
Urban AgriCulture and Food Systems Dynamics in the German Bonn/Rhein-Sieg Region

Darya Hirsch, Christian H. Meyer, Johannes Klement, Martin Hamer, and Wiltrud Terlau

*International Centre for Sustainable Development – IZNE Bonn-Rhein-Sieg University of Applied Sciences, St. Augustin, Germany
darya.hirsch@h-brs.de; christian.meyer@h-brs.de; johannes.klement@h-brs.de; martin.hamer@h-brs.de; wiltrud.terlau@h-brs.de*

Received February 2016, accepted May 2016, available online July 2016

ABSTRACT

Agricultural activities within city boundaries have a long history in both developed and developing countries. In this paper, a broad approach to *Urban AgriCulture (UAC)* is used, one that includes the production of crops in urban and peri-urban areas and ranges in developed countries from allotment gardens over community gardens to semi-entrepreneurial self-harvest farms and fully commercialized agriculture. With an empirical case study on UAC Initiatives in the Bonn/Rhein-Sieg region this work fills a gap since the lack of comprehensive and comparative studies on urban agriculture (UA) currently makes it difficult for researchers to identify the benefits of UA activities.

Keywords. agriculture; citizen participation; food systems; social empirical research; sustainable transition; urban green spaces; regional food production

1 Introduction

The population living in urban areas is continuously growing, and the proportion of urban dwellers is expected to be around 66% in 2050 ((Food and Agriculture Organisation [FAO], 2009); (United Nations Department for Economic and Social Affairs [DESA], 2014). This population growth brings increased pressure on Earth's resources since the available land could become insufficient for feeding the increased number of urban residents ((FAO, 2009)), with the expected demand for food rising by 70% up to 2050 ((FAO, 2009)). This population rise means that food security and sustainable food provision will become crucial issues ((Armar-Klemesu, 2000)), and this is reflected in the UN's Sustainable Development Goals (SDGs), which demand more effort in increasing the standard of living and quality of life of people worldwide (Resolution 67/97. The rule of law at the national and international levels, 2012).

Long-term sustainability for a rising urban population will be difficult under current food production circumstances. Contemporary urban food supply systems are based on a division of labor and global food production, processing and distribution (Murdoch, Marsden, & Banks, 2000), which brings benefits to the urban population (especially in the Global North): the food is constantly available, the food prices are relatively moderate. But this constant supply and these prices have "a high price" and significant implications for Global North and Global South: depletion of natural resources, severe labor conditions and pressure on farm (especially family farm) incomes in the producer countries, disappearance of traditional farming (loss of knowledge), food waste, loss of (agro)biodiversity and public health issues (malnutrition in both developing and developed countries, overweight and obesity) (Wiskerke & Viljoen, 2012).

However, cities cannot feed themselves alone; more integrated, interrelated and mutually reinforcing solutions are needed. Among different solutions emphasized in the literature (alternative food chains (Renting, Marsden, & Banks, 2003; Sonnino & Marsden, 2006; Watts, Ilbery, & Maye, 2005; Wiskerke & Viljoen, 2012), public food procurement strategies (Kirwan & Foster, 2007; Morgan & Sonnino, 2013)), are also suggestions to focus on integrated urban food policy planning. This policy planning can strengthen the urban-rural relationship, avoiding the currently observable complete segregation of agriculture and urban development (e.g. agricultural raw products and processing facilities are placed in rural areas and urban consumption happens in the cities) ((Stierand, 2012); (van der Schans & Wiskerke, 2012)). Consequently the importance of policies that create sustainable cities has grown, and food issues should become more prominent on the agenda of urban planning and decision making ((Stockmann, 2012); (Pothukuchi & Kaufman, 1999)). Wiskerke and Viljoen refer to rising so-called food policy-makers – a new generation of city and metropolitan administrators who are able to create interdepartmental cooperation between different public domains (Wiskerke & Viljoen, 2012) - and other researchers identify developing and strengthening interactions between (local/regional) government and civil society (Donald & Blay-Palmer, 2006; Koc & Dahlberg, 1999).

These changes in the everyday work of urban planners and other (directly or indirectly) food-related public domains are relevant especially for local agendas. The literature provides evidence of progressive food systems policy and planning, which includes municipalities having to commit to a sustainable food system (McRae & Donahue, 2013; Pothukuchi & Kaufman, 1999), a robust food policy council (Donald & Blay-Palmer, 2006; Harper, Shattuck, Holt-Gimenez, Alkon, & Lambrick, 2009; Stierand, 2012), food policy staff within municipal social planning (Pothukuchi & Kaufman, 2000), and lively and committed city-wide (network of) non-governmental groups and civil society working within and across the food system. There is therefore a growing Edible Cities, Food Policy Councils and Transition Cities movement. Urban food provisioning has become not only a national or regional phenomenon but is also gaining global importance. With the signing of Milan Food Policy Pact, 100 cities worldwide committed themselves to developing (local/national) sustainable and just urban food systems, including strong coordination with and participation of all relevant public domains at municipal and community levels (Municipality of Milan, 2015).

Civil society worldwide, and particularly in Germany, has already recognized the link between urban food systems and different public domains such as environment, public health, education, employment, spatial planning and social justice. Initiatives by farmers, consumers, retailer and NGOs have questioned contemporary urban food provision and started a number of counter-activities (Sonnino, 2009a, Sonnino, 2009b; Wiskerke & Viljoen, 2012). There is a growing movement across the globe acting against urban and rural divide and arguing for the production, distribution and consumption of food within the urban and peri-urban areas. This is the urban agriculture (UA) movement.

Currently, state and civil society often operate independently. Even within one municipality, parts and levels of governance (interdepartmental coordination) have limited coherency on e.g. food-related topics. However, Koc et al. have identified examples of interactions between both state and civil society on urban food policy issues for Canada (Koc, MacRae, Desjardins, & Roberts, 2008). In Germany, there are just a few examples of similar interactions, but unfortunately not documented for the international public. However, the Milan Urban Policy Pact (Municipality of Milan, 2015) and the establishment of first Food Policy Councils in Cologne and Berlin, Germany (Ernährungsrat Köln, 2016) mean the situation is changing.

