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Urban agriculture: multi-dimensional tools for social development in poor neibourghoods

E. Duchemin, F. Wegmuller, and A.-M. Legault

Institut des sciences de l'environnement, Université du Québec à Montréal, Succ. Centre-Ville, C.P. 8888, Montréal, Québec, Canada

Abstract. For over 30 years, different urban agriculture (UA) experiments have been undertaken in Montreal (Quebec, Canada). The Community Gardening Program, managed by the City, and 6 collective gardens, managed by community organizations, are discussed in this article. These experiments have different objectives, including food security, socialization and education. Although these have changed over time, they have also differed depending on geographic location (neighbourhood). The UA initiatives in Montreal have resulted in the development of a centre with a significant vegetable production and a socialization and education environment that fosters individual and collective social development in districts with a significant economically disadvantaged population. The various approaches attain the established objectives and these are multi-dimensional tools used for the social development of disadvantaged populations.

1 Introduction

Of the measures taken which tend to reduce poverty and promote social and economic development, urban agriculture[1] has been shown to play an important role in developing countries (Smit et al., 1996; Mougeot, 2006). Although this practice is still often considered to be a temporary or marginal activity that does not lead to sustainable urban development, urban agriculture (UA) improves economic conditions as well as the health of poor and vulnerable families and, more specifically, of women and children.

According to Smit et al. (1996), 800 million people worldwide practice urban agriculture. Two hundred million of them are involved in market production, and 150 million are employed full-time. These people produce approximately 15% of the world's food products. Although people practicing UA are found mostly in developing countries, they are also found in industrialized countries, in large cities such as New York, Chicago, Berlin, Montreal, Toronto and Vancouver. In Berlin, there are an estimated 80 000 people involved, and in New York there are approximately 1000 community gardens on public land. In Boston, the Boston Natural Areas Network is responsible for more than 150 community gardens, bringing together more than 10 000 people (Boston Natural Areas Network, 2008).

Urban agriculture combines agricultural issues with those related to city development. It has a direct and indirect impact on the various aspects of the citizens' quality of life. Agriculture in urban areas is generally seen as a resource that contributes to food security for families and communities and to the improvement of conditions for poor neighbourhoods in developing and industrialized countries.

In this article, the different intervention approaches taken by the Community Gardening Program of the City of Montreal (Quebec, Canada) and by 6 collective gardening associations will be discussed. We will then present the various results and observations that followed from the social and community development initiatives. The results will then be reviewed and the different challenges and issues raised to ensure that programs such as these are maintained and continue to be developed in poor neighbourhoods in industrialized countries. According to the intervention projects analyzed here, the various educational and empowerment actions involved in UA represent a social and economic development tool that encompasses more than just the issues of production and food security.

Correspondence to: E. Duchemin (duchemin.eric@uqam.ca)

[1]Generally speaking, UA can be described, as much inside as on the periphery of an urban zone, as including animal husbandry, the growing of plants and trees that yield edible or non-edible products and as the transformation and commercialization of the products derived from it, which are intended for the urban market (Smit et al., 1996; Mougeot, 1999).

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2 Intervention and analysis methodology

Urban agriculture is in line with the fight against food insecurity[2] experienced by vulnerable, and often poor, urban populations, with food justice[3] and with the creation of a viable city by offering practical and applicable solutions to the problems raised by the urban context (Mougeot, 2006; Reyburn, 2006). In UA's various analytical frameworks, its areas of intervention are education (public awareness, personal and political empowerment), economic development and the fight against poverty (Bhatt and Kongshaug, 2005; Bobyns, 2004; Boulianne, 2001; Izquierdo, 2007; Small, 2007; Henn, 2000), food security as a means to food self-sufficiency (Bhatt and Kongshaug, 2005; Bobyns, 2004; Ellis and Sumberg, 1998), leisure activities by providing places of relaxation and the opportunity to connect with nature (Dalcon Bouvier and Sénécal, 2001; Daclon Bouvier, 2001), social interactions (Bergeron et al., 2002; Daclon Bouvier, 2001), health, by promoting outdoor physical activity and providing quality foods (Milligan, Gatrell and Bingley, 2004), urban planning through citizen appropriation of vacant lots and, lastly, the environment, including the protection of urban biodiversity and the flow of matter and energy within the urban ecosystem (Gaston, 2005; Reyburn, 2006; Warren, Lerman and Charney, 2008) (Fig. 1).

