



Partecipazione e Conflitto
* *The Open Journal of Sociopolitical Studies*
<http://siba-ese.unisalento.it/index.php/paco>
ISSN: 1972-7623 (print version)
ISSN: 2035-6609 (electronic version)
PACO, Issue 8(2) 2015: 417-442
DOI: 10.1285/i20356609v8i2p417

Published in July 15, 2015

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RESEARCH ARTICLE

SOWING RESILIENCE AND CONTESTATION IN TIMES OF CRISES: The case of urban gardening movements in Barcelona

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ABSTRACT: Urban gardens have been observed to multiply in response to crises. However, the meaning and motivations behind the emergence of gardening movements varies greatly over space and time. In this paper we argue that bottom up urban gardening initiatives taking place in Southern European countries in form of land occupation and communalization represent forms of resistance that enhance social cohesion and collective action in times of need. Specifically, this research examines the role of urban gardens in (i) building community resilience and (ii) articulating forms of resistance and contestation to development pressure and commodified urban lifestyles. Our research is based on data collected among 27 urban gardening initiatives in Barcelona, Spain, including 13 self-governed community gardens and 14 public gardens. Data were collected from semi-structured interviews with gardeners and with staff from the Barcelona City Council. Our results show mechanisms through which urban gardens can contribute to build resilience by nurturing social and ecological diversity, generating and transmitting local ecological knowledge, and by creating opportunities for collective action and self-organization. We further examine collectively managed gardens as urban commons that emerge as a form of resistance to the privatization of public urban space, and that offer opportunities to experiment with new models of urban lifestyles. We show how gardening initiatives can be seen to represent an emerging form of urban green commons that provides a suitable ground to ‘sow’ resilience and contestation in times of crises and socio-ecological deterioration.

KEYWORDS: economic crisis, social-ecological systems, social movements, urban gardens, urban green commons, Spain

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1. Introduction

Urban gardens often proliferate in period of social and economic crises as a strategy to build local resilience (Okvat and Zautra 2011; Colding and Barthel 2013). Motivations behind crises-driven gardening initiatives include buffering food shortages and mitigation of negative social impacts from unemployment by enhancing community cohesion and promoting solidarity networks (Okvat and Zautra 2011; Borowy 2013). For example, during World War I the number of allotment gardens in Britain surged from 600,000 to 1,500,000, supplying city people with food and other ecosystem services (Barthel *et al.* 2010). These gardens were established in parks and sports fields, and even Buckingham Palace turned over its lawns to grow vegetables. Likewise

after the collapse of the socialist block, in Cuba, urban agriculture makes significant contribution to sustain La Havana's food provision (Altieri *et al.* 1999; Buchmann 2009).

The global financial crisis that first broke out in 2007 has had devastating economic and social consequences in Southern European countries. One of the countries that were deeply hit by the crisis is Spain, where the economic downturn was aggravated by the compounding effects of the international financial crisis starting in 2008 and the burst of a domestic housing bubble (Naredo 2009; Fontana 2011; Harvey 2011). Impacts from the crisis include skyrocketing unemployment rates, budget-cuts in the welfare state and basic public services, and increasing levels of poverty. As an illustration, unemployment rates reached almost 27% of the working population in 2013 (INE 2014a), the expenditure on education has decreased by 13.5% since 2009 (Eurostat 2014) and by 2013, 20.4% of the Spanish population was at risk of poverty (INE 2014b).

The economic crisis has fuelled a growing interest in urban agriculture across Southern European cities during recent years, giving rise to a flourishing of community gardens on vacant lots. In this paper we examine the emergence of gardening initiatives as a strategy to build resilience and contestation in cities in crisis-ridden Southern European countries. Specifically, this research examines the role of urban gardens in (i) building local resilience and (ii) articulating forms of contestation to urban development pressures and commodified urban lifestyles.

Our examination of resilience building strategies associated to urban gardening draws on previous research on the mechanisms that nurture resilience in social-ecological systems (Folke *et al.* 2003; Barthel *et al.* 2010; Colding and Barthel 2013). Folke (2003) synthesized such mechanisms in four main categories: (1) Learning to live with change and uncertainty; (2) nurturing diversity for reorganization and renewal; (3) combining different types of knowledge for learning, such as traditional ecological knowledge or experiential knowledge; and (4) creating opportunity for self-organization. More recently, research in urban gardens examined the role of social movements in building community resilience (Colding and Barthel 2013).