Among local authorities there is limited experience of policy transition towards sustainable food systems. However, nowadays, a number of cities, e.g. New York, Rome, Toronto, London, Amsterdam and Dar es Salaam are committing to sustainable food management and UA (Morgan, 2015; Morgan & Sonnino, 2010; Municipality of Milan, 2015; Toronto Food Policy Council, 2013). Despite individual characteristics of each city, one feature is common for most urban areas around the globe: the growing role of urban food systems on a global as well as a local level. Food production in cities has a long-standing history; urban inhabitants have been growing different types of food since urban areas existed (Tasciotti & Wagner, 2015). Yet, nowadays a new movement has emerged in most developed countries, one where fruits and vegetables are increasingly cultivated within community projects, on balconies or in other small spaces as e.g. mobile gardens or plants growing in buckets and boxes constructed from recycled material. The positive impact of UA on the environment, society and economy has been investigated in several empirical studies (Armstrong, 2000; Corrigan, 2011; Milbourne, 2012; Nugent, 2000; Wakefield, Yeudall, Taron, Reynolds, & Skinner, 2007).

In the light of the above, this paper explores forms of UA activities in the Bonn/Rhein-Sieg region, Germany and their potential significance for food system dynamics. Drawing on materials derived from an empirical study of seven out of 27 existing *Urban AgriCulture Initiatives*, this paper highlights the reasons for and further needs in urban gardening/farming projects in the Bonn-Rhein-Sieg region and explores

whether there are prerequisites for a sustainable urban food system in the region. The motivation for this paper emerged from the fact that the City of Bonn received a new political directive to make available more “space” for UA in the town: 20 disused green areas could be handed over to citizens for appropriate UA projects (and the city could “unburden” its municipal budget, too).

The paper has both theoretical and practical relevance as it responds to some of the challenges arising from the current globalized food system, to local and regional political requirements for regional and local urban food strategies and to societal changes connected to an increased involvement of civil society. The scientific merit of this paper lies in the documentation and analysis of urban agriculture cases, their resource needs and governance structure as well as of the motivation of those in the Bonn/Rhein-Sieg region. The work fills a gap since the lack of comprehensive and comparative studies on urban agriculture currently makes it difficult for researchers to identify the social, economic or/and environmental benefits of UA activities (Wiskerke & Viljoen, 2012). Wiskerke and Viljoen (Wiskerke & Viljoen, 2012) and Redwood (Redwood, 2009) stress that existing scientific insights are insufficient, with the latter stating that these insights are “not sufficient to help policy-makers to address the most compelling questions that are emerging in relation to urban food provisioning and land-use planning”. At the same time, the analysis is relevant for policy-makers responsible for shaping and strengthening sustainable production-consumption links.

2 Background

Urban food systems

The *food system* is defined as “the whole array of activities, ranging from input distribution through on-farm production to marketing and processing, involved in producing and distributing food to both urban and rural consumers (including farmers)” (Staatz, 2000). The food system of an urban area includes all processes food passes through, from its production over processing, transportation, retail, consumption to disposal of kitchen and table waste (incl. food waste) as well as all actors and institutions that influence these processes (Moschitz, Landert, Hecht, & Schader, 2015).

As mentioned, this system is governed by the (global) market mechanisms, influenced by and embedded in the local, regional, national and international policy frameworks. Furthermore it is placed in different public domains, predominantly in agriculture, public health, environmental issues and the economy, but there are also other policy fields that are, in one way or another, related to food (Wiskerke, 2009).

Urban food systems together with agriculture and food economy belong to critical infrastructures, which means that their elimination leads to long-standing consequences for a community, and possibly major disruption of public security (Gizewski, 2012). Global food systems are increasingly exposed to changes ranging from sudden shocks such as natural disasters (Grote, 2014), food speculations (McMichael, 2009), food scandals and food riots (Patel & McMichael, 2009) through to long-term developments, e.g. economic and political crises, climate change or natural resource depletion. Each of these impacts can already have measurable effects on food security in cities. However, in contrast to other infrastructure and supply nets for e.g. water, energy, education, public health and mobility, the urban food provisioning system continues to source globally rather than locally (van der Schans & Wiskerke, 2012), and food insecurity issues are therefore not so prevalent in the Global North.

Nevertheless, this binding of urban food systems in global connections of long food supply chains makes them prone to global changes and shocks. Furthermore there is evidence that the market (the global food provisioning system) is neither able to promote social systems (Maertens & Swinnen, 2009; Minten, Randrianarison, & Swinnen, 2009; Swinnen, 2007) nor to adequately use or maintain natural systems (Cordell, Drangert, & White, 2009; Foley et al., 2005). The industrialisation of the food system in the Global North, the geographical concentration of crops and a sectoral approach to food have also degraded national and regional capacities to adapt to changing climate conditions. Our review of the literature suggests that the resilience of urban food systems towards disturbances (e.g. climate change) needs to be enhanced. Lengnick et al. (Lengnick, Miller, & Marten, 2015) argued that the solutions are in “a transformation of production methods from industrial to sustainable and a transformation of food system geography from regional specialization to regional diversity”. Urban communities therefore are required to become resilient, to be able “to repel, prepare for, take into account, absorb, recover from and adapt ever more successfully to actual or potential adverse events. Those events are either catastrophes or processes of change with catastrophic outcome which can have human, technical or natural causes” (Scharte, Hiller, Leismann, & Thoma, 2014). Thus resilience cannot be set up by the state (administration) unilaterally; it is a mission for the whole society.

One possible vision to establish a resilient urban food system is a model developed by the Resource Centres for Urban Agriculture and Food Security (RUAF) (Resource Centres for Urban Agriculture and Food Security [RUAF], 2013) (Fig. 1).

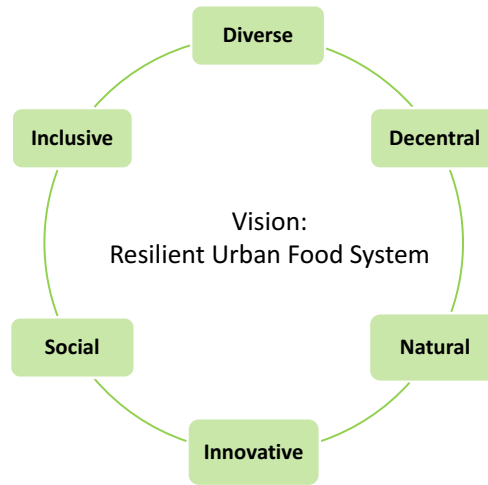


Figure 1. A Vision for a resilient urban food system. Diagram based on RUAF (RUAF, 2013)

As declared in the Bonn Mayors Adaptation Charter signed by 20 city-leaders in June 2013, holistic ecosystems-based approaches for urban food systems are required for resilient cities. The model developed by the RUAF (Fig.1) illustrates this holistic nature of resilient urban food systems, which are diverse, i.e. connect urban space with urban food issues (diversity of plans, ecosystem services, seed systems) while incorporating urban and peri-urban agriculture. Thereby the food production takes place in different places in cities and their fringes (decentral), in order to strengthen urban-rural material flows as well as labor sharing. The agriculture in and around cities brings a better management of natural resources (natural) and thus supports and creates synergies between climate, biodiversity and food systems' needs. A resilient urban food system develops furthermore new ways to build material cycles as well as to recycle nutrients. Here, above all, technology, design and creativity (innovative) play a large role in a food system and sustainable transformation. A resilient urban system contributes to the creation of "good work", poverty reduction and community building as well as to the creation of markets and networks (social). Urban dwellers are empowered in their double role as consumer (consumer power) and citizen. In a resilient urban food system, a wide range of actors from all sectors (business, public administration, politics, civil society as well as citizen-driven associations) is present and actively involved (inclusive).