This assessment will focus mainly on UA areas of activity related to social development. This preliminary analysis will be based on the different experiments carried out in the entire City of Montreal. The data presented have been gathered from surveys distributed by the organizations in collective gardens (about one hundred respondents) and numerous community gardens (455 respondents analyzed) and from semi-structured interviews (12 interviews) and participant observation.

3 Project description

3.1 Collective gardens

Although the collective gardens were grouped together in a network called the *regroupement des jardins collectifs du Québec*, there is no existing structured and homogeneous program for the collective gardens on the Island of Montreal,

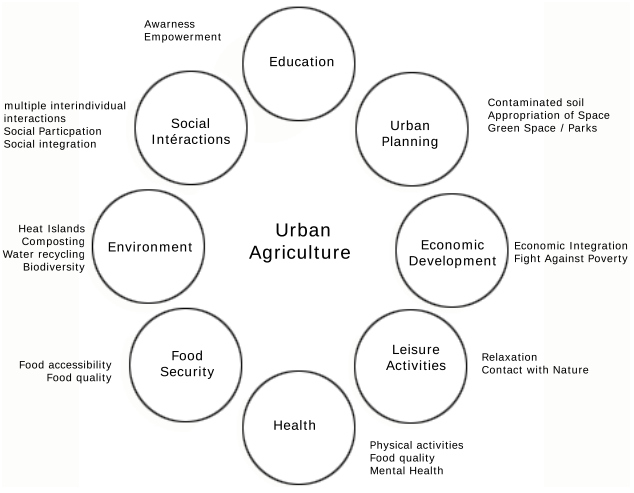

Figure 1. Different areas of UA activity and assessment related to economic, social and environmental development.

where there are at least nine collective garden associations, which run 42 collective gardens (Lebedeva, 2008). Together, they cover an area of approximately one hectare and have nearly 2000 participants. Each association is independent and responsible for determining its own method of operation and associative structure. Although the 6 collective gardens presented in this article[4] differ greatly from one another, their common goal is to fight food insecurity, provide education and foster empowerment. Some are associated with emergency food banks, collective kitchens and health services, or are an integral part of an organization offering a range of social services (Table 1). For example, Action Communiterre distributes 27% of the harvest from its gardens to social service organizations. In addition to having citizens take ownership of the production of fruits and vegetables, the organizations conducted numerous workshops on horticulture, nutrition and cooking. In 2007, for example, Nutri-Centre LaSalle held 432 workshops.

The number of people living on modest incomes or even experiencing food insecurity varies from one collective garden to another. According to available data, 20% of the people taking part in the gardening activities of *Action Communiterre* experience food insecurity, whereas between 56% (in 2007) and 60% (in 2008) of gardeners from *l'Action concertée en sécurité alimentaire de Pointe Saint-Charles* have family incomes below $20 000[5]. The data collected from the parties responsible for *Les jardins collectifs de la Maisons de Villeray*, reveals that 62% of questionnaire respondents in 2008, 55% in 2007 and 51% in 2006 had incomes below

[2]Food insecurity – The fundamental notion of food insecurity can be simply understood as the basic need for food not being met; however, this notion also includes food quality issues as well as social and psychological issues that arise from the context of a process managed by individuals (Radimer et al., 1992, 1991; Campbell et al., 1991).

[3]Food justice – food justice starts from the conviction that access to healthy food is a human rights issue and that the "lack of access to food in a community is an indicator of material deprivation". Food justice goes beyond advocacy and direct service. It calls for organized responses (as community or collectives gardens) to food security problems, responses that are locally driven and owned.

[4]Financed by a Centraide program.

[5]Statistics Canada estimates – using the Market Basket Measure – that an income of $21 196 is not enough for people to support themselves financially or feel socially included (Statistique Canada, 2000).

Table 1. Description of various projects.

