HAL
open science

URBAN AGRICULTURE DIVERSITY IN BRITAIN: BUILDING RESILIENCE THROUGH INTERNATIONAL EXPERIENCES

Ailbhe Gerrard

To cite this version:

Ailbhe Gerrard. URBAN AGRICULTURE DIVERSITY IN BRITAIN: BUILDING RESILIENCE THROUGH INTERNATIONAL EXPERIENCES. ISDA 2010, Jun 2010, Montpellier, France. 11 p. hal-00520451

HAL Id: hal-00520451

https://hal.science/hal-00520451v1

Submitted on 23 Sep 2010

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

ISDA 2010 Agriculture and Food
Innovation and Sustainable Development in Agriculture and Food
Montpellier – France
28 June – 1st July 2010
www.isda2010.net

URBAN AGRICULTURE DIVERSITY IN BRITAIN: BUILDING RESILIENCE THROUGH INTERNATIONAL EXPERIENCES

Ailbhe GERRARD *

*33 Longwood Avenue, Dublin 8, Ireland
MSc. UCL
London
ailbhe.gerrard@gmail.com

Abstract — Diversity of urban agriculture (UA) in Britain could reduce food security impacts if a crisis occured in industrial food production systems. Industrial agriculture (IA) both causes and suffers from a lack of resilience: environmental, financial and structural. In Britain, the allotment system, previously an important form of UA, now grossly insufficient to replace the output of industrial agriculture, particularly in London. With these points identified, the relationship between diversity and resilience takes on a new clarity. Systems theory shows that diversity in any system is key to resilience. Some lessons can be learnt from international experiences of food crises ammeliorated by different forms of urban agriculture. Examples include : St. Petersburg's *dacha*s, Milwaukee Growing Power farm and Havana permaculture. These examples are chosen to illustrate the potential to rediversify food production systems with urban agriculture. Finally, a discussion about applying aspects of these urban agriculture practices to London and other cities.

Key words : urban agriculture, industrial agriculture, resilience, diversity

Résumé — La diversité de l'agriculture urbaine (AU) en Grande-Bretagne pourrait réduire les impacts de la sécurité alimentaire en cas de crise s'est produite dans l'industrie des systèmes de production alimentaire. L'agriculture industrielle (IA) à la fois causes et souffre d'un manque de résilience: l'environnement, financières et structurelles. En Grande-Bretagne, le système de répartition, précédemment une forme importante de l'agriculture urbaine, désormais tout à fait insuffisant pour remplacer la production de l'agriculture industrielle, en particulier à Londres. Avec ces points identifiés, la relation entre la diversité et la résilience prend une nouvelle clarté. La théorie des systèmes montre que la diversité dans tout système est la clé de la résilience. Certains enseignements peuvent être tirés des expériences internationales des crises alimentaires ammeliorated par différentes formes d'agriculture urbaine. Exemples: datchas de Saint-Pétersbourg, Milwaukee Growing Power agricole et la permaculture Havane. Ces exemples sont choisis pour illustrer le potentiel de rediversify systèmes de production alimentaire à l'agriculture urbaine. Enfin, une discussion sur l'application de ces aspects pratiques de l'agriculture urbaine à Londres et dans d'autres villes.

Mots clés : l'agriculture urbaine, l'agriculture industrielle, la résilience, la diversité

INTRODUCTION

What would be the impact in Britain if there was some interruption to the current industrial agriculture (IA) food production systems which grow, process and deliver food to local shops and markets? Are we only nine meals from anarchy? From a systems theory perspective, the aspects of IA which helped develop short term success (hierarchical structure, high input of energy and monoculture) are the aspects which signal its lack of resilience as a system and may indicate imminent collapse.

This paper, based on a recent MSc. Thesis (Gerrard, 2009) examines the relevance to Britain of lessons from international experiences of food crises ameliorated through urban agriculture (UA). UA can simply be defined as growing food in cities, and takes diverse forms: small animal husbandry, bee keeping, recycling urban waste as compost, or vegetable production. UA is undertaken for various reasons ranging from leisure to food security and in a multiplicity of settings: home gardens: window boxes; green roofs; growing walls; community gardens across the world's cities; and is to a greater or lesser extent integrated into city infrastructure (Veenhuizen et al., 2006).

