A thesis submitted to the Department of Environmental Sciences and Policy of Central European University in part fulfilment of the Degree of Master of Science

Resilience at the margins:

Stories of seed practices in the city gardens of Havana City, Cuba



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This thesis is submitted in fulfillment of the Master of Science degree awarded as a result of successful completion of the Erasmus Mundus Masters course in Environmental Sciences, Policy and Management (MESPOM) jointly operated by the University of the Aegean (Greece), Central European University (Hungary), Lund University (Sweden) and the University of Manchester (United Kingdom).



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Emily DOWDING-SMITH

#### **CENTRAL EUROPEAN UNIVERSITY**

**ABSTRACT OF THESIS** submitted by: Emily DOWDING-SMITH for the degree of Master of Science and entitled: Resilience at the margins: Stories of seed practices in the city gardens of Havana City, Cuba

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There is a global decline in biological diversity; specifically, genetic erosion of our plant genetic resources ("PGR") of agricultural crop plants (cereals, fruits, nuts, and food legumes) (FAO 2010; Steinberg 2001). The twin impact of this genetic erosion is a cultural erosion which occurs when the PGR such as farmers varieties' are lost (Nazarea 2005; Brush and Meng 1998; Cleveland and Murray 1997). Impacts of this on seed systems tends to be studied in rural agriculture settings with few studies addressing the impact of a decline in PGR on seed sectors in urban settings. There is vast literature on urban agriculture, but not seed. Cuba is a country with a well established urban agriculture system and the presence of both informal and formal seed sectors. The current study explored the seed practices in city gardens of Havana City, Cuba to highlight the importance of seed practices as a factor to be taken into account in resilience studies. Specifically, the knowledge and memories of city gardeners in relation to seed were addressed against the theoretical frames of resilience studies and margins. It was found that permaculture communities in Havana City provide a useful connection between these two frameworks and that in general, city gardeners have knowledge and memories of seed practices. This suggests the potential to study seed systems within the urban setting and also the importance of both marginal spaces and marginal communities when assessing resilience, in particular the importance of seed practices as a factor to take into account.

**Keywords:** social-ecological resilience, margins, seed practices, urban agriculture, Cuba, agroecological farming, agro-biodiversity, conservation, farmers' rights to seed, permaculture, knowledge, memory, conservation, biological diversity.

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For Granny Smith and her seeds.

Kohikohia ngā kākano, whakaritea te pārekereke, kia puāwai ngā hua.

Gather the seeds, prepare the seedbed carefully, and you will be gifted with abundance of food.

(Māori Proverb, Aotearoa, New Zealand)

# **Table of Contents**

TABLE OF CONTENTS	VII
CHAPTER 1: INTRODUCTION	1
1.1 The story of gardens	1
1.2 Research background and problem definition	1
1.2.1 Reasons for the cultural and genetic erosion of farmers' varieties	
1.3 Research gap: UA and seeds	4
1.4 Research aim	6
1.5 Research objectives	6
1.6 Research questions	6
1.7 TARGET GROUP	7
1.8 SEED SYSTEMS IN RURAL AND URBAN AGRICULTURE	7
1.8.1 Seed sectors in UA	
1.9 Cuba's story	
1.9.1 Country profile	
1.9.2 Social and agricultural history	
1.9.2.1 20th Century Pre-revolution (1900-1959)	
1.9.2.2 Post-revolution (1959-1989)	12
1.9.2.3 Special Period - now (1990- 2011)	14
1.9.3 Rural agriculture reforms	
1.9.4 Urban Agriculture development	
1.10 THE GROWTH OF AGRO-ECOLOGICAL FARMING METHODS	
1.11 Types of gardens in Havana City, Cuba	21
1.11.1 Organiponicos, Semi-Protected Organiponicos and Huertos Intensivos	
1.11.2 Patios and parcelas	
1.11.3 Permaculture	
1.12 SEED SYSTEM	
1.12.1 Formal seed system	
1.12.2 Informal seed system	

1.13 Current study	
1.14 OUTLINE OF CHAPTERS	
CHAPTER 2: METHODOLOGY	
2.1 PUTTING MYSELF IN THE MARGINS	
2.2 My Methodology	
2.2.1 Before Cuba	
2.2.2 Research in Cuba	
2.2.2.1 Triangulation	
2.2.2.2 Interview questions	
2.2.2.3 Key informants	
2.2.2.4 Cross-cultural setting	
2.2.3 After Cuba	
2.3 SCOPE AND LIMITATIONS	
2.3.1 Scope	
2.3.2 Limitations	
CHAPTER 3: THEORETICAL FRAMEWORK	42
CHAPTER 3: THEORETICAL FRAMEWORK	
<ul> <li>CHAPTER 3: THEORETICAL FRAMEWORK.</li> <li>3.1 OVERVIEW.</li> <li>3.2 GARDENS AND RESILIENCE.</li> <li>3.3 RESILIENCE IN CUBAN CITY GARDENS.</li> <li>3.4 LIMITATIONS</li> <li>3.5 SEED PRACTICES AS A FACTOR OF RESILIENCE</li></ul>	
<ul> <li>CHAPTER 3: THEORETICAL FRAMEWORK.</li> <li>3.1 OVERVIEW.</li> <li>3.2 GARDENS AND RESILIENCE.</li> <li>3.3 RESILIENCE IN CUBAN CITY GARDENS.</li> <li>3.4 LIMITATIONS</li> <li>3.5 SEED PRACTICES AS A FACTOR OF RESILIENCE .</li> <li>CHAPTER 4: BUILDING RESILIENCE.</li> </ul>	
CHAPTER 3: THEORETICAL FRAMEWORK. 3.1 OVERVIEW. 3.2 GARDENS AND RESILIENCE. 3.3 RESILIENCE IN CUBAN CITY GARDENS. 3.4 LIMITATIONS. 3.5 SEED PRACTICES AS A FACTOR OF RESILIENCE. CHAPTER 4: BUILDING RESILIENCE. 4.1 OVERVIEW.	
CHAPTER 3: THEORETICAL FRAMEWORK. 3.1 OVERVIEW. 3.2 GARDENS AND RESILIENCE. 3.3 RESILIENCE IN CUBAN CITY GARDENS. 3.4 LIMITATIONS. 3.5 SEED PRACTICES AS A FACTOR OF RESILIENCE . CHAPTER 4: BUILDING RESILIENCE. 4.1 OVERVIEW. 4.2 GARDENS.	
CHAPTER 3: THEORETICAL FRAMEWORK. 3.1 OVERVIEW. 3.2 GARDENS AND RESILIENCE. 3.3 RESILIENCE IN CUBAN CITY GARDENS. 3.4 LIMITATIONS 3.5 SEED PRACTICES AS A FACTOR OF RESILIENCE CHAPTER 4: BUILDING RESILIENCE 4.1 OVERVIEW. 4.2 GARDENS. 4.3 GARDENERS' KNOWLEDGE.	
CHAPTER 3: THEORETICAL FRAMEWORK	42 42 44 44 44 45 49 50 50 53 53 53 53 53 53 53
CHAPTER 3: THEORETICAL FRAMEWORK	42 
CHAPTER 3: THEORETICAL FRAMEWORK. 3.1 OVERVIEW. 3.2 GARDENS AND RESILIENCE. 3.3 RESILIENCE IN CUBAN CITY GARDENS. 3.4 LIMITATIONS	42 
CHAPTER 3: THEORETICAL FRAMEWORK	42 42 44 44 45 46 49 50 50 53 53 53 53 53 53 53 53 53 53 53 53 53

4.6 Memory	
4.7 Linking seed practices, knowledge, memory and resilience	
CHAPTER 5: AT THE MARGINS	79
5.1 Look around; eyes wide	
5.2 WELCOME TO THE MARGINS	
5.3 Different gardens; different practices.	
5.4 Sowing margins into resilience approaches	
CONCLUSION	90
APPENDIX "A"	95
REFERENCES	

# List of Figures

Figure 1: Seed systems and agriculture systems
Figure 2: UA in Havana City, Cuba. Source: Author's photo
Figure 3: Map of Cuba (Source: Google Maps, 2011)11
Figure 4: Sembrando Voluntad, a special magazine extract from La Tribuna (Circa early
1990s) (Source: Author's photo)
Figure 5: An example of agro-ecological integration in UA, Havana, Cuba. (Source:
Author's photo)
Figure 6: Huerto Intensivo, Havana City: private garden with gate sales of produce
(Source: Author's photo)
Figure 7: Semi-Protected Organiponico, Havana City (Source: Author's photo)22
Figure 8: Patio Garden, Havana City. Most plants are grown in pots (Source: Author's
photo). 23
Figure 9: Permaculture garden, Havana City, The gardener uses a combination of pots,
raised beds and direct sowing in her garden, which was once a waste site (Source:
Author's photo)
Figure 10: Permaculture principles and ethics (Source: Permaculture Principles (2011)25
Figure 11: The trawling and mining concept in a literature search (Hart, 2001)
Figure 12: Primary and secondary indicators of resilience -adapted from Asah (2008)

Figure 13: Different aspects of the seed system – A: CTA shop sign; B: A gardener's saved
seed; C: A patio gardener's seed packet from Italy (Source: Author's photos)60
Figure 14: Copies of Se puede magazine collected by gardeners, Havana City, Cuba
(Source: Author's photo)65
Figure 15: Ecological fertiliser (left, 10A) and a selection of seed packets (right, 10B)
available for sale in a CTA. (Source: Author's photo)
Figure 16: Two gardening plans: José's garden prior to undertaking a design course (self
identified as a monoculture)(left, 11A) and the garden plan after the course (a
polyculture) (right, 11B). (Source: Author's photograph)69
Figure 17: Seed drier: every permaculture garden in this community has one. Havana City,
Cuba. (Source: Author's photo)70

Figure 18: A conceptual diagram depicting the margins being addressed in this study......79

# List of Tables

Table 1: Timeline of social and political factors that influence agriculture in Cuba from
1958 - 1989
Table 2: Timeline of social and political factors influencing agriculture for Cuba in the
early 1990s14
Table 3: Type of land management system implemented by the Alternative Model (Nelson
et al. 2009)
Table 4: Interviews undertaken during field research, categorised by interviewee

# List of Abbreviations

ACTAF	Cuban Association of Agricultural and Forestry Technicians Asociación Cubano de Técnicos Agropecuarios y Forestales		
ANAP	National Association of Small Farmers Asociación Nacional de Agricultores Pequeños		
CCS	Credit and Service Cooperative		
СРА	Agricultural Production Cooperatives		
CENSA	National Centre for Agricultural Health Centro Nacional de Sanidad Agropecuario		
CMEA	Council for Mutual Economic Assistance		
СТА	Agriculture supply and consultancy store Consultorios tiendas agropecuarios		
FANJ	Antonio Núñez Jiménez Foundation of nature and man Fundación de Antonio Núñez Jiménez de la naturaleza y el hombre		
INCA	National Institute of Agricultural Sciences Instituto Nacional de Ciencias Agrícolas		
INIFAT	National Institute of Fundamental Research of Tropical Agriculture Instituto Nacional de Investigaciones Fundamentales de la Agricultura Tropical		
MACAC	Farmer to Farmer Movement Movimiento Agroeocologico Campesino a Campesino		
MINAG	Ministry of Agriculture <i>Ministerio de Agricultura</i>		
NGO	Non Governmental Organisation		
PGR	Plant Genetic Resources		
UA	Urban Agriculture		
UBPC	Basic Unit of Cooperative Production Unidad Básico de Producción Cooperativa		

**CEU eTD Collection** 

# **CHAPTER 1: INTRODUCTION**

## 1.1 The story of gardens

This is the story of gardeners in Havana City, Cuba. I hope that by taking you on a journey to Cuba, right into the backyards and vegetable plots of everyday people and sharing their stories, you can learn more about the power of gardening, the strength of communities and within that setting, the importance of seeds. Although I am approaching these gardens with academic gumboots on for the purpose of this thesis, it is important to remember that one of the most rewarding things a person can have is a garden to create food and produce for their enjoyment. I cannot find a citation for it but I know it is a kind of global truth and this is what this thesis is all about. If you have not yet found such joy, perhaps after reading this you will. Here I seek to find answers to global problems by opening up the garden gate and wandering down the path and, of course, I traverse some muddy puddles along the way. But as I wandered this path I noticed the importance of looking up and around. Humans have a tendency to look straight ahead. Why not turn to the margins, or look up in the trees once in a while to see what surprises they hold?

# 1.2 Research background and problem definition

There is a global decline in biological diversity; specifically, genetic erosion of our plant genetic resources ("PGR") of agricultural crop plants (cereals, fruits, nuts, and food legumes) (FAO 2010; Steinberg 2001). Genetic erosion is "the loss of individual genes and the loss of particular combinations of genes (i.e. gene complexes) such as those maintained in locally adapted landraces" (FAO 2010). This may be a loss of either genes or alleles, or more broadly, plant varieties - both of which narrow our future genetic options (FAO 2010; Lipper *et al.* 2010).

There is a direct impact of this on agriculture systems, specifically agricultural biological diversity ("Agro-biodiversity") (Andersen 2010, Altieri 2009). PGR are embodied in seeds that farmers plant. Certain traits are found in the genetic codes of seed that provide direct benefits to farmers and indirectly to those people associated with the production, consumption and conservation of those seeds (Lipper *et al.* 2010; Louwaars 2010). Specifically, farmers' varieties of seed are an important component of global PGR in both industrial and indigenous agricultural usage (Cleveland and Murray 1997; Lipper *et al.* 2010; Nazarea 2005). In this study farmers' varieties (also often referred to as folk crop varieties, landraces or traditional varieties) are: "geographically or ecologically distinctive populations which are conspicuously diverse in their genetic composition both between populations and within them and are the product of local selection by farmer breeders" (Cleveland and Murray 1997). These varieties contain a vast amount of genetic diversity, with traits that are: important to feed a growing population, can adapt to marginal growing areas, pests, diseases, climatic changes such as drought or flooding; and require less chemical or fertiliser inputs (Cleveland and Murray 1997; De Schutter 2010; FAO 2010; Navdanya 2009).

As genetic erosion occurs we loose these traits and this in turn impacts on our resilience to withstand disturbances. Resilience in this sense refers to our social-ecological resilience, namely the capacity of our systems to absorb disturbances (such as hazard or climatic events or social, economic or political instances) and reorganise through these periods of change, but still be able to essentially retain our same functions and structures (Folke 2006, Resilience Alliance 2011). I will discuss resilience in greater detail in Chapter 3. Importantly, the impact of genetic erosion of farmers' varieties reaches further than the loss of seed – it extends to the loss of culture, memories and knowledge contained by the gardeners and farmers that are associated with those varieties (Aistara 2011a, Brush and Meng 1998; Nazarea 1998, 2005). For when the seed is gone, with it go these practices. In this study, I define seed practices to encompass: *the practices that gardeners and farmers do associated with their seed such as cultural norms and traditions, stories, songs, growing plants specifically for seed, saving and storing the seed for another time, sharing and exchanging the seed with friends, neighbours or through seed exchange networks*. Such practices are an important component of the resilience of communities and ecosystems (Barthel *et al.* 2010; Berkes and Turner 2006; Nazarea 2005). The twin impact of genetic erosion is therefore this cultural erosion which occurs when the PGR such as farmers varieties' are lost.

#### 1.2.1 Reasons for the cultural and genetic erosion of farmers' varieties

An identified driver for the global trend of the genetic erosion of farmers' varieties is the "shift from traditional production systems depending on farmer varieties to modern production systems depending on released varieties" (FAO 2010). This is specifically referring to the decline in biodiversity caused by changes to land use practices in our agricultural systems. Large scale industrial agriculture, based on monocultures (i.e. a one crop stop) has pushed farmer varieties of seeds and farming practices that favour biodiversity, specifically agro-biodiversity to the side, instead favouring homogeneity (Andersen 2010; De Schutter 2010; Nazarea 2005). Of the 1.5 billion hectares of farmland in the world, 91% is now dedicated to monocultures largely comprised of corn, soybeans, rice and wheat and the result of this intensive agriculture is an associated reduction in diversity of crops per tillable land unit (Altieri 2009). While industrial agriculture has resulted in increased yields for some farmers, mainly through mechanisation, genetic alterations to PGR and the development of agrochemicals for fertilisation and pest/weed control, this approach has come at a cost to ecosystems and agro-biodiversity (Altieri 2009; Beus and Dunlop 1990). Importantly, for the focus of this study, an associated cost is the impact of that system on the ability of farmers and gardeners to maintain their seed practices. For farmers, the industrial agriculture model is an alluring and powerful system, with mechanisms in place to attract them to change from their own seed varieties to those which are bred, engineered and aggressively promoted (Altieri 2009; Andersen 2010; Navdanya 2009; Nazarea 2005).

Further, recently there has been growing consolidation of the global commercial seed sector, with a risk of monopoly power in the seed market harming farmers who cannot access such markets or do not wish to do so (Louwaars 2010). A corollary of this is that legislation is often drafted in favour of seed companies through patents and in favour of plant breeders, rather than farmers (Andersen 2010; Cooper 2002; De Schutter 2009; Kloppenburg 2004). These factors tend to render farmers and gardeners, with their insightful knowledge and memory of seed practices, on the margins and at risk of losing these important skills and traditions (Nazarea 1998, 2005). Thus, in the current study I concentrate on where the knowledge and memories of gardeners associated with their seed practices run the risk of being pushed to the margins and being lost. My central focus is to highlight the importance of city gardeners and their role as holders of knowledge, memory and skills pertaining to PGR, crucially, their seed practices. This is the foreground of my study and it is set against the dual theoretical backdrop of resilience and marginality studies. I raise the importance of seed practices, particularly marginalised ones, to be included as a factor taken into account in resilience studies. To do so, I study the stories of gardeners in Havana City, Cuba where there is an abundance of Urban Agriculture ("UA") and diverse practices regarding seeds.

#### 1.3 Research gap: UA and seeds

Urban gardens provide the ideal setting to study a potential cultural erosion of seed practices. Home gardens are being recognised for their high levels of PGR, contribution to agro-biodiversity and provision of ecosystem services, as well as being applied to broader studies of conservation practices in communities (Barthel *et al.* 2010; Galluzzi *et al.* 2010). The reason

for researching seed practices in urban gardens stems from two research gaps that I have found within the context of genetic and cultural erosion of PGR. First, I have identified that there is a difference between studies of rural agriculture and UA relating to seed systems (Figure 1). While many studies focus on the importance of farmer-saved seed in rural areas, the importance of seed in the urban counterpart is rarely researched. Secondly, I have found that Havana City, Cuba creates an enabling setting to study seeds in an urban context given the presence of both formal and informal seed sectors throughout Cuba and because for at least twenty years Cuban UA has been well established as part of the country's larger push to agroecology.





The backbone of this study is the theoretical framework based on resilience approaches, which is outlined in Chapter 3. The importance of seed practices as a factor in community resilience will be explored through assessing the relationship between seed practices and gardeners' knowledge and memories, along with their type of gardens. How this ties into marginalising seed-savers and their practices will also be explored, but first I outline the research objectives, questions, outcomes and targets.

#### 1.4 Research aim

The overall research aim of this study is:

"To explore the seed practices in city gardens of Havana City, Cuba to highlight the importance of seed practices as a factor to be taken into account in resilience studies."

#### 1.5 Research objectives

In light of this aim, my research objectives are:

- To clearly show, through examples, a variety of seed practices that are occurring in an urban setting and thereby draw attention to the importance of such seed practices for practitioners and policy makers addressing *both* UA and seed policies;
- To share the stories, knowledge and memories of city gardeners in Havana, Cuba;
- To draw attention to "the margins" of agricultural systems in order to highlight the variety of practices that are occurring in such settings and to therefore learn from those examples;
- To demonstrate the importance of incorporating seed practices in resilience approaches when assessing communities and agricultural systems; and
- To show the potential for resilience approaches to take into account activities that are occurring on the margins.