Our examination of the role of urban gardens in the articulation of social contestation strategies builds on previous research on the role of grassroots garden movements in civil disobedience through occupations and communalization of land and vacant lots in cities (Castells 1983; Harvey 2013). Some organized gardening initiatives have been motivated by attempts to improve conditions in urban areas that suffered the effects of disinvestment or the negative side-effects of urban renewal and gentrification (Pudup 2008). For example, gardeners in New York City pioneered

practices of reclaiming and reusing urban land and initiated a movement known as urban 'guerrilla gardening' that spread to other cities (Tracey 2013).

We argue that bottom up urban gardening initiatives taking place in Southern European countries in form of land occupation and communalization represent forms of resistance that enhance social cohesion and collective action in times of need.

2. Methods

2.1. Case study

Our research is based on data collected among 27 urban gardening initiatives in Barcelona, Spain. Barcelona, is Spain's second largest city by population and one of the most densely populated cities in Europe (over 16,000 inhabitants/km²). Over recent decades, Barcelona has been subject of large development pressures that have resulted in large conversion of green and agricultural lands. The period of fast urbanization culminated with the urban development plans associated to the Olympic Games in 1992, which resulted in an almost complete depletion of urban gardens (Roca 2000; Huertas and Huertas 2004). Over recent years however, and especially during the economic crises, urban gardening is on the rise.

Gardening initiatives in Barcelona adopt two main forms (Camps-Calvet *et al.* 2014) referred here as 'community gardens' and 'public gardens'. Community gardens result from bottom-up self-governed initiatives of neighbors, local associations, and activists that occupy vacant lots to grow food. Public gardens are formally regulated allotments by the Barcelona City Council. Our research covers 13 self-governed community gardens and 14 public gardens. In 2013, when our fieldwork was conducted, the city council-led the initiative '*Pla Buits*' [vacancies' plan] offered vacant lots across the city to neighborhood associations. Urban gardens emerging from this initiative combine features of 'community' and 'public' gardens, but are not covered in our research since by the time we developed our fieldwork these urban gardens were not yet consolidated.

Fieldwork for the collection of primary data was conducted between April and October 2013 in 27 urban gardens within the municipal boundaries of Barcelona, covering all public and community gardens existing at the moment we conducted our fieldwork. The sample included 13 community gardens and 14 municipal gardens; of the latter, 13 are administrated by the Barcelona City Council through the '*Xarxa*

d'Horts Urbans de Barcelona and one (*Hort de l'Antic Jardí Botànic*) by the Cultural Institute of Barcelona.

2.2 Data sampling

Data sampling was conducted in three different steps: (1) secondary data collection and participant observation, (2) semi-structured interviews (N=44), and (3) interviews with experts from the Barcelona City Council (N=2).

Secondary data reviewed for this study included scientific literature as well as reports from associations and social movements engaged in urban gardening. Participant observation included field observations and informal interviews. Field observations were used to contextualize our research and to identify factors contributing to build up community resilience and forms of contestation. Informal interviews in each urban garden provided information on the gardens' property regimes, models of management, rules, norms and convention for the governance of the gardens, foundation year and motivations as well as the historical evolution of the garden.

Primary data were collected from semi-structured interviews among urban gardeners and staff of the Barcelona City Council involved in the planning and management of urban gardening. We conducted 44 face-to-face semi-structured interviews among users of urban gardens in Barcelona. During our participant observation we detected that in the urban gardens, both public and community ones, most of the gardeners were men ($\approx 70\%$). As a result of the gender structure of the gardens most of the 44 respondents were men (Table 1). The interview was focused on understanding the social and ecological importance of urban gardening initiatives. In addition, demographic data on age, education and income were collected to capture the diversity among gardeners. Where authorization was provided, interviews were recorded (N=31). Table 1 shows the list of interviews conducted.

We also conducted two interviews with technicians from the Barcelona City Council, in charge of implementing municipal urban gardening initiatives. First, we interviewed the coordinator of the municipal urban gardens initiative called *Xarxa d'Horts Urbans de Barcelona* [network of urban gardens of Barcelona] pertaining to the Council's Department *Espais Verds i Biodiversitat* [Green Spaces and Biodiversity]. Second, we interviewed the coordinators of the *Pla Buits* [vacancies' plan] initiative as part of the Department *Àrea de Participació d'Hàbitat Urbà* [Public Participation in the Urban Environment]. The objective of these two interviews was to capture the municipal managers' views on the future of municipal gardening programs and initiatives, as well

as their perception regarding bottom up gardening initiatives that emerged from initiatives outside the Barcelona City Council's programs and regulations.

Table 1 - Semi-structured interviews respondents and kind of urban garden affiliation.