It is not the intention of this paper to examine benefits and limitations of UA, however UA could be an effective food production systems for cities, using new policies and approaches and techniques such as permaculture and agro ecology. In fact, UA could provide a nucleus to challenge and at least partly replace the existing industrialised food production system. Policies and socio-economic organisations are needed to put this new food production paradigm in place, along with local and community based knowledge.

Method

The case studies investigate: St. Petersburg dachas, America's Milwaukee Growing Power farm and Havana permaculture. The case studies are chosen to explain the mitigating potential of rediversifying food production systems through urban agriculture, as diversity in any system is of key significance for resilience.

The case studies research reflects systems theory concepts: emergence, low input and high output. The lessons learnt from each study make useful connections for UA theory development when looked at as a whole in relation to UA resilience.

1. INDUSTRIAL AGRICULTURE – URBAN AGRICULTURE

1.1. Industrial Agriculture concerns

The food supply of cities, particularly in developed countries such as Britain, is now considered vulnerable. This is due to the interaction of global factors, such as agricultural commodity trade, freight and exchange rate variations, population growth, populations' transition from plant to meat eating, and limits to land, water and available labour. An additional weakness relates to modern agriculture's reliance on energy from fossil fuels and its impact on anthropogenic climate change. Mitigating this through growing bio-fuels merely reduces arable land for food production. Local factors include extended food supply chains, Just-in-Time delivery to supermarkets means there is little stock held locally. Extended suburbs and industrial parks means there are few farms and food producers close to cities. Finally cities in the global North have populations who have come to expect a wide choice of cheap, exotic food.

1.2. Urban Agriculture

However there are alternatives to industrialised food production, which are more agile, smaller scale, more local, less environmentally damaging and yet often more productive and

less expensive; despite not having economies of scale. UA in its various forms provides some of these alternatives. UA is a growing area of research, policy and practical interest for both developed and developing countries (Pretty, 2008, Smit et al., 1996, Veenhuizen et al., 2006, Wright, 2009, Mougeot, 2005). Two major reasons why UA is of growing interest: small farms are more efficient and with growing pressure on land, growing in smaller urban areas is an important consideration. Additionally the existence of a growing urban population dependent on an external food supply has prompted research on how city areas can be more self sufficient.

What also assists the rise of UA is unease from the public about industrial agriculture outputs: consumers in Britain are starting to demand a closer connection to their food. Urban dwellers, particularly in London, are starting to grow their own food in greater numbers in allotments, shared gardens and liminal city spaces. This facilitates the rise of alternative food production; sold through farmers' markets; community supported agriculture and vegetable box schemes.

2. DIVERSITY AND RESILIENCE

Reinstating biological diversity is necessary to undo environmental damage caused by industrial agriculture. Likewise for human systems - diversity in food production systems must be initiated to rebuild food access security. UA, a social-ecological activity, is fundamentally based in and reliant on the networks and relations of the environmental biological systems including micro-organisms, soil, water, plant photosynthesis. UA takes many forms worldwide, from Havana's organoponicos to Kerala's home gardens, to Chinese city aquaculture. Diversity is part of its strength and provides resilience.

2.1. Resilience

Resilience can be defined as the potential for recovery from disturbance - engineering resilience (Thrush et al., 2009). Alternatively it can refer to ecological resilience, rapid transitions between thresholds to new equilibrium states (Limburg et al., 2002). Resilience therefore is an aspect of a system, as Holling describes, but it also provides a crucial ecological service, which insures against loss of important system functions when faced with stress. Measuring and testing resilience in an ecosystem is uncertain, as thresholds are only identified once they are crossed.