# 1.6 Research questions

In light of these objectives, my research questions are:

• How do the knowledge and memories of seed practices influence gardeners in their gardens today? (Research Question 1; Chapter 4).

- In light of the answers to the above, what, if any, seed practices are marginalised? and (Research Question 2; Chapter 5).
- How does the marginalisation of certain types of seed practices influence the resilience of a community? (Research Question 3: Chapter 5).

## 1.7 Target group

In answering these research questions and in fulfilment of these research objectives, I have the purpose of addressing the following target groups:

- Students, researchers, practitioners, regulators and policy makers in the following fields: resilience studies; agriculture; agro-ecological farming practices; agro-biodiversity; community conservation; permaculture; gardening; seed systems (informal and formal); urban planning; plant breeding; and farmers' rights to seed.
- All gardeners and seed-savers.

#### 1.8 Seed systems in rural and urban agriculture

There is a large amount of literature on both UA (ETC 2006; FAO 2001; Mougeot 2005) and the separate topic of seeds (Cleveland and Murray 1997; FAO 2010; Lipper *et al.* 2010), but much of the research on UA to date seems to omit as a key issue the very starting point from which gardens grow: seeds. Moreover, the parallel set of literature on seeds and farmers tends to focus on rural farmers rather than city gardeners. Within the broader topic of seeds (and applicable to both rural and urban systems) is an important categorisation of the types of seed sectors (Cleveland and Murray 1997; Lipper *et al.* 2010). Seed sectors can be defined as either *formal* or *informal* based on the source and process by which seed is identified and produced (FAO 2004, 2010; Lipper *et al.* 2010). The formal sector is comprised of certified seeds produced

by scientific breeding and then distributed via commercial outlets, with farmers and gardeners accessing seed through purchase or perhaps via subsidies or emergency seed relief. The informal sector tends to be comprised of farmers' varieties (defined above) that have been developed by farmers over centuries and also recycled improved varieties (seeds of improved varieties from farmers' harvests, also sometimes referred to as "creolised" seed). In the informal sector, seed is generally saved from farmers' harvests, circulated within families or communities, in-kind exchanges or gifts, and often sold in local markets. Throughout this thesis I repeatedly refer back to this distinction between sectors, but note that for gardeners, the distinction is not always so clear.



Figure 2: UA in Havana City, Cuba. Source: Author's photo.

#### 1.8.1 Seed sectors in UA

With a change or absence in distribution, or a shortage of seeds, the foundation of UA is threatened. Without seeds farmers cannot grow crops. In turn they cannot feed themselves or provide to their markets. Therefore, I explored the extent to which contemporary literature on UA addresses the need of growers to access seeds and a safe supply of them. I found that key themes relating to food security, poverty alleviation and urbanisation often justify creating and maintaining urban gardens by organisations and authorities (FAO 2007; Mougeot 2001; Redwood 2009). A large component of the reports on UA debates how to define the concept. Definitions vary and contain numerous elements (ETC 2003; Mougeot 2001). Rather than explain the intricacies of UA definitions in this study, I prefer to use the less loaded term "city gardens" for the gardens that I study and note that these gardens focus on predominantly food producing spaces (vegetables, fruit, herbs, medicinal plants, rabbits, chickens and eggs) but also have some ornamental plants present (Figure 2).

Some UA researchers do mention the role of seed in communities when undertaking field work (Mougeot 2005). Naturally, the secure supply of raw materials such as seed, fertiliser, compost, water and soil to the gardens is valued by farmers. Often this issue will take priority over others. For example, Mayeko (2009) notes that while farmers in DR Congo were exposed to pesticides and herbicides they were not overly concerned about health impacts of their actions, but instead noted a lack of seeds, lack of fertiliser and lack of financial support as constraints to their livelihoods. Moreover, given the importance of seed in establishing gardens, cities often have seed networks to supply their farmers. Prain & de Zeeuw (2007) note Dar es Salaam (Tanzania), Dhaka (Bangladesh), Manila and Baguio (Phillipines) and Havana (Cuba) as examples of cities with community, local or central government seed systems to supply seeds to urban farmers at low prices.

Seed management plans should also form an integral part of the set-up packages for UA. A key strategy of this is to encourage the networking with and establishment of seed networks, involving households, schools, city health centres and central/local government, along with support organisations (Prain and de Zeeuw 2007). ETC (2006) note other seed programmes occurring in UA are: tax incentives for micro-enterprises that produce and supply ecological fertilisers and seeds (Cuenca, Equador); seed zones created to provide for high quality seeds of selected crops (Xiaotangshan town, Beijing); provision of free seed programmes (Botswana); subsidies or micro-credit directly to farmers for main agricultural inputs, including seeds; and set-up packages, that include compost, tools and seeds (for example, NURTURE programme Marilao, Phillipines).

It seems many cities have pro-active programmes in place to help farmers access seed, utilising both market-based instruments and local initiatives, such as reciprocal seed swaps. In light of this, I have found there is a clear desire by many organisations within cities to promote the informal seed sector for UA. It suggests that a secure supply of seeds is just as important to UA processes as their farming colleagues in rural agriculture. In fact, many of the principles for the seed sector in rural agriculture will be transferable to the less researched urban counter-part. I turn now to the context of the present study in Havana City, to outline the Cuban approach to its city gardens: how they were established out of necessity, the agro-ecological farming principles on which they are based, the different types of gardens found and how the Cuban seed system works within those gardens.

#### 1.9 Cuba's story

# 1.9.1 Country profile

The Republic of Cuba is located in the Caribbean Sea, at the entrance to the Gulf of Mexico and is an archipelago with a total surface area of 110,860 km<sup>2</sup> and a length of 1,200km (Figure 1) (Funes 2002). The climate is tropical, characterised by abundant rainfall from May to October (annually 1,300mm) and an annual mean temperature of 25°C (Funes 2002). The population is 11,239,000 and seventy five percent of that population is urban (Wright 2009).



# 1.9.2 Social and agricultural history

Cuba's agricultural history is intrinsically inseparable from the social and political fluctuations the country experienced in the 20th Century and those that still affect it today. Both domestic and international policies have shaped the way Cuba's society is run and its agricultural scenario is a product of those policies. I outline below key points in the agricultural sector's history to provide context for the present research.

#### 1.9.2.1 20th Century Pre-revolution (1900-1959)

In the first half of the 20th Century, Cuban agriculture was dependent on large scale monoculture sugar plantations. 75% of Cuba's exports were from sugarcane which were subject to the world prices for sugar (Wright 2009). Overall, land for the plantations was held by an elite few large land holders ("Latifundios") with many Cubans landless and unemployed (Wright 2009). In the 1930s 95% of land was in private ownership. There were also smallholder farmers practicing traditional agriculture at this time ("Minifundios"). In 1946 Campesino farmers (smallhold subsistence or pesanat farmers), who were practicing diversified agriculture on land between 5-75ha, contributed to approximately 50% of the country's agricultural production but on just 25% of the land (Funes-Monzote 2010).

#### 1.9.2.2 Post-revolution (1959-1989)

Agricultural practices in Cuba were dramatically altered by the 1959 Revolutionary overthrow of President Fulgencio Batista. From that point on the agricultural sector became one of the key foci of the new communist administration, who set about significant agrarian reform for the country (Funes-Monzote 2010; Rosset 1997; Wright 2009). Table 1 outlines the Post-Revolution agricultural history of Cuba.

	Table 1: Timeline o	f social and polit	al factors that influe	nce agriculture in C	Cuba from 1958 - 1989
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Key date	Event	Effect
1958	Pre-revolution land agrarian law by revolutionaries	Farmers working less than 2ha became owners of that land. Farmer tenants on private land less than 26ha should receive land without charge (Wright 2009).
1959 (May)	First Agrarian Reform Law	The removal of latifundios. Private ownership of land was reduced to a maximum area of 402ha. Land was set aside for export crops or to supply urban areas permitted up to 1342ha. Every farming house (of more than 5 members) was supplied with 27ha with a right to buy up to 67ha (Wright 2009).
	USA cancelled contracts for Cuban sugar	Cuba sold sugar to Soviet Union (for up to 5.4 times higher than world price) (Rosset 1998; Wright 2009).
1960	USA forbade exports to Cuba	Cuba became reliant on Socialist Bloc for goods it could not produce itself (including petrol, gas, certain food, fertilisers, pesticides and machinery) (Wright 2009).
1963 (October)	Second Agrarian Reform Law	Land holdings greater than 67ha were nationalised. Agriculture centrally organised. Farmers produced pre- determined crops, sold to the State. Farmers were required to form Cooperatives. Approximately 70% land (80% sugarcane) under state control (Wright 2009).

1964	USA trade	Dependence on Soviet Bloc increased (Rosset 1997).
	embargo bans	
	Cuban imports	
1960s	Sugar	Result was a decline in the domestic food production, which
	monocultures	led to the State developing cattle and dairy, pigs and poultry,
	and trade with	rice and citrus (for export) (Rosset 1997; Wright 2009).
	Soviet Bloc.	
1972	Cuba joined	Cuba was a part of the Council for Mutual Economic
	CMEA	Assistance (CMEA) the economic organisation of communist
		states, which allowed it to sell goods on the socialist market
		of Eastern Europe (Wright 2009).

The First (1959) and Second (1963) Agrarian Reform Laws reduced land ownership size (capped at 400ha) and passed ownership of rented lands to peasants (Funes-Monzote 2010; Wright 2009). Funes Monzote (2010) outlines the four objectives of this land reform were: "(1) to meet the growing food requirements of the population; (2) to generate monetary funds through the exportation of products; (3) to obtain raw materials for the food processing industry; and (4) to eradicate poverty from the countryside". The government's intention to depart from conventional agriculture at this point was explicit, sought to strike out its dependency on monoculture agriculture (Funes-Monzote 2010).

However, this did not pan out so well in reality. Instead, the Government's reliance in the following decades was on monocultures to grow staple products such as sugar, citrus, tobacco and coffee, to be traded with Soviet Bloc countries (Funes-Monzote 2010). In 1985 economic growth peaked in Cuba (Brundenius 2009). Cuba had sustained growth from 1970-1984. By 1988 Cuba sent 81.7% of its total exports to Eastern European countries, with 83.8% of its imports coming from those countries (Brundenius, 2009). At this time the Cuban agriculture sector was one with large amounts of state owned land, high mechanisation levels, crop specialisation, and high input usage and largely mirrored the Soviet agricultural system (Funes-Monzote 2010; Funes 2002; Wright 2009). For example 48% of fertilisers and 82% of pesticides were imported by Cuba in the late 1980s (Rosset 1998). These import dependent agriculture, seed and food systems were forced to change with the collapse of the Soviet Union from 1989.

#### 1.9.2.3 Special Period - now (1990- 2011)

The fall of the Soviet Union meant Cuba could no longer rely on the inputs of fertilisers, pesticides and farm machinery including replacement parts and the diesel to run equipment (Funes 2002; Nelson *et al.* 2009; Rosset 1997). Farmers were hit hard. Large state farms that were dependant on inputs to maintain the monocultures suffered and many collapsed. Slightly better off were smaller scale farmers, with more diverse agricultural systems, although these only made up 12% of total agriculture in 1988 (Funes-Monzote 2010). With reduced foreign exchange to Eastern Europe came a severed source of food imports from that region. In response, the Cuban government commenced the "Special Period in Time of Peace" ("Special Period"). The economic reforms of the Special Period directly affected agriculture in numerous ways. Table 2 summarises the key social and political factors influencing Cuba at this time.

Table 2 Timeline of social and political factors influencing agriculture for Cuba in the early 1990s

Key date	Event	Effect
1989-1990	Collapse of	The entire nature of Cuban political, economic and social
	Soviet Union	systems affected. Cuba enters a national state of crisis.
	countries and	
	CMEA	
1990	Commencement	To cope with the crisis, the government announced
	of the "Special	nationwide economic reform and rationing. With an
	Period in Time	absence of imports of food and raw materials for
	of Peace"	agricultural inputs, the focus shifted to a new model of
		farming to feed the people of Cuba (Wright 2009)
1993	"Alternative	Land management reforms led to the establishment of:
	Model" for	Basic Units of Cooperative Production (UBPCs); Credit and
	agriculture	Service Cooperatives (CCSs); and Agricultural Production
	introduced	Cooperatives (CPAs) as farm types (Nelson et al. 2009) (see
		Table 3).

1994	Agriculture	Farmers have a quota for produce sales to the state
	markets	purchasing and distribution agency. Any left over or
	"Mercados	"surplus" produce is now allowed to be sold in the markets
	Agropecuarios"	(Enriquez 2003).
	established	

Essentially, a country on par with many around the world for its industrialised agriculture had the metaphoric grass ripped from beneath it. This resulted in food shortages with a lack of domestic food production. Rosset (1997) describes how Cuba had to: "dramatically increase food production without significantly affecting earnings from export agriculture, all virtually without the chemical inputs and machinery on which it had become dependent". Not an easy feat and it came at a cost to society. The situation led to reduced food ration allowances per citizen, and an increase in malnutrition. Calorific intake declined and weight loss spread across Cuba to the detriment of citizen health. However, the country's food ration system in place since the 1960's served to ensure equitable food distribution and is attributed to the country avoiding famine (Funes-Monzote 2010). The economy entered a stage of stagnation (Brundenius 2009).

#### 1.9.3 Rural agriculture reforms

In the year 1993 reforms followed, many of which went back to traditional farming methods. The Ministry of Agriculture ("MINAG") adopted the "Alternative Model" for agriculture, with the objectives of diversifying agriculture, replacing machinery with man and animal power, adopting integrated pest management to reduce reliance on pesticides, researching and developing new techniques, implementing a large scale agro-ecological methods training programme, encouraging cooperation amongst farmers and discouraging urbanisation (Funes 2002; Nelson *et al.* 2009; Rosset and Benjamin 1994). Table 3 summarises the landownership categories associated with these reforms. To implement this, introduced policies focused on organic and more traditional, diverse methods of farming such as those practiced by

the peasant farmers in the countryside (hereinafter "Campensinos") (Funes 2002). Land was divided and the government bolstered state research into bio-control products and investments in agro-ecological research and programmes (Nelson *et al.* 2009). This period has been informally dubbed the "silent third Agrarian Reform law" (Funes-Monzote 2010), given its widespread and long term implications for Cuban land management.

Importantly, subdivision of large state farms occurred into UBPCs, which are worker owned enterprises or cooperatives that allow collectives of workers to lease state farm lands rent-free in perpetuity with the government still retaining property ownership (Funes 2002). UBPCs quickly dominated the landscape, with the majority of land held in this form of ownership as they still are today. Farming became difficult without inputs with rural farmers suddenly reliant on oxen and hard manual labour in the absence of mechanisation – a luxury foregone without petroleum inputs and spare parts or replacements for broken and old machinery (Perez Rojas and Echevarria Leon 2001).

Land ownership category	Description
Credit and Service Cooperatives (CCSs)	Cooperatives in which each member
	remains largely responsible for the
	management of his or her land parcel. Most
	common form of non-state land tenure.
Agricultural Production Cooperatives	Cooperatives with a more communal
(CPAs)	manner than CCS. Decisions are made by a
	management board and land is managed
	collectively by the cooperative community.
Basic Unit of Cooperative Production	Land previously belonging to state farms and
(UBPC)	also run as cooperatives with management
	boards. In 1997 400ha of these were devoted
	to UA and now a common land title in UA.

Table 3: Type of land management system implemented by the Alternative Model (Nelson et al. 2009)

#### 1.9.4 Urban Agriculture development

While Cuba was undergoing significant reforms in the rural agriculture sector, one of the biggest policy changes came to affect the urban areas. During the 1990s state wide UA programmes were initiated by the government, which played an important part in fulfilling dietary requirements of the nation (Altieri *et al.* 1999; Companioni *et al.* 2002; Wright 2009). The concept of intensive gardens to supply urban food stemmed from military gardens feeding the troops, which had begun prior to the commencement of the Special Period. The initiative was then stepped up. Soon every municipality had urban gardens introduced to feed the people and these are still present today (Funes 2002). Although there is variance between exact figures of how much food urban production provides, Wright (2009) suggests that by the end of the 1990s urban supply was providing approximately five percent of Cuba's overall food needs.

Extensive sub-programmes for urban and sub-urban gardens exist and these are operated by MINAG, through the National Group of Urban and Sub-Urban Agriculture (*Grupo Nacional de Agricultura Urbana y Suburbana*), who issue annual Guidelines ("Lineamientos") to regulate these practices. These guidelines are issued yearly and have twenty eight (urban) and thirty (sub-urban) sub-programmes outlining details ranging from land use to logistics, capacity building, animal health, soil, organic compost, pests, diseases, specific fruits, vegetables and animals and seeds (Funes-Monzote 2010; MINAG 2010). By 2006, UA in Cuba had risen to 4.2 million tonnes and was employing 354,000 people with a significant associated network of markets and supply stores (Funes-Monzote 2010).

Figure 4: Sembrando Voluntad, a special magazine extract from La Tribuna (Circa early 1990s<sup>1</sup>) (Source: Author's photo).



Newspapers and magazine articles in Havana from the early 1990s suggest that the government was on a campaign to educate people about the benefits of gardening in urban spaces, with information on how to grow vegetables and retain medicinal herbs and plants for health and well being (articles noted from Tribuna, Granma and Agriculura Organica) (see Figure 4)(Funes 2002; Wright 2009). Urban gardens supplied vital minerals and vitamins to a malnourished and food scarce society, through ensuring vegetables were widely available in urban zones (Alteri *et al.* 1999; Wright 2009). Cuba's story is widely researched and cited in literature as a success story for UA (Buchmann 2009; Gonzalez Novo and Murphy 2001; Wright 2009), food security (Altieri *et al.* 1999; Killoran-McKibbin 2006; Koont 2008) and organic gardening (Funes 2002; Nelson *et al.* 2009; Rosset and Benjamin 1994) and accordingly provides a great setting to study seeds in the context of UA.

18

<sup>&</sup>lt;sup>1</sup> This state newspaper is not dated. The date was identified by its owner.

## 1.10 The growth of agro-ecological farming methods

Amidst this setting is an agriculture system fundamentally based on agro-ecological farming (Funes 2002). The difficult times of the early 1990s enhanced the role of this low input method of farming given Cuba's lack of synthetic fertilisers, hybrid seeds, and oil for mechanised large scale farming. The urban gardens in Havana City are no exception to this, with many gardens operating based on these principles (Figure 5). Agro-ecological farming is an alternative to conventional agriculture which has widened the agriculture discourse and within that, the style of agricultural practice discussed and performed (Altieri 2002). Although around for a long time, given the global decline in PGR and loss of agro-biodiversity around the world, agro-ecological farming is entering the international spot light on issues of alternative agriculture systems and food security (De Schutter 2009, 2010). Cuba's agriculture system is a notable case (Funes-Monzote 2009; Nelson *et al.* 2009). The principles form the basis of its farming system and it has an extensive Agro-ecological Farmer to Farmer Movement ("Movimiento Agroecologico Campesino a Campesino") ("MACAC") represented in 85% of all municipalities in Cuba and employing facilitators and promoters (Funes-Monzote 2010; Rosset *et al.* 2011).