<i>Respondent</i>	<i>Gender</i>	<i>Engaged in the garden</i>	<i>Urban Garden</i>	<i>Classification</i>
E01	Man	1 year	Hort Casa de les Aigües	A P
E02	Man	6 months	Hort Casa de les Aigües	A P
E03	Man	5 years	Hort de la Trinitat	A P
E04	Man	2 years	Hort Masia Can Soler	A P
E05	Man	2 years	Hort Masia Can Soler	A P
E06	Man	5 years	Hort Collserola	A P
E07	Man	5 years	Hort Collserola	A P
E08	Man	5 years	Hort Camí Torre Melina	A P
E09	Man	4 years	Hort Camí Torre Melina	A P
E10	Woman	4 years	Hort Forat de la Vergonya	S C
E12	Man	6 years	Hort Forat de la Vergonya	S C
E13	Man	18 months	Hort Masia Can Cadena	A P
E14	Woman	1 year	Hort Masia Can Cadena	A P
E15	Woman	2 years	Hort Sant Pau del Camp	A P
E16	Woman	1 years	Hort Sant Pau del Camp	A P
E17	Woman	1 years	Hort del Xino	S C
E18	Man	1 month	Hort del Xino	S C
E19	Woman	1,5 year	Hort del Xino	S C
E20	Man	17 years	Hort de l'Avi	S C
E21	Man	5 years	Hort Masia Can Mestres	A P
E22	Woman	2 years	Hort Masia Can Mestres	A P

E23	Man	7 months	Hort Sagrada Família	A P
E24	Man	3 years	Hort Sagrada Família	A P
E 25	Man	3 years	Hort Masia Can Cadena	A P
E26	Man	3 weeks	Hort Masia Can Cadena	A P
E27	Woman	1 day	Hort Poble Sec	S C
E28	Man	1,5 year	Hort Poble Sec	S C
E29	Woman	4 years	Hort Maladeta	A C
E30	Man	4 years	Hort Maladeta	A C
E31	Man	4 years	Hort Pedralbes	A P
E32	Man	1 year	Hort Turull	A P
E33	Man	1 month	Hort Turull	A P
E34	Woman	3 years	Hort Can Peguera	A P
E35	Man	2 years	Hort I Poblenou	As C
E36	Woman	1 year	Hort I Poblenou	As C
E37	Woman	1,5 month	Hort II Poblenou	As C
E38	Man	2 years	Hort II Poblenou	As C
E39	Man	8 years	Antic Jardí Botànic	S P
E40	Man	2 months	Antic Jardí Botànic	S P
E41	Man	1 years	Can Masdeu	As C
E42	Man	2 years	Aki me planto	As C
E43	Man	1,5 month	Fort Pienc	S C
E44	Man	3 years	Fort Pienc	S C
E45	Man	11 years	Can Masdeu	As C

Land distribution and management

A: Allotment (land divided in lots tended individually)

As: Allotment-shared (individual plots, common plots, and participatory assemblies for general decisions and organization).

S: Shared land (assemblies for general decisions and organization)

Land property regime

P: Public (top-down initiatives from Barcelona City Council)

C: Community (bottom-up initiatives from groups of neighbors, local associations, grassroots movements and activists occupying vacant plots)

2.3. Data analysis

To assess the factors that contribute to enhance social-ecological resilience we analyzed data from participant observation, and semi-structured interviews. We adapted and developed the classification of resilience-building strategies by Folke (2003) to group our findings in four categories: (1) Learning to live with change and uncertainty, including (i) learning from past crises; (ii) coping with uncertainty; (2) nurturing diversity for reorganization and renewal, including (iii) promoting ecosystem services; (iv) nurturing cultural diversity; (3) combining different types of knowledge for learning, encompassing (v) learning from various knowledge sources; (vi) building knowledge into practices and habits; and (vii) recoupling to ecological dynamics; as well as (4) creating opportunity for self-organization include (viii) nurturing social cohesion. Table 2 summarizes the list and description of factors that build resilience and adaptive capacity in social–ecological systems among the users of urban gardens in Barcelona.

In order to assess how urban gardens constitute forms of resistance to predominant models of urban development, we analyzed data from participant observation, and semi-structured interviews using a not predefined coding process (Charmaz 2006). We coded our data based on (1) the context (and actors involved in), the conflict and the strategies of resistances; (2) the internal organization and goals of the community gardens; and (3) the role of the different actors involved in the development of urban garden projects in the city of Barcelona.

