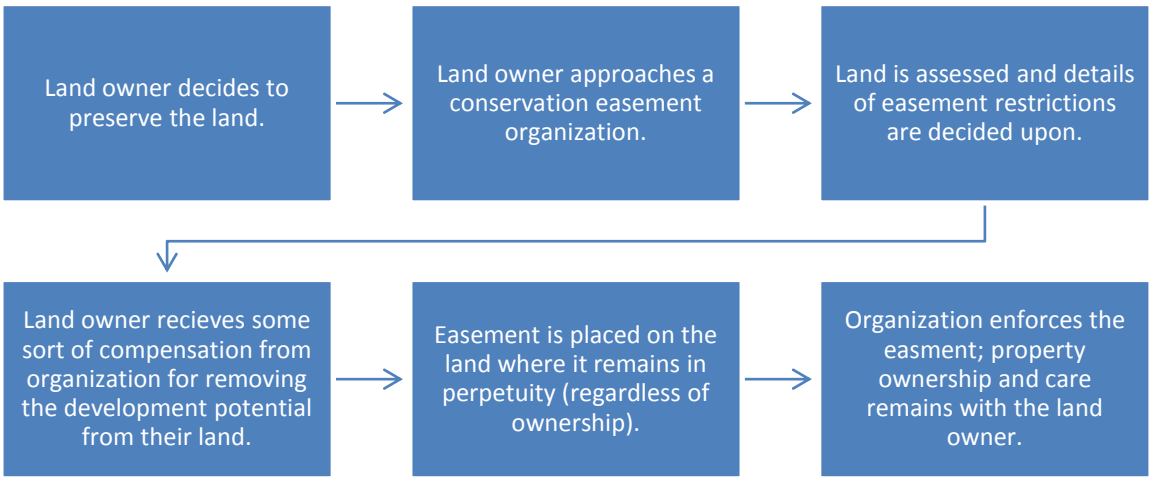


Figure 1: General Conservation Easement Process

2.2 Examples of Urban Growth Boundaries:

Conservation easements are used in different ways across the globe, and are discussed as a key tool in Case Study 2: Lancaster County. Examples and resources from other areas can be found in the list below:

- Ontario, Canada: http://ontariofarmlandtrust.ca/programs/land-securement/
- Chile: http://onlinelibrary.wiley.com/doi/10.1002/2013EF000136/full
- Terrat, Tanzania: http://vimeo.com/27329058
- Rhode Island, USA: http://www.nbwctp.org/CEG_Manual/RI%20Conservation%20Easement%20Guidance%20Manual.pdf
- Karnataka, India: http://www.wti.org.in/oldsite/archives/2012/04/04/wti-ifaw-secures-corridor-used-by-thousand-elephants-2/

3. Info-sheet for Urban Growth Boundaries

3.1 Description of an Urban Growth Boundary

An Urban Growth Boundary (UGB) is a zoning based tool used by planners to delineate between urban and rural areas. A boundary is created around the urban area with long-term growth, commonly twenty years, in mind. This "pro-active growth management tool … seeks to contain, control, direct or phase growth in order to promote more compact, contiguous urban development" rather than allowing low density urban sprawl or inconsistent development to eat away at rural areas (Greenbelt Alliance, 2012). The high-density development within the UGB often creates in-filling and redevelopment of brownfields for residential and commercial development, while leaving rural residential, industrial, or natural resources focused development outside the UGB. This tool encourages efficiency for servicing, infrastructure, and transit inside the boundary which creates municipal savings and removes the speculative development pressure for agricultural, ecologically sensitive, or natural areas that surround the urban centre. This assurance of developable land within the UGB removes the guess work from the development process, creating cost savings for both developers and municipalities.

UGBs can be implemented in two ways: through zoning parcels on one side of the boundary as urban and parcels on the other side of the boundary as rural, which can be reversed through re-zoning; or through legal action such as conservation easements, which are more difficult to reverse (Ecotrust, 2014). Some governments may prefer a zoning approach to ensure that the urban area can expand periodically if needed, while others may prefer to take a legal approach to ensure that sensitive areas are never developed. The costs of creating an UGB are generally related to conducting studies to determine where the boundary should be placed (The National League of Cities, 2012). The UGB tool has been widely used globally with positive results, and demonstrates that food security and farmland preservation depend just as much on compact urban development as they do on rural land preservation.

3.2 Examples of Urban Growth Boundaries:

A number of UGBs exist around the world to look to for advice. An UGB is one of the tools that is used in Lancaster County, USA, as described in Case Study 2: Lancaster County. Examples and resources from other areas can be found in the list below:

- Lexington, USA: http://www.lexingtonky.gov/index.aspx?page=606
  http://plannersweb.com/2011/01/building-invisible-walls-urban-growth-boundaries/
- Reference sheet from California: http://www.greenbelt.org/wp-content/uploads/2012/02/ugb.pdf
- UK Greenbelts: http://www.cpre.org.uk/resources/housing-and-planning/green-belts

- Waterloo, Canada: http://www.regionofwaterloo.ca/en/doingBusiness/resources/BlueprintShapingGrowth.pdf
- Copenhagen, Denmark: http://curis.ku.dk/ws/files/42003001/Forest_Landscape_Research_54_Urbanisation.pdf

4. Info-sheet for National Food Documents

4.1 Description of a National Food Document

A national food document could be one of many types of documents, such as a national food plan, a national food strategy, or a national food policy. The purpose of these documents is to provide a collective national approach to how the country will grow, trade, distribute, and consume food in the future. As food and food security become increasingly important, many countries are researching, consulting on, and creating documents that identify what society can do to support its food system, how the government can provide leadership and strategic guidance, and "articulate the direction of food-related policies" (Australian Department of Agriculture, Fisheries and Forestry, 2013).

In addition to establishing the state of food and agriculture in a country, these documents are comprised of central themes with goals and actions listed to support them. Topics touched upon in these documents are nation-specific, but often include: the agri-food sector and its industries, distribution of healthy food to the population, education about food and health, and food security as it is described in that county. Furthermore, the presence of these documents increases "inter-governmental coordination by establishing collaborative decision-making mechanisms that will create national priorities that will facilitate the optimal use of public funds across departments, jurisdictions and sectors", offers "a multidisciplinary approach to the full range of policy issues linked to … food supply and to the social and economic issues what are connected to or associated with that food supply", and provides guidance for policy and implementation decisions (Center for Science in the Public Interest, 2005).

4.2 Examples of National Food Documents:

An increasing number of national governments are creating food related planning and policy documents, with one example being described in detail in Case Study 4: Australia. Examples and resources from other areas can be found in the list below:

- India – National Food Security Act: http://www.thehindu.com/multimedia/archive/01404/National_Food_Secu_1404268a.pdf
- UK – Food 2030: http://archive.defra.gov.uk/foodfarm/food/pdf/food2030strategy.pdf
- Yemen – National Food Security Strategy: http://www.ifpri.org/sites/default/files/publications/yemennote1en.pdf

- Bangladesh – National Food Policy: https://extranet.who.int/nutrition/gina/sites/default/files/BGD%202006%20National%20food%20policy.pdf
- Kenya – National Food And Nutrition Security Policy: https://extranet.who.int/nutrition/gina/sites/default/files/KEN%202011%20National%20Food%20and%20Nutrition%20Security%20Policy%5B1%5D.pdf
- Scotland – National Food and Drink Policy: http://www.scotland.gov.uk/Resource/Doc/277346/0083283.pdf

4.3 Works Cited

Australian Department of Agriculture, Fisheries and Forestry. (2013). *National Food Pla, Our food future*. Canberra, Australia: Commonwealth of Australia.

Center for Science in the Public Interest. (2005). *National Food Policy Framework - Overview*. Ottawa, Canada: Center for Science in the Public Interest.

5. Info-sheet for Supportive Agricultural Policies

5.1 Description of Supportive Agricultural Policies

By definition, a supportive agricultural policy is a policy that has been designed to assist and encourage the success of the agri-food sector. These policies could relate to farmland preservation, farm diversification, on-farm value-added activities, financial support for farmers, and land tenure policies, with these polices being just the beginning of different policy avenues. These policies are designed to support, encourage, and facilitate all types of agriculture and agricultural activities. In addition, these policies should be integrated into all policy arenas, so that supportive agriculture is included in transportation policies, health policies, infrastructure policies, and all other policy areas of planners.

Beyond being solely supportive, agricultural policy should ensure that is does not impede or make it more difficult for those in the agri-food sector to succeed. For example, a wide spread ban on on-farm produce sales would impede farm success, while removing it would be considered an example of supportive agricultural policy. By removing policy barriers for agriculture, it is likely that local production levels will increase, with food security increasing alongside it. Through acting in the interest of agriculture to remove barriers and encourage agricultural success, planners can increase the level of food security in their jurisdiction by implementing supportive agricultural policies.

5.2 Examples of Supportive Agricultural Policies

A detailed example of supportive agricultural policies can be found in Case Study 5: Niagara Region. Other global examples of supportive agricultural policies can be found referenced in the list below:

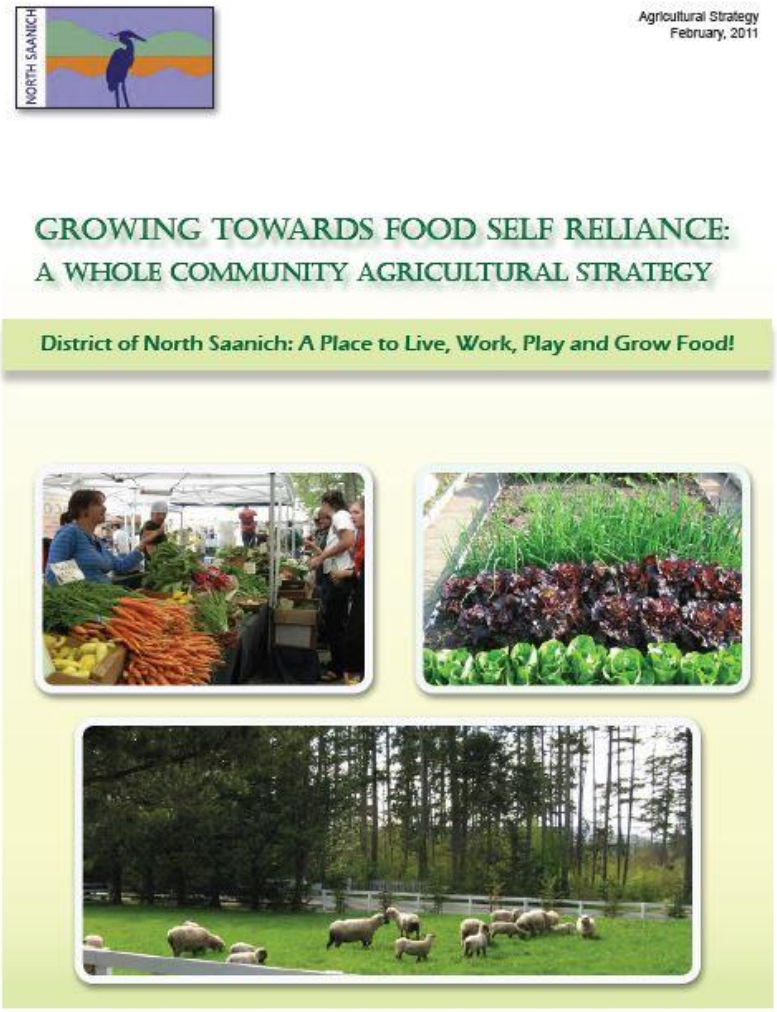
- Vancouver Food Strategy, Canada: http://vancouver.ca/files/cov/vancouver-food-strategy-final.PDF
- Seattle Comprehensive Plan (requiring 1 community garden per 2500 households), USA: http://www.seattle.gov/neighborhoods/npi/plans/central/Section3.pdf
- Agrotourisms, Italy: http://c.ymcdn.com/sites/www.agrifoodskills.net.au/resource/resmgr/fellowship_reports/iss_fel_report_p_porcaro_low.pdf
- Agrotourism, EU: http://www.card.iastate.edu/iowa_ag_review/summer_04/article4.aspx
- Primary Sector Recovery Policy, New Zealand: http://www.mpi.govt.nz/agriculture/funding-programmes/primary-sector-recovery

Part 2: Case Studies

(Retrieved on April 21, 2014, from: http://www.sott.net/image/image/s6/124360/full/goats.jpg)

Each of these case studies provides a detailed look at a tool or strategy being used by Commonwealth Planners in planning for food security.

1. Case Study: The District of North Saanich



1.0 Abstract

The District of North Saanich has designed and implemented a Whole Community Agricultural Strategy. This strategy was developed with the goal of "ensur[ing] that all of the agricultural potential and potential synergies between [traditional and non-traditional] forms of agriculture are achieved for the best functioning local food system possible – one that is community-centred, relational, place based, seasonal, participatory and supportive of the local economy (Buchan, et al., 2011). Many of the actions identified in this strategy have been implemented. Tools and strategies that can be learned from this document include ensuring that policies integrate in terms of implementation, and to continually nurture relationships with stakeholders (Buchan, 2013). If a lower tier government places value of these strategies and has the political will to support it, then they will be well on their way to planning for food security within their community.

1.1 Introduction

The District of North Saanich (North Saanich) is located on the southern tip of Vancouver Island, about 25km north of Victoria, in the south-west corner of Canada as shown in figure 2. North Saanich is a rural community with just under 12,000 residents in a land area of 37.25 km^2 situated within the Capital Regional District and the Province of British Columbia (Statistics Canada, 2013). North Saanich is outside the urban area of the region with the role of "support[ing] agricultural and rural land uses [within the region] and … retain[ing] the present rural, agricultural and marine character of the community" (Buchan, et al., 2011). In addition to its agricultural and rural role, North Saanich also contains a number of institutional centres, including the Victoria International Airport, a major ferry terminal (BC Ferries' Swartz Bay Terminal), and a Canadian Food Inspection Agency Centre for Plant Health (Buchan, et al., 2011). Land use in this area is regulated provincially, regionally, and locally. At the provincial level, British Columbia has legislation which designates land as agricultural and protects this land as part of the Agricultural Land Reserve (ALR). Land within the ALR is subject to land use constraints to encourage agricultural production which cannot be over-ridden by lower levels of government. In North Saanich, 35% of land is in the ALR and 30% of land uses are agricultural, making agriculture the dominant land use in the District (Buchan, et al., 2011; Masselink, et al., 2010).