Figure 5: An example of agro-ecological integration in UA, Havana, Cuba. (Source: Author's photo)



In practical terms, agro-ecological farming objectives are applied and adapted specifically to local situations (Alteri 2002; Rosset *et al.* 2011):

- a) Increase the recycling of biomass and achieve a balance of nutrient flows.
- b) Ensure favourable soil conditions by covering soil with mulch or cover crops to guarantee a high level of soil organic matter and active soil biology.
- c) Minimise nutrient losses from the system, through relatively closed rather than open system design.
- d) Promote the functional biodiversity of the system, including within and between species diversity, above and below ground and landscape level biodiversity.
- e) Promote increased biological interactions and synergisms among system components that can sponsor system services like regenerating soil fertility and providing pest management without resorting to external inputs.

Rosset *et al.* (2011) report that external factors such as local resources, labour, family conditions, farm size and soil type will influence the choice of practice. In agro-ecological farming, the need for chemical pesticides and fertilisers is negated. In this regard, agro-ecological farming is considered different to some organic farming practices which instead have a system of substituting toxic inputs with ones that are less noxious, which would be considered input substitution for agro-ecologists. Rosset *et. al* (2011) contrast this input substitution with agro-ecological integration, which reduces off farm inputs to a minimum and is the method employed by agro-ecological farmers. A farm will therefore have a greater or lesser degree of agro-ecological integration.

#### 1.11 Types of gardens in Havana City, Cuba

The city gardens present in Havana City that are relevant to this study are: Organiponicos (and semi-protected Organiponicos), intensive gardens ("Huertos Intensivos"), patio and parcel gardens ("parcelas" or "parceleros") and permaculture gardens. Cuban city gardens have a particular style to them. The warm, tropical climate on the island lends to good growing conditions. All city gardens have the following features:

- a lack of external inputs such as machinery and synthetic fertilisers instead organic compost is made (often on site, sometimes with the assistance of animal manure or by purchasing biofertilisers);
- 2. bright flowers (such as marigolds) planted at the ends of rows to deter pests;
- 3. some type of irrigation system; and
- 4. at least 10-15 different types of herbs and/or vegetables and fruit growing but usually delineated from each other in separate rows, pots or parts of the garden.

In the following part of this Introduction, I describe the key features of each type of garden.

#### 1.11.1 Organiponicos, Semi-Protected Organiponicos and Huertos Intensivos

The observable difference between these modes of gardening is that Organiponicos contain their trademark raised beds, often with tiles (*'zines''*) or brick around the outside whereas in the Huertos Intensivos plants are sown directly in the ground where soil is of better quality (Figure 6). Location and soil quality will often determine which is preferred (Companioni *et al.* 2002). Organiponicos provide a solution to poor quality soils and have the added benefits of retaining water and nutrients, and make the transition from disused or abandoned waste sites to more productive ones easier through the use of raised beds (Companioni *et al.* 2002). Organiponicos with shade cloths or awnings or partially enclosed to protect from the sun and

high temperatures are known as Semi-Protected Organiponicos (Figure 7). Sometimes the gardens are a mixture.

These three methods are used for large and medium scale vegetable and herb production throughout Havana. State sectors such as hospitals, military and government departments will often have their own Organiponicos or be supplied by a cooperative. Often reports on UA in Cuba refer to Organiponicos more generally to describe the style of large- scale state owned or cooperative run gardens that sell at the garden gate to the neighbourhood (Wright 2009), which is common in Havana. But, the use of raised beds to improve soil quality is also a feature of patio/parcelero gardens.

Figure 6: Huerto Intensivo, Havana City: private garden with gate sales of produce (Source: Author's photo).



Figure 7: Semi-Protected Organiponico, Havana City (Source: Author's photo).


## 1.11.2 Patios and parcelas

Size is a key feature of these gardens. Compared to those outlined above these are small gardens. Parcelas (parcels) or Parceleros (small parcels) and Patio gardens are often found along pathways, between houses or on balconies of apartments or houses. The majority of these gardens are private and the plants grown are used for cooking and other domestic uses (dried herbs, teas, medicinal uses) and not sold for profit (Buchmann 2009; Companioni *et al.* 2002; Premat 2009). Some are ornamental and grown for the pleasure of having plants around. The term Popular Gardens ("Huertos Populares") is often used interchangeably with Patios and Parcelos or Parceleros to describe these private gardens that sprang up during the Special Period.

Patio gardens tend to be a mix of herbs, medicinal plants, some fruit trees (if space permits) and often ornamental plants (Figure 8). In the patios, plants grow in containers, pots or whatever can be used. These gardens do not tend to have vegetables present. Instead the usual practice is that vegetables are purchased fresh, usually daily, from local markets or directly from the retail kiosks of Organiponicos.

Figure 8: Patio Garden, Havana City. Most plants are grown in pots (Source: Author's photo).



Parcelas and parceleros are often slightly bigger than patio gardens and while some plants may be grown in pots, raised beds or direct sowing into the ground are also common practices, depending on soil quality. Land may be off-site or near to where the gardener lives (Companioni *et al.* 2002). The key feature is that they are independent from the state and often located on wasteland or sites of collapsed buildings and usually produce is for household consumption. Despite this independence, ministerial endorsement of the practices is often sought and approval for spaces issued (Premat 2009).

## 1.11.3 Permaculture

Havana City contains a number of gardeners practicing permaculture in their gardens. Permaculture is based on a set of ethical principles and design guidelines for creating "permanent culture and agriculture" (i.e. permaculture) modelling these designs on patterns observed in nature and emphasising an interconnection between human creations (e.g. agroecosystems, buildings and communities), humans and the natural world (Aistara 2011b; Veteto and Lockyer 2008). David Holmgrem who, along with Bill Mollison, coined the word permaculture and its founding principles, now extends the definition to "consciously designed landscapes which mimic the patterns and relationships found in nature, while yielding an abundance of food, fibre and energy for provision of local needs" (Holmgrem 2007). In 1993-94 permaculture principles were introduced in Cuba, partly in response to the problems of the Special Period. Permaculture has since been promoted nationwide by the non-governmental organisation ("NGO") Fundación de Antonio Núñez Jiménez de la naturaleza y el hombre ("FANJ").

Figure 9: Permaculture garden, Havana City, The gardener uses a combination of pots, raised beds and direct sowing in her garden, which was once a waste site (Source: Author's photo).



In Cuban cities, permaculture gardens combine both huerto populares and huerto intensivos styles with the agro-ecological techniques common to both systems (Figure 9); however permaculture gardens extend these concepts further to engage community wide involvement and adhere to its particular design principles. Of particular relevance to this study is the extensive work that FANJ undertake in training promoters of permaculture and also the urban seed-saver network they developed to conserve and use locally adapted seed varieties, with producers multiplying seeds, which are then distributed to other producers (Wright 2009). Specifically, the permaculture principle to "use edges and value the marginal" is relevant to the present study. This draws on processes occurring in ecosystems where edges and margins are important for interfaces between communities, value of soil as an edge and the importance of expanding pre-existing edges to increase productivity (Aistara 2011b; Holmgrem 2007). This is depicted as Principle 11 in Figure 10.

Figure 10: Permaculture principles and ethics (Source: Permaculture Principles (2011).



# 1.12 Seed system

"Because without seeds what are you going to do? You can have all the oil in the world but if you don't have seeds, you have nothing." - Cuban scientist.

#### 1.12.1 Formal seed system

Prior to the start of the Special Period, there was not considered to be a problem of formal seed supply in Cuba. Cuba's system mirrored the Green Revolution model in many ways. The state seed sector was in control of selection, reproduction, storage and dissemination of seeds (Wright 2009). Similar to the Soviet system, Cuba had a centralised plant breeding model and the principle sources of genetic variation within that model were the "introduction of foreign varieties, hybridisation, landraces and mutation" (Ríos Labrada *et al.* 2002) and it would usually take 10-12 years for varietal development of a particular crop with sugarcane, roots, tubers, rice, tobacco, horticultural crops, pasture grasses, grains, fibres and some fruit trees the subject of research in the 1980s (Ríos Labrada *et al.* 2002). Since the commencement of professional plant breeding programmes in Cuba at the turn of the 20<sup>th</sup> Century, the inclusion of farmers' varieties has been common practice, by rouging the seed population (ie. the removal of undesirable plants and traits from seed production plots) or through selecting favourable off types within landrace accessions (Ríos Labrada *et al.* 2002)

During the Special Period the formal seed system collapsed, because of a lack of necessary inputs for research and distribution in plant breeding and because the high yielding seed varieties used performed poorly under the new conditions of low inputs (lack of mechanics and fertiliser) (Hasenhündl 2008). Policy makers sought research of varieties that would be successful under low-input conditions (Ríos Labrada *et al.* 2002). Wright (2009) notes that at that time farmers held little autonomy over seed selection and production, despite their reasonable knowledge of seed management. During the 1990s the state seed sector remained centralised, but struggled to fulfil its functions. Access to adequate seed varieties and seed quality was identified as one of the highest input constraints to farmers' production from 1999-2000 (irrigation fuel and fertiliser access were the most important) (Wright 2009). The result was farmers using poor varieties of seed, reduced levels of diversity, and a black market arising throughout the country (Wright 2009).

Further, the increased gardening of the successful UA sector meant that the state Seed Enterprise was unable to meet seed demand, especially at peak times (Wright 2009). Many urban farmers were self-sufficient in producing local varieties, but for salad varieties, not native to Cuba, new seed stocks were being imported each year (Wright 2009). This was a factor contributing to the establishment of the network of municipal seed farms that exist today. In 1999 along with a nationwide programme of decentralisation, responsibility for seed certification passed from the Seed Enterprise to the National Institute of Plant Protection ("Sanidad Vegetal") with regional stations to oversee seed supply at a municipal level (Wright 2009). There are now seed farms in every municipality nationwide, and these Seed houses ("Casa de las Semillas") or Seed farms ("Fincas de las Semillas") provide seeds to Co-operatives and agriculture supply shops ("Consultorios tiendas agropecuarios") ("CTAs") that sell these to individual gardeners or farmers and also to Co-operatives running city gardens.

## 1.12.2 Informal seed system

In the 1980s an investigation of crop genetic resources in Cuba suggested that the majority of PGR in Cuba were being maintained by farmers in non-industrial settings, such as home gardens and subsistence farms (Ríos Labrada *et al.* 2002). With the collapse of imported seed during the Special Period, it became apparent that small-scale farmers were "filling important gaps" in agricultural productivity through using their own knowledge of PGR (Ríos Labrada *et al.* 2002). The degradation of the formal sector at this time forced farmers to adopt such practices, for example while rural farmers obtained some of their seed from the state Seed Enterprise, up to 20% of this did not germinate so instead some CCS and CPA cooperative farmers would obtain seeds from neighbours and seed-saving practices (Wright 2009). However, some areas reported a decrease in such practices during the Special Period due to theft of seed crops and also challenges associated with seed storage and the inability of farmers to travel as they once had for seed prospecting (Wright 2009). Wright (2009) also observed a difference between property ownership types, for example CCS farmers were more likely to use farmer varieties and self-saved seed, whereas UBPC farmers were supplied by the State Enterprise.

There were also numerous information campaigns by the government on gardening at that time. In the 1990s magazines and publications such as *Se Puedel*, produced by FANJ, provided information on how to save seeds, with practical information. For example to avoid issues of humidity store with vegetation ashes, sawdust, or other dried material that is separated and has air/free space amongst it. Other tips included that gardeners must ensure to harvest at the optimal humidity, avoiding times of high precipitation, high humidity and high temperatures and also take care to notice diseases (Fresneda *et al.* 1995).

In Cuba programmes exist that unite farmers, gardeners, scientists across the country and combining aspects of the formal and informal sector (Fundora 2000). From the early 2000s work began with the Participatory Plant Breeding Programme (hereinafter "Fitomejoramiento Participativo") which combines the memory and knowledge of farmers about seed and the scientific background and know-how of researchers and scientists (Hasenhündl 2008). The programme stemmed from the work of Dr Ríos Labrada who sought to bridge the gap between the formal and informal seed sectors, initially with trials on pumpkin varieties and later with numerous others (Ríos Labrada *et al.* 2002). Programmes also exist in UA to build capacity with gardeners and facilitate knowledge and training specifically on permaculture principles, with FANJ actively teaching communities about seed saving and running local and inter-regional seed exchanges (Wright 2009). These programmes are further discussed below in Chapters 4 and 5.

## 1.13 Current study

In light of the above, I have chosen the setting of city gardens in Havana Cuba to explore the topic of seed practices in UA. I have illustrated that there is a strong UA presence in Havana along with informal and formal seed sectors and turn now to addressing those.

## 1.14 Outline of chapters

This thesis is structured so that the next chapter outlines the Methodology of my work in Havana, Cuba and introduces my perspective to the current study (Chapter 2). The Theoretical Framework based on the topics of resilience and margins is located in Chapter 3. Research Question 1, regarding *how the knowledge and memories of seed practices influence gardeners in their gardens today*, is then addressed in Chapter 4. In Chapter 5, Research Questions 2 and 3 are addressed by assessing *whether any of those seed practices are marginalised* and if so, then *does the marginalisation of certain types of seed practices influence the resilience of a community?* 

The Conclusion is located in Chapter 6.

# CHAPTER 2: METHODOLOGY

## 2.1 Putting myself in the margins

I went to Havana City, Cuba to study seed practices of city gardeners. Given that I am researching outside of my country, in a context that I am a foreigner in and in a place that to me is a new setting, it is important for me to be aware of my presence in that country. In my analysis of my data I am dipping into discourses discussing marginality and I discuss groups that are different from my own background and my sense of place. In order to find the margins then, I needed to be sure that I am comfortable with who I am and where I fit in those margins when I found them. Here I outline how I perceived myself in Havana City, Cuba.

I come to these spaces as a person who is not from the margins. I come to these spaces as a white middle class woman from conventional agriculture roots in a country that is dominated by mainstream neo-classical economic policies and capitalist discourses. Even though I come to that space as a person who is not from the margins, I arrive there as one that loves gardens and to garden. Therefore I feel comfortable in those spaces. So, I am not a Cuban city gardener but I am a New Zealand city gardener with a conventional rural agriculture upbringing. To the marginal space of city gardens, I therefore relate and locate myself comfortably in them. This common ground allowed me to relate to the gardeners, many of whom had their roots as Campesinos but, like me, had moved to the city.

I went to Cuba to learn and observe. I offered no suggestions or comments to the way things are done and I was never asked for any. My only personal goal, wrapped up in the bundles of thesis questions, was to learn from different agricultural and seed systems because I can see fundamental flaws in the way the dominant agriculture systems of today are working. In many ways, I am connected to this dominant agriculture system and I am an example personally, of the dominant learning from the marginalised in the same way the dominant economic and agriculture models have a lot to learn from the marginalised ones.

I tried to be as reflexive as I could be throughout the process. I was aware of myself as a qualitative inquirer and the differences between me and those studied. I kept an up-to- date and in-depth journal of my experiences in Cuba. I was constantly asking myself about the perspective that I was bringing to the interviews and my perspective on the responses that those being interviewed were giving me. For example, it became apparent to me that there was a marked difference in the responses of those being interviewed when I had my translator present in comparison to the situations when the translator was not. The interviewees were much more willing to speak and much more open about what they were willing to talk about with the presence of a local person.

The second part of my reflexive framework was concerned with those studied. I wondered how those interviewed knew what they knew, what shaped their world view, perhaps what their perceptions of me were and how I perceived them? (Patton 2001). In the final stage of this methodology and in writing the thesis, the third part of my reflexive triangulated perspective is trying to be aware of how those who read this study, with their unique perspectives, will perceive me and the findings of this study. I am writing this for both those in the dominant space, to learn from the stories of the gardeners on the margins, and for those on the margins to be proud of their practices and to have their stories told.

## 2.2 My Methodology

The three parts to the Methodology are: before, during and after Cuba.

## 2.2.1 Before Cuba

Before Cuba an in-depth literature review on UA and seed practices was undertaken. The methodology employed in the literature review was based on (Hart 2001) and his approach to a literature search known as "Trawling and Mining" (see Figure 11). This is where a broad based search occurs (trawling), which is then more refined and focused on specific aspects to identify key themes and issues in the literature (mining). Trawling can occur again to identify grey literature, and mining is once again conducted to analyse and categorise the contents. Grey literature includes documents that are written for a particular audience and are not readily available via conventional search methods and may be difficult to obtain (Hart 2001). For example, in this literature review, grey literature included literature found in research libraries or given to me by officials, scientists and gardeners while I was in Cuba such as magazines, publications and information pamphlets published by NGOs and research institutes on seed practices, permaculture and gardening.



The purpose of that literature review was to outline the issues facing UA to date and how urban gardeners and their seed practices fit within that context. A corollary of that review was to see the issues currently facing farmers in the seed sector. As noted in Chapter 1, that review highlighted that seed issues are not widely researched in the context of UA. The literature review began quite broadly and then focused in specifically on Cuba in order to gain a global and local perspective on the topics of UA and seed in the context of the study setting. The second aspect to the literature review involved the theoretical framework. Again, following (Hart 2001) I undertook a literature review on resilience. As I explain in Chapter 3, resilience is the common thread throughout this thesis. The literature review helped me to identify research gaps regarding seed practices in city gardens within the discourse of resilience studies (Barthel *et al.* 2010; Buchmann 2009) (addressed below). Later that literature review extended to topics of social memory and margins (Nazarea 2005; hooks 1989).

Those literature reviews form part of the Introduction, Theoretical Framework and also substantive chapters answering my research questions (Chapters 4 and 5). Further, I included

Figure 11: The trawling and mining concept in a literature search (Hart, 2001)

aspects of those reviews specifically in the methodology and research design. For instance, prior research on resilience suggested that key informants are important holders of local knowledge and information regarding community practices (Olsson *et al.* 2004). Accordingly, I included key informants as a central part of the research methodology. Research on the discourses of margins (Nazarea 2005) and reflexivity in qualitative research design (Patton 2001) also encouraged me to adopt a more informal and first-person writing style. I have put to one side my usual more formal writing style, changing my tone. This has heavily influenced my ability to tell the stories of the gardeners from a comfortable personal space and by not assuming a falsely objective space.

## 2.2.2 Research in Cuba

The research methodology on the ground in Cuba was qualitative in nature and followed Patton (2001). His in-depth description of qualitative research methods and the practicalities of undertaking such research, along with the role of the researcher guided my methodology through triangulation, interviewing, observations and document analysis.

#### 2.2.2.1 Triangulation

I triangulated the research design in multiple ways. Triangulation strengthens studies through combining methods, such as using a variety of data sources in a study (Patton 2001). I interviewed three types of actors in the three following groups:

- 1. Gardeners located in: Organiponicos and cooperatives, patio and parcela gardens and the permaculture community.
- 2. Organizations: FANJ, scientific research institutes and government departments; and
- 3. Academics and authors on the topic of Cuban agriculture and seed systems.

It is important to note that I observed within the boundaries of studying city gardens in Havana, that certain gardens occupied more of a central space. In particular, CTA shops, organiponicos and cooperatives are present in every neighbourhood of every municipality. Given this presence these actors are relatively easy to locate (often by walking streets or asking local people). At some sites more than one person would be interviewed, depending on their role, the size of the garden and if they were a husband and wife sometimes both would be interviewed.

Less frequent and less easy to locate are the permaculture communities and organizations such as FANJ that work with those permaculture gardeners. In fact, it was not until after speaking with representatives at FANJ that I learned of the presence of these permaculture communities. While there are many similar communities in and around Havana, I visited only one of these communities. Throughout this thesis I refer to that community as the "permaculture community" and I prefer to see them as a whole and an interconnected system rather than individual gardeners, as this approach is in line with permaculture principles (Holmgrem 2007). However, in my discussions key informants still share their stories. While only interviewing one community is a potential limitation of this study, I note that within that community I visited six different gardens and interviewed eight gardeners, two of whom were "promoters" of permaculture who I considered to be key informants of information on seed practices. Numerous families and people were involved in my tour of the neighbourhood and visits to the gardens. Further, I visited a permaculture garden outside the community that was practicising permaculture principles to sell medicinal plants.