It is crucial to understand the dynamics of links through a system and how to navigate to encourage resilience and adaptation to change. The mistake that industrialised agriculture systems makes is the assumption of stability (as opposed to cycles of change). This leads to attempting to manage out fluctuations, diversity and variability and has, after short term successes, resulted in eroding resilience.

2.2. Diversity

Diversity can be defined in population terms, but also in terms of diversity of flows in an ecosystem, the number and dynamics of links between populations (Ulanowicz et al., 2009). Diversity is also the reserve capacities in an ecosystem; this functional diversity builds resilience in systems. In a natural system, for instance the brain, the reserve capacity holds the inherent resilience; other parts will repair connections in case of damage. The importance of functional diversity to resilience in an eco and human system to change is highlighted here: *'resilience in some communities will be maintained by diversity within functional groups to ensure that the group encompasses a range of environmental response capabilities'* (Thrush et al., 2009 :3213).

Industrialised agriculture and classical economics are mistaken in considering reserve capacity and diversity as waste, something to be eliminated in the drive for profit, rather than

a vital element in a systems sustainability and survival beyond the short term. These concepts of resilience and diversity are aligned with systems theory, examined below.

2.3. Systems Theory

Systems Theory was developed to understand how complex systems such as cells, animals, social systems, ecosystems, the earth's atmosphere and sun systems operate as an integrated whole and how they may develop in future. Systems knowledge is about networks and interdependent relations between things from small to large scale. Unlike traditional science, which breaks down an item to be studied into elements and examines individual parts to work out mechanistic natural laws; systems theory analyses the whole, with a focus on context.

3. CASE STUDIES

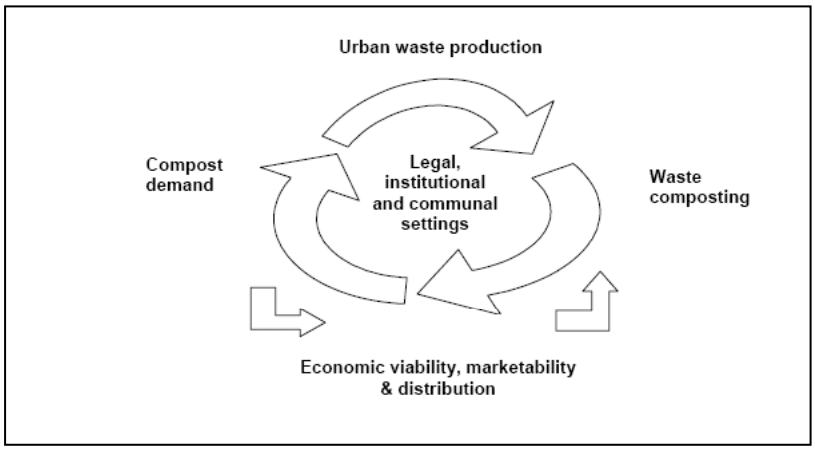
3.1. Will Allen – Growing Power farm

Will Allen's Growing Power farm reaches ten thousand city dwellers from two acres in a low income area of Milwaukee city, USA. This highly productive, highly innovative farm established in 1993 uses constant experimentation, cutting edge knowledge and simple technology. The farm's success is based on mimicking ecosystems; the biodiversity of a river, the process of decomposition with compost making worms. The varied outputs from the farm : fish, compost, vegetables, salad, meat, dairy, honey; are examples of ecological and production diversity. Social inclusiveness led by Allen means that the farm is a resilient part of the city fabric.

3.1.1. Context and background

Allen, a driven and socially aware African-American ex-professional basket ball player, is an excellent inspiration to teach and provide example on food farming, vermiculture and aquaponics to the surrounding communities. The low input systems developed are one of the keys to the farm's success, creating eco-cycles of nutrition. Examples include: compost made from urban food waste heats greenhouses; aquaponics where fish ponds recycle dirty water through filtering watercress plants for return to the ponds. (Figure 1)

Figure 1. Closing the urban nutrient loop, using UA to produce food from waste via compost



(Drechsel et al., 2004)