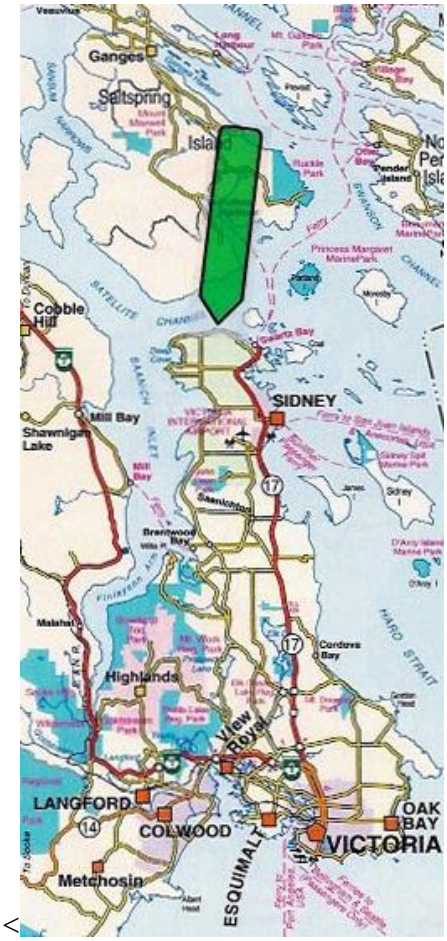


Figure 2: Location of North Saanich (Nash, 2014).

Agriculture in North Saanich focuses on (in order of land area) forage crops, dairy production, equestrian activities, greenhouses, field crops, and beef cattle (Masselink, et al., 2010). It has a cool Mediterranean climate with approximately 883mm of annual precipitation and 226 frost free days (Masselink, et al., 2010). Unfortunately, 84% of the precipitation occurs between October and April, creating a "climatic moisture deficit of 202mm" during the summer months, which means agricultural production is limited on non-irrigated lands (Masselink, et al. 2010). Despite this, the area is suitable for growing crops such as "tree fruits, berries, vegetables, bulbs, nuts, cereal grains and forage crops", including "lettuce, peas, [and] cabbage" on non-irrigated lands (Masselink, et al., 2010). The diversity of agriculture in North Saanich is noted in the following quote:

> "North Saanich has the second largest winery on the Saanich Peninsula, the most extensive organic blueberry farm on the Island, the principal organic salad green producer on the Island, two of the three dairy farms on the Peninsula, a significant poultry operation, a prestigious horse breeding farm, 16 greenhouse/nursery operations, the largest integrated grain farm and flour milling operation on the Island and the largest private forestry seedling nursery on the Island. It is notable that only 12 [of 78] farms

reported vegetable production on a total of 7 ha of land and only 2 farms raised sheep and lambs." (Masselink, et al., 2010).

Although agriculture is still an important part of North Saanich, its prominence has been declining since 1939 when a Royal Canadian Air Force Base was constructed (Buchan, et al., 2011). An example of this slow decline is that up until fifty years ago the area had continued to produce 50% of its own food, while today it is less than 10% (Community Social Planning Council of Greater Victoria, 2012). With just 23.2% of vegetables and 24.3% of dairy being produced locally, the issue of food security has become a major concern for public authorities, including planners, in the area (Community Social Planning Council of Greater Victoria, 2012). These public authorities included municipal staff, a municipal council made up of elected community members, and an Agricultural Advisory Commission (AAC), in addition to interested community members. The AAC acts as an advisory body to council and is made up of nine voting members (seven from the agricultural community, one from the Planning Advisory Commission, and one from the Environmental Advisory Commission) and four non-voting members (a council liaison, municipal staff member, Ministry of Agriculture staff member, and a staff note taker) (Masselink, et al., 2010). Although North Saanich has been looking at the issue of food security since 2004, this case will focus on the more recent aspects of their planning approach, including discussing the North Saanich Agricultural Plan (2010), the North Saanich Whole Community Agricultural Strategy (WCAS) (2011), and the North Saanich Economic Development Strategy for Agriculture (2012). As an innovative local strategy, the WCAS will be the main focus of this case, however the strategies will be discussed in chronological order.

1.2 North Saanich Agricultural Plan (2010)

The North Saanich Agricultural Plan was developed and accepted in 2010 through the funding support and encouragement of the Provincial government. This plan focused on the traditional, large scale, agri-food sector and was accompanied by a food charter and a sustainability guide. The plan was developed "to establish a framework that guides the long-term viability of the District's significant and valued agricultural activities" (Masselink, et al., 2010). More specifically, the goals of the plan include: supporting and enhancing agriculture, addressing agricultural policy and land use planning, and "encourag[ing] environmentally beneficial farming practices" (Masselink, et al., 2010). The development of this agricultural plan involved extensive public consultation including working with the AAC, conducting an online community survey, community sessions, and interviewing stakeholders (Masselink, et al., 2010). Important factors in the successful creation of this plan also included the support of community organizations, a strong history in community agriculture, and local political will. While this ongoing community consultation was taking place, the team was also familiarizing themselves with the background information, including local bylaws and initiatives, identifying agricultural

challenges and opportunities, creating a vision for agriculture in the community, and developing "action oriented strategies" (Masselink, et al., 2010).

Through this process, the biggest challenges facing agriculture in North Saanich were identified as: "economic viability, leadership and governance, protection and stewardship, education and training, and community health" (Masselink, et al., 2010). It is also noted in this plan the agriculture in the District faces a number of farmland issues that are shared with other areas in the Commonwealth, such as high land prices, decreasing farm population, urban/rural conflicts, deforestation, and access to sufficient water (Masselink, et al., 2010). To begin approaching these challenges 23 key strategic actions were created, each with detailed information to facilitate its completion. The top four priority strategic actions fall under the category of increasing economic viability and include: community collaboration, developing an economic development strategy for agriculture, strengthening the community identity to include agriculture, and "support[ing] the establishment of facilities and infrastructure that simulates growth and diversification of local agriculture" (Masselink, et al., 2010). The nineteen remaining strategies are categorized under: "leadership and governance, protection and stewardship, education, training and support, and community health and sustainability" and can be found listed on pages 8-10 of Appendix A.

1.3 Growing Towards Food Self Reliance: A Whole Community Agricultural Strategy (2011)

While the Agricultural Plan, along with the food charter and sustainability plan, provided valuable guidance to the community, these documents acted as independent pieces with few linkages to create an integrated District approach. When the Director of Planning was asked to create a work plan to implement these strategies, he noticed this issue and approached council for permission to come up with a strategy that would integrate all of the documents together (Buchan, 2013). The WCAS was the result of this request and was developed with the goal of "ensur[ing] that all of the agricultural potential and potential synergies between [traditional and non-traditional] forms of agriculture are achieved for the best functioning local food system possible – one that is community-centred, relational, place based, seasonal, participatory and supportive of the local economy", as shown in figure 3 (Buchan, et al., 2011). In this, they describe a sustainable food system as "one in which food production, processing, distribution, consumption and the disposal of end products are integrated to enhance the environmental, economic, social and nutritional health of a particular community and place" (Buchan, et al., 2011). WCAS "addresses the agricultural potential throughout North Saanich based on a comprehensive local food systems model" that divides actions into four categories: municipal priorities, community priorities, easily attainable actions, and a list of plants that could be used in edible landscaping (Buchan, et al., 2011). The top municipal priorities include:

1. “Ensur[ing that] municipal by-laws support agriculture.
2. Creat[ing] an agricultural webpage (on the municipal website).
3. Represent[ing] local and regional interests in food/agriculture.
4. Undertak[ing] an agricultural economic development plan.
5. Support[ing] independent local agricultural organizations.” (Buchan, et al., 2011).

Priorities 1, 2, and 4 have been completed, while priorities 3 and 5 are on-going (Buchan, 2013). In addition to these priorities, WCAS aims to increase public support for agriculture, attract young farmers, and increase “the effectiveness of the food system” (Buchan, et al., 2011). In total 89 municipal actions and 45 community actions haven been developed to achieve these goals with over half of them “appl[ying] to more than one factor in the local food system” and emphasising the interconnectivity of agriculture (Buchan, et al., 2011).

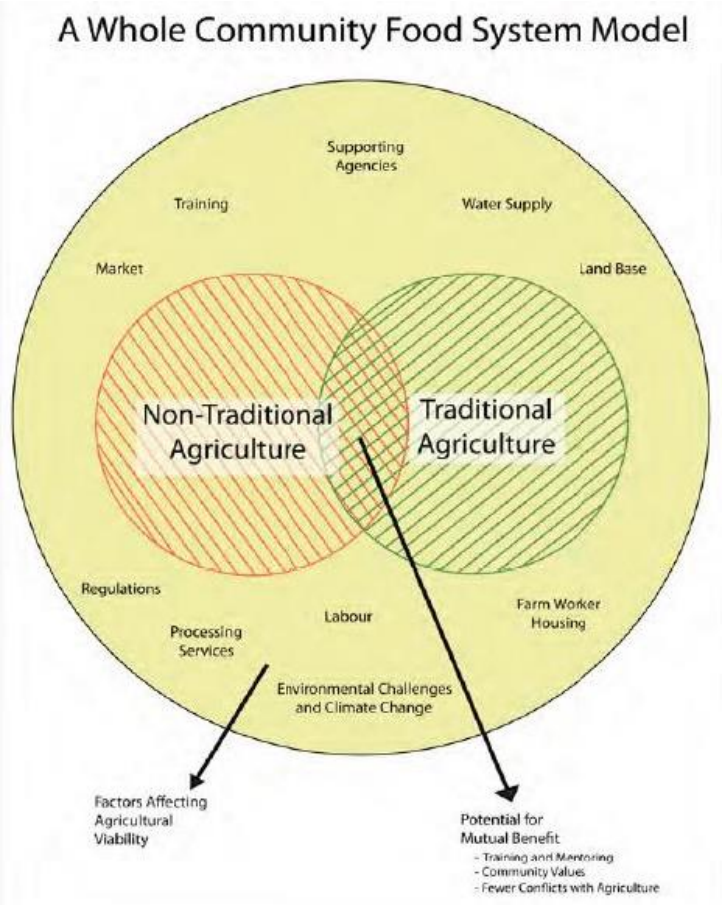


Figure 3: Visual representation of the WCAS (Buchan, et al., 2011).

Unlike the Agricultural Plan or the Economic Development Plan for Agriculture which were developed by consultants, the WCAS was developed in-house over five months for under $8,000, excluding the cost of a small amount of staff time, and was done without Provincial or

Regional involvement (Buchan, 2013). While local impressions were that the Province viewed the WCAS as a social exercise because of its inclusion of non-traditional agricultural elements, the Region supported the project as it fit well with their regional sustainability strategy (Buchan, 2013). The main supporters involved in the development of WCAS were the AAC, local food groups like the Capital Region Food and Agriculture Initiatives Roundtable (CR-FAIR), and many professionals who volunteered their time (Buchan, 2013). The development process began with staff familiarizing themselves with how agriculture and the food system operate in the District. Then they collaborated with the AAC, and hosted an Agricultural Ideas Fair and Public Workshop. This event allowed District staff and the AAC to liaise with the public, present ideas, and gain feedback. Public opinion was noted by providing participants with "a limited number of votes for or against each of the potential actions" (Buchan, et al., 2011). The results from this event were reviewed and validated with a stakeholder committee before approaching implementation. Each action is also placed into one of the 11 categories: "land base, marketing, labour, farm worker housing, processing services, training and information, water supply, support agencies, environmental and climate change challenges", and regulation (Buchan, et al., 2011). These actions contained all of the actions suggested in the Agricultural Plan, along with all of the ideas that were presented at the idea fair and public workshop, making this a successful way of putting together a strategy that resonated with the community.

The Agricultural Ideas Fair and Public Workshop was just the first part of public engagement, and the WCAS recommends continuing this by hosting similar events every two years (to allow time for implementation and monitoring). Council would be updated annually, and the community priority actions would be referred to the AAC for implementation and monitoring. The key components that allowed the WCAS to be developed were having political, community and stakeholder support, keeping the public engaged, and including the public in the strategy's priority setting (Buchan, 2013). What makes this strategy different is that it looks beyond the traditional aspects of planning for agriculture, such as farmland preservation, and gives value to non-traditional aspects such as market gardens and rooftop farming, while not diminishing the importance of traditional agriculture. This strategy takes the approach that municipal agricultural support does not just have to be just for the large farmers or just for the smaller farmers, but that municipal strategies can support farming and agriculture at all scales and steps of the process. To read more, the entire document is located in Appendix B.

1.4 North Saanich Economic Development Strategy for Agriculture (2012)

After developing both the Agricultural Plan and the WCAS, North Saanich took one of the first recommendations of these documents and developed an Economic Development Strategy for Agriculture. The goal of this strategy focused on the economic challenges that were described in the previous two documents and is identified as "increase[ing] the viability of the agriculture and

food sector, including both the commercial and informal aspects of food production and distribution within the food system" (Community Social Planning Council of Greater Victoria, 2012). This goal is to be achieved through five key objectives which include:

1. "Promote and educate about the value of agriculture in North Saanich by building points of contact with the food and farming community that contribute to growing public demand for local food.
2. Leverage investment in and build the agri-food sector, and the infrastructure it needs to thrive.
3. Support retention and access to land for new farmers and for scaling up of food production by existing farmers.
4. Support sector development to invest in current and future generations of innovative and successful farmers.
5. Create an enabling policy environment for agriculture." (Community Social Planning Council of Greater Victoria, 2012)

Below each objective are a number of priority actions that have been developed to reach the objective, along with a list of with potential municipal roles and potential partners as a starting point (Community Social Planning Council of Greater Victoria, 2012). Each of these objectives and actions take the Agricultural Plan and the WCAS into consideration, along with feedback from a number of stakeholders. This strategy identified a number of key factors that play an important role in the success of agricultural economic development. These key factors keep with the 'whole community' theme of traditional and non-traditional agriculture and include:

- Market access,
- Local procurement,
- Direct marketing,
- Agri-tourism,
- Critical mass,
- Investment,
- Local leadership,
- Cross-municipal collaboration,
- Regulatory environment,
- Extension services,
- Business services, and
- Infrastructure (Community Social Planning Council of Greater Victoria, 2012).