	Gardens	Managing organization	Number of gardens	Type of Cultivation	Organization
Community gardens	98 non-profit organizations	City of Montreal	98	Land	Independent organizations dedicated to UA, whose management is headed by different boroughs of the City of Montreal. The City program aims to provide access to cultivation areas.
Collective gardens	Collective gardens of Notre-Dame de Grâce	Action Communiterre	11	Roof and land agriculture. Fruit trees	The purpose of this organization is to provide environmental education, UA and food security for the Notre-Dame-de-Grâce district in Montreal.
	Collective gardens of Villeray	Maison de Quartier de Villeray	17	Container planting, land Fruit trees	Project integrated with an organization whose purpose it is to fight food insecurity for disadvantaged populations by putting collective kitchens, emergency food services and collective purchasing groups at their disposal.
	Collective gardens of Pointe Saint-Charles	ACSA Pointe Saint-Charles	1	Roof, land, Fruit trees	Project managed by a round table that brings together a collective kitchen and food security organization, a health and social services organization and an environmental organization.
	Collective gardens of Rosemont	Bouffe-Action	5	land	Project integrated with an organization working to eradicate food insecurity for the disadvantaged by putting collective kitchens, emergency food services and collective purchasing groups, among other things, at their disposal.
	Collective gardens of LaSalle	Nutri-Centre LaSalle	1	Containers, Land	Project is managed by an organization involved in food security education and preventive action.
	Collective garden of La Croisée de Longueuil	La Croisée de Longueuil	1	Land, Greenhouse	Independent organization that also manages a project that fosters social integration through horticulture training, a summer day camp for children from 5 to 12 years and extracurricular activities.

$18 000. Another study revealed that 40% of the people interviewed in 2 Montreal collective gardens had incomes below $20 000 (Daclon-Bouvier, 2006).

3.2 Community gardening program

The development of the City of Montreal's community gardens program took place in three stages (Bhatt and Kongshaug, 2005). The first occurred during the 1970s energy crisis, during which food security became the primary motivation for gardening. In 1974, the first community garden in Montreal was born of a popular movement and became the starting point for the rapid development of a phenomenon that by 1981, led to the establishment of 43 community gardens. In 1985, the City of Montreal modified its program to develop a clear policy concerning the elaboration and establishment of the gardens (Daclon Bouvier, 2001). Since then, the gardening program has become part of the *Service des sports, des loisirs et du développement social de la Ville de Montréal*. However, as of 1997, a third stage began to emerge that saw the stagnation, or even drop in the number of community gardens (Bhatt and Kongshaug, 2005; Pedneault and Grenier, 1996). In 2008, the program included 98 gardens with a total of 8459 plots. The City of Montreal estimates

Table 2. Garden produce from various projects.

District	Number of Gardens	Area (m^2)	Number of Gardeners (approx.)	Quantity (kg)	Quantity Per Person (kg/pers)	Quantity Per Area (kg/m^2)
Collective Gardens						
Action communiterre	11	4900	128	1545	12.1	0.3
Maison de Villeray	17	2380	133	898	6.75	0.4
L'Action concertée pour la sécurité alimentaire de Pointe Saint-Charles	1*	–	20	314	15.7	–
Collective Gardens of Rosemont	5	467.9	61	948.3	15.5	2.02
Nutri-Centre LaSalle	1	630	46	1311	28.5	2.08
La Croisée (Longueuil)	1	9000	85	8000	–	0.9
Individual and Community Gardens						
Pointe Saint-Charles	community	16	1 family	39	39	2.4
Pointe Saint-Charles	individual	8	1 family	27	27	3.4
Pointe Saint-Charles	individual	16	1 family	87	87	5.4

* Jardin Dent verte, data not available for the other two gardens in the district.

that approximately 12 000 to 15 000 people are directly or indirectly involved in the community gardens program of the City (A. Pedneault, personal communication).

The program gardens are semi-autonomous and managed jointly by 2 local representatives from the City of Montreal (a development officer and a horticulturist) and a committee of represented citizen-gardeners who are responsible for the management and organization of the garden. The gardens are divided into small 18 m^2 plots for the gardeners' use. The gardening and management rules are dictated by the City program and applied by representatives of the City and garden. Although all gardens have the same structure and must apply the same set of rules, there is no link or networking between them.

The results made available by the community gardens seem to indicate that people with a modest income (that is, having a family income below $20 000) make up between 27% and 61% of the gardens' population. This group represents 27% of the population of the Jardin Delorimier, 27% of the population of le Jardin Saint-Sulpice, 36% of the population of the Jardin Saint-Christophe, 61% of the population of the Jardin Sainte-Marie, 43% of the population of the Jardin Saint-Eusèbe and 47% of the population of the Jardin Mederic-Martin. Although the data being presented is preliminary, they are consistent with the social fabric of the given districts (CGTSIM, 2008). In districts with a high number of disadvantaged people, the presence of a higher percentage of this group can be found in community gardens, without exclusion, therefore promoting a diversified social context.