The outputs and results are impressive: annual output is 20,000 plants and vegetables, thousands of fish, livestock including chickens, goats, ducks, rabbits, and bees. Food production worth $250,000 dollars. Three hundred thousand pounds of compost are created from woodchips and 6 million pounds of waste food. Most of the compost is sold and the rest used to fill twenty five thousand pots tiered in greenhouses and in the open air for tomatoes, salads, beets, chards and other vegetables. Teaching and lecturing about the farm system is

also profitable, and the profits are reinvested in the farm and community (Royte, 2009). Growing Power is socially inclusive also ; part of the Farm-City Market Basket Program, providing reduced cost urban agriculture food to low income residents.

3.1.2. Future plans

Allen wants a community food system scaled to meet a city population needs. He plans to encourage Chicago to use its 77,000 vacant plots to grow food; and is campaigning for new community urban agricultural centres to help avert food security problems. A centre would incorporate a policy institute, training and outreach, experimentation in a research and development centre and a demonstration working urban farm (Allen, 2009).

3.2. Cuba – urban farming of the future

Spring 1992. Doctors, teachers, young and old urbanites attend an urban agriculture class in Havana. They are learning from older farmers, brought out of retirement, who are teaching urban dwellers the basics of traditional agricultural knowledge using organic and permaculture methods for growing vegetables and fruit in vacant plots in the city. The students are listening hard; as current food shortages mean that they need UA to feed themselves from their home gardens and plots. The average Havana citizen's daily food intake has dropped by half since the late 1980s (Wright, 2009).

3.2.1. Context and background – the years of the Fat Cow and the Special Period

This unlikely scenario in the twentieth century was brought about by a crisis in oil access after the collapse of the Soviet Union which radically affected Cuba's highly industrialised agricultural food production. The trading relationship until 1989 between Cuba and Russia meant the island was relatively well off – Cubans call the period the years of the Fat Cow, but in fact Cuba was extremely vulnerable, relying on a single trading relationship. Russia bought Cuba's mono crop sugar output at five times the world price; Cuba in return bought 90% of oil needs, tractors, fertilisers and 63% of imported food needs from Russia.
Due to the island's physical, political and economic isolation after the Soviet Union collapse, this Special Period tested Cuba almost to breaking point; overnight oil imports dropped from fourteen million tonnes a year to only four tonnes; meaning that crucial fuel for tractors, fertilisers, pesticides, animal feed, food transport and food preservation were not available. Almost immediately symptoms of malnutrition appeared in Cuba and an average Cuban lost twenty pounds by 1994 (Rosset, 1996, Wright, 2009, Morgan, 2006).

The State and people reacted quickly to the food crisis and with remarkable success; as the problem was defined as food security for everyone; and the solution as a self-sustaining agricultural system, incorporating permaculture and organic aspects. By mid 1995 the Cuban food crisis was under control (Rosset, 1996), and widespread changes had occurred in food production systems. Research in 2006 revealed a mere two hundred urban gardens providing ninety per cent of Havana's fresh fruit and vegetables. Vivero Organoponico Alamar is an example of a highly successful Havana urban farm; dating from mid 1990s, only 0.7 hectares; it employs c. 25 people and has a large output. It uses organic low input methods, like most Havana plots. The labour intensive, micro management required for organic and permaculture methods is particularly suited to the small plots available in cities (Buncombe, 2006).

Of course a crisis in food production on the scale of Cuba was not resolved immediately. Rural state run farms were slow to respond, and in the void left by the state farms; city dwellers out of necessity plunged into small scale, intensive, organic urban agriculture to feed themselves. The urban dwellers' lack of knowledge about conventional farming meant they were not prejudiced about farming techniques, and were quick to learn about and use permaculture and organic methods. After initial failures with rural crop yields falling; the government started a complete reorganization of land allocation and farm management; particularly focusing on urban agriculture which had proved successful: agile, producing new growing plots and improved food yields. Other changes the state initiated included facilitating

the various forms of UA which had arisen through mapping potential UA sites and assisting with training and marketing. In addition the state worked in integrating new agro and bio-technologies with traditional knowledge.