Urban AgriCulture

The tendency to integrate agriculture into urban planning is a return to the garden city movement of the early 20th century, proclaiming self-reliant cities (Heide, 2014; Philips, 2013). The term *urban agriculture* (UA) combines different types of urban horticultural activities. According to Lohrberg and Timpe it "serves as organizing concept for the various forms of primary (food) production within the city and puts their cultural character, their special urban appearance, in the center" (author translation) (. (Lohrberg & Timpe, 2011).

The literature provides various sources for the origin of the term *UA* (Baker, 2004; Clausen & Müller-Frank, 2012; Heide, 2014), and there is no common definition. In this paper, we use the term *Urban AgriCulture* (UAC), referring to a broad approach that includes the production of crops in urban and peri-urban areas and ranges from allotment gardens over community gardens (*urban gardening*) to semi-entrepreneurial/semi-professional self-harvest farms and fully commercialized agriculture (*urban farming*). Especially in the German language, there is conceptual ambiguity on urban gardening, urban farming, and urban agriculture. All three terms are used interchangeably, but are often misleading. Urban gardening and urban farming are the objects of our study; we use a common term with our special spelling *Urban AgriCulture* to show the wide range of subjects. We work with the five aspects of UA defined by Van der Schans and Wiskerke: A is a *production* (also urban gardening as (co)-producers) with *urban and peri-urban location*, which is directed to *local markets* and using *waste and underused resources* (*closed material loops or closed loop farming*) (van der Schans & Wiskerke, 2012).

The types of UA are diverse. The most common in Germany are as follows:

- *Community garden* is the generic term for all gardens operated by a community, in line with community gardens in New York. Rosol (Rosol, 2006) defined common gardens as “gardens, green areas and parks created and operated jointly and through voluntary engagement with the focus on general public”. Generally, a community garden is a piece of land planted with fruits, vegetables and herbs in joint voluntary work. The gardening is determined by rules. The beds are usually cultivated collectively or individually. The garden is open to the public for an appointed time. There is no membership restriction.
- *International or intercultural gardens* according to Müller (Müller, 2002) “differ from community centres for migrants primarily by the fact that people work with each other, that they have soil as a common basis on which they produce essential goods like fruits, vegetables, but also friendships and commonalities”. Most intercultural garden projects located in Germany since then have been inspired by the *Göttingen experience* (Moulin-Doos, 2014).
- *Company gardens* stem from a term established by the German national Company Garden competitions (in Hannover (2002), in Bremen (2006) and in Osnabrück (2009)), funded by the Federal Ministry of Transport, Building and Urban Affairs. The Green City Foundation, which works for improved life quality through green in the city, also organizes its own Company Garden competition. In the Science Year 2012, the call for the Project *Urban Gardening 2.0* was announced, with which the Leibniz-Centre for Agricultural Research (ZALF) and the Humboldt University in Berlin collaborated on the topic of company gardens.
- *Self-harvest garden* is a cooperation of consumers with (commercial and sometimes organic) farms. Farmers plant a wide variety of vegetables in long rows on arable land within easy reach of a city. The field is divided into strips so that a whole range of vegetables is grown on each strip. For a small fee, a strip can be leased. Community projects with farms can provide extra income for farmers.
- *Community Supported Agriculture (CSA, in German – Solidarische Landwirtschaft, SoLaWi)* is a community-based cooperation of a farmer with consumers. The members of CSA agree to provide direct and upfront support for farmers who will produce their vegetables. The farmers agree to provide a sufficient quantity and quality of food to meet the needs and expectations of the consumers (Galt, 2013; Lamb, 1994). The work is principally community-democratic; arrangements vary from farm to farm, from SoLaWi to SoLaWi.

The fact that urban food systems and politics inevitably depend on the particular characteristics of a city can explain the diversity of urban agriculture types. These characteristics include historical and cultural factors, state and basis of the local economy, geography and availability of natural resources, infrastructure, societal and political factors such as governance structures and the strength of the state and of civil society.

While in the Global North agriculture in the city and its fringes has all but disappeared, agricultural activities close to the cities and in descending proximity to the city remain a pillar of the food systems in the Global South (Bon, Parrot, & Moustier, 2010; Cofie, van Veenhuizen, & Drechsel, 2003; Nugent, 2000; Zezza & Tasciotti, 2010). But the increasing prominence of UA initiatives in the countries of the Global North nowadays indicates re-connection and rethinking of urban food provisioning systems by both urban dwellers and the city administration. However, despite its rising popularity, UA still has a niche status in urban structure and food systems (van der Schans & Wiskerke, 2012), and thus almost no investigations have been conducted on how the UA movement is able to boost the food security of cities. Exemplarily for the city of Cleveland, Grewal et al. (2012) came to the conclusion that if urban spaces and roof-tops were to be consistently used to grow crops, a densely populated western city would be able to produce a significant amount of the food needed to feed its population. But not only these unused grounds or buildings are a barrier, lack of farming skills, soil quality (contamination), resources needed for farming activities (water, fertilizer etc.) and financial means are seen as obstacles that have to be overcome on the way to implementing UA (Cohen and Reynolds, 2014; CoDyre et al., 2015).

3 Research design, data and methodology

Research design

Research was undertaken on Urban Agriculture (UAC) pioneers and UAC interested citizens in the Bonn/Rhein-Sieg region as well as in the city administration of Bonn and Sankt Augustin.