Though learning through the experiences of other jurisdictions, a list of best practices for "business-local government cooperation in agricultural economic development" was developed to include:

- "Supporting the development of local agri-food organizations and alliances to strengthen the sector's own development and leadership,
- Improving and harmonizing the local government regulatory environment,
- Ensuring affordable and stable input costs for utilities like water that local governments can control,
- Promoting and marketing regions and communities and agriculture and food destinations,
- Educating and engaging the public in supporting local agricultural products and experiences,
- Supporting land use for, and investment in, infrastructure for local processing and distribution,
- Supporting community acquisition of agricultural land for farming and related "food hub" functions,
- Marketing the area for agri-food investment and business location, to create distinctive clusters of agri-business value chains" (Community Social Planning Council of Greater Victoria, 2012).

For more information about the details of this strategy see Appendix C.

1.5 Current Status and Lessons Learned

North Saanich has made significant progress in implementing their WCAS. Although the political focus of the District has shifted, they are continuing to work on implementing all of the WCAS actions, including developing a work plan for the Economic Development Strategy and finding a location for a permanent farmers market (Buchan, 2013). The District has created demonstration gardens and orchards on their front lawn, which produces 3000 lbs of fruit and a substantial amount of vegetables per year, all of which are donated to the local food bank, and have joined forces with other municipalities on the Peninsula to create a Peninsula-wide annual food celebration, known as Flavour Trails (Buchan, 2013). Other things that have been done through these strategies include:

- amending the District sign bylaw to allow farmers easier advertising,
- amending the District zoning bylaw to enable non-traditional agriculture, such as "empting greenhouses from site coverage regulations, allowing bee keeping in all zones, allowing commercial market gardening as a home occupation"
- amending the District business regulation bylaw to allow residential market gardens,
- promoting edible landscaping, and
- "supporting a Farmer-to-Farmer forum within which farmers can engage in dialogue on issues and solutions to local challenges" (Buchan, 2011; Buchan, 2013).

The main challenges that North Saanich faced, and in some cases are continuing to face, include ensuring ongoing political support, gaining the support of the traditional agricultural sector, and working with the economic realities of current agriculture (Buchan, 2013).

When asked what other areas of the Commonwealth could learn from North Saanich's experience, the Chief Administrative Officer replied that planners need to think of complete communities as places that grow food and to integrate food into their community planning (Buchan, 2013). Tools and strategies that can be used to make this a reality include making sure that policies integrate in terms of implementation, and to continually nurture relationships with stakeholders (Buchan, 2013). If a lower tier government places value of these strategies and has the political will to support it, then they will be well on their way to planning for food security within their community.

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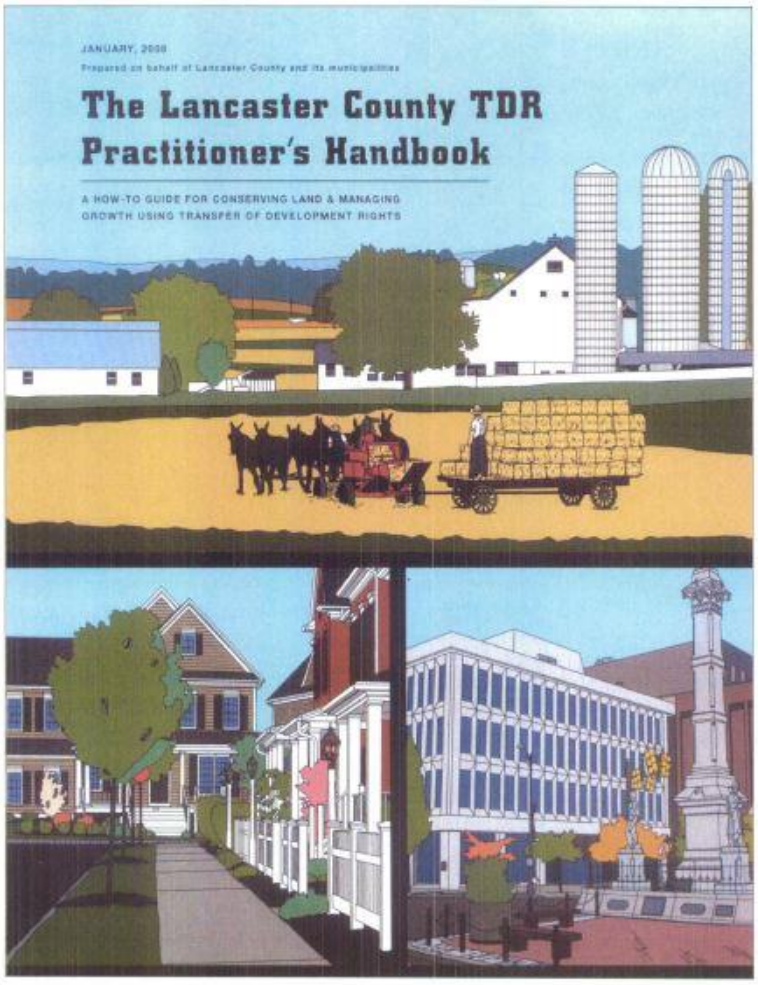
2. Case Study: Lancaster County, USA



2.0 Abstract

Lancaster County, Pennsylvania has preserved large blocks of farmland through the use of Purchase of Development Rights and Transfer of Development Rights programs. This program has been the most important tool used in this area, but would not have been as successful without being used in combination with agricultural zoning and Urban Growth Areas. Together this package of land use controls and incentives, along with the agricultural history of the area, form the ideal environment for this type of farmland preservation approach (Daniels, 2013). Tools that could be useful throughout the Commonwealth to preserve agricultural land include: agricultural zoning, UGAs, a right-to-farm law, and a taxation system that bases property values on the land use (Daniels, 2013). Lancaster County has been a leader in the US for their farmland preservation techniques, and will continue to inspire farmland protection advocates around the world.

2.1 Introduction to Lancaster County

Lancaster County is located in the north-east region of the United States of America, in between the major cities of Philadelphia and Harrisburg, as shown in figure 4. Lancaster County has an estimated population of 526,823 in a land area of 2,444 km^2 situated in the south-east corner of the state of Pennsylvania (US Department of Commerce, 2013). Lancaster County has a long history as an agricultural community, and over half of the County's land is being used for farming, and the County farmers producing more than $1 billion in farm products in 2007 (Lancaster County, 2006; US Department of Agriculture, 2009).The County continues to view agriculture as important, with "farmland preservation [being] consistently ranked by Lancastrians as key to the quality of life in Lancaster County and one of the highest priorities of the County's future" (Lancaster County, 2006). Additionally the substantial Plain Sect community made up of Amish and Mennonite populations also support the continuation of agriculture in the County, as their religious beliefs require them to avoid most aspects of modernity and rely on farming as a key component in their lifestyle. In fact, as of 1997 the Amish owned 41.5% of the farms in Lancaster County, equalling 99,238 acres of farmland (Lancaster County, 2006). Agriculture is also closely related to the tourism industry, with about 10 million visitors spending more than $1.8 billion in the County each year, and generating $338 million in annual tax revenue (Lancaster County, 2006; Pennsylvania Dutch Convention & Visitors Bureau, 2013; Setzkorn, 2013). While agriculture and tourism play key roles in Lancaster County, the area also has competitive advantages in "health care, construction, specialty manufacturing, food processing, and communications" (Lancaster County, 2006).

Figure 4: Lancaster County Map (Country Living Inn, 2014).

Land use in the area is regulated mostly by local municipalities. Pennsylvania is a 'home rule' state, which means "the responsibility for local governance [is shifted] from the State Legislature to the local community", giving the local authorities more control over governance than the State (The Community Environmental Legal Defense Fund, 2010). Municipalities are responsible for the majority of regulation, while some farmland preservation projects require state approval because of their use of tax-payer funding.

Agriculture is the dominant land use in Lancaster County, making up roughly 63% of the land base (approximately 383,000 acres) with "more than 50% of the … soils classified as prime farmland by the U.S. Natural Resources Conservation Service and 75% … classified as prime farmland or soils of state-wide importance" making this area home to "some of the best non-irrigated farmland in the world" (Lancaster County, 2006). Agriculture in Lancaster County is highly productive and focuses on a diversity of products including: milk, forage, soybeans, wheat, meat chickens, egg chickens, pork production and cattle production (USDA, 2012). Lancaster has a humid continental climate with an estimated average of 3,266 growing degree days (National Weather Service Central, 2013).

Before the specific tools and strategies that Lancaster County is using for planning for agriculture through farmland preservation are discussed, the inclusion and selection of this case should be explained. The United States of America is not within the Commonwealth, nor is the American Planning Association a member of the Commonwealth Association of Planners. However, Lancaster County has effectively used of a specific set of tools in planning for agriculture over the past 30 years, that have not been widely implemented in any areas of the Commonwealth. While these tools may not work in the exact same manner in Commonwealth countries, Lancaster County can offer many lessons for other areas that are considering similar approaches.

2.2 Farmland Preservation through the Purchase of Development Rights and the Transfer of Development Rights

Lancaster County has the advantage of widespread public support for agriculture that many planners desire, however there are still a number of challenges facing local agriculture including urban/rural conflicts due to residential expansion, financial pressures in the agricultural sector, and "growth and change in the Plain Sect communities" (Lancaster County, 2006). Because of the value of agriculture to the economy and culture, and the proximity of urban centres, the County has chosen to slow and concentrate development through farmland preservation techniques. The two main organizational bodies that focus on this mandate are the public County Agricultural Preservation Board (CAPB) and the private, non-profit Lancaster Farmland Trust (LFT).

The LFT was created in the 1988 as "an important support arm of the Lancaster CAPB" (Lancaster Farmland Trust, 2009). Both the LFT and the CAPB preserve farmland through conservation easements, although some differences in their approaches exist. The LFT operates on a charitable basis and relies mostly on donations and grants, while the CAPB is funded through County and state appropriations; therefore the prices the LFT can pay the farmer to purchase their development rights (as further discussed below) are less than what the CAPB can offer (Setzkorn, 2013). As a non-government organization the LFT can operate in areas of the County that the CAPB cannot due to a lack of local agricultural zoning policies, state farmland

preservation criteria, and cultural preferences (such as the reluctance of the Amish to work with government organizations). Furthermore, LFT's farmland preservation projects are not subject to state approval for the preservation of each property, in the same way that CAPB projects are. While many other distinctions exist between the two organizations, they illustrate two different organizational approaches to using the same tool for farmland preservation.

In the USA, the right to develop land is one of the many rights included in the bundle of landowner rights, including other land rights such as water and mineral rights. Purchase of Development Rights (PDR) is the component of this process, where the land owner voluntarily sells the development rights to the local, state, or federal government, or to a private land trust, who retires the development right and places a conservation easement on the property. In a conservation easement, the owner retains all other rights to the property, but activities are restricted to agricultural uses, forestry uses, or natural land, and prohibit "other commercial, residential, industrial, or institutional land uses" (Brandywine Conservancy, 2008).

In a Transfer of Development Rights (TDR) process, the local government determines how many development rights are available for each property, which can be thought of as 'development credits' (Brandywine Conservancy, 2008). For example, "the local government can grant one [development right] for every five acres a landowners owns, so a landowner who owns 100 acres would have 20 [development rights]" (Brandywine Conservancy, 2008). These development rights can bought by a local government, land trust, or a development company, and in some cases be transferred from one property to another to allow increased density to be developed in a designated TDR receiving area (Brandywine Conservancy, 2008).

In order for this transfer process to be successful, the local municipality must designate areas that development rights can be transferred from (where development is not encouraged), and areas that development rights can be transferred to (where high density development is encouraged), as well as the number of development rights that a developer can use on one property (Brandywine Conservancy, 2008).

The cash value that the landowner receives for participating in the PDR or TDR processes is generally the difference between the value of the land for agricultural uses and the value of the land for development purposes (Lawrence, 2013). This amount is determined by an independent property appraiser, and the value is either paid in full to the landowner through the CAPB's PDR program, is given in the form of a charitable donation to the LFT, or is given as a split-receipt, with a portion of the value provided as a charitable donation and a portion provided in cash (Setzkorn, 2013).

The TDR process is customized to each municipality, with some encouraging the process through their zoning, while others act as a TDR broker buying and selling the development rights themselves (Brandywine Conservancy, 2008). In the event that the municipality, or a land trust, acts as a TDR broker, the money from the sale of the development rights is often reinvested in

farmland preservation programs (Brandywine Conservancy, 2008). In Lancaster County the TDR process is used to preserve farmland and to encourage higher densities of development in its urban areas. Only five of the sixty municipalities in Lancaster County have TDR processes, and the majority of the time the TDR takes place within one municipality, although some municipalities have inter-governmental agreements or multi-municipality plans that allow development rights to be transferred between municipalities (Brandywine Conservancy, 2008).

The main challenges in developing a PDR program include: creating the necessary PDR management staff as a part of the County government, "building trust and educating farmland owners about PDR", creating and securing funding sources, and "creating a private non-profit land trust that could work primarily with Amish farmers" (Daniels, 2013). The third challenge of finding and securing funding has continued to be the most difficult long term challenge (Daniels, 2013). Because the development rights must be purchased from the land owner, these programs require large budgets. One statistic states that between the start of the program in 1981 and mid-1998 "over 115,000 acres of farmland have been preserved [in the State of Pennsylvania]… at a cost of about $240 million" (Daniels, 1998). As Lancaster County is on track to have preserved a record 100,000 acres this year, we can assume that a similar budget with market adjustments has been required for farmland preservation in this county (Rutter, 2013). Given the current economic environment in the US, the sustainability of this approach has been called into question, as government funding has been reduced (Reilly, 2012).