3.2.2. Urban farming systems

There were a variety of types of plot; home gardens which were intensively farmed and privately owned. Patio and balcony growing produced vegetables, salads and small livestock. *Organoponicos*; a raised bed irrigated intensive food production system was either state or cooperative owned (Wright, 2009). *Parceleros*, or farming on abandoned plots, marginal and wasteland; usually through gardening clubs and community organised workshops; were highly successful, by 2000 around one hundred thousand plots existed; with greater yields than combined *organoponicos* and home gardens. The workplace frequently facilitated workers to organise plots at work; and Havana was also surrounded by over two thousand small (2-15 hectares) private and State owned urban and peri-urban farms (Morgan, 2006, Rosset et al., 2006, Wright, 2009).

3.2.3. Current situation

The latest published research shows Cuban urban agriculture is still flourishing and largely organic with about seven thousand *organoponicos* urban allotments on eighty one thousand acres. However with availability of oil and conventional farming inputs the rural agriculture system has largely reverted to the pre-crisis industrialised system. Reforms to the agricultural system are still ongoing under Raul Castro with agricultural supply shops for farmers. Higher farm gate prices and encouragement of farm ownership mean farmers in Cuba are now paid relatively highly, unlike before the Special Period. Urban agriculture gives economic and job opportunities (an average fifteen jobs per hectare), along with environmental advantages of city greening. The *organoponicos* system is heavily supported and subsidised by the State, land is owned by the government but farmers have the opportunity to sell food at markets (Wright, 2009).

3.3. St. Petersburg *Dachas* – Urban planning and urban design

Every May Day there is a special and much loved holiday when millions of St. Petersburg citizens known affectionately as the summerfolk or *dachniki* - make an exodus from the city by train, car or bus. They go to their *dachas* to sow food crops for the year; at least half a million stay on the *dachas* for the entire summer; *dachas* account for over half a million hectares in cultivation around the city.This is a phenomenon not confined to St. Petersburg – it is common practice throughout Russia and Eastern and Central Europe for urban dwellers to produce considerable amounts of food on their residential plots outside the city. The food is harvested and stored in root cellars, bottled and pickled and brought back in batches to the city as needed, and it makes an important contribution to urban dwellers' food security and livelihoods especially during economic uncertainty) (Lovell, 2003, Moldakov, 2003, WHO, 2000, Rose and Tikhomirov, 1993, Seeth et al., 1998, Struyk and Angelici, 1996).

3.3.1. *Dachas* context and background

In St Petersburg *dachas* are common. A *dacha* spans from modest, simple structures to elaborate country house, the more basic being generally used for active food production and the larger ones more likely for leisure. Lovell points out the changing context and meaning of *dachas*. For instance it was after the 1917 Bolshevik coup, in fact during the Second World War, that *dachas* became closely associated with food growing by urban workers. Private *dacha* ownership existed throughout the Soviet period – an argument that the authorities recognised the importance of private food production plots to the city populations (Lovell, 2003 :173).

By the 1960s cooperative *dacha* garden plots of 600 sq m each, with huts of 25m^2 (*Tovarishchestvo*) were common, big state enterprises or institutions were issued land, and organised garden cooperative societies with multiple plots. However, the legal title was attached to the land use, not the ownership of the house (Lovell, 2003 : 194).

3.3.2. Planning and urban design issues

St. Petersburg has a lack of public green space; despite being a planned city. Unlike Greater London with one third of its area green or water, (Capital Growth, 2009) St Petersburg historic city core has only 8% public green space. (Clark, 2006 :268). This lack is offset by over twenty thousand hectares of agricultural land within the city boundaries used for urban agriculture in *dachas* and over half a million hectares in the peri urban area, replacing the suburb, which is not prevalent in Russian cities (Lovell, 2003). Green space in the peri urban areas are protected by being used for the *dacha* system of urban agriculture as usufruct (right to use).