The Bonn/Rhein-Sieg region is situated in the southern part of the federal state of North Rhine-Westphalia. It is part of the Cologne-Bonn metropolitan area. The region consists of the City of Bonn and 19 towns and communities that make up the Rhein-Sieg district around Bonn, including the town of Sankt Augustin. Until 1990, Bonn was the capital of Germany. With German reunification, Berlin became the

new capital and the Berlin-Bonn Act decreed that the government, parliament and a major part of the ministries move to Berlin. As a consequence, the region underwent major economic and structural developments. Today the Bonn/Rhein-Sieg region is one of the most attractive growth regions in Germany, with a focus on business, science, congress functions and culture. As the German United Nations City, hosting 18 UN organizations, Bonn has developed an international profile. The strong growth in the knowledge-intensive services (32% of those employed in the city possess an academic degree (City of Bonn, 2015)) as well as the close interaction of the city with the business and science communities make Bonn particularly attractive. In 2015, the City of Bonn's Urban Green Space Department (Amt für Stadtgrün) was given the task to hand over 20 disused green areas to Bonn citizens for UAC projects. This handover also alleviated economic pressure on the town, which had no financial means for maintaining the areas.

Within the Bonn/Rhein-Sieg region, a range of different forms of UAC were identified based on a desktop search on UAC initiatives in the Bonn/Rhein-Sieg region, on prior knowledge from projects with local municipalities and on first-hand experience and research. In Bonn and the Bonn/Rhein-Sieg region, there were, as of July 2015, approximately 30 different urban gardening projects (Wissmann, 2015) and contact was established with seven of these UAC initiatives that represented a variety of UAC forms existing in the region. Two guided interviews were conducted with the relevant municipal decision-makers (Head of Urban Green Space Department of the City of Bonn and First Alderman, Department of Urban Planning and Building Regulations of the City of St. Augustin). Seven guided interviews were conducted with the aforementioned UAC initiatives.

Their input, together with a questionnaire-based survey of citizens interested in the topic of UAC enabled the basic framework of UAC in the Bonn/Rhein-Sieg region to be established. This study therefore comprises the findings of nine guided interviews and 29 completed questionnaires aimed at providing a comprehensive overview of motivation, (most desirable) type of governance and resources needed for UAC development in the region.

Research methods

To assess UAC's contribution to food systems dynamics, a literature review and analysis and guided interviews and a questionnaire survey were undertaken between June 2015 and February 2016. All interviews were recorded and transcribed. Transcripts were analyzed inductively using a combination of qualitative content analyses and the grounded theory approach (Glaser, Strauss, & Paul, 2010; Mayring, 2015; Strauss & Corbin, 1996). The coding (Flick, 2011; Mayring, 2015) was not supported by a special qualitative analysis software; it was performed manually using MS Word. Codes were added to quotes to develop a conceptual understanding of the issues raised. Furthermore, the codes were organized based on emergent patterns and relationships between themes. Coding and interpretations were corroborated by first three co-authors. The guided interviews findings served as basics for developing a standardized questionnaire. The questionnaire focused on three blocks: (1) understanding and definition of urban gardening, (2) motivation, (3) socio-demographical data.

In addition, several regular informal interviews and spontaneous conversations with UAC pioneers (e.g. Emekeilgarden or SoLaWi), civil society (transition movement in Bonn) and participation at the city meetings relevant to the UAC topic were noted to help to bring out additional information not covered by the guided interviews and questionnaire and provide a more focused set of themes for discussion.

4 Results

UAC Initiatives in the researched region

As mentioned above, in Bonn and the Bonn/Rhein-Sieg region there are approx. 30 different UAC projects (Wissmann, 2015). The predominant type is the urban community garden. For the guided interviews with the pioneers, five UAC types were selected: community garden, international garden, company garden, self-harvest garden and community-supported agriculture. allotment gardens (the German *Schrebergarten*) were not considered in this study.

UAC initiatives were selected that had existed for at least one year at the beginning of this research (June 2015). The choice of initiative was also based on ensuring that there were at least three different types of initiative's ownership (public, commercial, company) (see Table 1).

* The term "urban gardening" was used in the questionnaire because, at the beginning of the study, only that term was referred to and because the green spaces provided by the City of Bonn are fairly small.

Table 1
Selected Urban AgriCulture pioneers in the Bonn/Rhein-Sieg region

UAC Initiative	Owner-Type	Size	Year	Motivation
Ermekeilgarten	Public	ca. 800 m ²	2013	<ul style="list-style-type: none"> • Area revival • Sense of community • Passion for gardening
Internationaler Garten WiLa Bonn	Public	3,000 m ²	2007	<ul style="list-style-type: none"> • Make people feel at home • Green space for people living in nearby high-rise buildings • Cultural exchange
Meine Ernte	Commercial	3,500 m ² (Bonn) 6,000 m ² (Bornheim)	2010	<ul style="list-style-type: none"> • Recover in nature • Create consciousness of nature • Gain gardening experience • Raise awareness and education regarding environmental questions • Grow food for individual consumption
Gärten der Nationen	Public	24,500 m ²	2013	<ul style="list-style-type: none"> • Opportunities for integration in difficult residential areas • Sense of community • Option to do social work through garden association
Himmel und Ääd	Company	400 m ²	2012	<ul style="list-style-type: none"> • Time-out from office work • Cross-departmental exchange
Schmetterlingsgarten im Gries	Public	40 m ²	2012	<ul style="list-style-type: none"> • Attractive place to meet • Opportunities for integration in difficult residential areas • Raise awareness and education regarding environmental questions
Solidarische Landwirtschaft	Semi-Commercial	30,000 m ²	2012	<ul style="list-style-type: none"> • Strengthen regional food production • Producing organic food in the vicinity of the city • Shorten transport paths • Preserving ecological diversity • Independence from food imports, market structures and agribusinesses

Certain UAC initiatives in Bonn have existed for several years. The oldest project in Bonn is the *International Garden WiLa Bonn*, which was established in 2007 by the Science Shop (Wissenschaftsladen, WiLa). The best-known gardens are the mobile community garden *Ermekeilgarten* and the self-harvest garden *My Harvest (Meine Ernte)* established in 2011 and 2010, respectively. The international garden in Sankt Augustin, *Gardens of Nations (Gärten der Nationen)*, was part of the project 'The Green C[†]' (*Das grüne C*). A company garden is located at the German Aerospace Center (DLR): *Heaven and Earth (Himmel*

[†] The Green C is a joint intermunicipal project of Bonn, Troisdorf, Sankt Augustin, Niederkassel, Bornheim and Alfter, all towns within the Bonn/Rhein-Sieg region. The overall goal of the project is to reevaluate the landscape along the River Rhine. The name of the project refers to the shape of the area.

und Äad, a dialect term for a regional dish) founded in 2012. The *Garden of Butterflies (Schmetterlingsgarten im Gries)* is a community garden established in a difficult residential area in 2012 to alleviate existing social problems. *Community Supported Agriculture Bonn (Soziale Landwirtschaft Bonn (SoLaWi))* is a cooperative founded in 2012, established from the *Transition City Bonn (Bonn im Wandel)*. It practices organic agriculture in cooperation with two local farmers.