3. Results

3.1. Urban gardens as sources of resilience

Building on Folke (2003), we classified resilience-building strategies in eight categories: (i) learning from past crises; (ii) coping with uncertainty; (iii) promoting ecosystem services; (iv) nurturing cultural diversity; (v) learning from various knowledge sources;

(vi) building knowledge into practices and habits; (vii) recoupling to ecological dynamics and (viii) nurturing social cohesion. In order to make the views of the gardeners more explicit and to better illustrate the different factors to build resilience provided by gardens, below we include some excerpts of the interviews.

Table 2 - Categories and subcategories contributing to build resilience and adaptive capacity in social–ecological systems among the users of urban gardens in Barcelona, based on Folke (2003).

<i>Categories</i>	<i>Subcategories</i>	<i>Description</i>
Learning to live with change and uncertainty	Learning from past crises	Understanding previous socio-ecological management for adaptation in the face of crisis context
	Coping with uncertainty	Strategies designed to improve survival in case of future disruption
Nurturing diversity for reorganization and renewal	Promoting ecosystem services	Contribution to increase biological diversity and to provide support areas to nurture ecological memory
	Nurturing cultural diversity	Diversity of stakeholders, institutions and organizations with different perspectives and roles
Combining different types of knowledge for learning	Learning from various knowledge sources	Combining local and traditional knowledge (from elder with rural origins to younger gardeners) and experiential knowledge (practices applying trial and error methods)
	Building knowledge into practices and habits	Urban gardens as institutions to store knowledge and tools of communication, education and understanding critical situations
	Recoupling to ecological dynamics	Knowledge about the human dependence on nature in the face of de-linking, de-coupling, and alienating humanity from nature

Creating opportunity for self-organization	Nurturing social cohesion	Engagement at the community level, creation of mutual support structures and empowerment of disadvantaged socioeconomic groups
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Learning from past crises: we found that elder gardeners were especially conscious of the critical role urban gardens played in mitigating the negative effects of past crises, such as World War II, post-war in Europe and Spain or the food rationing in Cuba after the collapse of the Soviet Union (respondent E38). Respondents highlighted the importance of understanding and learning from those past events to develop effective responses to new unexpected needs. For example, one of the respondents (E38) highlighted the importance of a future expansion of urban garden initiatives to provide the social capacity for learning and adaptation in the face of crises: *“Urban garden movements could create hope, and their expansion could address problems related to the current crisis. From indignation we learn and we promote social transformation”*.

Coping with uncertainty: our data illustrate examples of local management practices to cope with uncertainty. For example, the possibility to obtain local food as a way to buffer large scale crises in case of exhaustion of natural resources. One of our respondents (E28) explained that urban gardens improve long-term sustainability by offering local food and avoiding the environmental impact of food miles, especially problematic in a future with potential scarcities in crude oil.

Promoting ecosystem services: gardeners recognized the importance of multiple ecosystem functions and services associated to urban gardening, including pollination, maintenance of soil fertility, and provision of habitat to enhance biological diversity. Respondents explained that through organic compost from green waste and in some cases from food waste, they maintain and increase soil fertility to plant-growing. They also plant flowers to attract insects, while vegetables and fruits produced in the garden attract predators. Respondent E44 stated: *“[The garden] contributes to the biodiversity of the city –it gives life –; the biodiversity of plants leads to an increase in the diversity of insects and birds, and it increases future sustainability”*. For instance, a specific importance for biodiversity conservation has the *‘L’hort de l’Antic Jardí Botanic’*, which aims at preserving traditional horticulture biodiversity and Mediterranean seeds. Eventually, urban gardening also recovers vacant and unsanitary lots creating urban green areas that enhance landscape heterogeneity in the city. In a similar vein, respondent E45 pointed out that urban gardens contribute to the mosaic of biotopes and diversity of habitats.

Nurturing cultural diversity: here we refer to socio-cultural diversity in urban gardens as the diversity of stakeholders, institutions and organizations with different value perspectives and management approaches towards urban gardening (Table 1). Respondent E17 exemplifies this by arguing that urban gardens are meeting points for people of diverse ages and backgrounds with different interests, ideas, perspectives and projects. This diversity is captured in the disparate type of actors involved in public and community urban gardens. Users of public gardens included retired people, mostly men and their families (especially wives and grandchildren), workers from the Barcelona City Council (responsible technicians and green space managers), children mainly from primary schools but also from secondary schools and their teachers involved in environmental education projects, visitors especially neighbors but also tourists, as well as people at risk of social exclusion, such as prisoners. Users of community gardens included retired people, unemployed adults, families, visitors especially neighbors but also tourists, students and teachers, people at risk of social exclusion, social movements, activists, neighbors associations, environmental and agro-ecological cooperatives, permaculture projects, artists, journalists and multidisciplinary researchers among other professions.