3.3.3. Current situation

An estimated four in every five St. Petersburg families by 1997 had a *dacha* or similar land plot, and a special national public holiday; Gardeners' Day to mark the importance of urban agriculture was initiated in 1999. Interestingly it was women who managed the *dacha* plot. (Lovell, 2003 :218). By the millennium *dacha* huts were still simple; typically between 30 and 44 m^2 (the size varied whether the *dacha* was for summer or winter proofed) and only 5% had plumbing (Lovell, 2003, Struyk and Angelici, 1996). *Dacha* houses still have no legal status of permanent dwelling; the simplest are called *sadovy domik* - garden hut, and do not have post addresses (Kononenko, 2009).

4. CASE STUDY ANALYSIS

4.1. Will Allen – Growing Power Farm

The aspects of the Growing Power farm which are particularly interesting for this research include the hyper productivity of the urban farm and the integration of the farm with the city in diverse ways. This also provides a theoretical link with systems theory: in the ecological systems used in the farm, the knowledge transfer and social inclusion. For instance, Growing Power demonstrates an important synthesis of a number of inexpensive farming techniques: tiered and raised beds, aquaculture, vermiculture, heating greenhouses with heat from compost making to transfer the urban waste into food. The high productivity coming from the use of urban waste and the constant experimentation could be seen as an example of the holistic pattern which governs systems theory of living eco-systems. On the ecological level urban waste is diverted from methane making landfill to compost. Additionally Allen and his team carry out careful observation and continuous experiments to devise mutually supportive farm eco systems. There is an important ecological diversity of farming production: fish, worms, compost and vegetables.

Knowledge transfer; as discussed earlier is also an explicitly important element. In Growing Power's teaching and schools partnering. Social outreach and education are particularly important for the farm; working with community groups and schools, leading workshops to teach disempowered minorities sustainable farming techniques and giving opportunities to volunteers. There are important yet intangible social benefits of a vibrant and working farm in a deprived urban area. Economically, the highly productive food harvest and compost sales are an important income source.

4.1.1. Growing Power : Implication for other cities

Growing Power has already seeded. There are Growing Power outreach farms in Chicago and Illinois, which indicates that the system could be replicable.
In relation to Allen's plans for community food, Salatin from Polyface Farm (the farm studied in Michael Pollan's critique of the food industry *The Omnivore's Dilemma* (Pollan, 2006)) has a similar strategy. This is to scale up food production to community level with 'food clusters' to cover urban food production from farm to fork. These clusters are intended to link the necessary elements in a food production chain, processing, marketing, accounting, distribution and customers. With enough sizable food clusters; a few hundred each valued $5

to 10 million, Salatin envisages that urban centres could be serviced by local community based food clusters instead of the current industrialised system (Salatin, 2009).

4.2. Cuba: Response to crisis

The concern with defining, and formalising UA spaces led to mapping all the actual and potential urban agriculture sites and issuing usufruct rights. Facilitation of UA by the State with activities such as plot mapping and allowing limited food marketing were part of the important services the Cuban government carried out (Mougeot, 2005 :177). The mapping and formalising of UA was importantly allied with promoting research on sustainable technologies, the transfer of organic and permaculture agricultural knowledge to Havana's citizens and the provision of affordable agricultural inputs to urban farmers through the TCA, (agricultural goods and services centres) (Mougeot, 2005).

The State run rural farms were slow to adopt permaculture and organic. As Wright points out, no access to oil does not immediately mean widespread organic methods; which allows us to differentiate between the industrialised agriculture mindset (present in Cuba) and effect of agri-business interests (not present in Cuba) (Wright, 2009).

Permaculture and organic agriculture (under certain conditions) reduce the fossil fuel requirements in food production, a major input. The other major input required for food growing in Havana was information. Knowledge transfer was a crucial element in the success of Havana's UA– the older farmers as bearers of traditional knowledge about farming were recognised by the State as necessary to impart knowledge to help the young and urban dwellers learn how to grow food. Permaculture and systems theory overlap in several areas. For instance permaculture attempts to design and set up self-governing systems with feedback loops to produce food, which has a close link with systems theory. Permaculture theory considers that a deficit in inputs creates work; and considers a deficit in output to be pollution or waste; it is a cradle to cradle concept of cycling resource use (McDonough and Braungart, 2002), similar to Systems theory view of inputs and cycles.