The interview results

The mind map (Fig. 2) illustrates results derived from the interviews. The responses of the different UAC initiatives (the interviewees) are grouped around the specific category. There are three categories: 1. Motives/Objectives, 2. Stakeholders, 3. Requirements. The legend shows all interviewed projects, which are respectively represented by one specific shape (cloud, ellipse, parallelogram, diamond, underlined text, square, square with rounded corners). In addition, similar statements are grouped into waved squares to ensure better visibility of their frequency.

Thus, for example, under “motives and objectives”, the upper waved square includes four similar motives mentioned by four UAC initiatives, (“*Meine Ernte*”, “*Himmel und Äad*”, *Internationaler Garten WiLa Bonn* and *Schmetterlingsgarten im Gries*). All these motives, although they might have different wording (e.g. recover in nature or green space for people), can be summarized under a superior motive - recreational aspects. In a similar vein, the mind map shows from right to left, a total of six composite superior motives: 1. Recreational aspects, 2. Social work / integration, 3. Gardening, 4. Environmental Education/Awareness, 5. Food production, 6. Substitution of a community (see definition below). Five motives such as interdepartmental exchange [*Himmel und Äad*] or making an area accessible to the public [*Ermekeilgarten*] are loose and specific to one UAC initiative and therefore cannot be merged into any other motive.

The grouping of the “stakeholders” needed for and involved in set-up and running of UAC initiatives is displayed similarly. There are five composite superior stakeholder groups (from top to bottom, (Fig. 2)): 1. Volunteers, 2. Gardeners, 3. City (Public domain), 4. Sponsors, 5. Farmers. Four stakeholder types such as civil organization “Bonn im Wandel” [SoLaWi Bonn] or specially formed association [*Gärten der Nationen*] or management board of a larger corporation [*Himmel und Äad*] seem to be very specific stakeholders and cannot be merged in any of the other stakeholder groups.

Figure 2 also contains the “requirements” in the same manner. Four major requirements for the initiation and running of the UAC initiatives were identified; 1. More staff, 2. More land, 3. More funding, 4. More innovative farmers. Other requirements are, similar to those of the stakeholders and motives, specific to the UAC initiative, e.g. SoLaWi wishes to have clearer communication rules as well as a legalized organizational form, whereas neighborhood development garden “*Schmetterlingsgarten im Gries*” requires more volunteers. The international garden “*Gärten der Nationen*” is fairly well equipped but still found fault with the current planning approach. The company garden “*Himmel und Äad*” sees more need for a stronger participation (more gardeners).

Already the mind map illustrates that the researched UAC pioneers show certain similar characteristics regardless of their UAC type. However, the mind map is only a summary of the total information from the guided interviews. Below, a closer look is taken at each of categories of analysis: 1. Motives/Objectives, 2. Stakeholders, 3. Requirements. To make the results and the ensuing discussion more traceable and comprehensible, we use selected quotes from interviews to present the findings in each category.

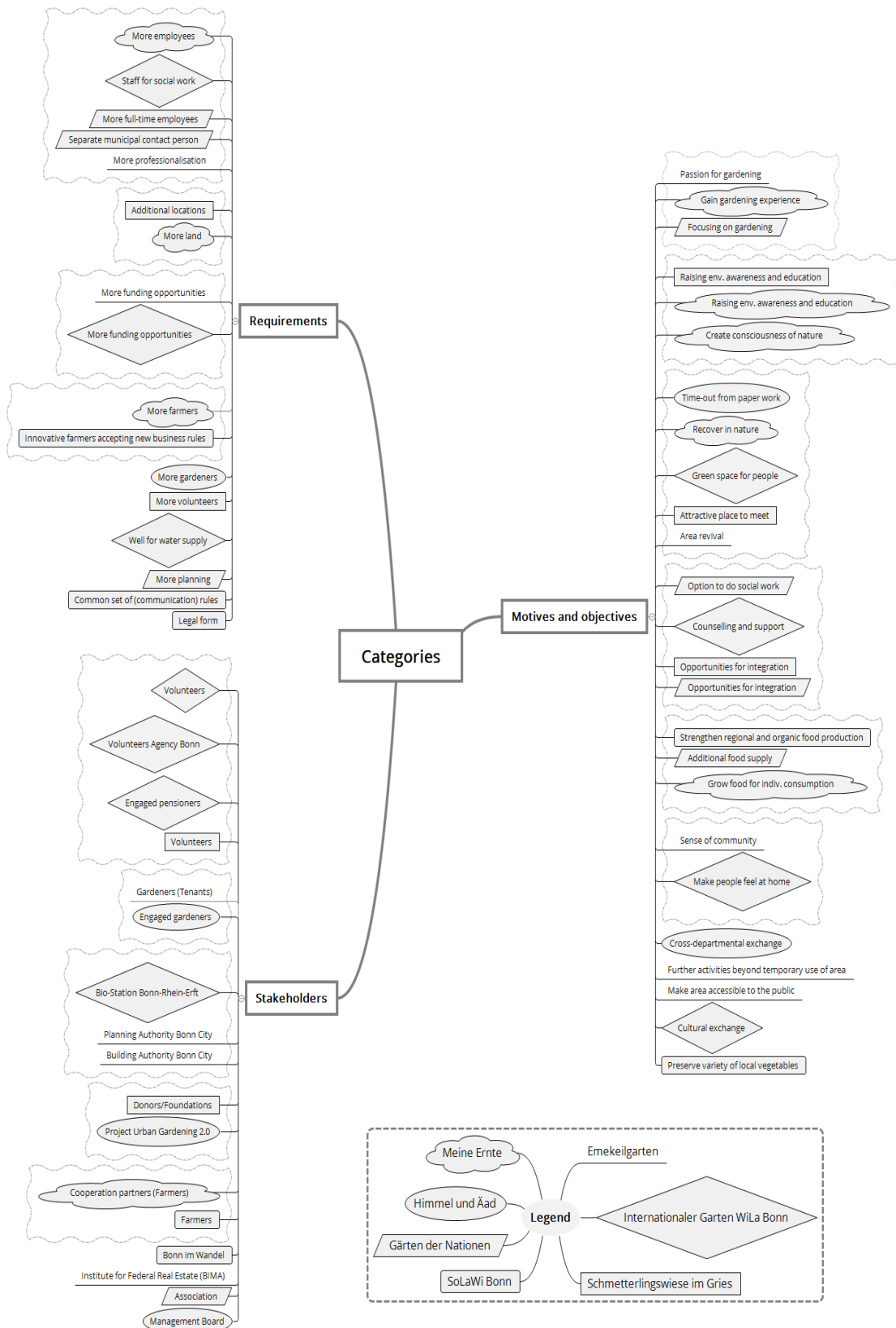


Figure 2. Analysis of the guided interviews (Mind Map)

4.1 Interview quotes illustrating the findings in each category

Motives and objectives

The reasons behind establishing and running UAC initiatives in the Bonn/Rhein-Sieg region cover six motives: Gardening, Environmental Education/Awareness, Recreational aspects, Social work/integration, Food production, Substitution of a community.