In total I undertook nineteen site visits to gardens in neighbourhoods in the Havana City, Cuba (located in Havana City municipality, as opposed to Havana province). Of these site visits I had eighteen interviews with gardeners (Table 4). I visited four organisations and NGOs around the municipality of Havana City and undertook four interviews with different representatives of those organisations, who were mainly scientists, project managers and directors. These interviews informed me of the bigger picture of the seed and agriculture systems in Cuba. Even though not all interviews are used directly in my data analysis in Chapters 4 and 5 they formed an important aspect of the triangulation giving me an operational overview of the organisations and the programmes they operate regarding seeds and agriculture. Interviews with academics were informal and not included in data analysis.

Interviewee	n	Total
A. Gardeners		18
Organiponico	7	
Patio	2	
Huerto Intensivo	2	
Permaculture gardens	7	
B. People working in		
Organisations/NGOs		5
C. Academics		2
D. CTA shops staff		2

Table 4 Interviews undertaken during field research, categorised by interviewee

On site visits, I inter-mixed interviewing, observations and document analysis. This was natural as many of the people interviewed would also show me reports, books, and seed packages, along with taking me on in-depth tours of their gardens, work places and communities. Numerous photographs and short videos were also taken of each site and often of documents or specimens that I was shown.

#### 2.2.2.2 Interview questions

I created a semi-structured interview design, based on a standardised open-ended interview approach that I created prior to visiting the sites. Depending on responses from the gardeners and their personal preferences of what they were wiling and able to talk about, I emphasised different aspects of those questions in different interviews. Some of these research questions for the gardeners were based on the work of Barthel *et al.* (2010) and the open ended questions that had been asked in that study. Those questions were modified in light of the focus in this study being on seed practices specifically and not allotment gardens. The interview questions that were asked are included in Appendix "A" to this report.

#### 2.2.2.3 Key informants

I used a snowball sampling methodology throughout this research project (Patton 2001). This was true for all three groups interviewed. Key informants or stewards in each garden were identified through asking other gardeners who they would recommend in the neighbourhood that I could speak with. All of the gardeners approached were willing to talk and comfortable with being interviewed. They were open and took their time to answer the responses. In these neighbourhoods gardens were identified randomly, through local recommendations or by noticing them from the street. No monocultures were interviewed, this was not by accident; I could not find any monoculture gardeners in Havana City. Demographically, overall I spoke to more males than females; the female gardeners were permaculture and patio gardeners.

In contrast to turning up onsite and interviewing gardeners, the main difference with interviews of academics and organizations was that they were slightly more formal. For example, academics were contacted via e-mail sometimes months in advance of the interviews, given their hectic schedules and that they were often out of Cuba, this was the best way to contact them. I made appointments with the NGO FANJ and science institute representatives by telephone and visits to their offices. These interviews provided an important perspective on the agriculture and seed systems, providing overall background and context to the gardens and programs in place in Havana City and throughout Cuba. In addition, documents, books, theses, PDFs and other resources were sourced from these organizations (enhancing grey literature (Hart 2001)).

#### 2.2.2.4 Cross-cultural setting

In order to overcome the barriers of a cross-cultural setting I had a translator present with me who lives in Havana. I am not a native Spanish speaker and my spoken Spanish is conversational but not fluent. In addition to translating for me, my translator also assisted in gaining rapport with the gardeners and in many ways helped me gain access to and feel comfortable in this marginal space. Informed oral consent was provided in advance of interviews and interviews were given in confidence, even from public officials. In this report the organisations may be mentioned but the representatives are anonymous. Further, I use pseudonyms to refer to gardeners when sharing their stories. Interviews were undertaken in Spanish. After the interview I would first transcribe the interview and comprehensive site notes. Then the translator would transcribe key parts of the interview verbatim in Spanish and English. Any ambiguities in language or nuances were cross-checked by the translator after the transcripts were completed. This assisted in overcoming issues of local phrases and nuances.

#### 2.2.3 After Cuba

Once all the interviews had been transcribed and the text in full quotes checked by the translator, I analysed the interviews for emergent patterns in the data (Patton 2001). A classification scheme was established. Responses were coded into categories: Seed Practices, Memory, Knowledge, and Marginality. Then, within these categories themes that emerged were also coded. It became clear where data began to dovetail in a meaningful way and also where differences among categories were quite bold. A software program was not used for the coding process instead the coding was undertaken by hand with multiple shorthand codes written directly on relevant data passages. Finally, the substantive organization of this thesis corresponds with those four main categories: seed practices, knowledge, memory and marginality. I then analysed these findings in the context of the theoretical framework in order to answer the key research questions. In the next Chapter of this thesis I elaborate on that theoretical framework before addressing those specific research questions.

#### 2.3 Scope and limitations

## 2.3.1 Scope

The scope of this study is restricted to the seed practices, knowledge and memory of those gardeners in Havana City, Cuba. The potential marginality of those gardeners' seed practices are then discussed in the context of the theoretical framework centred around resilience studies.

### 2.3.2 Limitations

In summary, the key limitations were: visiting only one permaculture community, spending only thirty days in Havana City and not being fluent in Spanish. Within the nationwide setting of Cuba, my study was restricted to city gardens in the city of Havana. Results will likely differ in another city in Cuba and the personal perspective of rural gardeners would be different again.

Assessing any system in a vacuum has strengths and limitations. Here, I have studied aspects of the seed and agricultural systems of Cuba to share stories that are held by communities within them. Depending on the perspective of the reader, the following points may be seen as strengths or weaknesses, but either way should be noted. The state owns most of the property and assets in Cuba and the majority of institutes and organizations I visited are also public. The properties containing the gardens that I studied in Cuba are all owned by the state. These are rented or leased or held in usufruct. The formal seed systems and their components are predominantly owned and operated by the state and this may therefore differ from other countries. It also means elements of the system I studied may differ from systems containing private property or company rights, but the key point to note is that the *utility* or *purpose* of gardens will often be similar wherever studied. The gardeners are running businesses and growing their produce to sell for profit while renting their land and/or growing things for

household consumption and/or just doing it for pleasure. This thesis is not directly concerned with private versus public ownership structures. Instead what I hope is that the key themes pertaining to gardening practices and styles elicited throughout the paper are *transferable* and *applicable* in their own right to other settings.

# **CHAPTER 3: THEORETICAL FRAMEWORK**

#### 3.1 Overview

In this chapter I outline the theoretical framework of this study. My approach is twofold: based on concepts from social-ecological systems and resilience approaches, as well as discussions in anthropology and other social sciences. The common thread throughout this thesis, and the topic of this chapter, is social-ecological resilience ("resilience"). As I introduced in Chapter 1, resilience is the "capacity of a system to absorb disturbance and reorganise while undergoing change so as to still retain essentially the same function, structure, identity and feedback" and importantly, is also the ability of systems to renew, reorganise and develop from the opportunities that arise from the disturbance (Folke 2006). Gardens are increasingly being studied for the role they play as social-ecological systems ("SES") and the resilience of those systems (Barthel *et al.* 2010; Buchmann 2009; Tidball and Krasny 2007). This thesis builds on and contributes to that growing field of work.

Moreover, ecologically and geographically gardens tend to be located along margins, which are also important places to study resilience of systems (Nazarea 2005; Thapa *et al.* 2010). The role of seed-savers within these gardens has been studied and specifically, their marginality within the global agricultural system (Nazarea 2005). In this thesis I am exploring the potential of incorporating marginal spaces into studies of resilience in particular communities. Specifically, RQ 2 and 3 address the connections between seed practices, marginality and resilience. Here I introduce the margins I am talking about briefly, and then discuss them in depth in Chapter 5 when I answer RQ3.

Literally, margins are the edge or the border of something, and to marginalise someone or something is to treat a person, group or concept as insignificant or peripheral (Oxford Dictionary, 2011). Metaphorically, and in discussions in the fields of social sciences, studies of marginalisation are not about geographical locations *per se*, nor are they "sites of deviance from social norms" (Tsing 1994). Instead, margins seem to be fascinating, and to me, quite inviting, spaces to study and learn from. They are articulated as: sites to perceive "the instability of social categories" (Tsing 1994) or even spaces of resistance (hooks 1989); and those marginalised are seen more as the type to take advantage of creative openings, have uncanny ways, perhaps be peculiar and even daring (Nazarea 2005). Any negative connotations should be put to one side, in order to "see the value in elements that only peripherally contribute to a function or a system" (Holmgrem 2007). So, with these inviting ideas, what potential inspiration could these spaces hold for those of us concerned about the global cultural and genetic erosion of PGR?

I introduce marginality as a concept here because I am interested in bridging the gap between systems approaches that assess resilience in communities and those tackling problems of the erosion of cultural and genetic agro-biodiversity (Caillon and Degeorges 2007). In short, to solve the latter, disciplines like the former need the creativity and innovation offered by diverse groups on the margins, such as seed-savers and their practices (Nazarea 2005). Similar to the permaculture principle inviting us to recognise and conserve the "value and contribution of edges, and the marginal and invisible aspects of any system", I see gardens as the link between these discussions and the potential for seed practices of gardeners to provide an appropriate lens to explore how we can potentially link these discourses. The intriguing spaces we find at the margins may just unlock the garden gate for us to do so.

First, however, I outline what resilience is and then elaborate on reasons for choosing it as a theoretical framework in the context of city gardens in Havana before discussing its limitations. Against this backdrop, I then explain how I am applying resilience in this study. Specifically, throughout this thesis I am highlighting the importance of seed practices as factors to be taken into account in resilience studies (Research Aim). Later, in the following chapters, this common thread will be enhanced and elaborated on through sharing the stories of city gardeners and their seed practices in Havana City, Cuba.

#### 3.2 Gardens and resilience

Resilience is a way of thinking that provides a context for the analysis of social-ecological systems (SES) (Resilience Alliance 2007; Cumming *et al.* 2005; Thapa *et al.* 2010). Such systems emphasise the integration of humans in nature and the interplay between social and ecological systems in relation to management practices, geographical settings, cultures and ecosystems (Thapa *el al.* 2010; Resilience Alliance 2007). Resilience is important in the context of gardens (Tidball and Krasny 2007). It is important for gardens and their gardeners to be able to adapt and reorganise while undergoing change, mainly because of their utility for community and household food provision. This may be in times of crisis, and in the literature, Cuba's Special Period is cited as an example of this (Barthel *et al.* 2010; Killoran-McKibbin 2006). This may also be for everyday survival (Baumgartner and Belevi 2003; Redwood 2009).

Further, gardens have a role in retaining ecosystem services and biodiversity in city spaces. Cuban home gardens have also been studied as a source of resilience. Buchmann (2009) noted in her research in the city of Trinidad de Cuba, that traditional ecological knowledge interacts with resilience in these tropical home gardens. Further, Barthel *et al.* (2010) studied allotment gardens in Stockholm, Sweden, with an aim to see how and where knowledge and practice linked to the production of ecosystem services are socially retained and temporarily transmitted. The study was based on collective gardening practices in allotments and suggests the significance of social-ecological memory as a resilient feature of urban gardens. Certain seed practices were found important in this (Barthel *et al.* 2010). Seed sharing was an example of "participation" within the social-ecological memory of the community examined and many participants shared seeds. In the current study I aim to build on these findings by combining the

diversity and resilience of Cuban gardens (not just home gardens, but also commercial gardens) as discussed by Buchmann (2009) and focussing on social-ecological knowledge and memory of gardeners, to address the potential of seed practices as a factor to be taken into account in resilience approaches.

Resilience is also about taking into account risks in a system. The risk that a disturbance may occur should be kept in mind, even if it is unclear what that will be. While resilience can also refer to engineering resilience (the speed of return for a system to a steady state), in this study resilience is based on ecosystem or ecological resilience (systems are dynamic with multiple equilibrium states) (Thapa *et al.* 2010). There are three keys aspects to resilience in this context (Folke 2006):

- a) the amount of disturbance a system can absorb and still remain within the same state or domain of attraction;
- b) the degree to which the system is capable of self-organization (compared to lack of organization, or organization forced by external factors); and
- c) the degree to which the system can build and increase the capacity for learning and adaptation.

Resilience in this context originates from the work of C.S. Holling in the early 1970's on resilience and stability in ecological systems (Folke 2006; Thapa *et al.* 2010). Holling took observations from systems in nature and subsequently these have been applied to human situations. He analysed the existence of "multiple stability domains" or "multiple basins of attraction" in environmental systems and how those relate to ecological processes or random events, and the heterogeneity of temporal and spatial scales (Folke 2006).

Regarding the role of resilience in social systems, Kofinas and Chapin (2009) state:

"sources of resilience in social systems provide people with the means to buffer against change...Resilience can also follow from a group's capacity to innovate in the face of new or rapidly changing social-ecological conditions."

Further, resilience extends to where communities can withstand external shocks to their social infrastructure such as environmental variability, or social, economic, and political upheaval (Folke 2006). The principles of resilience as a theory for analysing systems have since been applied to the disciplines of anthropology, ecological economics, environmental psychology, cultural theory, human geography, management, and property research along with other social sciences (Folke 2006).

## 3.3 Resilience in Cuban city gardens

In light of these reasons, I have chosen resilience as an appropriate theoretical basis to ground the study of seed practices in city gardens in Cuba, for three main reasons:

- 1. **Disturbance** to a system is treated as an opportunity in resilience studies, not necessarily as negative (Berkes and Turner 2006; Buchmann 2009). Cuba underwent a political-economic disturbance in Special Period in the 1990s and in response (and out of necessity) came agrarian reform and city gardens (Funes 2002). While assessing that disturbance in terms of resilience would be an interesting study, it is not the focus of this thesis. However I cannot ignore the reasons for the creation of Havana's city gardens and where my study is set.
- 2. **Diversity** of the genetic information held in seeds themselves combined with the intraand inter- genetic resources and species diversity of seeds planted in small spaces such as gardens contributes to resilience in ecosystems (Galluzzi *et al.* 2010). A corollary of that is the cultural memory and knowledge that people have associated with seed (Galluzzi *et*

al. 2010; Nazarea 2005) and this memory and knowledge is also an indicator in resilience studies (Asah 2008).

3. Agro-ecological farming practices are an example of retaining diversity amongst a system to better enable resilience (Berkes *et al.* 2000; King 2008). As I outlined in the Introduction, the city gardens of Cuba are founded on principles of agro-ecological farming systems.

Asah, (2008) clearly conceptualises resilience and the primary and secondary processes involved in this, which are outlined below in Figure 12. Buchmann (2009) also emphasises the resilience of the setting for Cuban gardens and she suggests that all four categories are found in home garden management.



The diagram is a helpful way of visualising indicators of resilience (primary processes) which in turn have their own sets of certain indicators (secondary processes). It can also serve to illustrate why I chose to look at Cuban gardens in the context of resilience. Of particular relevance are

Matching

convergence

of ecosystem and

scales

Accounting

of change

external drivers

for

categories 2 and 3 which relate to Research Question 1: *do the knowledge and memories of seed practices influence gardeners in their gardens today?* 

#### 3.4 Limitations

There are methodological difficulties in measuring resilience (Buchmann 2010; Cumming *et al.* 2005; Thapa *et al.* 2010). Often it is abstract and multi-faceted, making it difficult to put into practice (Cumming *et al.* 2005). (Cumming *et al.* 2005) note that it "is by no means obvious what leads to resilience in a complex system, or which variables should be measured in a given study of resilience," and present a framework to operationalise it. Other researchers have attempted the same (Asah 2008; Thapa *et al.* 2010), and guides for practitioners and researchers have also been prepared to assist the process (Resilience Alliance 2007).

Importantly, given the interchanging nature of resilience, and the fact that is does not narrow down to a specific theory or hypothesis, the STEPS Centre caution against the use of terms pertaining to resilience as a particular theory, and instead prefer 'resilience approach.' which they describe thus:

"Resilience approach is a theory of change and seeks to understand how complex systems change, what determines the system's ability to absorb disturbances and the capacity of actors to learn from change." (Thapa et al. 2010)

Further, resilience may not be necessarily accurately applied by practitioners (given its ambiguities and vague nature), may be wrongly interpreted in certain situations and may focus too much on the ecological aspects of a system rather than the human/social influences (Thapa *et al.* 2010). Asah (2008) notes that the parameters often described in resilience contain difficulties with direct measurements, specifically, the degree to which any of them are present. Further, she notes the place specific nature of social ecological interactions and contextual differences make it difficult to generate standard measures of parameters even in systems with similar ecologies or social cultural situations. The SES approach has also been criticized for its focus on coarse scales as apposed to finer-scale human-environment interactions (such as the

level of individuals) and emphasis on one scale (such as a region or a large community) with long term and slow changing variables, which can inadequately reflect the rate of changes that actually occur in biophysical and social systems (Asah 2008).

After researching this thesis in the field of resilience approaches, I am aware of the difficulties of undertaking such studies in practice. I am also aware of the limits of my own study and resources. To overcome these limitations, as I outlined in the Methodology, the scale that I choose to assess in this study is set at the community level (city gardens in Havana, Cuba). I have also not chosen to impose a standard measure of parameter to assess this community, nor have I tried to use pre-determined indicators to assess seed practices in the community. Instead, and in a similar vein to other studies, my approach is more general. I decided that to do justice to the overall aim of this study, to focus specifically on building a case for seed practices to be included as a factor taken into account in resilience studies, would be an achievable outcome and within my capabilities. The methodologies and tools provided by organisations to overcome the aforementioned limitations of the theory, could then potentially be applied by other researchers, students or institutions to assess how seed practices indicate resilience in a particular community or SES.

#### 3.5 Seed practices as a factor of resilience

Seeds are important given their role in the renewal of a system. From seeds, life in agriculture begins. Further, seeds are more than just phenotypic diversity carriers with traits for resilience to external physical events, but also social diversity carriers, with traits for resilience to external physical events for people that hold them (Cleveland and Murray 1997; Nazarea 2005). In this regard, they arguably cross the human-environment interface by containing social-ecological memory properties. Seeds are of themselves a window into the resilience of society. They suggest resilience in a community in two main ways:

- a) through agro-ecological principles of diversity: if seeds are maintained and stored within the society, their physical storage and phenotypes may lead to genetic and food diversity (Altieri 2002; Cleveland and Soleri 2007); and
- b) knowledge shared between communities and the memories associated with seed, may also foster resilience in the communities themselves (Buchmann 2009; Nazarea 2005).

These properties are important for adaptation and renewal within agricultural systems. The importance of seed practices in the context of resilience studies was highlighted by Cumming *et al.* (2005), who assessed Brasilian Amazonian forest at risk of divide by the Trans-American highway. They used a methodology based around four indicators, which were tested as suggesting resilience. Saving and storing seeds, and in particular seed banks, were described as examples of "continuity" – in that study an indicator that leads to resilience. The seed banks contained persistence through temporal and spatial scales, which seemed to reinforce the importance of retaining the social knowledge associated with these seed banks. For the current study, this lends support to my suggestion of the importance of including seed practices as factor when studying resilience.

Referring to Asah (2008)'s conceptualisation of this (Figure 12), I note that seed practices of city gardeners have the potential for "nurturing diversity for reorganisation & renewal", which is a primary process/indicator of resilience (Asah 2008). A secondary process, which may indicate the presence of that, is social-ecological memory. As I outlined above, social-ecological memory is the foundation of Research Question 1 in this study in relation to the seed practices of the city gardeners. Further, those seed practices may have a role in "combining different types of knowledge for learning", which is another primary process/indicator of resilience and also a related aspect of Research Question 1. So, here I am not concerned with seed practices as indicators of resilience themselves, but instead I consider that they have the potential to be considered a factor when establishing those indicators in a system.