Learning from various knowledge sources: data collected from our interviews show that urban gardening in Barcelona draws from different sources of knowledge, including local, traditional and experimental knowledge. *Local and traditional ecological knowledge* relates to traditional practices in urban gardens and, in some cases, the transmission of this knowledge from elder to younger gardeners. Elders with rural origins pointed out that they applied knowledge acquired from their ancestors. For example, respondent E41 referred to the application of crop rotation as a traditional practice to maintain soil fertility. Respondent E30 underscored the importance of knowledge transmission in relation to the cultivation and production of food, while pointing out that this fact is usually not sufficiently acknowledged. The same respondent highlighted that when elders die, their knowledge may be lost. *Experiential ecological knowledge* is well referred to by seeing the garden as “*a laboratory of agricultural experimentation*” (E02), where trial and error is applied. Using their intuition, gardeners applied new techniques that in previous occasions had shown successful or, in other occasions, they learned from the error and modified the technique until becoming successful.

Building knowledge into practices and habits: This strategy refers to the articulation of knowledge into institutional and social networks. Respondents stated that urban gardens can serve as a medium for communication, education and understanding raising popular knowledge and awareness about important environmental issues, such

as waste management, reuse, and alternative consumption patterns (respondent E10). Within community gardens in Barcelona it is a common practice to organize joint activities, such as workshops on agriculture or environmental issues, and public working days where knowledge is generated, applied and transmitted. Furthermore, respondents saw urban gardens as a medium to further involve citizens in urban agriculture and to spread information on the diverse manners to conduct urban agriculture, be it in form of backyard gardens, green roofs or community gardens.

Recoupling to ecological dynamics: this strategy refers to the restorative function of urban gardens counteracting physical and cognitive disconnection from nature in urban areas. For example, respondent E19 claimed: *"We shouldn't lose our origins because we are living in cities – this is not the origin of humanity – we have built [cities] because of imposed needs and this is not healthy"*. A graffiti-painting at one of the community gardens stated: *"Let us get back to the earth: creating life"* (Figure 1). Informants also argued that urban gardens promote knowledge about the human dependence on natural processes and resources, such as food, noting that supermarkets would be empty without gardens (E38). Respondents argued that citizens, especially children, have lost a general knowledge about basic natural processes, such as how to grow food, and highlighted the importance of urban gardens as a place to enhance social capacity to learn. Respondent E19 stated: *"We have lost the culture to cultivate! While there are people suffering from famine, schools do not teach the most basic issues: how to live and to be self-sufficient. Instead, they only teach about how to make money."*

Nurturing social cohesion: respondents emphasized the importance of social cohesion, especially in a context of competition, individualization and atomization of urban societies. For example, respondent E24 explained that loneliness is an urban problem, and expressed the importance of urban gardens as social spaces: *"If there is no communication between people you will have less life, the garden gives life to people"*. We also found that urban gardens at socio-economically depressed neighborhoods, offered a place where youth and adult neighbors feel safe and protected (E12). Our data also suggest that urban gardens enhance mutual support structures. For example, respondent E17 explained that gardeners help immigrants to solve administrative issues with immigration-related legal proceedings.

Figure 1 - Graffiti on a wall inside the squatted garden called: 'Aki me planto'. We can read: 'Come back to the earth, creating life'.



3.2. *Urban gardens as nodes of resistance*

In this subsection we document (1) conflicts and strategies of resistances where gardening initiatives are engaged; (2) internal organization and goals of the community gardens; and (3) the role of the different actors involved in the development of urban garden projects in the city of Barcelona. This latter category takes into account the roles, both, of activists and of the Barcelona City Council technicians in charge of implementing new urban gardening policies.

Urban environmental conflicts: our respondents noted that urban gardening initiatives run by bottom-up movements face many difficulties to be consolidated. For example, the community garden called 'El Forat de la Vergonya' ['the Hole of Shame'] is particularly well-known for the conflict between the City Council and private interests on the one hand, and neighbors and activists on the other (Anguelovski 2013). In 2000 the Barcelona City Council started to demolish buildings with the purpose to

build a private parking area and upper-class housing real estates. In response, neighbors and activists occupied empty buildings to avoid more demolitions and the lot where the car-park was planned. By building, *inter alia*, a community garden on the occupied lot, neighbors and activists highlighted the urgent need of more public and common spaces in the neighborhood. Respondent E10 from 'El Forat de la Vergonya' claimed: "*In Barcelona there are fewer and fewer public spaces, there are more and more [bar and café] terraces – a subtle form of privatization. The garden is a public space. [...] We hold workshops, popular meals; we offer something to the neighborhood. [...] The garden establishes political positions on certain common practices, new alternatives for action, collaboration and work.*"