2.3 Other Approaches to Farmland Preservation

2.3.1 Agricultural Security Areas

Agricultural Security Areas (ASA) are a voluntary designation that farmers can use to help protect their ability to farm. Not all municipalities in Lancaster County have zoning that designates land as agricultural, which can result in restricted agricultural activity. To prevent these restrictions, under Pennsylvania state law farmers can group together to create an ASA which makes it more difficult to take farmland through eminent domain for a public use, protects normal farm practices from being categorized as a 'nuisance' by the municipality, and allows farmers to apply to sell their development rights to the CAPB farmland preservation program. Both municipal agricultural zoning and farmer participation in an ASA are required for the farmland to be eligible for the CAPB programs (Severson & Knepper, 2010). These requirements incentivize local municipal participation and results in the protection of a larger area. In 2009, 36 of the 41 rural municipalities in Lancaster County have ASAs, with most being enacted in the early 1990s (Severson & Knepper, 2010). Within these 36 rural municipalities, 171,000 acres or 40% of farmland within the County is in an ASA (Severson & Knepper, 2010).

An ASA is created when a group of landowners, each with at least 10 acres of land, combine their land to make up a minimum area of 250 acres, or a minimum area of 500 acres to be able to participate in the CAPB farmland preservation programs (Severson & Knepper, 2010). These landowners petition the local government for an ASA designation, which must be approved by the "municipal planning commission, the county planning commission, and the Agricultural Security Area Advisory Committee" and is evaluated based on:

1. "The soil capability classification;
2. Compatibility with local comprehensive plans;
3. Acreage to be included (landowners need not include all of their land in the ASA);
4. The viability of agriculture for land proposed for inclusion in the ASA; and
5. Other factors such as the extent and nature of farm improvements and anticipated trends in agricultural economic and technological conditions" (Bureau of Farmland Preservation, 2006; Severson & Knepper, 2010).

The land making up the ASA can be non-contiguous and may span multiple municipalities (Bureau of Farmland Preservation, 2006). The ASA designation is valid for the first seven years, after that "the farmer may have the ASA designation removed at any time by submitting a written request to the local government"; if removal is not requested then the designation stays with the property even if sold or subdivide, until such time that it is requested (Bureau of Farmland Preservation, 2006). While an ASA is a requirement for participation in the CAPB PDR program, ASAs on their own are rather weak and would be stronger if they were part of an agricultural zoning ordinance (Daniels, 2013).

2.3.2 Urban Growth Areas and Designated Rural Areas

Lancaster County, like many areas, has seen growth and development over recent years due to its location near large urban centres. While TDR processes help to focus growth in certain areas, Lancaster County has taken steps to guide development further through their growth management framework (Lancaster County, 2006). As part of this framework certain areas were delineated to focus urban development and retain rural character through the designation of Urban Growth Areas (UGAs) and Designated Rural Areas (DRAs) respectively (Lancaster County, 2006). UGAs were developed in 1993, 10 years after the PDR process was introduced, while DRAs have been introduced with the "Balance" comprehensive plan in 2006 (Daniels, 2013). This approach attempts to remove competition between developers and farmland preservation advocates by restricting development in the DRAs and guaranteeing the ability to develop in the UGAs.

In Pennsylvania, the County has no legal authority to enforce UGAs and must work with local governments to create this designation. The designation is depicted as a hard line on the map

which separates the areas where development is encouraged and discouraged. This clarity has created a truce between the farmland preservation organizations and the developers, as development is made easier within the UGAs and more difficult outside of them. These lines have been reinforced though community engagement, the preservation of farms along the boundary, and the retention of the agricultural character that is a key part of Lancaster County's identity.

There are four types of DRAs in Lancaster County, all with the aim of enhancing or supporting "rural resources, rural character, [or] a rural way-of-life" (Lancaster County, 2006). These four types are Designated Agricultural Areas, Designated Agricultural with Natural Areas, Designated Natural Areas, and Rural Centres (Lancaster County, 2006). Development within the UGAs will "be provided with a full range of public infrastructure and services" with land categorized as either Concentrated Building Areas, General Building Areas, Core Reinvestment Areas, General Reinvestment Areas, and Natural Areas (Lancaster County, 2006). As alluded to by their categorizations, certain areas have different types of growth permitted, for example any development that must occur outside of a UGA should be directed towards a Rural Centre "to maintain the integrity of DRAs and the character of traditional, small scale settlements" and prevent rural sprawl (Lancaster County, 2006). Similarly, within the UGAs "compact development patterns with increased density, intensity, and mixed uses, offering a variety of lifestyle choices and promoting housing affordability" are encouraged (Lancaster County, 2006). Although most of the agricultural land is in DRA, 6.2% is within a UGA, as UGAs need to have "enough development capacity to meet future land use needs over a 25-year period without constraining the development market" (Lancaster County, 2006).

2.4 Current Status and Lessons Learned

Due to forward thinkers in Lancaster County, large contiguous blocks of farmland, including the farmland along 1/7th of the county's UGA boundaries, has been preserved. This re-enforces support for agriculture and the permanency of UGA boundaries. The PDR/TDR program has been the most important tool used in this area, but would not have been as successful without being used in combination with agricultural zoning and UGAs. Together this package of land use controls and incentives, along with the agricultural history of the area, form the ideal environment for this type of farmland preservation approach (Daniels, 2013).

While Lancaster County does have a unique set of circumstances, other areas of the Commonwealth could use similar strategies such as creating large contiguous blocks of preserved farmland and focusing on preserving farmland along urban growth boundaries (Daniels, 2013). These strategies could be implemented using tools such as: agricultural zoning, UGAs, a right-to-farm law, and a taxation system that bases property values on the land use

(Daniels, 2013). As Lancaster County moves forward, the focus will continue to be on preserving farmland, while tackling the challenge of making the UGAs more attractive, walkable, and supported by efficient and affordable mass transit. Lancaster County has been a leader in the US for their farmland preservation techniques, and will continue to inspire farmland protection advocates around the world.

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3. Case Study: The Caroni Lands

3.0 Abstract

The Caroni GREEN project is an agricultural land re-use project, to put more agricultural land into production in the country of Trinidad and Tobago. While still in its implementation stage, the Caroni GREEN project offers a unique situation that provides new ideas for tackling issues with food security. Tools and strategies that planners across the Commonwealth can take from this project include looking for innovative land sharing opportunities and considering the agricultural redevelopment of abandoned lands. The Caroni GREEN project will continue to provide interesting lessons for planning for food security as the project results become available.

3.1 Introduction

The Caroni Lands are located on the island of Trinidad, a part of the archipelagic state of Trinidad & Tobago, and is situated in the Caribbean 11 km off the coast of South America, as shown in figure 5. Trinidad & Tobago have a land area of 5,128 km^2 with a predominantly rural (86.1%) population of 1,328,019 (Brereton, et al., 2013; Jugmohan, 2013). The Caroni Lands present an interesting case that demonstrates how the redevelopment of traditional agricultural lands can support food security, and was suggested as a case study by Margaret McDowall, President of the Trinidad and Tobago Society of Planners. These lands were originally used for sugar cane production by the Caroni (1937) Ltd company which was established in 1937 by a British multi-national corporation (Sugar Heritage Village, 2012). In 1975 the company was bought by the State who changed the name to Caroni (1975) Ltd and "continued producing sugar, but also [diversified their production by] producing citrus, prawns, large and small ruminants, and rice" on roughly 75,000 acres of land (Sugar Heritage Village, 2012). In 2003, the State decided that this was no longer a profitable venture and closed the company, "affect[ing] 9,000 workers directly, and a further 35,000" indirectly (Sugar Heritage Village, 2012). This move generated extensive controversy within Trinidad & Tobago, while also raising concerns about the effect that this decrease in production would have on national food security.

Figure 5: Trinidad and Tobago Location (World Atlas, 2014)

Beyond its agricultural history, Trinidad & Tobago "is the leading Caribbean producer of oil and gas" and is quickly growing in tourism, "although [tourism is] not proportionately as important as [it is] in many other Caribbean islands" (Caribbean Agricultural Research and Development

Institute (CARDI), 2011). In 2009 and 2012 respectively, agriculture accounted for 3.8% of employment and for 0.7% of GDP (CARDI, 2011; Jugmohan, 2013). Agriculture in Trinidad & Tobago has traditionally focused on sugar cane, coffee, and cocoa production, but also includes the production of large crops of "coconuts, citrus fruits, rice, poultry," yams, sorrel, pimento, eddoes, dry corn, watermelon, string beans, hot peppers and tomatoes (Brereton, et al., 2013; Ministry of Planning and Sustainable Development, 2012). It has a humid, tropical climate with approximately 1,869 mm of precipitation annually and average temperatures of 25°C - 29°C (Brereton, et al., 2013; CARDI, 2011). As the temperature stays relatively stable, the seasons are categorized as 'wet' and 'dry', with the wet season from June-December and the dry season from January-May (CARDI, 2011). Agriculture on the islands is made up of 19,111 farms spread over 84,990 hectares (Jugmohan, 2013).

3.2 The Caroni GREEN Initiative

The use of the Caroni lands has been a source of debate since Caroni (1975) Ltd closed in 2003, with the Ministry of Food Production recently moving to resolve the debate by undertaking a new initiative "to boost food production by utilizing the mass of idle agricultural lands distributed to former Caroni workers" (Ministry of Food Production, 2013). As part of the State's divestment package, each of the 9,000 employees were offered a two acre plot as part of their severance package (Caroni Limited, 2013). However, although roughly 7,000 plots were leased "less than two percent are currently under cultivation" with the remaining plots not used for agricultural purposes (Boodan, 2013). These leases had a number of restrictions including an inability to sublet their plots to other farmers, which has resulted in many lease holders being unable or uninterested in pursuing farming (Boodan, 2013; Ministry of Food Production, 2013). In an effort to " increase food production…Caroni (1975) Ltd developed the … GREEN Initiative programme to provide farmers who have no land tenure with an opportunity to farm these lands" while also reducing domestic reliance on food imports (Ministry of Food Production, 2013). Beyond providing land tenure opportunities, the GREEN Initiative also provides sustainable employment opportunities for farmers, supports the creation of a value-added food processing market with export potential, and expanding local produce markets (Ministry of Food Production, 2013).

The GREEN Initiative offers the lease-holders the opportunity to "lease their lands to [back to] Caroni in exchange for guaranteed payment" in the form of an annual rent payment (Ministry of Food Production, 2013). Once Caroni has obtained the leases for these lands they will bring in "private farmers [to] provide expertise and labour", secure financial support, and then "select farmers and hand out cultivation contracts on a crop by crop basis" (Ministry of Food Production, 2013). The resulting profits would be split between "Caroni and the contractor",

although it is unclear how the profit division will be determined (Ministry of Food Production, 2013).

The Caroni GREEN Initiative has been broken down into three phases with the overall goal of bringing 5,800 acres of the former Caroni (1975) Ltd lands back into production. Phase One began June 5, 2013 by cultivating 560 acres with "tomatoes, melongene, cauliflower, cabbage, hot peppers, caraille, and chives", which resulted in a harvest of over 10,000 pounds of produce on October 1, 2013 (Caroni Limited, 2013). Phase Two was set to begin in mid-November 2013 by adding an additional 1,240 acres of "pigeon peas, sorrel, paw par, root crops, plantains and bananas" to production (Caroni Limited, 2013). Phase Three will take place in 2014 and add an additional 4,000 acres of "green vegetables, root crops, and legumes" to the project and will aim to satisfy "the demands of the local agro-processing company" (Caroni Limited, 2013). If continuous production occurs as planned, at its peak this project should increase the amount of locally grown produce available in Trinidad & Tobago by roughly 12% (Ministry of Food Production, 2013). Sales will take place on-farm or at pick-your-own establishments with prices set "as little as ten per cent above the cost of production" (Ministry of Food Production, 2013).

This initiative was spearheaded by the government under the Caroni (1975) Ltd name, which still exists in order to facilitate the management of severance packages (C News, 2013). Because of the limited operating capacity of this corporation, a new State-owned company has been created as a separate legal entity to run this as a profitable business venture (C News, 2013). This new limited liability company would be named 'Caroni Green' and able to take up the functions that Caroni (1975) Ltd is unable to do, "such as procurement, auditing, accounting, marketing, public relations and corporate … [that would facilitate] business generation [and] profit making" (C News, 2013). Caroni Green is made possible by the transfer of authority from the Ministry of Food Production and the Ministry of Finance to a separate state-owned governing body that would be required to report to the Ministry of Food Production (C News, 2013)

3.3 Links to Food Security

The Caroni GREEN project is multi-purposed, aiming to efficiently use dormant agricultural land to provide employment opportunities and increase local food security. One component of increasing local food security includes increasing land accessibility for farmers. As stated by a young farmer in the area, the "major deterrents to planting were flood, land availability and praedial larceny" – land tenure (Boodan, 2013). The Caroni GREEN project is purported to remove or reduce the second and third deterrents.

Land availability is a challenge that is often faced by farmers around the world in both developed and developing areas that have little arable land, high population densities, or increasing

development pressures. Trinidad & Tobago has little remaining arable land, a population density of 261.49 people/km^2, and an estimated population increase of roughly 10,000 people in the next 5 years (iNews Guyana, 2013; The Government of the Republic of Trinidad and Tobago, 2010; Trading Economics, 2013). The former Caroni (1975) Ltd lands were allocated for agricultural purposes, yet were not widely being used for active production. This project states that it increases the availability of agricultural land to those who want to engage in production through leasing dormant agricultural land and re-leasing it to contracted farmers. However, there is little information regarding the origin of these farmers; will they be local corporations, international corporations, or individual farmers? If these contracts are to be awarded to large agri-business corporations then the project has not been successful in increasing access for the average farmer, although it will have increased the overall food production levels within the country.