Gardening, especially to provide gardening opportunities, is the most frequent motivation for establishing an initiative.

- **Quote 1:** *“...for us it is important that people can garden...”*
- **Quote 2:** *“...the gardening is of primary importance”*

Environmental education and awareness-raising of the urban population seem to be crucial reasons for establishing a UAC initiative in the Bonn/Rhein-Sieg region.

- **Quote 3:** *“...for us it is important that people can ...create awareness for nature ...children learn where French fries come from, they learn about seasonality and quality...”*

The data from the interviews also reveal recreational motivations for setting up and running the UAC initiatives.

- **Quote 4:** *“...to provide a balance to office work and to allow personal exchange in the company...”*

Some UAC initiatives in the region were motivated to provide elements of social work and care (counselling). However, this motivation seems to be a by-product or desirable element of the UAC initiatives; currently there are no professional social workers in any of the UAC initiatives.

- **Quote 5:** *“...there is a lack of qualified staff in the areas of social work and counselling...”*

Food production does not play a determining role as motivation for the interviewed UAC initiatives. Some interviewees reported partly self-sufficiency of the gardeners.

- **Quote 6:** *“...self-sufficiency in terms of the supplement to their diets...”*

Another motivation relevant for many interviewed UAC initiatives was a community component: we call this “substitution” of a community, referring to the specific socialization processes within the urban areas (constant moving, reduced contact to the neighbors, no clearly defined community within the one concrete neighborhood etc.).

- **Quote 7:** *“...it is really incredible what has happened here, people have met each other who otherwise have no contact...”*

4.2 Stakeholders

The key stakeholders essential for both set up and running of UAC initiatives are volunteers, city (public domains), gardeners, sponsors and farmers. The municipality plays a crucial role in the UAC movement.

In terms of volunteers, interviewees stressed the importance of voluntary work within the initiatives. This concerns especially UAC initiatives where volunteers are completing tasks comparable to those of paid employees. Our respondents in different UAC initiatives spoke about professionalization and adequate payment for such qualified volunteers. Another interviewee mentioned a lack of volunteers.

Without support from city administration, individual citizens cannot usually progress with their initiative. For Bonn, the initiatives sought contacts with the municipality and vice versa. The Bonn *Urban Green Space Department* is seeking a partnership with some of the interviewed UAC initiatives, such as *Ermekeilgarten* and *Meine Ernte*. Together with *Ermekeilgarten*, it organized a workshop (1st Bonn Urban Gardening (UG) Day), which took place on November 14th 2015 in the *Ermekeil* barracks. This first information event served to offer collaboration options between Bonn UAC initiatives and like-minded people. Citizens interested in UAC had an opportunity to learn about possible uses of vacant green space. The event provided for the first time an overview of the current development of UAC activities in Bonn.

However in the interviews, respondents also mentioned that different departments were responsible for UAC activities e.g. the planning authority, the building authority or the Urban Green Space Department. Furthermore, municipalities play an important role in UAC with regards to obtaining suitable plots of land. Also, long-term sustainable use of urban areas can only be achieved in cooperation with the municipality.

UAC initiatives cannot be realised without gardeners. Most of the interviewees mentioned gardeners as important stakeholders; however, in many cases there is no lack of gardeners; the waiting lists are long.

- **Quote 8: “...the gardening takes off of itself [from the people], it [UAC initiative] fails due to a lack of facilitation/coordination...”**

Nevertheless, the insufficient number of members or desire to get more gardeners was referred to by some UAC initiatives.

The sponsorship and (innovative) farmers are other important stakeholders, especially for further running (and expansion) of the UAC initiatives.

4.3 Resources

The following topics were mentioned as resources required for the future long-term operation of the interviewed initiatives: more staff, more land, more funding, more innovative farmers. All these resources can facilitate long-term or even permanent adoption and institutionalization of UAC initiatives.

Full-time personnel (employees) is the most demanded resource for the successful, sustainable continuation of all interviewed UAC initiatives. This request is expressed by both groups of interviewees: state administration and gardening initiators. The city of Stuttgart has set an example by creating the new position of a Coordinator of Urban Gardening. This position is linked to the Department of City Planning and Urban Regeneration. Both interviewed municipal employees (Head of Urban Green Space Department (Amt für Stadtgrün), City of Bonn as well as the first alderman of the town of St. Augustin) have stated a desire to create a similar position. UAC initiators stressed the need for professionalization in their initiatives.

Funding by the municipal government or private sponsoring is another essential resource mentioned by different interviewees. Furthermore, some interviewed UAC initiatives expressed a wish to expand. Some of the UAC initiatives also expressed a need for cooperation with open-minded innovative-oriented farmers.

The questionnaire results

The citizens who participated in the workshop were surveyed using a standardized questionnaire. The questionnaire consisted of three blocks: personal interest in gardening, motivation for the participation in this event and communication/information plus personal details. The questionnaire included a mix of questions with a 5-point Likert-scale where a respondent had to tick one of the categories: e.g. strongly agree, agree, partly agree, disagree, strongly disagree, and open questions for recording individual opinions. The exact number of event participants is not clear since no lists were kept.

The evaluation of the personal details from the questionnaire showed that 60% of the citizens who participated in the 1st Bonn UG Day were female, 50% were over 45 years old, a resident of Bonn, predominantly a university graduate, lived in a rental flat and came from a single household. Most of the interviewed citizens knew about urban gardening/farming (59% were very well informed and 28% had basic knowledge). 34% of the respondents were already a member of a Bonn UAC initiative; 24% wish to join an initiative (see Fig. 3). 10% of the interviewees had resigned from an UAC initiative before. One of the reasons for this was a move to a place with gardening possibilities. Fig. 3 confirms also the basic assumption that mainly members of existing UAC initiatives participated in the workshop.