In the chapters that follow, I assess social-ecological memory and knowledge associated with seed practices (Research Question 1, Chapter 4) and then the role of margins and marginality in developing different seed practices (Research Question 2, Chapter 5) and the potential connection between resilience and marginality (Research Question 3, Chapter 5). In each of these Chapters, I undertake a separate literature review on each of those specific aspects related to resilience and marginality respectively, and then present my findings from Havana City, Cuba and discuss the implications thereof, bearing in mind the potential of seed practices as a factor of resilience.

# **CHAPTER 4: BUILDING RESILIENCE**

"Traigo yerba santa para la garganta/traigo caisimón para la hinchazón /traigo abre caminos para tu destino/traigo la ruda para el que estornuda/También traigo albahaca para la gente flaca/el apazote para los brotes/el vetiver para el que no ve/y con esa yerba, se casa usted."

"I bring the holy herb for the throat/I bring *caisimón* for the swelling/I bring open roads for your destiny/I bring *ruda* for the sneezing/I bring basil for the skinny people/ Stinkweed for the rashes/ *vetiver* for those who do not see/and with that herb, you'll get married." (From the song "The Modern Herbalist" ("El Yerbero Moderno") by Néstor Milí Bustillo)

## 4.1 Overview

In the preceding Chapter I outlined the theoretical framework for resilience. In this Chapter, I introduce city gardeners in Havana and explore their knowledge and memories in the context of resilience to answer Research Question 1: *How do the knowledge and memories of seed practices influence gardeners in their gardens today?* First, I introduce social-ecological knowledge and memory in the context of gardens. As noted in Chapter 3 two important processes to indicate resilience in a community are knowledge and memory, which are closely interrelated (Figure 12). In the following Chapter 5, I then assess my observations to see whether and how any of those seed practices are marginalised. In summary, I have found:

- the knowledge that is contained by the gardeners tends to be either formally acquired through external training and social networks or self-taught.
- By drawing on their memories, many of the gardeners iterate stories of their upbringing and how their family history has informed their seed practices today. Some gardeners contrast those earlier times to now.
- Some gardeners employed in commercial city gardens have memories of seed practices but do not use those practices in their gardens today.

- If gardeners are employed, compared to those gardening in their home gardens, this can influence how they apply their personal knowledge and memories about seed. Further, some of those gardeners have knowledge of seed practices, but they are not applying that knowledge to their current practices in their gardens.
- In contrast, new knowledge is also being created about seed practices with permaculture gardeners learning how to grow plants for seed, to save that seed and to exchange it within seed-saver networks. This system suggests aspects of resilience by actively undertaking methods to enhance biodiversity conservation in city gardens.
- I consider that this new knowledge is in fact strengthening resilience in those communities and that more than seeds are being shared, but also knowledge and memories.

#### 4.2 Gardens

Gardens are social-ecological systems. The human (gardener) and environment (ecological systems and services in the garden) interact on site within gardens. Moreover, urban gardens are a source of resilience within landscapes (Barthel *et al.* 2010). Around the world, gardens contain high levels of intra- and inter-specific plant genetic diversity and the importance of recognising and preserving these important sources of biological diversity is apparent (Galluzzi *et al.* 2010; Nazarea 2005). Home gardens are also valuable spaces for transmitting knowledge related to agricultural practices and through doing so livelihoods and incomes may increase (Galluzzi *et al.* 2010). There is ecological and cultural significance in the agrobiodiversity contained in home gardens. Further, local agricultural systems, such as gardens, reflect local adaptations that are often based on long term experiences and local knowledge that has been built up (Barthel *et al.* 2010; Berkes and Turner 2006; Buchmann 2009). The learning and knowledge of the gardeners is also intrinsically linked to the memories of those gardeners

(Buchmann 2009). But, this knowledge of course evolves and often combines old timely ways of doing things with new approaches or learning, for example the application of permaculture principles (which are relatively new concepts) by farmers to their own existing practices (Aistara 2011b). Given that most of the city gardens studied in Cuba have been created in the past twenty years, to answer Research Question 1 (*how do the knowledge and memories of seed practices influence gardeners in their gardens today?*) I explore here how gardeners are combining new knowledge making techniques with their memories of earlier practices related to seed.

## 4.3 Gardeners' Knowledge

Knowledge, in particular, traditional ecological knowledge (TEK), is an important component of resilience studies (Folke 2006). Combining different types of knowledge is important in facilitating community learning (Asah 2008). Definitions of knowledge vary and are often debated but in this study, and this context, I take the working definition of Berkes *et al.* (2000), referring to TEK as:

"a cumulative body of knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment".

As I noted in Chapter 3, Buchmann (2009) assessed this knowledge in Cuban gardens and found that it interacts with resilience in Cuban tropical home gardens. The role of social networking and knowledge sharing associated with gardening within those communities was also found to be important in assessing resilience. In this study I build on the themes by focusing specifically on seed practices within city gardens and how their associated networks influence the knowledge and learning of gardeners. Importantly, for the context of this study, TEK is not an antiquity; it is instead being created daily (Fonte 2008). In this sense, contemporary practices such as those of city gardeners and how they work with their seed constitute examples of knowledge.

Another relevant aspect of the knowledge base in Cuba is the wide-spread use of agroecological farming. Traditional management systems of natural resources contribute to conservation of biodiversity, through for example, a wider selection of varieties, species and the interactions with landscapes (Berkes *et al.* 2000). Specifically, traditional practices such as agroecological farming are examples of methods that have been largely abandoned by conventional resource management but are still found to occur in local or traditional societies (Berkes *et al.* 2000). Knowledge of those systems can inform our current resource management and in Cuba, as I noted in Chapter 1 it has done so (Altieri 2002; Berkes *et al.* 2000).

It is also clear that as societies adapt to social, economic or natural disturbances they create new knowledge bases along the way (Berkes *et al.* 2000; Berkes and Turner 2006). Institutions can play a key role in this (Berkes and Turner 2006). This is important and applicable to the current case study, given that the UA system that spawned the development of the city gardens in Havana was created during the turbulent times of the Special Period. New knowledge had to be created and institutions such as FANJ, INIFAT, ANAP and INCA have played a key role in that. These institutions have strategically designed capacity building of local gardeners and farmers to cope with the after-effects of such disturbances and to deal with further changes. There are active knowledge sharing networks between organisations and individuals across many sectors in Cuba, specifically in the agriculture sector. The Campesino-to-Campesino programme and the Fitomejoramiento Participativo, are both good examples in the rural sector of working with farmers at a local level to facilitate capacity building and knowledge sharing (Ríos Labrada *et al.* 2002; Rosset *et al.* 2011). In this regard, there is modern knowledge creation taking place. These organisations have an important role facilitating between scientists, farmers, gardeners, researchers and their own project goals.

Implicit in knowledge is the role of local experts and their knowledge and skills. Lay knowledge tends to be about how things work in a system, and is a form of technical knowledge "acquired through particular experiential circumstances and transmitted by specific 'local experts' in formal situations of learning" (Fonte 2008). This can be compared to tacit knowledge, which tends to be a more unconscious knowledge, transmitted through communities in the form of social norms and habits that occur and is important for enhancing trust and stability, along with the formation of social networks (Barthel *et al.* 2010; Fonte 2008). I consider that both tacit and lay knowledge are important components of the knowledge that is retained and transmitted by gardeners in city gardens.

Fonte (2008) discusses modern practices contributing to knowledge in the context of the agri-food sector and the dynamics of knowledge in European countries and their local food systems. She notes that much lay knowledge of how to produce food crops and prepare them for consumption has been lost, with the dominance today of food processing and retail industries. Projects around Europe that establish networks by bringing experts together with local knowledge on food preparation techniques have been cited as bridging that knowledge gap. Analogous to this are the Fitomejoramiento Participativo projects in Cuba bringing together farmers to work with scientists and also seed diversity fairs (herinafter "ferias de diversidad"). Further, as I outlined in the Introduction and elaborate on below, gardeners in Cuba can and do take part in seed exchanges (hereinafter "intercambio de semillas") where regional representatives get together and share knowledge and experiences about seed, fruit, vegetable and herb varieties. The intercambio de semillas offer a platform to exchange knowledge of seed and seed systems (lay, tacit and technical) and is therefore an example of contemporary knowledge present in city gardeners.

Another important aspect of knowledge in seed systems is information (Lipper *et al.* 2010). When assessing *accessibility* of seed in rural markets, Lipper *et al* (2010) suggest that

physical availability, information and cost are key issues. Even if seeds are physically available and affordable, Lipper *et al* (2010) state: "limited information about its genetic content and characteristics, such as its provenance or adaptation to specific agro-ecologies, reduces the accessibility of the resource to farmers." Although I did not directly address the concept of gardeners' access to seeds in this study (i.e. the availability of seed and the capacity to obtain it), I specifically addressed where the gardeners obtained their seed (purchasing, sharing, gifts or seed exchanges) and also the information available to gardeners when they do so, to inform myself on how knowledge of seed practices influences those gardeners in their gardens.

### 4.4 Gardeners' Memories

Closely connected to knowledge is memory. The framework of social-ecological memory is comprised of concepts from social (collective or cultural) memory discussions. Social memory is "the collective memory of past experiences that is retained by groups" (Kofinas and Chapin 2009). If passed on, it endures longer than memory of an individual and is therefore thought to contribute to resilience (Kofinas and Chapin 2009). Stemming from this background, social-ecological memory is the memory of groups involved in ecosystem management (Barthel et al. 2010). Gardeners can therefore have this memory given their roles as stewards or managers of ecosystems. Moreover, within the social-ecological system of gardens, key stewards play an important role through establishing and maintaining links within and between organisations and facilitating information and knowledge flows (Olsson et al. 2004). In fact, stewards themselves can form part of the social memory of a community (Olsson et al. 2004). This relates directly to my methodology, in which I selected key informants in the gardens and interviewed them as stewards or holders of this information (see Chapter 2). I highlight the stories of some of those stewards, who I consider to be holders or guardians of seed knowledge, to show the wealth of
knowledge that they have and to share their memories. First, however, I discuss the networks that support those stewards and of which they form an integral part.

# 4.5 Havana's garden knowledge networks

When answering the research question about how *the knowledge and memories of seed practices influence gardeners in their gardens*, I found that knowledge networks are important. An important facet of these networks is information sharing amongst gardeners. I found that the support networks that gardeners rely on influence their seed practices. All gardeners identified a reliance on external support networks for information sharing and knowledge transfer about gardening and specifically, seed practices. In Havana there are divergent networks present. To illustrate this, first I outline the knowledge networks for gardeners working in Organiponicos and their access to information on seed. Private gardeners are more reliant on state-run agriculture supply shops (the CTAs) and their own memories and knowledge about seed practices. Then I explore how gardeners in the permaculture community are treading a different path in the informal sector and reinventing past ways through establishing contemporary knowledge. Here there are gardeners working together in a close-knit community training promoters in the practices and principles of permaculture, as well as working at a national scale with the intercambio de semillas.

Figure 13: Different aspects of the seed system – A: CTA shop sign; B: A gardener's saved seed; C: A patio gardener's seed packet from Italy (Source: Author's photos).



Α



# 4.5.1 Organiponicos

A notable and impressive Organiponico I visited is a UBPC producing up to 376.6 tonnes of vegetables per year for sale with trained agronomists employed and a large amount of agro-ecological integration. It is a 10.80 hectare property with animals, fruit trees, herbs, a sales kiosk and over 300 different species of plant being grown with agro-ecology at the core of the business ethos. Fruit trees and some ornamental plants are produced on site by cuttings and asexual reproduction of the plants. Despite this, the usual practice is not to save seed for vegetables; instead they are purchased through the formal system. In line with my observations at the CTA shops and other smaller Organiponicos (outlined below), I was told the origins of the seed is mixed (usually Italy, Israel, Japan and Mexico) and used for growing vegetable seedlings (3.30 tonnes per year), a big part of the business with the seedlings grown to be onsold to many other gardens around the city.

The reason they do this is for business. It is simply not profitable for them to save all of their own seed from year to year, and still produce the quantities they do and then be able to return shares to the employees who are part owners of the business. The importance of people as part of the agro-ecological system was emphasised - these farms need skilled workers and to retain those people they need to be able to pay a decent wage, based on income generated from sales of produce. If they take the time to save their own seeds they run the risk of pests and diseases destroying these crops, and losing valuable income. Given that there are not many studies done on the production of seed in the absence of a formal sector on large scales in urban settings, it is difficult to understand whether it is practical or feasible for such a scale of production to occur. For example, it may take up too much space given the practical constraint of needing spread out areas to grow plants to produce seeds onsite, and in Cuba, issues of temperature, humidity and climatic events such as hurricanes would also be conditions to take into account. But in terms of resilience within a system, a lack of such practices or methods of potentially putting those practices in place if needed, may render local communities actually less resilient.

Given the high degree of agro-ecological integration at this and other Organiponicos, I could not help but notice the anomaly of how they managed seeds. All the other required aspects of the system (fertiliser, water, soil) are produced on site, organically. So it seems a secure supply of seed via the formal seed sector to provide certainty for the production cycle, in conjunction with the tightly regulated state controlled seed farms and its associated complicated supply chain, seems to hold these Organiponicos to Cuba's formal seed sector. As I outline below, this is in contrast to the practices of the smaller-scale gardeners and those in the permaculture community, who are not so reliant on this formal sector and seem to have more agro-ecological integration as a result.

At larger Organiponicos that are producing according to demands of customers (often state sectors such as hospitals or schools) and selling produce for the profit of the cooperative, gardeners order their seed a month in advance and stick to demanded vegetable varieties such as broccoli, cabbage, cauliflower, lettuce, tomato, carrots and beetroot. At some of these Organiponicos I was shown the original containers of vegetable seeds, which were labelled as being from Brasil, Israel, Italy, Japan and Mexico. As these Organiponicos will receive larger, bulk seed supply the seed are often still in their original containers and the excess seed stored in reused plastic drink bottles. In this way, it is easy for the gardeners to tell where the seed is from and its quality. Seeds are also produced locally as well at the provincial Finca del Semillas (Seed Farm) in San Antonio de los Baños. This suggests that there is a relatively high amount of information available for the gardeners in these gardens about the origin of the seed they are using. When I visited a large Organiponico, a junior gardener was sowing lettuce seed from Israel into small containers to grow as seedlings. But I observed that once the colourful package with a clear label has been discarded, things become a bit more complicated and it is harder to trace the origin or for the gardeners to be able to say with certainty where the seeds are from.

Dependence on the formal seed sector for seed seems to have remained constant for the city gardeners working in the Organiponicos. Carlos has been working in his Organiponico garden for just over twenty years and explained that for him the seed system of purchasing from the cooperative via the MINAG has been the same the entire time. Consistent with this, Juan, who has been running a UBPC for eight years, noted a lack of systemic changes to the formal seed sector during that period:

"No, no, the system is the same: the Agricultural Supply Company of the Ministry of Agriculture imports [the seed]. These plans are made at the municipal level ... Then the agricultural products company has a stock of seeds and applications are made by cooperatives. We, as do the state and cooperatives around you, distribute them. Sometimes you apply for a seed and there are none [available], because that year they [the Ministry] could not buy or because the amount they [the Ministry] bought is very small. This is not without difficulties, as it is not without difficulties at all. There is one thing that is real, the seed supply has remained fairly stable in the sense that few seeds are missing and every year seeds are imported"

These comments seem to suggest that despite the ups and downs of seed supply, there is dependence by gardeners on imported seed and the system MINAG has created. Most gardeners noted that they will help out the other cooperatives or gardeners nearby through sharing seed or seedlings if others need them. But, often the origin of this shared seed is likely to be that previously purchased from the cooperative (and often therefore abroad). It is possible for these systems to incorporate seed saving and exchanging practices and examples do exist. For example, I was informed by a gardener of an Organiponico in Sancti Spíritus province that is now applying permaculture principles. However, the usual practice of these operations is not to do so. Despite this reliance on the formal system, gardeners often know how to save seed, but in these systems the cheap and constant supply of seed means there is a perception the alternatives are uneconomic and too risky.

Trained agronomists and gardeners in Organiponicos explained that they have access to training courses, usually run by MINAG and/or support networks through their cooperatives if they require further information or learning. The latter includes technicians or other experts who may be present at meetings or on site to answer questions and address problems. Further, many of these agronomists also have knowledge of seed saving practices, even if they do not use that knowledge in every day gardening operations. Another notable example of this knowledge that is not utilised was at a different Organiponico where I noticed rows of lettuce going to seed. When I asked if that was to save and store for the next round of planting, the head gardener explained that no, the vegetables were grown that way to be sent to the local zoo for animal fodder. As noted above, there is more to the practice of saving seed than just that, the point here is that the vegetables do seed and there is the potential for this knowledge to be further applied in the gardens.

So, how does the knowledge of seed practices influence gardeners in their gardens today? It seems that they clearly do know how to grow produce for seed but they do not. Instead, the gardeners in these Organiponicos seem so reliant on the formal seed sector's supply of seed they therefore do not see a need to utilise the practices that they already know. This aspect relates to the supply of seeds as an 'input' to their garden systems, but seed practices extend beyond this. Many of the gardeners in these gardens have knowledge of seed-saving and other aspects seed practices but in their workplace do not implement them. While this does seem to be a bit a waste of knowledge, an important point to highlight here is that these gardeners still *do have* extensive knowledge about seed practices even if from leaning on the gate post you cannot see that in action.

It is this point that I see as important for those interested in studying seed practices as a factor of resilience: you cannot tell what the gardener knows by looking at just the vegetable plot. Knowledge is an important indicator of resilience for this reason, for example if the formal seed sector were to collapse these gardeners would still have knowledge and information to offer about the informal sector, in conjunction with their knowledge of commercial garden operations. Therefore, I caution that the absence of practices pertaining to the informal seed sector in the gardeners are working may not necessarily make those individual gardeners *less* resilient in the long term.

## 4.5.2 Patio, parcela and huerto intensivos

I noticed that there are also support systems for patio or parcela gardeners in the community (separate from the cooperatives), who are welcome to visit the local Organiponicos and ask people working there for advice. Gardeners in these larger UBPCs and CCS gardens were open to sharing information on seed practices with local patio or parcela gardeners. I also found that many gardeners are self-taught about seed practices. This is usually through reading books, newspapers, magazines, or from the internet (where accessible), school programmes, and discussions with friends or neighbours. At their patio garden, a notable and knowledgeable gardening couple Maria and Jorge showed me a collection of newspaper and magazine cuttings

on gardening tips and health and lifestyle articles that they had kept for over 20 years. This included state newspaper articles on information of times for planting, soil care and health, how to plant vegetables at home and to build compost bins and sow seeds.

Of note, the state-run media publications they had kept focused on garden preparation and seed sowing, not specifically on saving, storing and exchanges. The seed practices that were outlined assumed the seed had already been obtained. However, amongst the information Maria and Jorge had were copies of the *Se Puede!* (It's possible!) Magazine, issued by FANJ that contained information on seeds and how to save and store seed for personal use with advice on methods to overcome issues of humidity (Figure 14).

Figure 14: Copies of Se puede magazine collected by gardeners, Havana City, Cuba (Source: Author's photo).