Land tenure has been known to be a challenge for farmers in developing countries. There is a vast set of literature on the difficulties of securing land that is consistently available for farming and is without the threat of expropriation, as referenced to in the literature review. This case presents an arrangement where land was leased to employees as a severance package, largely was not used for agricultural production, and then leased back to the company in order for the company to lease the land on a contract basis. While this project seems to provide a secure source of land for farmers, it is unclear why the Caroni GREEN project is required to act a facilitator for this arrangement rather than facilitating direct agreements between land owners and land renters.

Beside increasing land availability and land tenure opportunities, this project is expected to increase the amount of locally produced food in the country by up to 12% (Ministry of Food Production, 2013). Government press releases also suggest that these products will be sold at a price that is accessible to the majority of the population while also offering the farmers the ability to earn a decent wage (C News, 2013; Ministry of Food Production, 2013). In a country that has focused most of its food security agenda on creating international agreements to guarantee access to neighbouring countries' land for food production, this initiative marks a different domestically oriented approach. Up until the Caroni GREEN initiative was announced, the main focus of food security in Trinidad & Tobago was on an agreement with the Guyanese government to allow Trinidad & Tobago to lease 10,000 acres of agricultural land for crop production in order to reduce "the food import bills and food inflation" in addition to increasing food security (iNews Guyana, 2013). This project appears to diversify Trinidad and Tobago's approach to food security, by providing an opportunity for increased local production.

While still in its implementation stage, the Caroni GREEN project offers a unique situation that provides new ideas for tackling issues with food security. Tools and strategies that planners across the Commonwealth can take from this project include looking for innovative land sharing opportunities and considering the agricultural redevelopment of abandoned lands. The Caroni GREEN project will continue to provide interesting lessons for planning for food security as the project results become available.

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4. Case Study: Australia

4.0 Abstract

The Australian National Food Plan was released in May 2013, with few results available at this time. National food plans are not present in the majority of Commonwealth countries, and offer an area for improvement. Regardless of the implementation results of the Australian plan, taking stock of the food resources and goals of an area is always beneficial to future plans and policies. Tools and strategies that can be useful in proceeding with a food plan include determining what issues are important in the area, determining the current level of food security, and creating stakeholder support. If any level of government places value on these strategies and has the political will to support it, then they will be well on their way to creating a food plan and increasing food security within their jurisdiction.

4.1 Introduction

The Commonwealth of Australia (figure 6) has a population of roughly 23,400,000 people, that is distributed mostly between two coastal regions (Australian Bureau of Statistics, 2013). Australia has an overall land area of 7.692 million square kilometers, with more than 60% of that land being used for agriculture (Australian Government, 2013; Australian Government, 2014). With a clear separation between its rural areas and urban cores, Australia's primary economic industries include: "manufacturing, finance, ship building, information and technology, agriculture, mining, insurance, aviation, and telecommunications" (Compare Infobase, 2007). As in many developed countries, land use planning in Australia is primarily done at the state and territory level (Australian Government, 2013).

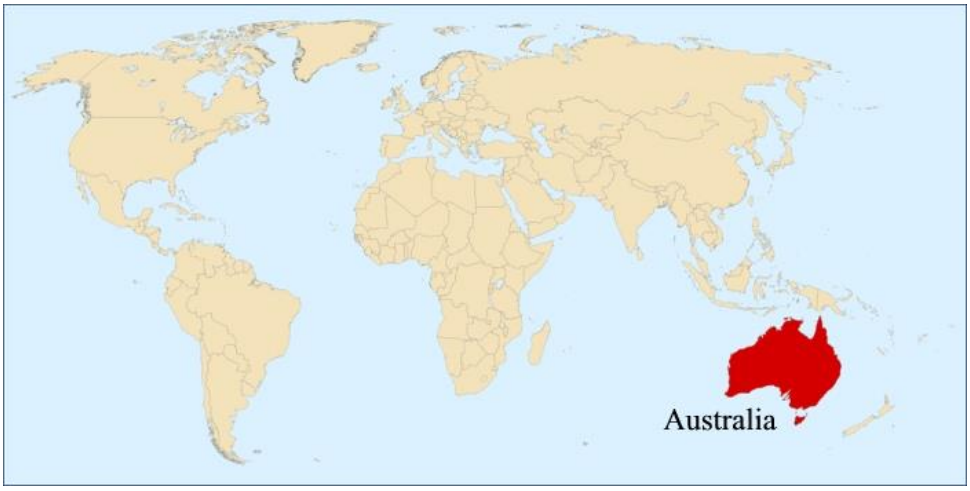

Figure 6 Location of Australia (Primary Topics, 2014).

Agriculture in Australia focuses on wheat, sugarcane, eggs, lamb, beef, and milk production, with notable vegetable, fruit, fisheries, and grain production as well (Australian Department of Agriculture, Fisheries and Forestry, 2013). The climate varies across the continent, and includes equatorial, tropical, sub-tropical, desert, grassland, and temperate regions, but is generally dry with an average of 600mm of annual precipitation and over 200 frost free days (Australia 101, 2014; Australian Bureau of Meteorology, 2012; Tourism Australia, 2014). Despite the drought potential, the area is suitable for growing a variety of crops, which supply Australians with 90% of their produce needs (Australian Government, 2013).

Because of challenges such as "climate change, population growth, diet-related health issues, and competition for resources" the Australian Government developed a national approach "to help ensure that the government's policy settings are right for Australia over the short, medium and long-term" through the creation of a National Food Plan (Langley, 2013; Regional Development Australia Sunshine Coast, 2014). This plan was also motivated by the "perception that agricultural land [is] being lost to urbanisation, foreign investment and mining" (Hall, 2012).

This plan was released on May 25, 2013 and was spear-headed by the federal Ministry of Agriculture, Fisheries, and Forestry, along with state and territory governments and non-government organizations such as the Food Policy Working Group and the Food Processing Industry Strategy Group (Langley, 2013; Regional Development Australia Sunshine Coast, 2014).

4.2 Australia's National Food Plan (2013)

The role of Australia's National Food Plan is to identify what society can "do to support our food system", and how the government can "provid[e] leadership and articulat[e] the direction of food-related policies" (Australian Department of Agriculture, Fisheries and Forestry, 2013). This Plan was developed with the goal of "foster[ing] a sustainable, globally competitive, resilient food supply that supports access to nutritious and affordable food" (Regional Development Australia Sunshine Coast, 2014). This goal is supported through the following objectives:

- "Identify and mitigate potential risks to Australia's food security;
- Contribute to global food security;
- Reduce barriers to a safe and nutritious food supply that responds to the evolving preferences and needs of all Australians and supports population health;
- Maintain and improve the natural resource base underpinning food production in Australia;
- Support the global competitiveness and productivity growth of the food supply chain, including through research, science and innovation;
- Reduce barriers faced by food businesses to access international and domestic markets; [and]
- Contribute to economic prosperity, employment and community wellbeing in regional Australia" (Regional Development Australia Sunshine Coast, 2014).

The plan has the support of Australia's National Farmers' Federation because of its focus on helping "Australian food businesses overcome their diverse challenges, and benefit from emerging markets in Asia" (Langley, 2013). The plan also has the support of the Australian Made Campaign with the "importance of branding Australian products" in foreign marketplaces (Langley, 2013). However the Federal Opposition and the Public Health Association of Australia have criticised the Plan because it is too profit and industry focused (Langley, 2013).

Given the extensive breadth of this plan, it has been broken down into 16 goals and four key themes. The four themes include:

- Export growth – to increase growth in the food industry, to take advantage of growing Asian markets, and to create an Australian "brand identity";

- Economic development – to command a larger share of the national economy, to invest in infrastructure for the food value chain, and to increase food literacy;
- Food security – to support labelling initiatives, grants for community food programs (community gardens, farmers markets, etc), and maintaining "food supply during emergencies such as natural disasters"; and
- Sustainability – to reduce food waste, be mindful of climate change adaptation, and encourage "adoption of more sustainable farming practices" (Langley, 2013).

There is a strong focus within the plan on creating new markets, business opportunities, and branding of Australian products. However, this is also substantial focus on sustainable food, food literacy, and water efficiency. While the plan cites several times that food security is not a major concern within Australia itself, the country considers itself an important player in increasing global food security, as reflected in one of the plan chapters.

4.3 Other Australian Food Plans

The National Food Plan is the first plan to look at all aspects of food security on a national level in Australia, but it is not the first food plan to be written in the county. The development of previous, more regional plans set the stage for a national plan and provided momentum within policy circles. Some examples of other Australian food plans include:

- *National Strategy for Food Security in Remote Indigenous Communities (2009)* – a joint effort between the national and state-level governments focused on "providing a secure, sustainable and healthy food supply to remote Indigenous communities; and actions aimed at increasing the purchase and consumption of this healthy food" (Council of Australian Governments, 2009).
- *Anangu Pitjantijatjara Yankunytjatjara Lands Food Security Strategic Plan 2011-2016 (2010)* – a plan from the Government of South Australia that attempts to address food security factors in this region including: "the cost of food, governance of the store, transport of food from the source to the community", food literacy, and income sources (Government of South Australia, 2010).
- *Issues Paper to Inform Development of a National Food Plan (2011)* – the preliminary research done by the Commonwealth of Australia to "provide a focus for consultation about the possible improvements" to national food policy and the future direction of food and food security in Australia (Australian Department of Agriculture, Fisheries and Forestry, 2011).

4.3 Current Status and Lessons Learned

The Australian National Food Plan has been released for eight months at the time of this writing, with few results able to be currently determined. National food plans are not present in the majority of Commonwealth countries, and offer an area for improvement. Regardless of the implementation results of the Australian plan, taking stock of the food resources and goals of an area is always beneficial to future plans and policies. Tools and strategies that can be useful in proceeding with a food plan include determining what issues are important in the area, determining the current level of food security, and creating stakeholder support. If any level of government places value on these strategies and has the political will to support it, then they will be well on their way to creating a food plan and increasing food security within their jurisdiction.

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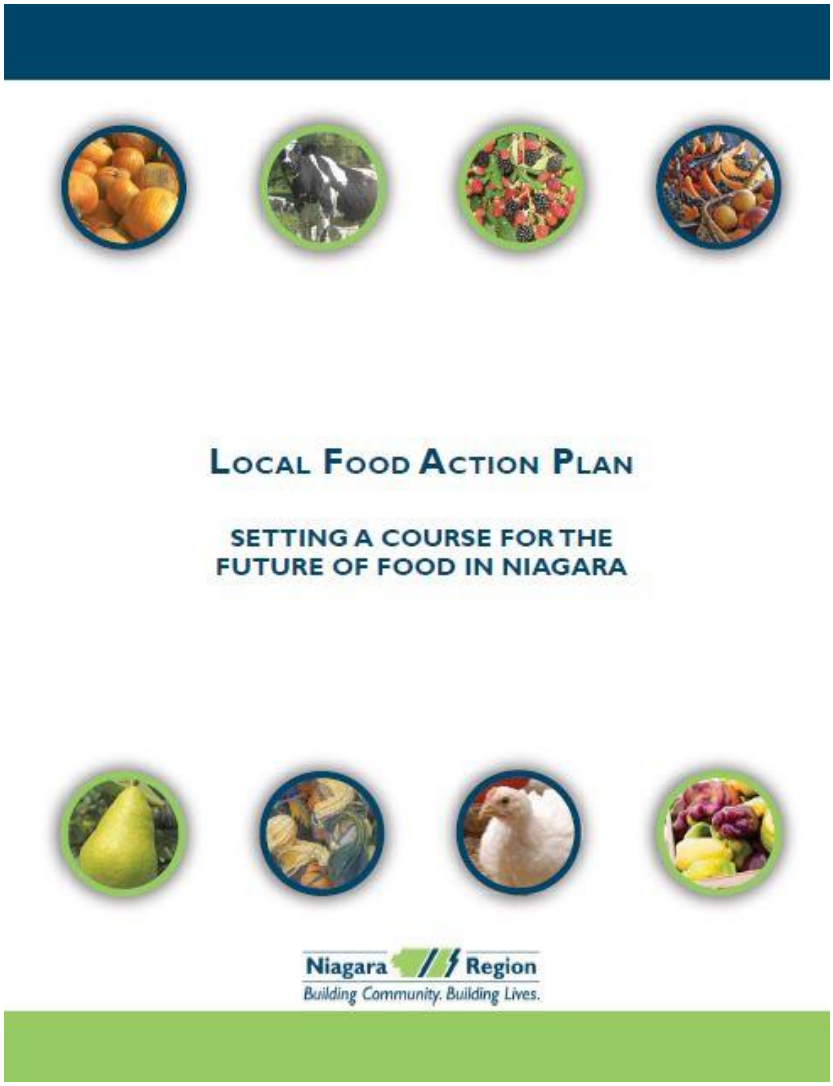
5. Niagara Region, Canada



5.0 Abstract

Niagara Region has an extensive diversity of current and proposed practices that support food system resiliency. Agriculture and food are seen as multi-dimensional and linked to a number of regional systems including education, tourism, industry, infrastructure, and natural heritage. There are also a number of tools related to food production, process, and distribution, as well as creating the infrastructure to support this. Niagara Region includes themselves as part of the food system, by practicing local procurement and evaluating their role and relationship with the current system. This case represents how agriculturally supportive policy can contribute to a strong and diversified food system.

5.1 Introduction

The Regional Municipality of Niagara (henceforth known as Niagara Region) is located between Lake Ontario and Lake Erie, against Ontario's south-east US border, as shown in figure 7. Niagara Region contains the major urban municipalities of St. Catharines (pop. 131,400) and Niagara Falls (pop. 82,997), along with ten others, totalling twelve lower-tier municipalities (Statistics Canada, 2014). Niagara Region has a population of 431,345 (2011), with an estimated growth of 17.8% over the next twenty years (Niagara Region, 2014). Portions of the Region are subject to the Provincial Greenbelt Act, Niagara Escarpment Plan, and Places to Grow Act.