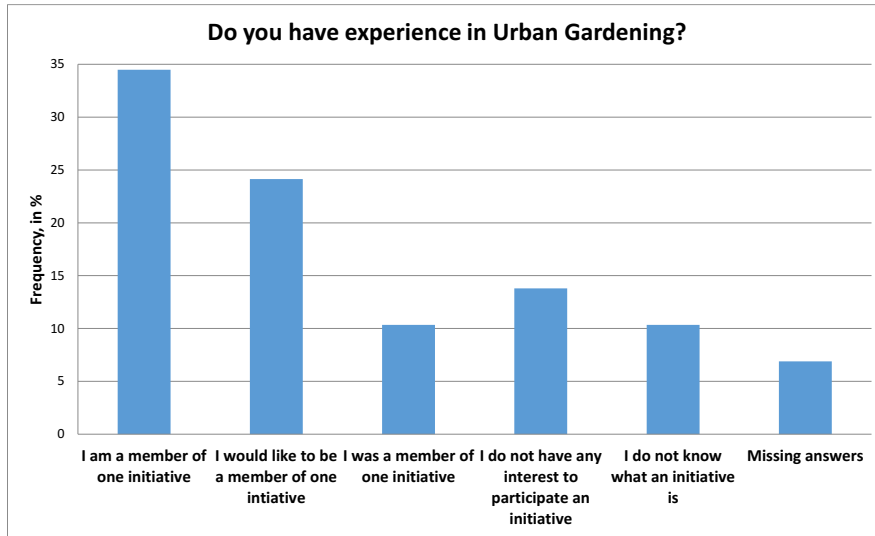


Figure 3. Experience in Urban Gardening
Questionnaire block on understanding and definition, Q3, n=29.

Personal motivations of the respondents (see Fig. 4) to get involved in a UAC initiative focus quite strongly on **production of safe and organic food**. Furthermore, citizens interested in UAC projects stated that an **improved quality of life** and **satisfaction of personal needs** are important (Fig. 4). Further motivations include 55% of the respondents seeing in UAC an opportunity to work outdoors and 55% of the respondents also indicating that UAC production has to be organic. Other motivations to join a UAC are fun gardening (52%), meeting new people (52%) and producing safe food (51%). Motives such as beautification of the city (48%), self-fulfilment (41%), time-out from office work (38%), climate protection (48%) and health reasons (38%) seemed to be less relevant for the interviewed citizens. Self-sufficiency is the motivation least indicated by the respondents (17%).



Figure 4. Personal motivation to get involved in an Urban Agriculture project located in the Bonn/Rhein-Sieg region
Questionnaire block on motivation, Q5, n=29, multiple answer option.

4.4 Discussion

The aforementioned results of our investigation have confirmed findings presented by other authors. Thus, for instance, in terms of motivation, Rosol (Rosol, 2006) highlights that people see gardening as a balance for a stressful working life. Literature shows evidence of such motives with respect to UAC in developed countries. Kortright and Wakefield (Kortright & Wakefield, 2011) emphasize the satisfaction of gardeners when harvesting their own fruit or vegetables, observing the development from seed to product. Thus gardening contributes to a sound work-life-balance. The growth of a plant cannot be accelerated and forms a contrast to the modern working world where quick and efficient functioning is often required. However, the harvest is rarely the objective of UAC (Dunnett & Qasim, 2000). Although both of those latter studies refer to individual/home urban gardens, the argumentation is also relevant for the current study. Is mostly about activities in the (garden) community and active participation (Kayser, Böhm, & Spiller, 2012).

In a recently published study, *Gemeinschaftsgärten im Quartier* ((Bundesinstitut für Bau-, Stadt- und Raumforschung (BBSR) im Bundesamt für Bauwesen und Raumordnung [BBR], 2015) - Cooperative gardens in the town quarter), The Bundesinstitut für Bau-, Stadt- und Raumforschung (Federal Institute for Research on Building, Urban Affairs and Spatial Development) shows the significance of UAC as an important contribution to the development of neighborhoods, in such that common goods are created and inhabitants proactively and jointly participate in the revaluation of the city. UAC could also contribute to public security. Examining a possible negative relationship between the greening of urban spaces and various crimes in Philadelphia, Branas et al. (Branas et al., 2011) found evidence that urban greening might reduce crime. While in developing countries UAC activities contribute first and foremost to food security and the generation of family income (Armar-Klemesu, 2000), the food self-sufficiency in developed countries has more of a side effect. The current increase in regional products, direct selling, organic and animal welfare labels are possibly a sign that people feel increasingly uneasy about industrialised agriculture (Kayser et al., 2012), and citizens in the Global North have an increasing desire to know where their food comes from and how it is produced. However the UAC initiatives in the Global North do not generally foresee an immediate and complete self-sufficiency, aiming more towards fulfilling a desire for self-empowerment, self-determination and other social components (Halder, Jahnke, Mees, & Haide, 2011; Müller, 2011; Rosol, 2004, Rosol, 2012). This difference is in line with Bell et al. (Bell et al., 2016), who provide an overview of the findings in the literature on the motivation to participate in UAC, as they list as drivers ecological and cultural benefits, local, fresh and healthy food, environmental concerns and social integration and socializing .

The literature also supports our findings on essential stakeholders; this concerns especially the city municipalities and their involvement in and commitment to the questions of establishing, running and permanently adopting UAC initiatives. Von der Heide (Heide, 2014) referred to Rosol (Rosol, 2006) when she underlined the importance of municipal administrators and politicians who are open-minded and supportive towards emerging UAC initiatives. Wunder (Wunder, 2013) emphasizes a lack of acknowledgement by public administration of the provisory services gardens as barriers to the Berlin urban gardening project *Allmende Kontor*. Rosol (Rosol, 2004, Rosol, 2010, 2012) speaks about government-beyond-the-state, an emergence of the new political acceptance of autonomous projects, such as UAC initiatives, and active citizen participation. She mentions that these projects can be understood as a form of outsourcing of former local state responsibilities for public services and urban infrastructure (Rosol, 2012). Such examples of government-beyond-the-state in Bonn might be the transition city movement in Bonn (Transition Towns movement - Bonn im Wandel) – co-establisher of the SoLaWi Bonn, which, at the same time, is a member of a UAC initiative in a panel on climate change.

The volunteers seem to play a crucial role in the everyday operation of the UAC initiatives. Rosol (Rosol, 2004) gives an explanation of the difference between volunteer work in UAC projects, with its additional benefits, and “citizen labor” in other areas. These benefits include personal contribution to individual food consumption since gardening has a certain degree of self-sufficiency. In addition to this, UAC supports the production of common goods, e.g. volunteers create open spaces, which potentially improve housing and life quality in neighborhoods. Rosol (Rosol, 2006) showed in her investigations that volunteers asked for full-time employees provided by the local state, whose working hours harmonized with those of volunteers (evenings and weekends). Until now, no such innovative solutions were found in the research region.