Another example of contestation is illustrated by 'Can Masdeu', an occupied active socio-cultural center and community garden (Cattaneo and Gavaldà 2010). Respondent E45 described the conflict that arose between developers and local neighbors from an attempt to build a luxury retirement-home, as neighbors rejected the development plan and asked for the recovery and preservation of the Can Masdeu valley in its traditional use, where many generations have been working in horticulture (Can Masdeu 2014). The neighbors set up a garden, constituted the '*Assemblea d'Horts Comunitaris of Can Masdeu*' [Community Gardens Assembly of Can Masdeu], and managed to stop the development plan. As of today, this bottom-up movement continues to struggle for the re-appropriation of the land for the neighbors (Can Masdeu 2014).

Bottom-up movements also recover marginalized and idle urban lots. For example, figure 2 shows a panel situated in the urban garden called '*Hort Vallcarca*'. It explains the processes of deterioration and gentrification that occurred in the neighborhood of Vallcarca led by private urban developers and the Barcelona City Council. To denounce those processes, neighbors and activists developed a collectively organized and commonly managed green space, recovering an abandoned lot (Comuns Urbans a Barcelona 2014); similarly emerged the urban gardens '*Hort 1 Indignat del Poblenou*' and '*Hort 2 Indignat del Poblenou*'. The initiatives behind these two gardens sprouted in 2011-2012 from the, so called, 15-M movement, internationally better known as the "*Indignados* movement", emerged in response to the "current international dictatorship of the financial markets" (Hessel 2011).

Figure 2 - Information panel: Hort de Vallcarca.



Source: <https://n-1.cc/g/huertos-urbanos-vallcarca>

Policy developments: The conflicts that gardening movements have made visible through their struggles may have acted as a significant driver of changes in local urban policy and planning. For example, within the 'Xarxa d'Horts Urbans' the City Council provides garden plots during 5 years of land cession to retired people and to persons at risk of social exclusion (Ajuntament de Barcelona 2014). The most recent initiative, 'Pla Buits', promotes temporal uses of vacant lots in the city offering 3 years of land cession to non-profit entities that want to develop a self-organized project.

Both initiatives are developed on municipal land, but as highlighted by the coordinators of the 'Pla Buits' this situation could change in future editions, with the inclusion of private owned idle plots. Nonetheless the coordinators of the 'Pla Buits' noted that the interaction with private land owners proves to be often difficult. While these two initiatives have been depicted as win-win solutions for the City Council, the neighborhood and the associations/users, they have received contestation by some urban actors. Social movements raised a number of conflictive points in the regulations of municipal garden initiatives, such as short-term land cession, enclosure and excludability of the land, bureaucratic obstacles to self-organization and the loss of anonymity, due to the fact that obtaining land cessions requires the registration as an organization under 'Pla buits' or a personal request for gardens organized in the 'Xarxa d'Horts Urbans'.

Figure 3 - Information panel: Hort 1 Indignat del Poblenou. (Photograph: Johannes Langemeyer)



Spaces of autonomy: Out of the 27 urban gardens in our study, 13 resulted from bottom-up movements or neighbors' initiatives on occupied vacant lots, the gardens emerging out of the latter initiatives are self-organized and run by assemblies where gardeners take decisions on critical issues, such as the appearance and equipment of the garden, rules and regulations in regard to organic farming, upkeep of the common areas and distribution of tasks (See Figure 2 and 3). An example of these types of norms, principles and rules agreed in assemblies can be seen in the board exposed in the garden *'Hort 1 Indignat del Poblenou'* (Figure 3): self-organized and communal, where the decisions are to be taken in assemblies. In addition, respondent E35 highlighted the importance of the assemblies to give voice to those who are silenced: *"Our management and the constitution of an assembly enrich people, respecting the others, avoiding disputes and making agreements with consensus."* Various concerns regarding the role of the City Council in urban green planning were mentioned by gardeners. For example, respondent E42 described community gardens as a process of re-occupying land, and stated an unwillingness to be organized and monitored by the local authorities, due to the perception of lacking representation by local governments. Along the same line, respondent E19 highlighted the importance of urban gardens as self-managed spaces without external dependencies from the government, and as a step towards self-sufficiency. Respondent E28 added that the community garden is the opposite of public spaces because it is a space without hierarchy. During the interview with the coordinators of the *'Pla Buits'* we asked for their opinion on the conflict and the situation of the current occupied gardens in the city and they reported that: *"There is no strategy to regulate squatted gardens. The idea is to provide a framework to formalize and regulate all experiences that are more or less formalized. The squatting movement is a different kind of claim on public space and of denunciation; not necessarily all initiatives follow the same path. Public administrations need to respect legal rules; we will never be as flexible to allow squatting and legalize squatted gardens."* However, the latter situation occurred in the garden called *'l'Hort de l'Avi'* that was initially squatted by the neighbors and subsequently integrated in the City Council's *'Xarxa d'Horts Urbans'*. Also in the case of *'El Forat de la Vergonya'* the local government finally agreed to the neighbor's demand and conserved the community garden.