Figure 7: Location of Niagara Region (Calatorim, 2013)

The Niagara Regional economy was built on transportation networks, with the first highway, the first stagecoach service, the first railroad, and the first electrified streetcar in Upper Canada occurring in this area between the late 1700's and the mid-1800's (Niagara Peninsula, 2014). Today's economy focuses on manufacturing, tourism, agri-business, and advanced technology (Niagara Economic Development Corporation, 2010). Agriculture plays an important and varied role, as described in the following quote:

> *Agriculture is an important industry in the Region. Fruit and vegetable crops, poultry, livestock, greenhouse products and general crops are large categories of agricultural production. The fruit-processing industry and the wine industry are two important secondary industries which depend on a viable agricultural industry. There are approximately 2,700 farms of various sizes and types in the Region (Niagara Region, 2014).*

5.2 Regional Policy Plan

The Region Policy Plan is Niagara Region's primary planning document which guides policy decisions at the lower-tiers. This plan is broken down into twelve policy chapters; policies within seven of the twelve chapters are related to agriculture, including the "Regional Strategy for Development and Conservation", "Economic Development and Tourism", "Urban Areas", "Agriculture and Rural Areas", "Natural Resources and Environmental Areas", "Transportation", and "Implementation" (Niagara Region, 2014).

This policy plan was notably amended in 2009 with Policy Plan Amendment 6-2009 which focused on encouraging and enabling value added policies for agriculture. This amendment was created to "encourage the growth of a diversified, profitable and sustainable agricultural industry in Niagara" while specifically "support[ing] and attempt[ing] to expand the ability of Niagara's farmers to develop agricultural value added activities in agricultural areas" (Niagara Region, 2009). The amendment included new definitions for a number of food and agriculturally related terms. The definition for 'agricultural uses' now includes: "the growing of crops, including nursery and horticultural crops; raising of livestock; raising of other animals for food, fur or fibre, including poultry and fish; aquaculture; apiaries; agro-forestry, maple syrup production; and associated on-farm buildings and structures, including accommodation for full-time farm labour when the size and nature of the operation requires additional employment" (Niagara Region, 2014). Other notable definitions include farm diversification, value retention, and value added (Niagara Region, 2014).

Additionally, this amendment allows farmers to use products from neighbouring farms for value added activities on their own farm, whereas farmers previously were required to have their own facilities. These changes allow farmers to share equipment, "reflect[ing] the cooperative character of farming in Niagara where smaller famers take advantage of processing and often marketing facilities on larger farms" (Niagara Region, 2009). Other changes accepted in this amendment include allowing site-specific adaptive reuse and site-specific farm diversification activities, such as using a barn as a banquet hall or engaging in green energy production.

5.3 Local Food Action Plan (2008)

This document was created by Niagara Region to "outline actions that need to be taken to support, enhance, and promote our local food products to ourselves, our neighbours, and beyond" (Niagara Region, 2008). This plan is primarily a community-based implementation document with twenty actions defined under four key themes, which include: information resources and research, local food network and infrastructure, education and raising awareness, and supportive policy and funding (Niagara Region, 2008).

One of the difficulties that the Region encountered in the development of this plan was defining what 'local food' meant. The task force and stakeholders were unable to come to a consensus on

the true definition of 'local', with the resulting actions reflecting a scale of localities. Each action was defined and included: a current status, suggested tasks, a timeline, a responsible party, a priority, and a difficulty level (Niagara Region, 2008). The highest priority actions listed in this plan include:

- "Research, compile, and provide advice on crop yields, seasonality, new products and needs of market for producers.
- Assess the strengths, weaknesses, opportunities and strengths of the local food network in Niagara and work to improve the existing condition.
- Investigate expansion of existing distribution outlets and the feasibility for a Niagara Distribution Centre for local food products.
- Increase consumer access to local food products.
- Educate consumers about local food products - how to find, grow or prepare them and where to purchase.
- Educate producers about the changing needs/desires of the market, and other means and methods of farming.
- Create a comprehensive marketing campaign surrounding the promotion of Niagara local food products. The target audience would be both within and outside Niagara.
- Review and refine policies or practices (where possible) that hinder the production, processing or distribution of local food.
- Support and promote local food efforts in Niagara through the creation of a comprehensive plan or strategy.
- Develop, offer and promote financial programs for producers and processors." (Niagara Region, 2008).

This document is intrinsically linked with agriculture in the Region and speaks to the desire of the Region to support their local food system at a variety of scales. The Region defines their role in this document as one of leadership in order "to coordinate and facilitate a diverse group of stakeholders to communicate and work together to implement and make the actions come to fruition" while creating supportive policy (Niagara Region, 2008). Many of these actions have been implemented by the Region, community groups, and individual actors, with the Region acting as a facilitator and supporter of community-based action (Donia, 2014).

5.4 Agricultural Action Plan (2006)

The Agricultural Action Plan was created to describe the "most effective bundle [of actions needed] to realize [the Region's] goal to grow the industry" (Planscape, 2006). The creation of this plan was inspired by the results of the Regional Agricultural Economic Impact Study which stated that the agricultural sector was healthy, but pointed to a "vulnerability of the land base, … pressure from foreign competition, … discrepancies in service levels, costs of inputs, access to services and delays at the border,… [along with] pressure for urban expansion" (Planscape, 2006). The seven action areas developed in this plan include:

1. "Re-establishing the research capability of the Vineland Research Centre to support the agricultural industry.
2. Reducing barriers to growing the agricultural industry with recommended solutions.
3. Specific tax policies for value added facilities as part of the farm operation.
4. Providing raw water for agriculture.
5. Developing small and medium processors.
6. Re-visiting the use of the Agricultural Easement program of the earlier 1990's program entitled the "Niagara Tender Fruit Lands Program".
7. Developing a Niagara brand for agricultural products – quality products, quality farms, quality environment for community health." (Planscape, 2006).

Each of these action areas has a number of specific actions to support it. At this time some of the actions have been implemented, while the remaining actions will be incorporated into the Region's current project, described in Section 2.2.5 (Donia, 2014).

5.5 Current Status

Niagara Region is currently beginning the process of bringing together the Local Food Action Plan and the Agricultural Action Plan to create a food strategy that addresses the entire food chain (Donia, 2014). This project will address production, value added, storage, distribution, marketing, and disposal, along with including topics such as public health, social health, and food accessibility (Donia, 2014). The desire of this project is to capitalize on the Region's assets through determining how to better serve the agricultural community, better support agricultural incentives, and to simulate economic development to encourage further growth with the help of an agricultural Community Improvement Plan (Donia, 2014). This strategy is intended to bring

all aspects of the food system together in order to better serve all constituents, while building upon successes and lessons that have been learned (Donia, 2014). The document is expected to be released in late 2014 or early 2015.

5.6 Lessons Learned

A number of tools can be taken from the Niagara Region planning department to be applied by planners across the Commonwealth. The tools that are present in Niagara Region and relate to supporting food security include:

- Participating in research to inform regional actions – The Local Food Action Plan speaks extensively to the importance of food systems research. Research topics include:
    - what's needed for the "long-term financial viability of local food production and processing",
    - information on "crop yields, seasonality, new products and needs of [the] market for producers",
    - defining "the local food network" with a "database of producers, processors, and distributors",
    - creating "a comprehensive listing of information on availability and seasonality of local food products",
    - the state of the current food system and what's needed to improve it, and
    - "investigat[ing the] expansion of existing distribution outlets" including feasibility assessments (Niagara Region, 2008).
- Prioritizing food security education – Topics that have been prioritized include educating producers about "the changing needs/desires of the market and other means and methods of farming", offering "opportunities for future producers through training, apprenticeships, and incentives", and educating the public about local food production in Niagara, including how to purchase and use local products, the "social and physical health benefits of local food", and food-related activities in school programs (Niagara Region, 2008).
- Local purchasing policies – Supporting local food security by participating as a consumer (Niagara Region, 2008).

- An inclusive definition of agriculture – The Region's definition of agricultural uses is inclusive and permits "associated on-farm buildings and structures, including accommodation for full-time labour" (Niagara Region, 2014).
- Defining agriculturally-related activities – The Regional Policy Plan includes definitions of farm diversification, value retention uses, value added uses, and adaptive re-use which contribute to a comprehensive understanding of what is required to support the food system (Niagara Region, 2014).
- Being an advocate for the agricultural industry – The Region states that it will "advocate and support government policies and programs which promote the agricultural industry [and protect the] farmers' right-to-farm by minimizing the introduction of incompatible land uses within the agricultural areas" (Niagara Region, 2014). This includes advocating for Provincial and Federal programs, and stepping in where support is needed (Niagara Region, 2014).
- Considerations of flexibility – Recognizing that each lower-tier needs the flexibility reflect their local circumstances and desires through providing "different regulatory provisions" (Niagara Region, 2014).
- Encouraging farm diversification – Encouraging farmers to diversify in ways that complement the principal agricultural use. Farmer resiliency is increased by permitting "those agricultural[ly] related value added and secondary uses that complement farming activities and provide for increasing the economic value and consumer appeal of an agricultural product or use" (Niagara Region, 2014).
- Permitting adaptive re-use of agricultural heritage buildings – This allows the farmer to diversify while continuing to work within agriculture. This also encourages the public to visit these settings and become more exposed to agriculture.
- Urging caution in agricultural areas - Planners are urged to carefully apply the policy in cases of speciality crop areas, due to the "intensive nature of speciality crop farming, and the significance of this agricultural land base" (Niagara Region, 2014).

Niagara Region has an extensive diversity of current and proposed practices that support food system resiliency. Agriculture and food are seen as multi-dimensional and linked to a number of regional systems including education, tourism, industry, infrastructure, and natural heritage. If categorized, these practices could be broken down into education, research, advocacy, and

barrier reduction. There is a substantial section on concentrating urban development to reduce sprawl with the intention of preserving agricultural land. There are also a number of practices related to food production, process, and distribution, as well as creating the infrastructure to support this. Niagara Region also seems to include themselves as part of the food system, by practicing local procurement and evaluating their role and relationship with the current system.

Niagara Region provides a unique and informative case that represents a fairly well integrated food system with respect to its planning process. The results of this case provide tangible tools for planners to engage with food security. By strengthening the many components of the food security with the help of planners, any level of government can strengthen and diversify their food system.

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Part 3: Literature Review

(Retrieved on April 21, 2014, from: http://ilsauottawa.files.wordpress.com/2012/11/foodsecurity.jpg)

Food security is an important local and international topic from a sustainability, source, and safety perspective. From dealing with urban land conversion in developed countries, to limiting agricultural land growth in tropical rainforests, there are a variety of important food security issues in the Commonwealth. This literature review will cover the most pressing of these challenges and touch on how they connect to different components of the planning profession.

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1. Introduction

Food security is an important local and international topic from a sustainability, source, and safety perspective. The Commonwealth consist of roughly two billion people and is a "voluntary association of 54 countries that support each other and work towards shared goals" such as ensuring that future generations will have the ability to feed themselves (Commonwealth Secretariat, 2012). From dealing with urban land conversion in developed countries, to limiting agricultural land expansion in tropical rainforests, there are a variety of important food security issues in the Commonwealth. This literature review will cover the most pressing of these challenges and touch on how they connect to different components of the planning profession. Planners have traditionally been more "concerned … with clean air, clean water, and the adequacy of shelter" than food, however current events have sparked interest in changing this focus (Caldwell, et al., 2011). In 2007, the American Planning Association published a *Policy Guide on Community and Regional Food Planning* which included the following statement:

> "Food is a sustaining and enduring necessity. Yet among the basic essentials for life — air, water, shelter, and food — only food has been absent over the years as a focus of serious professional planning interest. This is a puzzling omission because, as a discipline, planning marks its distinctiveness by being comprehensive in scope and attentive to the temporal dimensions and spatial interconnections among important facets of community life." (American Planning Association, 2007)

Globally, access to the inputs needed to sustain conventional agriculture is decreasing, and the availability of affordable and safe food has become a concern for many professionals. The challenges facing planners across the Commonwealth include: land tenure, dealing with climate change, developing regional food systems, land use change and conflicting land uses, farmland preservation, and the sustainable management of land and fisheries. This paper will describe and review the literature surrounding each of these issues, and build upon the discussion paper "Planning and Food Security within the Commonwealth" (Caldwell, et al., 2011). As food security is a global issue, examples and situations from outside the Commonwealth are included in this literature review in order to understand and place planning for food security in the broader global context. Through this, the literature review makes the connection between global and

local food security challenges, and sets the stage for further work, in which the authors will examine what planning as a profession can contribute to creating food security solutions.

2. Food Security

"Food security stands at the intersection of many disciplines and is a complex issue. Governments everywhere have a responsibility to ensure that everyone has enough to eat – food needs to be available, but it also needs to be affordable and accessible through a resilient and reliable supply system" (Bostock & Walmsley, 2009).

The term 'food security' means a number of things depending on when, where, and how it is used. In East Africa food security may refer to the ability to produce food, while in Canada food security is more likely to refer to the supply and safety of food (Condon, et al., 2010; Moore, et al., 2012). Food security connects to studies in many disciplines, including those that are related to sustainability, health, demographics, and land use. As stated by Caldwell et al. (2011) "linking planners with other professions in determining a solution to the food security dilemma allows for new and exciting partnerships" to develop and advance research in all of these areas.

2.1 Climate Change and Water Dependency

"Agriculture is the sector that has the potential to transcend from being a problem to becoming an essential part of the solution to climate change" (Hoffmann, 2011).

Climate change has become the definitional topic of this era. From the North and South poles, to the temperate and desert regions of every continent, climate change is expected to, and in some cases already has, change the way that we feed ourselves. Moore et al. (2012) explore this in East Africa by connecting food security and the projected effects of climate change. Examining land cover/land use changes (LCLUC) and the subsequent effect on crop yields in Kenya, Uganda, Tanzania, Burundi, and Rwanda, Moore et al. (2012) conclude that LCLUC will "be considered as a primary driver of food production risk". In this case, LCLUC refers to land that is changing

from being used as grazing and crop land, to being used as crop and urban land respectively. The LCLUC of these lands results in changes in the surface albedo, which consequently alters the local climate. Because these changes are location sensitive, the effects of climate change in East Africa will be very diverse with unknown actual results. However, it remains that regardless of the prediction for the area, climate change will be the catalyst for food production change in East Africa.