4 Results

4.1 Gardens: places where produce can be grown to provide food security

As defined previously, one of the objectives of agricultural programs is to reduce food insecurity in poor neighbourhoods. Food security (or insecurity) refers to having access (or not) to an appropriate quantity and quality of fruits and vegetables. The study led by Daclon Bouvier (2001) reveals that shortage of food is the main concern for 30% of people with an income below $20 000.

As to quality, collective gardens promote organic agriculture by disallowing chemical inputs in fertilizers as much as in disease and pest control. For the community garden program, an organic approach to agriculture is also encouraged; however, only chemical inputs used to ward off insects and disease are banned.

The observations made of the various gardens revealed that the different collective gardening projects provide between 7 kg and 28.5 kg of fresh vegetables, with an average of about 16 kg per person (Table 2). This yield is obtained during the summer season, from mid-June to the end of October. Moreover, the rare data available for community or individual gardens indicate that a more abundant yield varying between 27 kg and 87 kg per person is obtained. Given that the average Canadian consumes 40.5 kg of fresh vegetables (excluding potatoes) annually (Elward et al., 2005), the average production weighed in collective gardens (16 kg/person) over 18 weeks represents a weekly yield of 0.88 kg, that is, the average intake in terms of fresh vegetable consumption for a Canadian adult. Including potatoes (the cultivation of which is excluded from collective and community gardens), this represents 70% of the annual intake of fresh vegetables for an adult.

The quantity of fresh vegetables produced per land area is between 0.3 kg/m^2 and 5.4 kg/m^2 (Table 2); the difference between gardens and UA approaches (community gardens and collective gardens) is still evident. However, it is important to mention that these are preliminary results and that very little data are available on community gardens (1 garden) whereas data are available for 35 collective gardens.

The differences noted between the different collective gardens in terms of production per land area depend largely on crop intensity and the stage of development of certain gardens. The quantity produced per person depends on organizational and field decisions regarding the type of cultivation used (containers, permaculture, etc.) or on how work is organized in a given garden. Some associations recommend one harvest per week, consequently reducing plant production. Some gardens, wishing to promote socialization and education, do not allow work to take place at all times and instead encourage team work during specific hours, often putting off agricultural tasks to the following week. Others, on the contrary, allow work to be done at all times and hire a horticulturist who has the specific task of ensuring the production and maintenance of the garden outside collective work hours. Others encourage a strong neighbourhood presence, through considerable spatial set-up and a large growing area; although these might produce less, they have a greater impact in terms of urban development and activities.

Compared to the general production rate for market garden produce, the data collected from the different projects differentiate themselves. As a result, Agriculture and Agri-Food Canada (2007) estimate that the production rate per m^2 for vegetables destined for markets without being processed is 0.6 kg/m^2, whereas De Vries et al. (1997) estimate that on a worldwide scale, the rate would be between 0.15 and 0.57 kg/m^2 depending on the district. With rates between 0.3 and 5.4 kg/m^2 UA projects in Montreal are showing their production potential.

4.2 The Gardens: places of belonging and socialization

The aim of projects working towards food security is also to foster the social participation of people who are destitute (Bergeron et al., 2002). Indeed, according to certain people involved in collective gardening, this type of gardening offers more than what is reflected in the results, such as health through good nutrition and access to healthy food at a reduced cost. Participating in this type of gardening offers a unique opportunity to develop relationship competencies (Bergeron et al., 2002), and although the desire to socialize does not seem to be the primary reason for getting involved in community gardening (Daclon-Bouvier, 2001), interactions involved in this type of activity eventually foster a social environment that enhances the activity itself by providing participants with a social network that becomes important particularly when they are feeling isolated. According to the data gathered during this study, which involved more than 455 respondents, although "meeting people" might be the last reason for wanting to garden, it is not considered any less important for them (for 2 out of 4). A form of social development therefore emerges out of UA.