Another resourceful example of being self-taught is Pedro, a gardener in his seventies running a successful Huerto Intensivo. He explained how he asks his daughter to look up articles on gardening and seeds for him on the internet, because he does not have access to it himself. These examples of individual gardeners suggest the diverse tools available to city gardeners to learn about seed practices. In addition to be self taught or asking someone from a local cooperative for assistance, patio and parcela gardeners can also go to the local CTA shop if they have an issue that needs addressing. For example, Maria (a patio gardener) explained to me that when her tree had a disease she hired a technician from the CTA who helped her with eradication. This is consistent with the information provided by ACTAF and also my visits to CTA shops. I visited two CTA shops, which are used by both the gardeners and co-operatives to purchase gardening and agricultural supplies. These shops were in the same neighbourhoods as the Organiponicos and patio gardens I visited. For sale at these shops are bio-fertiliser, worm farm products, seeds, hats, baskets, magazines and also ornamental plants and pots. In these stores, the majority of seeds for sale were vegetable (Photo 10A and 10B). At the CTAs it is difficult to identify the country of origin of the seeds, because for most every day gardeners (not necessarily the bulk orders of the Organiponicos) the seeds are sold in small unmarked paper packets for one peso (Photo 10B). These have also been divided up from bulk supply and lack of labelling makes identification of seed origin for the purchaser impossible. They all look the same and country or source of origin is not present.

Figure 15: Ecological fertiliser (left, 10A) and a selection of seed packets (right, 10B) available for sale in a CTA. (Source: Author's photo)



I enquired to the sales person about the country of origin for the seeds that she had listed for sale (see Figure 13 A). These vegetables were mostly from abroad, she explained, from Israel, Brasil and Japan. Then we went through the list and of the varieties and their origins (that the sales person knew) and she thought eight of them were from abroad and seven from Cuba. But these seemed to overlap and there were inconsistencies. For example, vegetable varieties such as cauliflower, cabbage, lettuce, beetroot and onion were identified as coming from *both* Cuba and

abroad. She did not know for sure if they were produced in Cuba, or perhaps just packaged here. The point is it can be very difficult to know exactly where the seeds in the formal sector are produced or come from with this lack of labelling and lack of certainty in the local support networks. I discuss the resilience of this approach in Chapter 5.

Further, CTA shop staff I visited did not have information on how gardeners could save and preserve seed for coming seasons, despite ACTAF staff suggesting they would. The stores do contain other more general gardening information (such as pamphlets and some magazines) for gardeners and the CTA staff can access manuals for themselves for learning. It seems in these shops gardening more generally is supported for gardeners but information is lacking specifically on the seed and also more generally regarding seed practices, for example: how to save and store seed, how to grow plants for seed harvesting, when to harvest seed and how to become involved in local seed-saver networks. My impression from visiting these shops is that they are not opposed to knowledge sharing about seed practices to everyday or Organiponico gardeners; they are just not actively undertaking this knowledge sharing. Therefore, regarding Research Question 1 about how knowledge of seed practices influences gardeners in their gardens today, the way the formal sector operates through the CTAs I visited suggests that if a gardener were just to rely on those shops for her/his seed knowledge, they would be restricted to purchasing prepackaged seed (either produced in Cuba or from abroad) and not be actively told of how they can use and get involved with seed practices such as those in the informal seed sector. This suggests that there is a potential to improve the support network to actively encourage and inform gardeners of all seed practices that are available to them. My findings are consistent with the observation of Lipper et al. (2010) who note in summing up their comprehensive text on seed trades in rural markets (Lipper et al. 2010) that:

"...information is the most problematic dimension of seed access in local markets for farmers. In many of the markets and vendors surveyed, the information necessary for seed purchasers, such as adaptation, origin, purity, disease-free status, etc. was not given. When it is available, it is not always accurate." The authors were assessing rural markets for seed across Mali, Bolivia, Kenya, India and Mexico, but the concepts are relevant in the current study. AsI noted, in Cuba seeds are not well labelled in CTAs and information for gardeners using this system is lacking. Given the importance of lay knowledge in transferring information to gardeners in city gardens, CTA shop staff and their technician colleagues are holders of lay knowledge. However, important to this discussion is that knowledge and information regarding informal seed sector and its associated seed practices are not transferred to those gardeners by these local experts and accordingly, there is a gap occurring for these local gardeners. Even if they do not want to know about such seed practices, it would be helpful for them to at least have the option.

# 4.5.3 Permaculture community

In contrast to many of the observations I made regarding gardeners that are reliant on the CTAs and formal seed sector, for those involved in the permaculture community access to information and sharing knowledge is approached differently in two main ways. First, there is capacity building for new gardeners through a network of local knowledge promoters in the communities. Secondly, there is a nationwide network of seed-savers with extensive information available to gardeners about the origin and type of seed. I outline both of these processes and introduce the permaculture gardeners and their stories.

In the permaculture community, where gardeners are often new to not just permaculture, but also to gardening, knowledge is transferred initially through local "promoters" in the community. The "promoters" teach other aspiring gardeners permaculture practices and principles. Like many urban communities adopting permaculture in other areas around Cuba, the initial project stems from the work of FANJ. This sharing of knowledge and creation of a support system for new gardeners is a strength of the project. Likewise, in a similar vein but in rural Cuba, is the extensive Campesino-to-Campesino learning and knowledge sharing methodology that promotes farmer innovation and knowledge sharing in a horizontal way, from farmer to farmer (Rosset *et al.* 2011).

I interviewed two of these permaculture promoters and discussed the seed practices they use in their community. They focus on the resources that are available in the local community and capacity is built by explaining the philosophy of permaculture in three main stages: Introduction; Design (all the tools to begin designing, the techniques, principles); and then an Advanced Course with specific topics for the local area e.g. water or soil. In the community I visited courses are run approximately twice a year, depending on demand. For many of the gardeners in the permaculture community these courses provide the foundation of their gardening knowledge. For others, a change from traditional gardening practices has occurred after they have undertaken the course. José, one of the promoters I spoke with, explained that for him a big change when he first learnt about permaculture was switching from monoculture style gardening to a polyculture. This is demonstrated in his pictures depicting his gardening style before and after attending the Design course (Figure 16).

Figure 16: Two gardening plans: José's garden prior to undertaking a design course (self identified as a monoculture)(left, 11A) and the garden plan after the course (a polyculture) (right, 11B). (Source: Author's photograph).



The importance of seed in the system is explained from the beginning. The role of seed in the system was explained to me by a representative of FANJ:

"Within the process of capacity building [within the] community [FANJ] realised that without the seed, it wouldn't be possible to develop the programme. The seed is the base for the whole work. [FANJ] began with small seed banks within the community. For example, in [two communities] there is working right now, a bank of seeds, rustic seeds. [FANJ] had to go beyond. So, every system has to save, store its own seeds. Therefore every family stores its own seeds."

It is common practice for the permaculture gardens to have solar seed driers installed in their gardens (of six gardens visited in the community all had solar driers installed) and all gardeners used them to save their own seed and sometimes dry herbs or bread to feed their rabbits (Photo 17). For many gardeners saving their own seed, in the long run it is considered cheaper to harvest seed from a crop even when it is initially purchased from a CTA. José also explained: "Well, once you buy one, a package worth a peso, and when you collect the harvest, you also collect the seeds. You no longer have to buy more, so it would cost a peso." This comment is quite different from the idea that it is not affordable to save seeds for the next harvest and seems to be different from the business model adopted by the Organiponicos.

Figure 17: Seed drier: every permaculture garden in this community has one. Havana City, Cuba. (Source: Author's photo).



A core aspect of this system is empowerment of local people and there is lay knowledge present here with local experts sharing their knowledge and skills. I consider that this lay knowledge is a fundamental component of the information that is retained and transmitted by these gardeners. This seems to be enhanced by the permaculture community and their established social networks. In contrast to the formal seed system, Lipper *et al* (2010) noted that "in the informal sector, petty farmers/vendors are the ones most likely to provide relevant information for seed purchasers, and this information is most likely to be accurate." My observations made regarding the detailed information given to gardeners in the informal seed sector in Havana in the seed exchange network facilitated by the FANJ are consistent with these observations.

These social networks extend from the community level out to a nationwide network of communities actively involved in seed-saving and sharing. The process was outlined by a representative from FANJ, who explained that there are periodic exchanges of seed at community, provincial or national levels. At a regional exchange there can be up to 200 people.

"The result of this exchange is that people come back [to their province] with seeds that then they can use and reproduce in the system in the locality. At the exchange people have a large table. The table is divided into 3 parts [illustrating with hands, 3 different partitions]: Here: Fruits, Here: Vegetables, Here: Aromatic herbs. It is a classification of different types. The people don't [just] have the varieties, fruit, vegetables, etc they have an exchange of knowledge also the "know-how".... From producer to producer [meaning producer of seed] they have an oral exchange. And, the Foundation [FANJ] does a record with the seed, the area, the name, the person who brought it, and then they [FANJ put out a bulletin with that information, and also the information of the producer for them to exchange. Also, this is inserted within the work of a magazine."

Thus, at these intercambio de semillas, more than seeds are transferred. There is also an exchange of knowledge and experience. As José explained: "also the seed exchanges are about the opinions of each individual, with each group comes their experience." He pointed out that gardeners from another province had come to visit his site and made practical suggestions to help his garden. This relates directly to the discussion of lay knowledge being created and shared

in a contemporary setting. At the intercambio de semillas local experts convene and share this knowledge with one another. These external support networks and information sharing systems go further than this; in the permaculture community knowledge is shared amongst friends nationwide and is in accordance with the permaculture principles emphasising people and communities in systems. For example, in addition to these well run exchanges, gardeners will call each other regularly and visit, often bringing seeds. For these gardeners, seed exchanges also allow a better selection and quality of seed:

"That's why we make the exchange of seeds, because we don't have to go buy any seeds and we can choose, 'cause we choose the best seeds...[In] these selling centres (referring to a CTA) the ones that produces the seeds want to sell - they do not care whether [the seed is] unborn or born. And unlike us who do, we take the best seeds, because we know well which will yield results." (José, permaculture gardener).

This suggests a perception that the gardeners have about the CTAs not caring about the type of seed they sell the gardeners, whereas at the seed exchanges the gardeners have a better selection of seed and therefore better results in growing them, which suggests the gardeners place value on both information about the seed and also its quality. This perception is also echoed by gardeners not actively involved in the permaculture community, but still saving and storing their own seeds. Jorge a patio gardener, not directly involved in permaculture and partially reliant on the formal seed sector for his seeds, explained to me his perception of how the system works:

'It is not the same the seed I use here, or used by people in their houses that the seed used to grow [on] large plantations, 'cause the seed to be used for large farms has other scientific work, taken to the laboratory and seed banks (those are banks of sterilized seeds to remove bacteria), and then when you are sowing them, they are sowing a product plant without any bacteria or anything to kill it. Here are terrible [i.e. big] seed banks, but they are meant for large producers. For cooperatives. They are not interested in me ... he sold the seed to me, but those seeds do not have any quality. Quality is what I seek, I go [to the] home [of] someone who has a very large basil and very good and I try to go to get the seeds from there. There are two things: the seeds used in homes and seeds that are used for large farms."

Thus, he suggests the gardeners' perceptions that there are two distinct systems in place – one for the cooperatives and one for seed-savers, such as him. This also suggests a more general knowledge of the seed sectors that operate in the country. In addition to information, quality of seed is perceived to be lacking in the formal sector. These gardeners like to know where the seed is from, to understand its history and quality. If they just buy it from the commercial sector then these traits, these personal qualities, of the seed are lost.

It is not only the permaculture community that engages in seed practices. At Pedro's Huerto Intensivo he produces 50% of his own seed, grows many herbs from cuttings and receives seeds from a variety of sources, including seed exchanges and even being sent from friends abroad. Pedro has also been abroad himself to learn about gardening practices. The garden is rich in diversity, with an emphasis on spice and herb production (fresh and dry), to also sell at his roadside kiosk.

For these private gardeners many of the herbs and fruit trees are reproduced from cuttings ("esquejes") or sourced from eyeing up a desired specimen at a friends house and asking them for some seeds or a cutting. Patio and parcela gardeners do not see a need to grow vegetables because in their neighbourhood, like most in Havana, there are markets within walking distance selling fresh vegetables and fruit, along with an Organiponico selling freshly cut produce at the gate. When I visited Maria and Jorge's garden I identified over 20 different species of herbs, spices, medicinal plants and fruit trees, and in addition, an abundance of tropical ornamental plants. Most of these are kept in pots that line the adjacent pathway in a space of 5m x 8 m. However, like Pedro, Maria and Jorge explained they occasionally do have to purchase seed from a CTA, but this is rare.

# 4.6 Memory

The second aspect of Research Question 1 is the influence that gardeners' memories have on their current seed practices. I observed that some gardeners are *Campesinos* from the countryside who have formed part of the urban drift to the city and found it natural to get back to their farming roots by working in the gardens. In contrast to the permaculture community and their new found knowledge, these gardeners tend to have lay knowledge that they learnt while growing up on farms. Many have also observed changes to the Cuban seed system over the years.

Carlos is a seventy nine year old gardener in a Co-operative who has been gardening for 60 years and working in his Organiponico for twenty. He described that the gardening practices he used on his farm in the countryside were largely the same as what he practices today in his Organiponico (aside from the animals, which he does not keep now). He outlined the seedsaving techniques they used to use and then compared those to his current practices. For him, there is a distinction between that older time and the seed practices of today:

"So ... you fix the bottles, fix it, because it is a process, you have to pass through hot water, disinfect it and all that, the caps and seals well. Put them in a place that it can stay a long time, for 6 months to 8 months. But these traditions now ....they have lost all. It's all gone beyond that. We ask the state and the state brings them, but I still say it's not like [when] you harvest them and keep them [i.e. the seeds]. No, when I have to bring them and I know[what] that process has been, because they have many conditions, but in a shipment, for example from here to the Oriente, [seed quality changes] in [the]heat and whatnot. If I have it at home, I always stay the same."

This shows Carlos' preference for his old methods, despite being reliant on the formal seed sector for his seeds today. When discussing any changes he has seen over his lifetime to the way the seed systems work in Cuba, he notes when the seed production facilities began to dominate the seed sector and how traditions of seed saving were lost:

"Laboratories start to work and inventing banana seeds... then ...here with the triumph of the revolution [when it] began to advance [from 1959] (in) the entire country. In laboratories they pull out [i.e.put them in to the market] the seeds, all kinds of seeds, with more ... bigger, a little bit bigger ...more productive ... and then this tradition [of seed saving] has been lost."

Reflecting on his time, Carlos compared now to then and explained that today the gardeners still help each other out and will share seeds and knowledge, but in his early days, compared to now the familiarity was stronger and he describes it was a time that was "more pure". At seventy nine and now reliant on the formal seed sector rather than saving his own seeds, Carlos' memories and knowledge of seed practices are being eroded. If this is not shared or even utilised today it will be lost. For Juan, the situation is similar. He is a trained agronomist in his mid-thirties working in a 1ha Organiponico with a mixture of vegetables, a fruit tree orchard, a rabbit farm and chickens. He is also from rural campesino roots, learning much of his knowledge there and has added to that through being formally trained. His co-operative is reliant on the formal seed sector for seedlings and seed, but despite this, he knows how to save, store and use seeds. He explained this through reflecting on his family history, what it was like when he grew up and, like Carlos, has this knowledge but does not use it. When he grew up his family bought some seed, but saved others. He explains: "In the family...put them to dry and also bought them, because there are seeds that can not be produced here in the field, you have to buy." Chard and radish were purchased but beans (by drying on the vine) and lettuce were saved for the next year. Like the agronomists outlined earlier in this Chapter, Juan is not utilising that knowledge or his memories associated with seed-saving practices. He does however share seeds with others in the area, if they need them.

For these gardeners their current seed practices may be in accordance with their memories of earlier times. For others, these memories suggest that the opposite is the case: they once knew of seed practices but today do not utilise them. Juxtaposed to Carlos and Juan, Maria's earlier memories are directly related to her practices in her patio garden. Maria explained how she knows about gardening, drawing on memories:

"customs were passed from family to family, from father to son, even my mother's family was the family farm and my dad too... with animals, plants, trees, and fruit. We learn about it because we walk all around, we lived in the city and went to the fields, we saw and learned. We saw everything that the farmers did. Once a week, at least, we went to that country zone that was close." And then later: "The [seeds were] hung to dry, I remember that they were collecting the seed and played them well. That's why I pick them up and start to dry ...And since I was girl seeing that with plants, people grows their gardens or fields, giving some seeds or by taking cuttings." As I explained above, today she puts in place these practices from times past noting that in her neighbourhood:

"We share with people. They give me and I give them. They give me some seeds and I give them others, it depends, or plant cuttings that get reproduced by a branch. I have friends who have other plants, you go and exchange with people."

What these three examples illustrate is the importance of memory and knowledge in gardeners' current seed practices. Memories of seed-savers and their practices are an integral part of agro-biodiversity and in many ways are inseparable from the seed itself (Cleveland and Soleri 2007; Nazarea 1998, 2005). What these examples from Havana City suggest is that there is also a diverse array of memories attached to seed in an urban context, as well as the more widely researched rural farming sector. I identified in the Introduction a research gap between rural and urban seed practices, and in light of my observations in Havana City, I suggest that there is actually also memory associated with seed held by these city gardeners. Given the demographic trends of urban migration and that seventy five percent of Cuba's population now live in urban centres (Funes 2002), many of whom have migrated as Campesinos from the countryside, this highlights the importance of the urban setting when addressing issues associated with seed, and specifically, the role of memory and knowledge of city gardeners pertaining to those PGR.

### 4.7 Linking seed practices, knowledge, memory and resilience

Through analysing the knowledge and memory of gardeners about their seed practices it is apparent that the operations of the cooperatives will largely determine what practices those gardeners can implement, but this does not necessarily indicate what gardeners know. While knowledge not used may, at face value, seem to be redundant knowledge, when addressing my research goal about seed practices as an aspect of resilience, it becomes rather important. For future disturbances or changes that may occur in a community or agricultural/seed system this knowledge may in fact be very useful. In other words if a disturbance occurs and disrupts a secure supply of formal sector seeds, at least these gardeners have *some* knowledge and memories that would lend them to be more resilient should they need to call on that knowledge to affect changes to their seed habits. The risk is, of course, that people may forget their learnt seed practices if they do not put them into practices. So, if gardeners in these cooperatives do not use this knowledge or share it, there is a risk it will be lost. In a similar way, memories that gardeners have of seed practices that they used to implement, but no longer do, will also be phased out if they are not relayed to younger generations. These people are key stewards in communities and contain knowledge and memory about seed practices that is important in resilience studies. As holders of lay knowledge, they have much to share but if they do not share it, the knowledge is gone rendering the community less resilient.

For those that are not so knowledgeable on seed practices, but would like to learn, a lack of readily available information about seed practices in local shops or only observing the formal seed system in operation at their neighbourhood garden they visit for advice, reduces not only the gardeners potential knowledge of such practices, but also their overall accessibility to those genetic resources. If a gardener is not made aware of the diverse selection of seed types, seed exchange networks (and hence support networks), seed-saving and storing methods, she/he will instead be reliant on the formal seed sector, thereby reducing the availability of the diverse selection of PGR and also associate cultural and community knowledge available within the informal seed network. In terms of the importance of seed practices in studies of resilience therefore, this suggests the importance of taking into account the knowledge networks and quality of external support that is made available to gardeners, within communities.

To highlight the importance of this, the aforementioned examples of the extensive support networks that are available for gardeners in the permaculture community, suggests that *it is* possible to provide extensive information and knowledge to gardeners at a grass-roots

community level. The local capacity building and knowledge sharing that occurs through promoters on a personal level within each community and the associated support that is created (i.e. by knowing there is a promoter in the community that can be turned to in times of need) coupled with nationwide networks of intercambio de semillas and organisational support from a local NGO, mean that there is new knowledge being created regarding seed practices and it is being successfully passed along. The success of this can be seen in the gardens, in just short periods of time the gardeners have applied this new knowledge and converted waste sites adjacent to their houses into productive sites for produce, feeding their families and friends. Therefore contemporary lay knowledge is being created in Havana City about seed practices and that knowledge is based on the informal seed sector. Where information is readily available to communities, it is strengthening their resilience.