4. Discussion

We organize our discussion around three main themes. First, our results show that urban gardens are perceived as a source of multiple factors that could contribute to enhance social-ecological resilience in cities. Secondly, we have illustrated that some urban gardens are the outcomes of resistance processes (and thus becoming spaces of resistance) to dominating neoliberal urbanization models. Finally, we point out the linkages of urban green commons as sources of resilience and resistance simultaneously.

4.1. *Urban gardens and local resilience*

Given the historical emergence of urban gardens in contexts of crisis, our respondents were aware of the contribution of urban gardens to provide social capacity for learning and adaptation to mitigate the effects of crises. Urban planning should incorporate historical information about the organization and management of previous food crises by urban gardens movements in order to enhance living conditions for the urban poor (Barthel *et al.* 2013).

Our results show that urban gardens may help to restore unsanitary and vacant lots creating green areas, contributing to landscape heterogeneity. The specific practices developed in the urban gardens of Barcelona, such as planting flowers to attract insects, making organic compost or applying traditional techniques, including crop rotation, provide ecosystem services such as pollination, maintenance of soil fertility or habitat for biodiversity of species groupings and functional groups. Thus, the alternative reorganization patterns are increased in the face of change or disturbance (Folke *et al.* 2003) and the dependence in more than one single resource enhance social-ecological resilience (Tidball and Stedman 2013).

Our results demonstrate a wide diversity of stakeholders, organizations and institutions interested and involved in the development of urban gardens, such as social movements, associations, Barcelona City Council technicians or agro-ecological cooperatives. This cultural diversity may enrich decision-making process through the diversity of stakeholders' perspectives and cultures, different types of initiatives and managements or diversity of motivations (Tidball and Krasny 2007). Moreover, the overlapping roles of individuals, institutions, organizations and other actors sustain social memory (Folke *et al.* 2003).

Our respondents widely perceived a separation of citizens from nature. Folke (2007) points out that the existence of human exemptionalism –i.e. the belief that human

society is exempt from environmental forces (Cairns 1999) –, and the anthropocentric tendency can result in decoupling of social and ecological scales. De-linking, decoupling, and alienating humanity from nature compromise the notion of human dependence on nature and negatively affect resilience (Folke *et al.* 2007; Tidball and Stedman 2013). Our results demonstrate that urban gardens oppose this process by offering green spaces that contribute to the spatial and cognitive coupling between humans and ecosystems. Furthermore, our results point to the fact that urban gardens increase the awareness for human dependencies on nature and create social capacity to learn, for example, due to the contribution of urban gardens in supporting human life providing ecosystem services such as food. As previous research suggests, the deep understanding on societal dependence on ecosystems and biodiversity can increase the resilience of the system, especially in cities (Tidball and Stedman 2013).

Our findings regarding the social capacity for learning provided by urban gardens are consistent with previous research (Barthel *et al.* 2010). Our research shows that urban gardens are spaces where elder people transmit their knowledge to younger. Besides, different types of knowledge such as experiential ecological knowledge and local and traditional ecological knowledge are present in urban gardens in Barcelona. Traditional practices applied by elder people with a rural background in urban gardens contribute to preserve social-ecological memories (Berkes *et al.* 2000; Andersson *et al.* 2007; Shava *et al.* 2010). Traditional ecological knowledge stores the long term memory of the social-ecological adaptations to change (Barthel *et al.* 2010), and maintains the capacity of ecosystems to provide essential services (Gómez-Baggethun *et al.* 2012). To enhance the adaptive capacity of social-ecological systems, knowledge production in itself is not sufficient and institutions are essential (Folke *et al.* 2003). Our results demonstrate that many urban gardens provide institutional frameworks to ensure the flow of information to the public; for example, through workshops or common work days in the garden, knowledge can be generated, applied and transmitted. Besides, community activities in urban gardens encourage citizens to be involved in different ways of urban gardening, including home gardens, green roofs or community gardens, creating a framework to promote the expansion of urban agriculture.