These forms of social development can be seen through the multiple interindividual interactions that govern relations between individuals in these gardens. Among these interactions, numerous exchanges take place during gardening activities. In fact, in a study carried out on Montreal's community gardens, Daclon-Bouvier (2001) revealed that 80% of the gardeners surveyed stated having regularly exchanged advice with other gardeners, and three out of five respondents stated that they frequently exchanged or gave away seeds. The 79% whose purpose for gardening is to give their produce to family or friends outside the garden should also be mentioned. In addition to these types of exchanges, the social dynamics inherent to community gardens are nourished by the desire to develop a collective and community life through activities. Through the first reading of the results obtained from our research based on the interviews with gardeners and garden presidents in three community gardens in Montreal, a desire to develop a community dynamic can be perceived. As one of the garden presidents stated, "*This is what I tell new gardeners, that this is the way we are; we try to be a family*." Moreover, activities such as *La fête des récoltes* and community meals are organized to foster, in this case deliberately, a form of social dynamism. The latter, integrated in a UA context, proves to be all the more pertinent, in that it appeals to people of different origins, socio-economic status and age (Daclon-Bouvier, 2001). The garden president states that "*It is a place where a number of people, from every social class, get together to grow vegetables and end up exchanging tips and socializing. It's just a pretext, but it's a great way to socialize*." Urban agriculture therefore provides a social context in which gardeners can integrate themselves through their participation; it takes on an importance that for some of them is of great relevance. As it is with this gardener, "*Because in this place, as I have mentioned, we meet friends. I am an elderly man who lives alone.*"

Therefore, it seems that this type of UA project proves to be "an important instrument for developing a sense of belonging and a sense of communal ownership that facilitates exchanges not only in the group, but also between the group and the rest of the community" (Bergeron et al., 2002). This is particularly true for people having to face a social void, as is often the case with the elderly, people who are part of minority groups and people who are socio-economically disadvantaged.

4.3 The gardens: places of edu-action

Education is at the heart of the mission of numerous community organizations that carry out urban collective gardening projects and adopt numerous social development approaches for disadvantaged populations. And yet, very little research

has, until now, looked into the education potential of these initiatives.

The preliminary results of two case studies[6] provide an opportunity to understand the importance of the *community* approach *(place-based community)* and the education provided by such projects. True to Villemagne's (2005) theoretic proposal concerning environmental education in urban community environments, the educational experience offered by collective gardens seems to be closely linked to the actions taken (development of knowledge and know-how from the collaboration on common projects) and location (foothold in the community). Villeray organizer, Mohand, states: "*the best method is to learn while working, playing, doing something. (. . .) And that is what a garden is, a place where people can breathe, chat, work, learn, listen to others, express their emotions, in other words, do it all.*" Therefore, the garden represents the educational context (environment), its subject (what), a strategy (how), an approach and/or a goal.

Moreover, the collective and social aspects of the gardening project have a great impact on its educational foundation. According to Alain, a gardener in Villeray: "*. . . there exists a complete system of values underlying all this (the gardening project): social support, solidarity, respect, dignity and sharing. This is important. This is what encourages people to get involved at some point.*" Therefore, what this project brings to its participants goes beyond the technical and productive aspects of the gardening experience, it provides them with the opportunity to develop a social, community and environmental conscience that aims to deconstruct and transform socio-ecological situations and guide them towards a more harmonious development (Sauvé, 1997; Villemagne, 2005). True to this vision, the role of every garden's facilitator is to encourage participants to take ownership of part of the learning process and project and therefore give themselves a stronger sense of empowerment and commitment.

Consequently, the decentralized type of education that takes place in collective gardens should be seen as a continuous and complex process that is constantly evolving, with benefits that are sometimes obvious and at other times not. Nevertheless, a political[7] dimension unquestionably arises from the reforging of relationships that takes place between individuals, community and environment in collective gardens of neighbourhoods where they are established. Continued studies carried out on the projects initiated will undoubtedly add new dimensions to this course of thought. The education potential of community gardens in the City of Montreal has never been examined, but it is highly probable that it is also present.

[6]Action Communiterre in NDG and the Maison de Quartier dans Villeray

[7]The term *political* used here should be understood as referring to the process of social change, the purpose of which is to change established power relationships.

5 Issues and challenges

Contrary to cities in the south, where UA plays a food-producing and commercial role (Smit et al., 1996; Mougeot, 2006), the objectives established by UA projects in cities of industrialized countries are never centred solely on food production. Gardening in this case becomes a pretext for social action (leisure activities, education, networking, solidarity, empowerment, physical activity, political activism). In this article, several of these elements have been clearly identified as being the result of actions taken.