4.2.1. Implication for other cities

The Havana case indicates the importance of the centrally controlled state's role in supporting and promoting UA in an oil induced crisis through mapping, ensuring knowledge transfer and facilitating marketing food produced. The state's role (discourse analysis), is not recognised by a number of Cuban UA researchers, (Hopkins, 2008, Morgan, 2006) instead study concentrated on the organic production aspects.
In applying lessons of the Havana experience to Britain the central control of the state is most unlikely to be replicated. However, the concerted and coordinated response to the crisis; with the successful outcome for low input organic and permaculture food production and the avoidance of prolonged food insecurity could be reviewed for the facilitatory role the state could take in transferring mapping and low input farming techniques.

4.3. St Petersburg *dacha* system

A summary of policy and planning framework for London follows, reviewing the key contextual planning and policy framework issues relating to Green Belt and the potential for UA. Planning frameworks and objectives are initiated at the London Level (Greater London Authority) and Borough Council scales respectively.

4.3.1. Land use planning implications for London and British cities

The *London Plan* is key to UA strategic priorities, as it provides protection and allows diversification for London's best farmland. Farmers' markets are seen as good practice. The Plan also foresees the Green Belt acting as a pastoral relief to Londoners. National *Planning Policy Guidance* (PPG) is prepared by the Office of the Deputy Prime Minister. This outlines how *Unitary Development Plans* (UDPs) relating to local circumstances and political priorities need to give account to issues including Green Belts (PPG 2), Retail Planning (PPG 6) and

Waste Management (PPG 10) (Barrett and Keech, 2004). The *Curry Report* contained over one hundred recommendations for change in the food and farming sectors, for example, extending support by local councils for farmers' markets in areas undersupplied by retailers, developing food buying co-operatives especially in areas of low income, and examining how public sector procurement could achieve environmental and economic benefits. (Policy Commission on the Future of Farming and Food, 2002). The 2008 conference *Growing Food for London* highlighted an enormous recent reduction in London food growing, although a short food chain close to the city was considered of great importance for London communities. (Howard, 2008).

4.3.2. Benefits and limitations of transplanting the *dacha* idea to other cities

Although the St Petersburg *dacha* allotment system is not indigenous to Britain, if the *dacha* system were applied, it could produce planning, economic and social benefits. *Dacha* allotments are potentially a highly effective strategy to protect Green Belt areas by giving a positive use. Urban agriculture in the form of a residential allotment system would provide a clear use, maintaining the Green Belt character and use. This planning benefit is in addition to the other benefits of *dachas* for social cohesion, food production, re-use of waste and encouraging ecological diversity. The Happy Planet Index points out '*more immediate contact with, and hence a greater awareness of, physical limits can successfully encourage ecological efficiency'*. This argues for UA as urban dwellers are frequently cushioned from an awareness of ecological results from lifestyle choices which growing your own food can alter; in demonstrating ecological limits to urban farmers. (NEF et al., 2009)

However these benefits need to be considered against some potential problems. The most obvious is the issue of 'doubling up' on housing for the urban dweller with a *dacha*, and all the attendant services required. A solution to this problem would be to carefully design standard *dacha* huts as very simple, 'off grid' units, with composting toilets, rainwater harvesting and renewable energy for lighting and heating. The grouping of *dacha* huts and the allotments in permaculture community-like lots of twenty or fifty could lead to economies of scale for roads, waste management and other servicing. *Dacha* allotments would also reduce the demand for the resource demanding yet unproductive weekend country cottage. Against the objection that successful *dacha* allotment schemes may mean hundreds of thousands of urbanites travelling (with the attendant transport and carbon use) *dacha* allotments could be situated in the urban or peri urban areas on public transport lines to reduce car travel. A further benefit is that the movement from city to country could be considered a healthy change for urbanites; breaking down the traditional city/country divide.