Wunder (Wunder, 2013) confirms a vital need for financial support of UAC initiatives, which was also mentioned by the interviewed members of the UAC initiatives in the Bonn/Rhein-Sieg region; funding and financial means are an issue and often present a major obstacle (LeJava & Goonan, 2012).

The vision of a resilient urban food system as visualized in Figure 1 reflects more than regional or local approaches of food provisioning systems with their production, processing, distribution, consumption and disposal approaches. This vision going further and illustrates a holistic, integrated conceptualization of food – as a process that connects urban-rural material flows, e.g. water and energy; the environment, such as biodiversity and agro ecosystems; social issues, such as access to food and employment; public health issues, e.g. obesity and malnutrition among the disadvantaged urban population; innovative solutions and last, but not least, actors from different levels and different responsibilities: policy, planning, business, civil society, scientific research and citizens. To quote Carolyn Steel (Steel, 2012) “our most vital shared commodity, food is embedded in our lives socially, physically, and symbolically. ...since we must all eat, the question of how we should eat approximates to that of how we should live”.

To summarize, it can be stated that the Bonn/Rhein-Sieg region and especially the City of Bonn offer good conditions for UAC initiatives. The region demonstrates elements of a progressive food system policy and planning, which include active and committed city-wide non-governmental groups such as UAC initiatives or transition cities working within and across the food system as well as the municipal governments’ acknowledgement and (formal and informal) commitment to these projects.

It is crucial that a very interested and committed group takes the starting UAC initiative, as happened in Bonn, and a suitable piece of land is available. Examples in Bonn are e.g. *Ermekeilgarten* and *Meine Ernte*. Apart from finding financial support, an up-to-date website[‡] (e.g. *Meine Ernte*) or social media presence (e.g. *Bonn im Wandel*, *Ermekeilgarten*), word-of-mouth recommendation, contact to the media and events within the UAC initiatives, such as seed festival in the beginning of each vegetation year, are further success factors. For example, the *Ermekeil Initiative*, provider of the *Ermekeilgarten*, offers an all-year program with cultural, political and garden-related events.

The city administration in Bonn, especially the Urban Green Space Department (UGSD), works hand-in-hand with the UAC projects, and the initiatives seek dialogue with the city. The UGSD has also actively designed the thematic area of UAC; examples of city commitment include maintenance and further development of (not public) urban orchards as well as implementation of the project “*Green C*”, where UAC is covered through cooperation with peri-urban farmers as well as through the leasing of a subplot to the UAC entrepreneur *Meine Ernte*. Additionally, the Bonn/Rhein-Sieg region is located in close proximity to Cologne, where the first German Food Policy Council was established. Civil society actors as well as citizens interested in UAC activities have intense interexchange beyond the cities’ border; social media and word-of-mouth recommendations make this possible, relevant film events are organized, *Bonn im Wandel* undertakes interviews with UAC innovators, joint information events are undertaken with Eatable City Andernach etc. These are the signs that Cologne-Bonn/Rhein-Sieg region is coming closer to implementing the “inclusive aspect” of the vision of resilient urban food systems (Fig.1).

5 Conclusion

To conclude, this paper shows also that UAC has the potential to make a city more sustainable and liveable. In UAC initiatives, citizens re-develop the sense of seasonality in e.g. self-harvesting gardens and increase their environmental awareness. They contribute to education of sustainable development. Effects are not limited to horticultural aspects since they can also change consumer behaviour or introduce political participation (e.g. participation of members of *Bonn im Wandel*, who are at the same time members of UAC initiatives and in the Panel on Climate Change). UAC projects present new forms of community work, give neighbourhoods an additional space, are community-oriented and participatory and act as learning and meeting places in the city. All these also directly and indirectly contribute to upgrading the social aspects of current urban food system.

As the growing number of UAC initiatives show, people are interested in urban community gardening. Along with this, new organizational structures are evolving, with new actors in the food system, such as *Meine Ernte* or *SoLaWi*, partnering with organic (and conventional) farmers. Although these partnerships are yet rare, they show that people are not only demanding changes from the industrialised agricultural and food industry but that they are increasingly starting to shape it themselves. This shows potential for innovative UAC activities.

However, UAC is still a niche movement and does not yet guarantee sufficient food provision. It does not pursue immediate complete self-sufficiency, as the investigations cited above show. However, currently, as long as global agri-food is with us, it is not about sufficient urban food production by UAC initiatives in the Global North. It is more about transitioning from a wasteful, unethical, unequal food system to a

[‡] Which is not the case for all existing UAC initiatives.

resilient and sustainable one. It is more about searching and testing for new ways in urban food systems, real experimenting, reevaluation of the urban-rural relationship around the regional and local urban food provisioning system. Deeper research of the UAC phenomenon and its role and transformative power in food system dynamics is necessary; especially its potential to be a pivotal driver of urban development and a contributor to environmental health and the quality of life in cities and to urban policy governance. More specifically for the region studied, in-depth research on the diversity of UAC types and their governance structure and potential for permanent adoption deserves attention. Also issues of the economic importance or meaning of UAC for the agricultural sector are still not sufficiently researched, especially in terms of competing land-use interests (city planners, business development, chamber of agriculture, climate advisors, civil society).

There are several limitations emerging from this study. First, it was not possible to cover a larger number of UAC initiatives in the guided interview since there is no well-structured pool of UAC initiatives in the region. In addition, the total number of UAC pioneers is small (around 15).

Second, there is no publicly available analysis⁵ or documentation on UAC initiatives from the region studied. This explains why we applied an inductive research approach to get a general overview of UAC initiative types, their governance structure etc. This work is the basis for follow-up deductive research, which can be based on a broader survey of UAC initiatives' members. The results of the current study are also useful for the cities involved e.g. for their currently elaborated integrated land use and space planning concept, which has been developed inter-departmentally.

Third, we rarely had opportunities to get in touch with the citizens. From July 2015 to now (July 2016), only two events took place where we could collect primary data. We have considered this as a communication shortage between city and citizens, which begins with the City of Bonn's relevant Web pages having muddled explanation of UAC (or, as it is called there Urban Gardening), an irregular website content of the respective topics and an anonymous e-mail contact address (urban-gardening@bonn.de). There is no face behind this concept.

Despite these limitations, our study produced comprehensive information on UAC initiatives in the Bonn/Rhein-Sieg region, which can be an asset for both researchers dealing with UAC and those directly involved in UAC. It also serves as an asset for policy-makers who need to recognize and holistically address challenging issues of sustainability, resilience and food provision and land use in their strategies, e.g. by integrating food issues into urban planning strategies.

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⁵ We found only abstracts of some diploma thesis, the entire text of which is usually not published.

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