# **CHAPTER 5: AT THE MARGINS**

"Seedsavers embroider landscapes of forgetting and abandonment with sensory reminders of identity and Altierity. Thus, they provoke the rest of us to examine with fresh vision the vulnerabilities of modernity and globalisation, and to take stock of our own options." (Nazarea 2005)

# 5.1 Look around; eyes wide

I have taken you to the margins. First to Cuba because given its agricultural history and agro-ecological systems it lies on the margins of the global agriculture scene. Agro-ecological farming is a method that can enhance resilience in a community, but it is also a practice that is found on the margins of modern conventional agricultural systems (Altieri 2002; King 2008). Then within that system, to the city gardens, which are also on the margins of Cuba's agriculture system (although Cuba has more UA than most countries around the world, rural agriculture still dominates). Within those city gardens this thesis is discussing seed practices. As I explained in the Introduction, these are also usually studied in rural agriculture as opposed to urban settings. A way of conceptualising this is to picture matrioshka dolls with one stacked inside another – here I am opening each one to see what can be found inside and looking to the margins (Figure 18).





I am describing marginalisation in the context of seed practices. I introduced margins and the notion of marginalising in Chapter 3 and noted that in this study I apply a broader definition from the more literal notions of margins, however I suggest the literal meaning as a starting point. For that is how I arrived at exploring these seed practices in the gardens of Havana: to highlight the importance of such seed practices as a factor to take into account in resilience studies (my research Aim). From this quite literal starting point, margins in this context become somewhat more conceptual and diverse spaces, and in fact enabling places with opportunities (Aistara 2008; Tsing 1994). For this I draw on inspiration from Virginia Nazarea (2005) and specifically on her work identifying seed-savers as people found on the margins and the role of memory and knowledge that those seed-savers, at those marginal places. I also refer to principles of permaculture, which are relevant in this study given the seed practices of the permaculture community I studied and the importance of those founding principles of drawing our attention to the importance of marginal spaces themselves.

This Chapter is answering, in light of the knowledge and memories of seed practices that I have discussed in Chapter 4, *what seed practices are marginalised*? (RQ2) And then later, *how does the marginalisation of certain types of seed practices influence the resilience of a community*? (RQ3). As I outlined in the preceding Chapter, my findings regarding seed practices of city gardeners suggest many of the city gardens rely on the formal seed sector for seed supplies and that the formal seed sector is the dominant system. Larger Organiponico farms of 1 ha or more, or those that were members of a cooperative, were more likely to purchase seeds in bulk through the MINAG. This is through the formal seed sector programmes. Of six Organiponico sites run by cooperatives, the gardeners all described the similar purchasing system that they follow. As noted in the previous chapter, this seems to be a business model that has remained constant for many years. Given the abundance of organiponicos and cooperatives around Havana City I find that this system dominates. This is a tightly followed, well regulated and uniformly applied approach across these gardens. Essentially the gardeners have to follow this model, which is expressly outlined in either the Urban or Suburban Agriculture Guidelines. I therefore see this as the dominant seed system in Cuba and specifically, Havana's city gardens.

In contrast, permaculture gardens do not rely heavily on the formal seed sector, but instead, have their own role in the well-established informal seed sector locally and regionally. Patio and parcela gardens tend to be somewhere in between with some seed saving and exchanging and some purchases through the formal sector. I found that the permaculture community and those that save their own seed and participate in the informal sector are on the margins of the Cuban agro-ecological farming system, within the UA spectrum. For the gardeners I met, seeds are a way of life as well as the starting point of life. Diversity of seed practices strengthens a community and there are more to seeds than just their phenotypic traits. This highlights the importance of taking into account not only marginalised groups and but also the spaces that they occupy when assessing resilience in a given SES - they may in fact demonstrate more resilient practices than those in the dominant space.

#### 5.2 Welcome to the margins

Agricultural practices and the systems and marketplaces that influence them can lead to marginalisation of farmers, particularly those located outside of mainstream industrial agriculture, for example, in the organic sector (Aistara 2008). Further, gardens and the seed practices of the gardeners within them sit in the margins. In contrasting monocultures with polycultures, (Nazarea 2005) emphasises the importance of gardens in maintaining biological diversity and highlights their role as marginal spaces:

"in small-scale farming or subsistence production, including what are referred to as dooryard gardens, backyard gardens, or home gardens, diversity is generated, enhanced, relished and protected at every turn, ensuring its persistence and making uniformity untenable. These marginal spaces deserve thoughtful reexamination as natural and social scientists, environmental conservationists, and development practitioners grapple with the erosion of the genetic diversity of crops and their wild relatives along with the attrition of knowledge attainting to those plants." Through turning our attention to these spaces, she urges us to break free from the mainstream and look to the margins of agriculture systems, specifically at our seed savers and their role in those places. Margins can also be spaces of resistance. Nazarea (2005) positions many of the seed-savers she has worked with, in the global south, as "relatively peripheral or marginal in a multilayered and intricately nested world system" and queries how seed savers have managed to elude the lures of modern agricultural systems:

"Seedsavers comprise an obscure but omnipresent challenge to agricultural commercialisation, monoculture, and genetic erosion. Because of their marginality and random distribution, they elude the more quantitative studies on crop genetic resources." (Nazarea 2005)

In this way, seed-savers around the world are resisting the mainstream or the norm and parallels can be drawn between them and the struggles of other marginalised groups. hooks' essays on marginal spaces emphasise "understanding marginality as a position and place of resistance" which she sees as "crucial for oppressed, exploited and colonised people" (hooks 1989). She identifies margins as sites of "radical possibility, a space of resistance" (hooks 1989). Although, I note that Nazarea (2005) does not state that all seed-savers will be consciously resisting the mainstream - quite the opposite - she suggests they might even be oblivious to it, or somehow circumventing the dominant system. As I explained in Chapter 3, the use of margins in this sense should not be perceived with negative connotations, but instead possibilities (Holmgrem 2007).

To find the margins in Havana, I first look at what I suggest is the dominant system, which to me is prescribed by regulators or officials and is followed by the majority of people within a community. I consider in the global context, and also within the local setting of Cuban UA and its seed practices, that the majority of seed practices are to be found in the formal seed sector (i.e. certified seeds produced by scientific breeding and then distributed via commercial outlets, with gardeners accessing seed through purchases (Lipper *et al.* 2010)). This is the dominant system. In contrast I find the informal seed sysem to be marginalised. I noted in the

Introduction that is comprised of: farmers' varieties developed by farmers over centuries and also recycled improved varieties (seeds of improved varieties from farmers' harvests), with seed saved from farmers' harvests, circulated within families or communities, in-kind exchanges or gifts, and often sold in local markets (Lipper *et al.* 2010). As I also outlined in the Introduction, I describe seed practices as "the practices that gardeners and farmers do associated with their seed such as cultural norms and traditions, stories, songs, growing plants specifically for seed, saving and storing the seed for another time, sharing and exchanging the seed with friends, neighbours or through seed exchange networks."

Many of these seed practices therefore will be present in both the informal system and the formal system. For example, cultural norms may still be associated with seeds purchased at a shop, or as noted in the preceding chapter, gardeners may well know how to save and store seed, they may just for the purposes of their business actually rely on the formal sector. While seed practices cross the two sectors, I distinguish the dominant (formal) seed sector with the marginal (informal) seed sector in this analysis. However, I note that this distinction is my own, made by my observations and not by suggestions of anyone interviewed or studied.

Within Havana, marginal spaces and their use are an important component of UA. It is the disused car parks, the abandoned buildings and the waste sites that have been restored, which now provide spaces for most of the city gardens. Resourcefulness in these margins is abundant. Nothing seems to go to waste, with the gardens adorned with reused tyres, pots, bottles, even parts of cars and old wheel barrows. These gardens have been studied in the context of urban spaces and the marginality of groups occupying them. Premat (2009) discusses the Cuban state's ability to include citizens in official programs by looking at the role of 'model' gardens in a campaign that was run in Havana to green its UA spaces. The official campaign was the "Movement of Patios and Parcelas" ("Movimiento de Patios y Parcelas") which began in 2000 and sought to involve nearly 70,000 patios and parcelas in Havana from which model gardens were then identified. Often gardeners aspired to have their garden be selected as a model.

Through looking at this competition, Premat (2009) explored why gardeners would join a state run campaign on a voluntary basis. She noted that through engaging gardeners ("inhabitants of space") in this campaign, whom are usually people equated with being powerless, they actually become involved in the process and activities that are usually dominated "by those in positions of power and authority". This suggests that the combination of top-down regulation of UA and bottom up nature of community engagement, along with the international community's interest in Cuba's UA system, is working to shift the boundaries of where the margins lie for Havana's city gardens. Although the UA of private gardens in Cuba may be moving from the margins towards the mainstream, as well as being influenced by international actors and media, I address here whether the *seed practices* of those gardeners are in the margins. The gardens themselves might be in the limelight, but the seed practices within those gardens are still marginalised.

An interesting aspect of this is that often UA will be geographically located on the margins, such as the peri-urban zones (Redwood 2009). Looking to the edges of the city, at the peri-urban interface where urbanisation is usually greatest and conflict over land use and development goals often occurs (urban and rural development), Thapa *et al.* (2010) outline there is the potential for resilience approaches to be applied to these spaces. Geographically, these areas are on the edges of cities. Often within them the established social structures mean groups are marginalised. While I did not look at UA in the peri-urban zones of Havana, I explored the margins of the seed sector and I have found there are many examples of practices that are occurring that strengthen the resilience of those communities as a result. Accordingly, as I outline further below, this thesis also suggests there is potential for resilience approaches to be applied to such marginal spaces.

# 5.3 Different gardens; different practices.

In analysing the interview data in the context of marginality, the key theme that emerged is that commercial enterprises, such as cooperatives that are growing vegetable produce for profit and are the larger gardens in the city, tend to be dependent on the formal seed system (dominant space) (e.g. Organiponicos and Huertos Intensivos); whereas smaller gardens tend to grow herbs, medicinal plants, vegetables and fruit for household consumption and are more likely use the informal seed sector (marginal space).

In Chapter 4 I outlined that knowledge of seed practices such as drying seed, saving seed for another season, storing seed (usually in reused plastic drink bottles) and also the community and inter-regional intercambio de semillas greatly influences their practices of permaculture gardeners their gardens (Research Question 1). In contrast to those reliant on the formal seed sector, gardeners engaged in the informal sector are well aware of where the seed is from. Through the exchanges they will meet a farmer face to face who will share the experience of the seed. A representative of the FANJ working with permaculture gardeners in cities around Cuba explained how the informal seed sector is the norm rather than the exception for those gardeners:

"They rely better, on the [permaculture] system, than from those outside. They rely on that. For them it is better to rely on the closed system. All of this is about the exchange, the national exchange, the local exchange. They may go to the shop, but it is not the general practice."

These comments are echoed by the permaculture gardeners who thoroughly enjoy the community links associated with seed exchanges and they note the tight connections they have with seed savers in other provinces, such as those in Sancti Spíritus. Here at the margins seed practices are more than just about planting the seed, they also encompass the foundation of the entire gardening system on which the social and community food network is based. However, juxtaposed to this new knowledge which is being created and shared in the permaculture community, I found that knowledge and practices of some gardeners is also being marginalised

by the dominance of the formal seed sector dictating how seed practices must operate. For example, within some cooperatives, Gardeners know how to save, store and exchange seeds, but they do not because they are tied into a highly regulated system that largely prevents them from doing so. But, importantly, this does not mean that they cannot necessarily go ahead and try to do this in their gardens.

## 5.4 Sowing margins into resilience approaches

hooks (1989) and Nazarea (2005) ask us to contemplate the spaces that communities such as the permaculture community occupy and what they are doing in those spaces. Resilience approaches ask us to question the capacity of a SES to absorb change or disturbance and point to indicators that show us how this can occur (Cumming *et al.* 2005; Thapa *et al.* 2010). In between, like the very gardens they strive to develop, promoters and followers of permacutlure practices and principles, also expressly draw our attention to the margins (Holmgrem 2007; Aistara 2011b). As I have outlined, these permaculture gardens implicitly provide us with numerous examples in their practices of how gardens, as SESs can absorb changes and disturbances through the existence of diversity and agro-ecological integration.

I find that these principles provide a link in the chain between resilience approaches and marginalisation studies in the search for solutions to the global decline in PGR (both genetic and cultural). Firstly, the permaculture principle of using edges and valuing margins, is useful, not only in its practical sense, but also to draw our attention to the importance of valuing diversity that can be found in spaces often considered to be waste areas. Once cultivated, they can contain diverse arrays of plants and animals, as the permaculture community in Havana City showed, with their conversion of waste sites into productive tropical home gardens. These margins increase the diversity of the system and relate directly back to permaculture principles of valuing diversity. Secondly, that principle itself contains many elements that are present already in resilience approaches, particularly in the sense that it suggests that expanding and creating margins can "increase system productivity and stability" (Holmgrem 2007). These are similar to the aspects of resilience approaches that ask us to nuture diversity for reorganisation and renewal and deal with change and uncertainty.

Like the ecological examples offered by both permaculture and resilience principles, in these permaculture communities at the margins, I find there is a diversity of approaches serving both the strength of community and also the strength of conservation of PGR. There are networks that are established for seed practices (such as the exchanges locally, regionally and nationally); the sense of pride and community felt by the gardeners involved in these practices; the diverse selection of plants and seeds that they have saved and stored in each house, and the knowledge of the practices associated with those plants and seed along with a minimal reliance on the dominant formal seed sector. These are all factors that suggest diversity (ecologically and socially) within a system which is being enhanced and maintained through tightly established social networks and knowledge sharing.

In this regard, these permaculture communities, like their founding principles, point to diversity, which in turn indicates resilience. In addition, and referring back to the useful conceptualisation of resilience as outlined in Figure 12 by Asah (2008), there are numerous elements present in the permaculture communities in these urban settings that themselves suggest a resilient community. Therefore, here at the margins, there are seed practices containing elements that are: capable of dealing with change and uncertainty; nurturing diversity for reorganisation and renewal; combining different types of knowledge for learning; and creating opportunities for self-organisation (Asah 2008). This suggests the important role of seed practices in making a community more resilient and strengthens the case for seed practices specifically, to be taken into account as a factor when assessing the resilience of a system. I am bringing those marginalised communities, and specifically, their very desire to enhance margins

in ecosystems and value diversity, to the forefront of discussions on how to find solutions to the global decline in PGR, by highlighting the importance of their seed practices as a factor to be taken into account in resilience studies.

Accordingly, when assessing how the marginalisation of certain types of seed practices influences the resilience of a community I suggest there is a link between studies of marginality and resilience through the new knowledge that is being shared by networks in the permaculture community. This knowledge is coming from the margins and yet contains lay (promoters as 'experts') and tacit knowledge (social norms associated with permaculture), along with being an example of combining different types of knowledge and learning by the networks and seed exchanges that are created (Asah 2008; Fonte 2008). As noted above, in assessments of the resilience of a particular system, such knowledge is an important indicator. Therefore, these findings indicate support the suggestion the importance of looking to the margins of a community, in this case those actively involved in the informal seed sector in city gardens (Nazarea 2005), when assessing resilience of a community, to see what knowledge sharing networks are being utilised in those spaces.

In this regard the gardeners are contributing to biodiversity within their communities and also, through exchanges nationally sharing those resources. They are creating and enhancing the social and genetic diversity surrounding seed through strengthening the community ties and networks. Despite being on the margins of the seed sectors within their country, these actors are vital in maintaining the diversity and strength of the seed system and therefore are contributing to resilience within their communities. This was evident in the Special Period, when Cuba had to turn to the informal seed sector when the formal sector collapsed as explained by a scientist:

<sup>&</sup>quot;The conventional system, the formal system of seed distribution in Cuba, collapsed. Who are the ones that actually have seeds? Those farmers who were further apart from the formal system. That conserved and managed their own seeds."

Thus, suggesting that Cuba's own seed sector resilience through the turbulent times of the Special Period and the harsh lessons it learnt from this disturbance, are a case in point on the importance of including seed practices as a factor to consider when assessing resilience in communities. Therefore by illustrating seed practices being undertaken in city gardens and looking to the margins of that system, there are connections to be made regarding resilience.

Recalling my research aim: to explore the seed practices in city gardens of Havana City, Cuba to highlight the importance of seed practices as a factor to be taken into account in resilience studies I turn now to the conclusion to discuss the implications of the connections between resilience and margins.

# CONCLUSION

The aim of this thesis has been to explore the seed practices in city gardens of Havana City, Cuba to highlight the importance of seed practices as a factor to be taken into account in resilience studies. This goal is set against the backdrop of a global decline in PGR, specifically the cultural and genetic erosion of those PGR (FAO 2010; Lipper *et al.* 2010). Specifically, I have focused on the importance of gardeners' seed practices amidst this global problem and I have focused on city gardeners in particular because as I outlined in the Introduction: there is very little research to date on the role of these gardeners and their seed practices, particularly in the informal seed sector. I have studied these seed practices in the context of Havana City, Cuba, because that city has an extensive network of city gardens, both producing commercially for retail, domestically for consumption and also for joy. Moreover, the city has the presence of both the informal and the formal seed sectors operating alongside one another. Therefore Cuba's city gardens, set against their own unique agricultural and political history, and being based upon agro-ecological principles, provide the ideal setting to put the spot light on the cultural and genetic erosion associated with a global decline in PGR and draw attention to the importance of seeds in city gardens.

I have found the combination of all of these factors provides a unique opportunity to assess seed practices in the context of resilience studies. Increasingly, resilience approaches are gaining popularity and being applied to systems throughout our communities particularly in addressing the social exclusion of marginalised groups and and social justice issues (Thapa *et al.* 2010). In this study, rather than attempt to use indicators of resilience to address how seed practices may indicate resilience, I have instead shared the stories and experiences of knowledgeable and highly skilled key informants in Havana City, Cuba. The knowledge, memories and practices that these people have regarding seed is impressive and on its own suggests the power and importance of taking into account such seed practices when assessing resilience either in communities generally or in agricultural systems specifically.

Through sharing these stories I have identified the following pertinent points:

- Knowledge about gardening in general, and seed practices specifically, is being created through extensive support networks available to city gardeners and many gardeners are also self-taught via various mixed media methods;
- New knowledge, which specifically encompasses seed practices in the informal sector is being facilitated by initiatives such as permaculture promoters teaching at a local level in communities;
- Regionally, knowledge pertaining to seed practices in the informal seed sector, including information on the origins and production of seeds is being facilitated and shared by seed exchanges and capacity building amongst seed-saver networks, specifically by those in city gardeners;
- Gardeners in commercial operations are more likely to be tied into the formal seed sector, and importantly, will often still have knowledge of seed practices associated with the informal sector, but do not utilise this in their daily practices;
- Memories associated with seed practices suggest a long-standing knowledge base exists in city gardens, which often stems from Campesinos migrating to the city from the countryside;
- Given many of the gardeners are aging, the memories and knowledge that they have regarding seed practices may be lost if those gardeners do not share it;
- Despite the existence of the formal and informal seed sectors in Cuba, seemingly coexisting, the informal sector is still marginalised with the majority of commercial operations are reliant on the formal sector for their seed supply; and

91

• This marginalised informal seed sector contains diversity (both genetic in terms of seed and also cultural in terms of numerous communities); knowledge and seed sharing across multiple regions, cities and communities throughout Cuba; capacity building and local ownership of permaculture and agro-ecological principles; and a strong sense of community.