In conclusion, a proposal to initiate *dacha* allotments in London, facilitating urban agriculture by urbanites in the peri-urban area, may assist with breaking the log jam of destructive (private single house) uses for agricultural land. The British planning laws could be amended or interpreted to allow a *dacha* type allotment system to be implemented and thereby protect Green Belt and countryside which is currently vulnerable to the numerous exemptions which allow building. This planning benefit is in addition to the above mentioned economic, environmental and social benefits; but the planning implications could provide the impetus to planning authorities to encourage or initiate a *dacha* allotment pilot scheme. *Dachas* could be knitted into the social fabric of British holiday making, as they have much in common with the existing much loved beach huts and allotments.

5. CONCLUSIONS AND RECOMMENDATIONS

It is not entirely unlikely that Britain could suffer a hiatus in food accessibility, this has already happened during the world wars. A financial crisis, like the 1980s St. Petersburg experience which reinvigorated UA food growing is also possible. If the industrial food production system collapses; or goes into crisis and cannot deliver in a situation similar to the Cuban food crisis, then city populations are likely to need agile, diverse, UA forms to feed themselves. As the

Cuban example showed, rural agriculture could not respond quickly for a variety of reasons, which is likely to be replicated in the British context. These reasons include: lack of knowledge and suspicion of organic and permaculture techniques, the five to eight year time lag to regenerate the soil after industrial farming, lack of productivity of extensive farming compared with UA allotments and micro plots and most importantly, lack of diverse systems in place which could quickly scale up to deliver in place of the current industrial food system.

5.1. Contribution the research has made to the literature and further research recommendations

The lessons learnt from each study make useful connections for UA theory development when looked at as a whole in relation to UA resilience in London and other British cities.

The research for this report identified a number of fascinating initiatives and growing projects which could be synthesised into a publically accessible database to inspire and guide policy. However it is hard to see how cohesive policy and planning can be made about UA in London and other cities with the dearth of focused research on UA in its wider theoretical, economic and social setting. This research would be of great benefit in assessing the current resilience of UA in London. An additional important area of research is on 'food clusters' from the Growing Power and Polyface farm community scaled food production and distribution.

5.2. Implication or implementation for practitioners

There are implications for government, academia, urban planning and design. Spatial planning intends to ease the conflicts between different users of space; for instance residential and industrial or commercial users. In cities administering these conflicts fairly can be extremely complex. In adding yet another claim, urban farmers with their particular spatial requirements, could be seen as a complication too far. Mapping is one method to solve this issue; GIS systems allied with AHP (Analytic Hierarchy Protocol) can provide a framework for city planners in spatial analysis and modeling, allowing integration of complex soil analysis, roads access, water and markets, land use pattern to optimise land allocation for UA in city plans (Thapa, 2008).

It is possible to pilot each of the major lessons from the international examples. For instance, a pilot Growing Power farm could be set up in London. Permaculture principles could be taught to large sections of the London population, following the Cuban example, along with a mapping exercise to identify potential growing spots. A section of the Green Belt could be set aside for a pilot *dacha* allotment scheme in conjunction with the GLA and the local authorities. Despite the fact that application of UA in a city would be costly and complicated, diversifying UA is worthwhile. Even though the industrial food production system is still operative, built in redundancy could be crucial. Hospitals have back-up generators, and fire brigades stand by all over the country, although they are relatively underused, for the same reason: redundancy keeps systems running. It is also cheaper and long term efficient to fix a problem now rather than on crisis arrival. Lord Stern makes a similar argument on climate change budgeting (Stern et al., 2008).

Finally, this report could lead to constructive change ; in triggering awareness of the preservation of accumulated experience and communicating the case study findings to policy makers and citizens it could stimulate innovation. This knowledge could encourage and sustain the capacity of people, institutions, and the environment to deal with change and build resilience in urban agriculture.

REFERENCES