In a city like Montreal, the portion of fresh vegetables destined for individual consumption by UA is quite significant and warrants further study. In this context, an interesting point to consider would be what food production represents, in terms of net requirements of fresh food for citizens, compared to all other presumed or proven advantages (see Fig. 1) UA brings to social and economic development in the poor urban neighbourhoods of industrialized and developing countries. It is possible that the importance of the production aspect, compared to the pretexts for social activity, might be over-valued (in developing countries) or undervalued (in industrialized countries). In trying to respond to these questions, we create the possibility of pursuing new paths of development for UA and of distinguishing the advantages and disadvantages presented by the various solutions, such as container gardening on balconies and roofs. In addition, the production dimension should also be seen through the wider lens of changes in eating habits. Obtaining fresh vegetables certainly compels target communities of the project to seek complements they would not otherwise have bought.

In this article, the data obtained were given particular consideration in regard to the financial poverty experienced by the target population. However, other types of disadvantages, such as mental health problems, isolation, impairment, recent immigration/culture shock, are also targeted by the objectives of the identified actions. UA organizations must also face these same issues.

As seen in Montréal, UA has succeeded in taking an important place in the lives of about 14 000 to 17 000 people, 2000 of whom are involved in collective gardening. Nevertheless, numerous challenges persist in terms of the maintenance and development of these action initiatives. Mentioned below are three challenges that seem to have priority:

First, there is a need to recognize these initiatives as representing intervention projects for the social and urban development of neighbourhoods. Although different facets have been identified and analyzed in this article, more research should be done to evaluate the initiatives taken. With the support of political representation, this evaluation will eventually lead to UA being considered a key element in city planning in the development of disadvantaged neighbourhoods. The challenges posed by UA in Montreal mirror the

same concerns expressed in the cities of developing countries (Mougeot, 2006).

It goes without saying that agricultural development also comes up against potential uses for soil and the type of use for vacant land (buildings for social housing, rentals, residences or private apartments, commerce/industry, community facilities, parks, etc.). In terms of potential, 22 of the 98 gardens that are part of the community gardens program (approximately 20% of the gardens in the program) of the City of Montreal need considerable work to allow crops to be grown. Numerous vacant spaces (wastelots) in poor neighbourhoods are not suitable for cultivation (contamination by industrial and other activities). Vacant spaces in neighbourhoods with a high percentage of economically-disadvantaged people are very often claimed for the development of social housing. Vacant land use therefore has its own set of challenges that must be taken on, which can be accomplished provided that creative initiatives are set up using a multidisciplinary approach. This will lead to an urban development that caters to various needs, including UA. The space given UA in a city is sometimes more important than the ground itself (Mougeot, 2006).

Lastly, organization is certainly a challenge that must be met. Although there exists a group of collective gardens in Quebec, the different UA initiatives and actions of each garden remain isolated from those of other gardens. There is no joint evaluation of their program and social and educational intervention approaches are not really discussed or shared. However, changes are occurring after more than 11 years following the establishment of the first collective garden in Montreal. As to community gardens, they are local entities that do not have any direct link between them. The City provides a consultation table that lists the different municipal stakeholders responsible for managing the program. In addition, the gardens are very often cut off from the social organizations of the neighbourhoods in which they are established, thus decreasing their potential in terms of social and educational development. As a result of this division, the tools developed from the different initiatives taken are not shared.

6 Conclusions

Although there is less surface area of agricultural land available in the city, and although it would be difficult to feed the entire population of a city like Montreal with the available land, a multi-approach implementation of gardening in urban environments, such as land agriculture, container gardening on balconies and roofs and a vertical integration of elements, would certainly contribute to the social development of disadvantaged neighbourhoods. Although not exclusive, the data presented here reveal that the initiatives are socially inclusive, that is, they encourage diversity in the gardens and therefore avoid excluding or stigmatizing certain groups of people. Moreover, this diversity fosters social support.

Studies done on UA, which have mainly been carried out in developing countries, generally examine the issue of economic integration through a segment of the urban population (often women) whereas in this study, we also examined socialization and educational issues that were certainly present in these projects. Here, only one garden (La Croisée) takes action on issues of economic integration. It does so through professional training and through the sale of baskets of organic vegetables. However, in various North American cities such as Toronto and New York, the sale of vegetables and processed products (canned foods, jams, etc.) becomes a tool for the economic development of vulnerable populations.

In conclusion, it appears that a cross-analysis of initiatives taken in industrialized and developing countries would greatly benefit both, but especially industrialized countries, where UA is still in its initial phases of development.

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