4.2. Contestation to hegemonic urban models through urban gardening

The examples of community gardens in Barcelona show the difficulties of non-institutional initiatives to be consolidated in the urban fabric. The emergence of community gardens in Barcelona in recent years responds to two interlinked reasons. The first one is the opposition to speculative urbanism such as in Ciutat Vella (*‘El Forat*

de la Vergonya). The second one is the recovery of vacant and idle lots, resulting from the burst of the housing bubble; such would be the cases of Vallcarca or Poblenou neighborhoods, where empty and marginalized lots have been recovered by bottom-up movements with an alternative vision of how urban development should proceed (Staeheli *et al.* 2002). Community gardens increase the visibility of land-use conflicts in the city, thus raising the issues of gentrification processes and speculation-led urban planning. They are, thus, spaces to defend the 'right to the city', and hence the right to use urban space in different ways than the ones imposed by neoliberal urban governance (Harvey 2013).

As we mentioned in the previous section, due to the important benefits and the social demand, the City Council has developed the urban garden programs '*Xarxa d'Horts Urbans*' (2003) and '*Pla Buits*' (2013), and has been actively committed to sustainability through Barcelona Agenda 21. Our findings show, however, that struggles and disagreements between some social movements and the Barcelona City Council due to the regulations of urban green areas are still present.

4.3. *Urban gardens as emerging commons*

An important insight from our research is that urban gardens create opportunities for self-organization, offering spaces to enhance social cohesion and collective action. In a context of atomization of urban societies (Harvey 2013), we have shown in the case of Barcelona that urban gardens lay the foundations of mutual support structures and bonds of solidarity among people and among communities (D'Alisa 2011; Anguelovski 2013), fostering social cohesion to buffer individual misery (material- and emotional-wise) in moments of economic and social crises (Altieri 1999). Resource equity and the capacity to distribute post disaster resources to those who most need and attend conscientiously to the areas of greatest social vulnerability are vitally for community resilience (Norris *et al.* 2008). The emergence of urban gardening initiatives, especially in the poorest areas of Barcelona and in a context of generalized drawback of the welfare state and basic public services may contribute to the reduction of social exclusion and vulnerability by creating self-organized spaces that allow covering needs outside the market domain in a context of generalized drawback of the welfare state and basic public services.

We can define the urban gardens in Barcelona that emerged from bottom-up movements as urban green commons (De Angelis 2005; Colding and Barthel 2013), based on decentralized and participatory models of organization. These urban gardening initiatives are characterized by a low degree of excludability, high level of

self-organization and the use of direct democracy through popular assemblies. Thus, urban green commons offer opportunities to develop and debate around new alternative models of urban lifestyles. In sum, urban green commons offers a space of resistance to hegemonic urban models and, simultaneously, provide multiple source of social-ecological resilience in the city.

Urban gardens can build resilience in the face of crises through a number of strategies associated to gardening and associated outcomes including a physical and cognitive recoupling to ecosystem dynamics in city areas, enhancing the social capacity for learning combining experiential ecological knowledge and local and traditional ecological knowledge, creating opportunities for self-organization, social cohesion and integration of the most socio-economical disadvantaged groups.

Besides highlighting the contribution of urban gardens to build local resilience, our study further sheds light on the obstacles for self-governed urban gardens run by bottom-up movements to be consolidated in the face of high pressures from private interests and restrictions imposed by local authorities. Urban grassroots movements in Barcelona develop resistance against urban developers through protest actions and occupations of vacant lots and create new urban green commons. Besides improving conditions in urban areas affected by urban pressure and gentrification, urban green commons open up spaces to rethink the city along developing and debating around alternative models of governance and lifestyles. In this sense urban green commons can be seen to 'sow' resilience and resistance in times of crises.

5. Acknowledgments

The authors wish to thank all the gardeners who collaborated in the project. We also thank the '*Xarxa d'hortos urbans comunitaris de Barcelona*', the '*Xarxa d'hortos urbans de Barcelona*', the '*Associació d'amics del Jardí Botànic*' and the Barcelona City Council.

This research was funded by the NILS program on Science and Sustainability (O28-ABEL-IM-2014B) and by the action COST TU1201: Urban Allotment Gardens in European Cities. Hug March acknowledges funding from the Spanish Ministry of Economy (JCI-2011-10709).

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