The elements present in the marginalised informal seed sector accord with many aspects of resilience approaches (Asah 2008; Folke 2006; Thapa *et al.* 2010) as well as permaculture (Aistara 2011b; Holmgrem 2007). Increasingly, resilience approaches are being applied to new systems and therefore the potential to assess systems that have marginal elements should be taken into account. These systems are not to be perceived with negative connotations, instead embraced and actively sought out. Through using the example of seed practices, which are often marginalised as well as their associated seed-savers (Nazarea 2005), and specificially the knowledge and memories of those practices, I have drawn the gaze from the central space dominated by commercial seed varieties to those of the farmers' varieties and their associated methods. This example has illustrated the potential for those working with and only accustomed to the formal seed sector to learn of the diversity of varieties, strength of knowledge and unison of community that can be found on those margins. While this is just one example and the global applicability of a system studied in a vacuum must be approached with caution, I consider that there is the potential for analogies to be drawn between this study and other formal/informal seed sector dichotomies.

Moreover, this example provides builds on work associated with city gardens as spaces of agrobiodiversity and providers of ecosystem services (Barthel *et al.* 2010; Galluzzi *et al.* 2010; Tidball and Krasny 2007) and suggests the potential for including seed practices specifically in assessments of those city spaces. The stories and experiences of the city gardeners in Havana City, Cuba draws attention to the importance of such seed practices for practitioners and policy makers addressing *both* UA and seed policies. The example suggests that instead of marginalising urban seed practices through solely addressing rural seed practices and markets, the inter-connections between both systems, particularly in the informal system, should be further explored.

As noted above, dealing with change and uncertainty is a key indicator of resilience. The role of the Special Period as a disturbance factor that influences resilience is not expressly studied here as a goal of research but as I have explained, it cannot be ignored. The intensive city gardens of Havana were born out of the need to feed people in time of crisis. What I have explored in this study, set against that historical backdrop, is how *now* these gardens, some twenty years on, have well established seed practices in city gardens. Cuban society may have indeed developed a particular knowledge base through the experiences of the Special Period. Therefore, this study suggests the importance of learning from communities that have been through disturbances. For those studying the resilience of community or agricultural systems, there is the potential to learn even more from such communities and this study is an element of that learning process.

Cuba itself seems to be enabling resilience at the margins. While many urban planners sit and contemplate the role of UA in their cities, Cuba has now had a well established and productive system in place for twenty years, while it has been arguably marginalised itself from the global seed and agricultural sectors. The result of which is a network of communities that are knowledgeable and skilled in gardening and seed saving. The harsh times of the Special Period have meant that the system in Cuba itself has had to overcome disturbances and it has done so through creating knowledge networks and local level facilitation through gardeners and farmers, thus enhancing capacity building and resilience within its own system. A result of that is a seed system that combines both formal and informal aspects that are both enabled to function concurrently and to the benefit of the gardeners and those consuming their produce.

As I mentioned in the Introduction, people have a tendancy to look straight ahead and not up and around. By engaging too much in this indoctrinated way and staring straight ahead we miss out on the diversity, the community, the knowledge and information that can be found along the edges, borders and at the margins of a system. I discovered that myself in Havana. In fact by focussing too much on the mainstream, well documented and discussed systems of Organiponicos and cooperatives in the city's spaces, I nearly missed the margins. Wandering the paved paths of Havana, as a keen gardener it is easy to be drawn to these awe inspiring corner plots with rich red soil, bright flowers and meticulous rows of lush organic vegetables. I found that even within what I thought were already marginalised spaces (in terms of global agricultural and seed systems) there are again marginal spaces. To build resilience and strength in a community, to secure food supplies, to enable and encourage the next generations to learn of practices such as saving seed and growing vegetables, we must keep these margins alive and look to them for potential solutions. Many of the gardeners I met are old and their knowledge is dying out. As young people move to the cities this knowledge is lost. I consider that memories of social-ecological practices can enhance resilience, but only if the practices remembered are actually applied. So, by sharing the stories of these gardeners I hope to keep some part of those practices alive.
# **APPENDIX "A"**

### English/Spanish

#### Interview questions for gardeners / Entrevista preguntas para los jardineros

Background - Antecedentes

How long have you been gardening for?

¿Desde hace cuánto tiempo ha estado haciendo jardinería?

How long have you been gardening [here]?

¿Cuánto tiempo ha estado haciendo jardinería aquí?

• Please describe the type of gardening that you mainly do and how often you do it. Por favor, describa el principal tipo de jardinería que usted practica y con qué frecuencia lo hace.

• Please describe your vegetable garden for me [physical characteristics, where it is on your property, types of plant].

Por favor describa su huerta [características físicas, donde es de su propiedad, tipo de planta].

• Please describe the surrounding area/barrio where the garden is located. Por favor describa el área circundante / barrio donde se encuentra el jardín.

• If you use any of the following in your garden, how do you obtain and/or make them: Si utiliza cualquiera de los siguientes productos en su jardín, por favor explique ¿cómo los obtiene o cómo los produce:

Fertilisers (describe what kind and how you use it)
 Fertilizantes (describir qué tipo y cómo lo uso)
 Compost
 El compost / abono
 Soil
 El suelo
 Seed
 Las semillas
 Water
 El agua

We've been talking about gardens in general. Now I'd like to ask you some questions that focus on seeds. In particular, seeds in your vegetable garden.

Hemos estado hablando de jardines en general. Ahora me gustaría hacerle algunas preguntas que se centran en las semillas. En particular, las semillas de su huerta.

<u>General seed care and thoughts on seed production</u>/*Cuidados generales de semillas y reflexiones sobre la producción de semillas* 

• What, if any, species in your vegetable garden do you grow from seed [includes root/tuber/grain]?

¿Cuáles son, si alguna, las especies vegetales en su jardín que usted cultiva en su huerta [incluye raíces / tubérculos / grano]?

• What, if any, species in your vegetable garden do you grow from seedlings? ¿Cuáles son las especies en su huerto que crecen de semillas? (en caso de que tenga alguna)

- Where do you get your seedlings from?
  ¿De dónde obtiene sus plantas de semillero o de almácigo?
- How and where are those seedlings grown from seed? ¿Cómo y dónde están crecen esas plantas de semillero?
- What, if anything, are factors in the environment that influence how you grow your seeds [or seedlings]?

¿Cuáles son, si considera q hay alguno, los factores del entorno que influyen en cómo hacer crecer las semillas [o plántulas]?

- How important to you is the role of your seeds in your garden? ¿Qué importancia tiene para usted el papel de las semillas en su jardín?
- Who do you think should be responsible for reproducing seeds for your garden? [farmers, government, scientists, both]

¿Quién cres que debería ser responsable de la reproducción de semillas para su jardín? [los agricultores, el gobierno, los científicos, todos]

• What do you think about reproducing seeds yourself for your garden? [saving, selecting your own for another year]

¿Qué piensa usted acerca de reproducir por usted mismo las semillas para su jardín? [ahorrar, elegir sus propio jardín por un año más]

• What do you think about someone else reproducing the seed for your garden? [saving, selecting on your behalf]

¿Qué piensa usted acerca de que otra persona reproduzca las semillas para su jardín? [ahorro, la selección de semillas en su nombre]

 If you are selecting your own seeds for your garden, what characteristics or certain qualities are you looking for? [lack of disease, tastes, uses, yield, other preferences? Si usted está seleccionando su propias semillas para su jardín, ¿qué características o cualidades determinadas estás buscando? la falta [de la enfermedad, los gustos, usos, rendimiento, otras preferencias?

• What, if any, seeds do you save for the coming seasons?

¿Cuáles semillas guarda, si alguna, para las próximas temporadas?

- How do you do this? ¿Cómo hace eso?
- What, if any, seeds do you share with others?

¿Cuáles son las semillas que no comparten con los demás? (si hay alguna)

- How do you do this?
  - ¿Cómo hace eso?

# Knowledge and memory of gardening and seed - El conocimiento y la memoria de la jardinería y las semillas

We have been talking about the seeds in your garden. Now, let me ask you broader questions about your knowledge, learning and memories associated with gardening and seed. *Hemos estado hablando de las semillas en su jardín. Ahora, déjeme preguntarle cuestiones más amplias acerca de su conocimiento, el aprendizaje y la memoria asociados con la jardinería y las semillas.* 

# Knowledge/Conocimiento

• What, if anything, have you been taught about gardening?

¿Cuál ha sido su educación sobre jardinería, en caso de que haya tenido alguna?

- Who or what taught you about seed [e.g. saving, conserving, exchanging]
  ¿Quién o qué le han enseñado acerca de las semillas [por ejemplo, ahorro, conservación, intercambio]
- When did you start learning? ¿Cuándo comenzó a aprender?
- What did you learn? [Any particular hints/advice?] ¿Qué aprendió? [¿Alguna pista en particular o consejos?]
- What sources do you use to remind you of what to do with gardening? (Books, magazines, newspapers, discussions with other people, observations, education classes etc) ¿Qué fuentes usa usted para recordarle de qué hacer con la jardinería? (Libros, revistas, periódicos, conversaciones con otras personas, observaciones, etc clases de educación)
  - What about seeds specifically?
    ¿Qué pasa con las semillas en concreto?
- How do you learn about the ecology of your garden? (Books, magazines, newspapers, discussions with other people, personal observations, education classes etc) ¿Cómo

aprende o se informa sobre la ecología de su jardín? (Libros, revistas, periódicos, conversaciones con otras personas, observaciones personales, educación, etc clases)

• What about seeds specifically? ¿Qué pasa con las semillas en concreto?

• How do you share your own knowledge of gardening with others? ¿Cómo puede compartir sus conocimientos en jardinería con los demás?

- What about seeds specifically? ¿Qué pasa con las semillas en concreto?
- How could you [potentially] share your knowledge about gardening and seeds?

¿Hipotéticamente cómo podría usted compartir sus conocimientos sobre jardinería y las semillas?

# <u>Memory/Memoria</u>

• What kinds of memories do you have of others in this community/barrio associated with gardening?

¿Qué tipo de recuerdos tiene usted sobre otras personas en esta comunidad / barrio asociadas con la jardinería?

• how long ago was this; and

hace cuánto tiempo fue esto, y

• what did they do?

¿qué hicieron?

• What kinds of memories do you have about them with seeds?

¿Qué tipo de recuerdos tiene usted sobre ellos relacionados con las semillas?

• What kinds of memories do you have of parents/relatives associated with gardening [not necessarily here in this community]?

¿Qué tipo de recuerdos tiene usted de los padres u otros parientes asociados con la jardinería [no necesariamente en esta comunidad]?

• how long ago was this; and

hace cuánto tiempo fue esto, y

• what did they do?

¿qué hicieron?

- $\circ$  What kinds of memories do you have about them with seeds?
- ¿Qué tipo de recuerdos tiene usted sobre ellos relacionados con las semillas?

• How did those people share their knowledge of seed within their community?

¿Cómo comparten las personas el conocimiento de las semillas dentro de su comunidad?

#### Memories of Crisis/response Memorias de crisis y respuesta

We have been talking about knowledge and memory associated with gardening and seed. Now, let me ask you to think about any specific events or changes that have occurred here in the past that may have influenced your caring for seeds.

Hemos estado hablando sobre el conocimiento y la memoria asociados con la jardinería y las semillas. Ahora, permítame pedirle que piense en eventos específicos o cambios que han ocurrido aquí en el pasado que pueden haber influido en el cuidado de las semillas.

• Can you remember any changes that have occurred that have affected seeds since you have been gardening here?

¿Puede recordar los cambios que han ocurrido que han afectado a las semillas a partir del momento en el que empezó a hacer jardinería en este lugar?

• If so, please tell me what those changes are.

Si es así, me podría explicar por favor, cuales son esos cambios.

• How has the system for obtaining seed changed since you have been gardening?

¿Como ha cambiado el sistema para la obtención de semillas desde q usted empezo a practicar la jardiería?

How do you remember seed access being before the Special Period?

¿Recuerda como era el acceso a las semillas antes del Período Especial?

• What did you do then that is different to now?

¿Qué hacía usted diferente en esa época en comparación a sus practicas actuales?

• Before revolution if older people.

Antes de la revolución, si las personas mayores.

• Since you have been gardening, can you remember any events which have affected the way you access seed? [e.g. weather, hurricane, social, political, economic, community, business]

Desde que usted ha sido jardinero, puede recordar los eventos que han afectado la forma en acceder las semillas? [por ejemplo, el clima, el huracán, sociales, políticos, económicos, comunitarios de negocios].

 $\circ$   $\;$  What were they and how have they affected you?

¿Qué son y cómo lo han afectado a usted?

• Before those events did you acquire seed in a different way?

Antes de esos acontecimientos adquiría usted las semillas de una manera diferente?

Community seeds: norms and practices in the area Comunidad semillas: las normas y prácticas en el área

Now, let me ask you to think about your community and the practices that occur here regarding seeds. Ahora, déjeme preguntarle sobre su comunidad y las practicas relacionadas con las semillas.

• What do most people do with their seeds here?

¿Qué más hace la gente con sus semillas en esta lista?

• You mentioned you did.... How do other people in the community or barrio work with their seeds here?

Usted menciona que hiciste .... ¿Cómo la gente en el trabajo de la comunidad o barrio con sus semillas en esta lista?

• How does having these practices build a strong community?

¿Cómo tener estas prácticas construir una comunidad fuerte?

• What, if any, social networks are in your community and involve gardening? (Groups, activities, community work, markets, sales, sharing, garden groups)

¿Cuáles son las redes sociales en su comunidad relacionadas jardinería en su comunidad en caso de que haya alguna? (grupos, actividades, trabajos comunitarios, mercados, ventas, distribución, grupos de jardín)

• Which social networks have a specific focus on seeds?

¿Qué redes sociales tienen un enfoque específico sobre las semillas?

 $\circ$   $\;$  What, if anything, is your role in these social networks?

¿Qué es su papel en estas redes sociales si tiene alguno?

Final questions & notes Preguntas finales y notas

- Who in your barrio do you consider to hold the most knowledge about seed saving, exchange and sales in this area? ¿Según su criterio quién considera que tiene el mayor conocimiento sobre el ahorro de semillas, el intercambio y las ventas de semillas en su barrio?
- Please recommend other gardening/seed experts in the area

Por favor, recomiendeme otros jardineros o expertos de semillas en el área

• Finally, is there anything that you would like to share with me, or something important that you think I have missed? Por último, ¿hay algo que quisiera compartir conmigo, o algo importante que cree que ha faltado?

Gender / Género: hombre o mujer

Age group / Grupo de edad

A: 0-30 años;

B: 31-50 años; C: 51-70 años; D: 70 + año

# Interview questions for organisations – Las Preguntas de entrevista del organizaciones

#### Background - Antecedentes

- Please describe the objectives and role of your [organisation] [group] [personal interest] Por favor describa los objetivos y el papel de su [organización] [grupo] [interés personal]
- Please describe what your role is within this [organisation] [group] Por favor describa cual es su papel dentro de esta [organización] [grupo]
- What, if any, work does your organisation do with city gardeners?

¿Cuál es, si alguno, el trabajo que hace su organización con los jardineros de la ciudad?

• What, if any, work does your organisation do with rural gardeners? ¿Cuáles, si alguno, el trabajo hace su organización con los jardineros rurales?

#### Seed system - El sistema de las semillas

We have been talking about your organisation in general. Now, let me ask you specific questions regarding the garden and seed system in Cuba.

Hemos estado hablando acerca de su organización en general. Ahora, permítanme hacer preguntas específicas sobre el sistema de jardín y de las semillas en Cuba.

• If you can, please explain for me how the process for the production of seeds works here [seed development – distribution – markets – sales to gardeners]

*Si es posible, por favor expliqueme como funciona el proceso de producción de semillas aquí [desarrollo de la semilla - distribución - mercados - las ventas a los jardineros]* 

o Institutions involved (Seed houses, breeding stations)

Instituciones involucradas (las casas de semillas, estaciones de cría)

• Where are they produced?

¿Dónde están las semillas de raza?

• Where are they reproduced?

¿Dónde se reproducen?

• What about certification – must seeds be certified? If so, by who? Are there royalty payments?

¿Qué hay acerca de la certificación – las semillas deben ser certificados? En caso afirmativo, por quién? ¿Hay pagos por derechos de autor?

Storage – where do the primary products and end products go (Seed-vegetables)?

En relación con el almacenamiento - ¿dónde van productos primarios y productos finales (semilla, vegetales)?

• Markets – where are goods (seeds, vegetables) purchased from and sold to?

Sobre mercados - ¿donde son productos (semillas, vegetales) comprados y vendidos?

• Processing

¿Procesamiento?

• Seedlings

¿Las plántulas o almácigos?

• In this seed system, what, if any, differences are there for the role of farmers in cities compared to farmers in the countryside?

En este sistema de semillas, que diferencias hay, si hay alguna, en cuanto a el papel de los jardineros de la ciudad comparados con los agricultores de campo?

• Where does your [organisation] [work] [interests] fit within the seed production process you have just described?

¿Dónde encaja su [la organización] [trabajo] [intereses] dentro del proceso de producción de semillas que acaba de describir?

• What, if any, role does your organisation have in educating or sharing knowledge with gardeners about seed?

¿Cuál es, si tiene alguno, el papel tiene su organización en la educación o el intercambio de conocimientos entre los jardineros sobre las semillas?

• What types of gardeners [city/rural] do you work with?

¿Con qué tipos de jardineros [ciudad / rural] trabaja?

• How does the organisation educate the gardeners?

¿Cómo educan a los jardineros?

• What, if any, [other] education and training programmes occur in this community regarding gardeners and their seeds?

¿Cuáles, en caso de que haya alguno, programas educativos o capacitación se producen en esta comunidad con respecto a los jardineros y sus semillas?

• How do you consider the role of farmers to be in the seed system?

¿Cómo considera que es el papel de los agricultores en el sistema de semillas?

• What, if any, role should farmers have?

¿Cuáles, si alguno, es el papel que los agricultores deberían de tener?

• How important is that role of farmers in the seed system?

¿Qué tan importante es que el papel de los agricultores en el sistema de semillas?

# Changes - Los Cambios

• How do you remember any changes that have occurred that have affected the seed production system since you have been working here? [social, economic, political]

¿Cómo recuerda los cambios que han ocurrido que han afectado al sistema de producción de semillas ya que han estado trabajando aquí? [sociales, económicos, políticos]

• If so, please tell me what those changes are.

Si es así, por favor, dime lo que esos cambios se.

• How do you think those changes have affected gardeners?

¿Cómo crees que esos cambios han afectado a los jardineros?

How do you remember the seed system being before the Special Period?

¿Cómo recuerda el sistema de semillas que antes del Período Especial?

• What occurred then, that is different to now?

¿Qué ocurrió entonces, que es diferente ahora?

• How do you think this has affected gardeners?

Cómo crees que esto ha afectado a los jardineros?

• Since you have been working here, can you remember any events which have affected the agricultural [seed production] system? [e.g. weather, hurricane, social, political, economic, community, business]

Debido a que ha estado trabajando aquí, ¿Te recuerdas de los eventos que han afectado a la [producción de semillas] agrícolas sistema? [por ejemplo, el clima, el huracán, sociales, políticos, económicos, comunitarios] de negocios

• What were they and how have they affected your organisation?

¿Qué son y cómo han afectado a su organización?

How do you think these events affected gardeners?

¿Cómo cree usted que estos eventos afectados jardineros?

# Final questions & notes – Las Preguntas ultimo

• What other people or organisations do you consider to hold knowledge about seed saving, exchange and sales in this area?

¿Qué otras personas u organizaciones que no se tiene en cuenta para mantener el conocimiento sobre el ahorro de semillas, el intercambio y las ventas en esta área?

• Please recommend other gardening/seed experts in the area

Por favor, recomendamos jardinería otros / semillas de expertos en el área

• Finally, is there anything that you would like to share with me, or something important that you think I have missed?

Por último, ¿hay algo que quisiera compartir conmigo, o algo importante que creo que ha faltado?

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