It is important to remember when considering how climate change will effect agriculture, that in many developing countries agriculture is one of the most important sectors, employing up to 65% of the population (Hoffmann, 2011). This sector has the potential to be compromised by the way that climate change will affect natural resources, but the sector could also be part of the solution in mitigating climate change. The relationship between agriculture and climate change is important because: food production emits greenhouse gasses (GHG), agriculture has the potential to be a carbon sink, agricultural land use changes have large impacts on emissions, and "agriculture can produce energy and bio-derived chemicals and plastics, which can replace fossil fuel[s]" (Hoffmann, 2011). Hoffmann (2011) also notes that most GHG emissions are carbon heavy where as agricultural GHG emissions are nitrogen heavy, emphasizing the need to approach agriculture differently. While this article is limited by its focus on developing countries and the resources that they would have available, Hoffmann (2011) suggests lessons that are applicable to all: the importance of irrigation efficiency, the need for enhanced crop and livestock diversity, and the support for regenerative agriculture that recreates the resources it uses.

While the last two articles focused mostly on the concerns of developing countries, developed countries have a number of climate change concerns as well. For example, during July and August 2012 the United States experienced one of the most extensive droughts in 60 years, resulting in a harvest that amounted to only 72% of the predicted corn crop (Crutchfield, 2013). This less-than-predicted harvest resulted in increasing grain prices, with corn prices hitting "record-high season-average[s]" (Fyksen, 2013). While consumers in the developed world may notice a slight increase in meat or dairy prices, it is the consumers in the developing world where these crops make up "30% of [their] mean caloric consumption" that will feel the real impact of these rising prices (Naylor, et al., 2007). Not long after in December 2012 and January 2013,

Australia experienced a heat wave that broke most temperature records for the area and resulted in bushfires that destroyed "around 350,000 hectares of land … and thousands of livestock", driving home the fragility of food production (Rourke, 2013). These events remind us that water is one of the key factors for prosperous human life, and thus agricultural productivity and food security. Water scarcity increases the lands susceptibility to desertification, and "therefore, is the single biggest risk to global food security" (Caldwell, et al., 2011). Desertification increases the likelihood that rural residents will migrate to urban areas, resulting in increasing the pressure on urban food resources and overall rural decline. As stated by Stigset (2008) and cited in Clapp and Cohen (2009) "each year, five to ten million hectares of agricultural land are lost because of degradation caused by water shortages", making this a concern for both current and future agricultural productivity.

One suggested approach for dealing with climate change in developed countries was brought forward by Claassen and Morehart (2009), who suggest that American cap-and-trade GHG programs should be expanded to include the agricultural community. They found that carbon sequestration practices took 5-10 years to be effective in reducing emissions, and that maintaining permanent pasture or forest for this period of time was a more effective way of reducing carbon emissions than changing production practices (Claassen & Morehart, 2009). While this article proposes an interesting connection between agriculture, policy, and climate change, the applicability and feasibility of a cap-and-trade program in the American agricultural context requires further research.

Climate change is just one of the many issues that needs to be considered in planning for food security and agriculture. While a number of models exist, current weather patterns continue to be unpredictable and often have negative consequences for food production. Additionally, further research is required to determine the impact of climate change on crop production, predicted yields, and the possible replacement of selected crop types with alternatives. These articles skim the surface of climate change effects, yet reinforce the need for a focus on planning and food security.

2.2 Land Degradation

"The conversion of rainforest or native grasslands … to plantation crops and cattle ranches is one of the largest threats to terrestrial biodiversity and a key driver of the global extinction crisis" (Edwards & Laurance, 2012).

As mentioned in the previous section as a result of water scarcity, land degradation is another important facet of food security. Land degradation can occur in any area and is defined as a "reduction or loss of biological productivity [that] is caused, worldwide by poor agricultural and land stewardship practices"; these practices "include inadequate water and soil resource management, veld management, salination due to over-irrigation, erosion, and reduction or loss of pollinator species" (Caldwell, et al., 2011).

Inadequate water and soil management refers to practices such as over-irrigating which leads to salination, improper crop rotation, loss of soil fertility through insufficient organic matter, lack of nitrogen fixers, or fertilizers, or neglecting a cover crop in the fallow season to prevent wind and water erosion. Food security pressures can incentivize clearing land that is generally unacceptable for agriculture; the result can be increased erosion and loss of biodiversity. Veld management refers to properly managing forage and pasture grasses for animal production, including moving the animals to different areas of the pasture and having appropriate animal density to limit overgrazing, as well as ensuring that there is adequate infrastructure in place (van Oudtshroorn, 2007). Soil erosion happens mostly through water erosion or wind erosion, and occurs when water or wind carries the soil away from its primary location. There are a number of steps that individuals can take to prevent erosion including: planting vegetation to act as a wind and water barrier, controlling run-off through contour banks and infrastructure, planting vegetation to cover the soil, taking care to plow adjacent to slope lines rather than parallel to slope lines, and "reducing impervious surfaces" to reduce runoff (Capital Regional District, 2013). Finally, with "at least one-third of the world's agricultural crops depend[ing] upon pollination provided by insects and other animals", the protection of pollinator species is critical to agricultural production (FAO, 2013). These pollinators are facing increasing pressures from

removal of habitat, extensive mono-crops, and pesticides, which may result in decreased yields for "87 of the leading food crops worldwide" (FAO, 2013). According to the United Nations Environment Programme, approximately 0.2% of agricultural productivity is lost annually as a result of these practices (Mann, et al., 2009).

A specific type of land degradation is slash and burn agriculture. Slash and burn agriculture occurs when a forested area is stripped of vegetation and burned to remove the remaining stumpage before being used for farming (Rainforest Saver, 2013). This creates a short-term boost in fertility, but also causes substantial erosion which results in these cleared lands quickly losing their crop productivity, and consequential contributes to cyclical deforestation. Farmers with less education and lower land ownership are more likely to use slash and burn techniques, even though they provide the lowest level of productivity when compared to multi-cropping or mono-cropping, because they have the lowest entry fee and may be a simple way to gain land tenure (Schuck, et al., 2002). This land degradation issue is common in tropical areas where cattle ranching and export crops are profitable businesses, and with variable land tenure policies, farmers remove tropical rainforests in order to expand their operations. In these areas policy makers need to reduce the profitability of removing forested land, create rainforest protection areas, and discourage slash and burn agriculture whenever possible. Continued veld burning without a proper burning programme can also contribute to land degradation, and the constant burning exposes the top layer of the soil and causes a reduction in biodiversity.

2.3 Population Growth and Shift

Where and how humans live greatly shapes the surrounding environment. Population growth, decline, and migration have particular relevance to planning and food security. It's been shown in populations around the globe, that as urban numbers increase and become wealthier, dietary choices tend to shift from cereal-based to meat-based diets, and the importance of agriculture is reduced (Fischer, et al., 2012). As the social importance of agriculture is reduced, the population tends to move away from agricultural employment and focuses more on industrial and manufacturing employment opportunities. In China, Fischer et al. (2012) describe how dramatic urban migration has resulted in urban sprawl, the growth of industrialized farms, and farms that

are located close to transportation centers. China has some of the highest poultry and pork densities, creating the possibility that these operations will increase "environmental deterioration … by roughly one-third to nearly half" with nitrogen loss being one of the main causes (Fischer, et al., 2012). While sustainable agriculture is the focus of this article, the sustainability issues are a result of population growth and migration.

In Latin America Carr et al. (2009) use statistics and country-level data to examine the relationship between population change and agricultural land use change between 1961 and 2001. They found that deforestation continued to increase despite rural population decline, as resource extraction opened up new areas and the market for cattle ranching grew (Carr, et al., 2009). Additionally Carr et al. (2009) found: that in Latin America irrigation and fertilizer use increased with per capita income; that urbanization was linked to expanding cattle ranching and export crops (such as soy); and that agricultural expansion "continued unabated despite dwindling forest reserves and heightened concerns about conserving tropical forests and increased policy initiatives in many countries", due to rising international consumption, rather than local population growth.

3. Agricultural Systems

The "farming industry is not only central to the UK's long term food security, but also the sustainability of food production, food policy, and consequently people's health" (Royal Town Planning Institute, 2010).

In much of the developed world, agricultural systems are industrial and focus on large-scale exports. In Canada, less than 3% of Canadians are part of the farm population, as the trend for farms to increase in size and decrease in number continues (Statistics Canada, 2009). This separation between people and their food has contributed to a collective loss of societal food knowledge, including when products are in season, where they come from, and what products look like in their unprocessed form. Condon et al. (2010) suggest that a shift to "enhanced community-based/local food systems" would reconnect urbanites with their food sources, build employment opportunities that support the local economy, and enhance food security. They

suggest that this should be done through Municipal Enabled Agriculture (MEA) in which the agri-food system is integrated "within the planning, design, function, economy and community of cities" (Condon, et al., 2010). The authors describe MEA in the context of Metro Vancouver, Canada, where an agricultural land reserve (ALR) has existed since the early 1970's. Condon et al. (2010) argue that while the ALR may be preventing agricultural land from being developed, it does not contribute to "high value local/regional markets" and could be better utilized. They recommend determining where the urban-rural interface should be and creating a 500m corridor along it. The 100-200m of the corridor closest to the urban side would be rezoned for medium-high density urban (in order to create transit corridors and commercial outlets), while the remaining 300-400m would be legally protected by municipalities or land trusts and used for intensive agriculture destined for local markets. This agricultural land would be further regulated through leases that require the crops to be high value, labour intensive, organic endeavors, while the money made from selling the development portion of the land would be used to support local food security (Condon, et al., 2010). While this is an interesting idea, the feasibility and effectiveness of this approach requires further research.

The definition of sustainable agriculture is a debatable subject in itself. Emerson and Wallis (2003) describe two of the view points as emphasizing either "production or … natural resource conservation" (Caldwell, et al., 2011). The production proponents favour intensive agriculture, free trade, and "agricultural biotechnology" to feed the world, while conservation proponents state that if the resources needed for agriculture are conserved, then "the potential for sustaining or enhancing productivity levels will be maintained" (Emerson & Wallis, 2003). The future of sustainable agriculture likely lies in between the two perspectives and is composed of a "mosaic of sustainable production systems" that "leverage agriculture's multi-functionality" (Hoffmann, 2011).

3.1 The Local Food Movement

In recent years the prominence and importance of local food has increased dramatically in the developed world. Community supported agriculture (CSA) programs are popular, "local" has become a marketing buzz word, and in 2007 'locavore' became the Oxford Dictionary's word of

the year (Oxford University Press, 2007). Sumner et al. (2010) describe this emergence as the tension between conventional industrial agriculture and alternative sustainable agriculture. They note that CSAs were first started in Japan in the 1960's as a response to a decrease in local food production; there CSAs are known as "tiekei" which philosophically translates to "food with the farmer's face on it" (Sumner, et al., 2010). This sentiment captures what many consumers who choose to buy local products are looking for in their food, a connection to the place and the people who grew it.

3.2 Agricultural Technology

During the last 50 years, agricultural technology has undergone significant changes. Yields and scales that were unimaginable in our grandparent's generation are now common. In the developed world, farms continue to grow in size and decrease in number. This trend is aided by increased farm mechanization and tools such as herbicides, pesticides and fertilizers that allow farms to produce large amounts with fewer people. Additionally, genetically modified seeds are available and have dramatically changed the way certain products are produced. While there are positive and negative effects of these technological changes, the fact remains that agricultural technology has taken significant steps over the past few decades, setting the stage for future changes of equal magnitude.

4. Land Use Change

The accessibility of land is one of the key parts of achieving food security. Land change is continual and can be both positive and negative. Positive land use changes include conservation development and the rehabilitation of abandoned sites, brown fields or aggregate pits, while negative land use changes include deforestation, unrestrained urbanization or mining and its related pollutants. While work is being done to create positive change, negative changes still create concern for the future of food security. This section describes some of the land use change issues related to food security, and includes some of the proposed solutions.

4.1 Land Tenure

Food security "depends on the land resources available to the household or community and their ability to mobilize resources for the production and/or distribution of food to achieve an active and healthy life" (Dione, et al., 2009).

In order to produce food, farmers must have secure access to land. However, while trying to achieve this, land tenure policies often have unintended side-effects. For example, Cameroon's policy states that the first person to use and continuously occupy the land has the right to it, but Schuck et al. (2002) found that this encouraged slash and burn agriculture for both the landless and high productivity farmers who want to expand, affecting the type of local agricultural, the productivity, and the surrounding ecosystems, as discussed in section 2.2.

While Schuck et al. (2002), Peters and Kambewa (2007) and McLees (2011) note that secure land tenure is necessary for agricultural investments and improvements, how land tenure is secured has a number of difficulties. The tenure approach used in Cameroon encourages environmental degradation, while titling, an approach used in Malawi, resulted in exacerbating gender inequality (Peters & Kambewa, 2007). In Malawi, most agriculture is subsistence based and land is traditionally passed down through matrilineal succession and matrilocal residence (Peters & Kambewa, 2007). The new titling policy attempts to address gender equality by stating that any child can inherit the land regardless of gender; unfortunately, this change in policy results in more gender inequality, as male children are the preferred heirs (Peters & Kambewa, 2007). The policy further undermines gender equality by requiring the title to be held by the head of the household, who is usually a man, whereas traditionally the land would be held by the woman. Beyond addressing gender equality, the Malawian land tenure policies try to improve economic growth and opportunity for small scale farms while facing widespread land competition and conflict, varying political will, and low government or donor capacity "to provide the requisite levels of public investment" with varying results (Peters & Kambewa, 2007).

McLees (2011) focuses on urban agriculture and land tenure in Tanzania, looking specifically at farming in open spaces, such as under power lines, and how "to integrate urban agriculture into city zoning plans". In Tanzania, this style of urban farming is legally ambiguous and commonly done for-profit on non-tenured land. Local authorities perceive these farmers as poor, recent rural migrants, yet in many cases the farmers can earn a stable income and have been in the city for a number of years while becoming established in the community. Although Tanzania is one of the few African countries that has legalized urban agriculture in the national zoning guidelines, as of 2011 no land had received that zoning classification and so urban agriculture "remains effectively illegal" (McLees, 2011). In terms of land tenure, the farmers often have no formal agreements and are dealing with powerful landlords; these landlords benefit from allowing the farmers on their land in three ways: by increasing the safety of the area, by reducing the flooding of the land, which makes it easier to develop, and by maintaining the appearance of the land, which makes it more attractive to future investors (McLees, 2011). The farmers are aware of these benefits and worry that by improving the land they are damaging their own long term security, but see few other options. To deal with the hovering threat of forceful-eviction, these farmers grow quick harvesting crops, and do not invest in the land with permanent structures, such as wells (McLees, 2011). McLees (2011) suggests that rather than having agricultural zoning in name only, that urban agriculture should be allowed as an integrated use in existing zones, such as school yards.

Insecure land tenure is cited as the main reason for farmers' inability "to improve their farming practices" such as resolving well and water contamination problems, as most government support is not available to those without formal long-term tenure agreements (McLees, 2011). These cases illustrate how land tenure policy affects the productivity and ability of the farm community to produce food. In these situations, agriculture is traditionally the dominant use of the land, and is greatly affected by the policies that are in place to guide land use.

On a global scale, land tenure has become a concern through increasing awareness of 'land grabbing'. This describes the situation where large areas of land are acquired by "domestic and transnational companies, governments, and individuals … for the purpose of [securing] food and biofuel production" for those investors (Dadian, 2012). The land that is being acquired is primarily in Africa, Southeast Asian, and Latin America, with many international organizations

voicing concern about the local impact of this practice (Dadian, 2012). In order to have any resolution, land grabbing will need to become the focus of federal-level and international policy makers.

4.2 Urbanization

Urbanization presents a constant challenge for agriculture in both the developed and developing world. In the developed world, despite numerous cost-of-community-services studies that show agricultural lands provides a higher net return than residential development, urban areas continue to expand into agricultural or forested land, while vacant city lots or brownfields are ignored (Freedgood, 2002; York, et al., 2011). In Ontario, Canada, even with provincial acts such as the Green Belt Act, agricultural land continued to be developed at a rate of 4.5% between 2006-2011 (Kulasekera, 2012). York et al. (2011) explored some of the drivers for urbanization in the southwest US, and found that "water provisioning, population dynamics, transportation, topography, and institutions" were key factors in urban expansion. In the southwest US water is the main consideration in new developments, with many developers purchasing agricultural land because of its water supply rights; however, the leap-frog development that this leads to destroys habitat corridors, is expensive to service, decreases agricultural productivity, and "reduces or eliminates culturally-relevant open spaces and natural amenities" (York, et al., 2011). Population dynamics also played a key role in expansion, as the "demand for rural homes and lifestyles" increases and creates "rural sprawl" (York, et al., 2011). Additionally, certain demographics can contribute to more sprawling developments, such as retirement communities that are associated with golf courses, and transportation planning should be carefully considered when crossing farmland as new transportation corridors often lead to adjacent development (York, et al., 2011). Institutional policy also plays a role in urban expansion, as these policies determine where jobs are be created, fueling growth and expansion in those areas (York, et al., 2011). Finally, York et al. (2011) recommend considering both the land use and the ecological consequences of urban expansion and fragmentation when designing policies and plans or considering zoning, rather than focusing solely on the most obvious component.

In the developing world, unrestrained urbanization presents large challenges for agricultural productivity. It's estimated that by 2020, developing countries will hold most of the world's megacities, and by 2030, 81% of the world's population will reside in urban areas (Mohan, et al., 2011). Because of the quick expansion of these megacities, and the challenges facing their planning departments, much of this urbanization is taking place in an "unplanned and uncontrolled manner" and "is having a marked effect on the natural functioning of ecosystems" (Mohan, et al., 2011). Mohan et al. (2011) found that the urbanization surrounding Delhi, India led to a sharp decrease in agricultural productivity, and recommended that future development take place on "waste land or sandy areas in place of productive agricultural lands". In all cases, development should be planned in such a way as to fully utilize the potential of the land that has already been built upon through rehabilitation and infilling, and evaluate future land uses against a pre-determined set of criteria for that area.

5. Land Preservation

"Both development planning and the development management functions need to be recognized as an important tool to help improve … food security in the longer term – giving consideration to the wider land use and spatial implications" (Royal Town Planning Institute, 2010).

Without farmland, the question of food security quickly becomes unanswerable. There is a limited amount of productive land available and suitable for agriculture. A good portion of this land already lies beneath the Commonwealth's urban areas, as human settlements generally occurred where the agriculture was the most productive. The land that remains is a valuable resource that needs to be managed and protected in order to sustain and increase the current amount of global food security. Complicating matters, is that productive agricultural land can be located in the same spot as valuable mining products, such as aggregates, coal, and phosphorous. The conflicting uses of agriculture and mining create challenges for government and industry, as rehabilitation potential is variable and any mining activity is likely to disrupt the local biodiversity. While it sounds alarmist, once agricultural land is developed or contaminated from pollution, that land is lost for agricultural purposes for the foreseeable, if not long-term, future.

5.1 Legal Tools

A number of legal tools exist for governments and special interest groups to use for protecting agricultural land. Lower levels of government have the most direct impact and control over food security in their area. Generally speaking, local governments determine the primary use of specific land sites and are the best judges of what is taking place within the community. Unfortunately, in some instances local governments either lack the expertise to evaluate the agricultural potential of a particular parcel, or are biased towards development, leading to occasions when it is necessary for higher levels of government to step in. In the developed world this is administrated through zoning, official plans, and application decisions. For example, in New York City the council has adopted a number of zoning incentives through the Food Retail Expansion to Support Health (FRESH) program (White, 2012). One such incentive was density bonuses that allow "developers to increase the maximum allowable development on a property" when the development contained a "grocery store on the ground level" of the building (White, 2012). These incentives could be adapted to increase food access in all municipalities, with a special focus on those that contain lower income areas.

At the nation or upper levels of government planners and policy makers can take steps to provide an overarching framework for food security. The right to access food should be incorporated in legislation as a basic human right, and can be done in a number of different ways (Bultrini, 2009). Whether it be through trade guidelines, production targets, or high level policies such as the BC Agricultural Land Reserve or the Ontario Greenbelt Act, the need for food security planning is recognizable at all levels of government.

An example of a legal tool that special interest groups can use is purchasing development rights (PDR). PDR, also known as conservation easements, began in 1978 in the US and are used to remove the ability to "convert undeveloped lands" (Lui & Lynch, 2011). Lui and Lynch (2011) found that in the Mid-Atlantic States "having a PDR program decreases a county's rate of farmland loss by 40% to 50% and decreases farmland acres lost by 375 to 550 acres per year" on average. However, this achievement came with some unintended consequences. Once the land was preserved, the surrounding land had higher land prices and increased housing pressure, as

residents found it desirable to live near permanent open space (Lui & Lynch, 2011). PDR programs are voluntary, and as agricultural profits increase enrollments in the programs increase as well, emphasizing the importance of considering community agricultural profitability in planning (Lui & Lynch, 2011).

5.2 Land Tenure

The ability for a farmer to participate in a conservation program is dependent on their land tenure status. If the land is not owned by the farmer, or they do not have a long term lease, it is unlikely that the farmer will be interested in improving the long term land productivity, especially if the process results in a short-term yield decrease. Additionally "even if renters are willing to take action, they would be unable to sign long-term carbon offset agreements – or adopt the necessary practices – without a long-term lease" (Claassen & Morehart, 2009). An example of a program that relies on land tenure to succeed is the Conversation Reserve Program in the US. This program pays farmers to establish and maintain conservation cover for duration of 10 years. The program is based on the fact that changing cropland to permanent conservation cover, such as permanent pasture or forested land, provides more carbon sequestration than changing to conservation production practices such as no-till (Claassen & Morehart, 2009).

Land owners may be reluctant to sign long-term leases because they want the flexibility to change the land payment agreements. In the American context, farmers were unlikely to own the land when it was made up of large plots and highly productive crop land, as it is expensive to own (Claassen & Morehart, 2009). In contrast, farmers were more likely to own the land when it was made up of smaller properties such as rural residences or land used for livestock purposes, where the landowners need stability to build the necessary infrastructure (Claassen & Morehart, 2009). By owning the farmland, the farmer may be more interested in improving their land's productivity, and participating in stewardship action to reduce environmental degradation. The high prices of crop land in much of the developed world make it more difficult for farmers to participate in this kind of long term investment, and increases the barriers for new farmers who are starting out.

5.3 Farmland Preservation

As previously mentioned by Condon et al. (2010), land reserves can inadvertently be used as urban growth boundaries. In the case of the BC ALR, this was neither the intent, nor the design when the reserve was created. While Condon et al.'s (2010) proposal of a high density urban-agricultural corridor raises a numbers of questions; the intent of bringing this topic to discussion is a good one. It would be wise to consciously decide the extent of urban development, determine where the rural-urban interface will occur, and commit to that.

In 2010 Indiana, in the United States, had no state-level farmland preservation policy, and began to take the first steps to creating official policy with the help of the Indiana Land Resources Council (ILRC). The ILRC provides counties with aid in developing agriculturally-friendly plans and ordinances (Hall, 2010). In Indiana, agriculture is the largest economic sector in the state, yet it only employs 4.5% and the state has historically allowed unrestricted development of agricultural land. Hall (2010) argues that preserving prime agricultural land provides the most economical and environmental method of farming, as this land requires fewer inputs than farming marginal land. If development of farmland continues at its current rate, by 2040 54.1% of Indiana's current farmland will be urban (Hall, 2010). As agricultural zoning is the foundation of farmland preservation in developed countries, creating this is Indiana's first step to building further agricultural plans or policy (Hall, 2010). The proposed solution to limit the development of Indiana's agricultural land is to restrict all development in wetlands or forests that are larger than 20 acres, and areas with at least 50% of the land being "devoted to agricultural production" (Hall, 2010). While this will reduce the amount of sprawl and increase density, a number of questions remain regarding the determination of the area boundaries and what is considered to be land that is devoted to agriculture.

Puerto Rico shows another example of a location without farmland preservation recognizing the need to constrain growth. As the population increased and migrated to urban areas between 1977-1994, it was found the urban growth usually occurred on prime farmland, as it was close to urban areas, easy to develop, and already had good roads (del Mar Lopez, et al., 2001). As Puerto Rico became more urbanized and industrialized it switched from being a food exporter to

being a food importer. del Mar Lopez et al. (2001) recommend introducing agricultural zoning, focusing on vertical and dense development, introducing mass transit, and including natural resource value when doing economic assessments.

Critics of farmland preservation argue that the market should decide the pace and location of development; unfortunately past experiences have shown the market to result in urban sprawl. Additionally, the logic that people only purchase what they support is not sound, because while consumers could be purchasing single family homes in cul-de-sacs because they like them, they may also provide the only option at the time. As Box et al. (2001) question "does the purchase of an article signal approval, thoughtlessness, or lack of a better alternative"?

6. Fisheries

"Fisheries can reduce vulnerability to food insecurity by providing a complementary source of food or income as part of a diversified livelihood strategy" (Bostock & Walmsley, 2009).

Fisheries are an often forgotten component of food security, yet they make up "the main source of animal protein for about one billion people" (Bostock & Walmsley, 2009). Fisheries contribute to food security not only through providing nutrient dense food, but also through providing a source of income and economic growth opportunities. Unfortunately despite the importance to global trade, fisheries have been chronically mismanaged, and what should be a renewable resource now suffers from environmental degradation, illegal unreported and unregulated fishing, and the effects of climate change (Bostock & Walmsley, 2009). Most fishers in developing countries participate in a combination of subsistence and for-profit fishing, with developing countries making up the majority of fishery exports.

In order to allow fisheries to remain a viable component of food security Bostock and Walmsley (2009) put forward a number of suggestions. Aquaculture is a growing component of fisheries, and needs to be done in such a way that it causes no environmental harm to wild stocks. Bostock and Walmsley (2009) suggest that aquaculture has the most efficient feed conversions when compared to other protein sources, but that feed substitutes need to be developed to replace wild fish meal, as a salmon consumes "over 8 kg of wild fish for every 1 kg of salmon produced".

They also suggest that policies that focus on rights-based management and the "wealth-generating potential" of fisheries will be the most effective in creating sustainable fisheries (Bostock & Walmsley, 2009). Institutional reform through politically complex national decisions about fisheries allocation and catch allotments, along with supporting and aiding developing countries to meet retail standards and participate in trade markets, are also key components in a sustainable food-secure fishery (Bostock & Walmsley, 2009). While fisheries are facing a number of challenges, many positive cases exist where change has successfully occurred.

7. Future Work

"The answer lies in part in envisaging and building a[n] … agriculture sector in which agriculture and urbanity are inextricably linked via planning and economic strategy" (Condon, et al., 2010).

This work provides the basis for future work on the diversity of agricultural systems that exist within the Commonwealth, and how planners can integrate these systems into food security. The work will create a framework that breaks these agricultural systems into types based on geography, and provide the specific resources and case studies that will apply to each type. It will also make the connection between global and local food security challenges, and what planning as a profession can contribute to creating solutions that represent the diversity and geography of the Commonwealth. This literature review will aid in developing these future works, providing the framework for phase two of the current research.

8. Conclusion

Food security is a complex and multi-faceted issue that has many additional components beyond what has been mentioned in this paper. This literature review attempts to highlight the most important of these issues as they related to food security policy and planning. The wide diversity

of agricultural systems, development stages, and geographies within the Commonwealth adds additional complexity. However, with this diversity often comes innovation as resources, strategies, and ideas are shared and applied to new contexts. This research provides a background for this innovative work to move forward from, and brings together some of the many challenges facing those working towards food security within the Commonwealth and around the globe.

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