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Reality vs. Expectations in the Implementation of Urban Agricultural Projects—A Polycentric Governance Analysis

Ouiam Fatiha Boukharta [1,2], Loïc Sauvée [2], Leticia Chico-Santamarta [1,3], Fabiana Pena-Fabri [2] and Luis Manuel Navas-Gracia [1,*]

[1] TADRUS Research Group, Department of Agricultural and Forestry Engineering, University of Valladolid, 34004 Palencia, Spain; ouiamfatiha.boukharta@uva.es (O.F.B.); lchico-santamarta@harper-adams.ac.uk (L.C.-S.)
[2] InTerACT Research Unit, Institut Polytechnique UniLaSalle, 76130 Rouen, France; loic.sauvee@unilasalle.fr (L.S.); fabiana.fabri@unilasalle.fr (F.P.-F.)
[3] Global Impact Department, Harper Adams University, Edgmond, Newport TF10 8NB, UK
* Correspondence: luismanuel.navas@uva.es

Abstract: Population growth and urbanization are threatening food security. Urban agriculture is therefore a solution for urban food production and distribution. This paper investigates a multi-level governance framework to evaluate how local authorities implement their prescriptions at different levels of decision-making and objectives for urban agricultural projects and their role in building urban resilience. A qualitative assessment based on interviews and fieldwork over two periods in 2023 and 2024 was conducted with stakeholders from different entities in the Normandy Region of France, including the metropolis, the city, and two projects' presidents. The findings revealed a positive alignment on polycentric governance between different entities in terms of socio-economic integration, climate improvement, and nutritional diversity, all of which were achieved by the cases evaluated. Additionally, local authorities are seeking to achieve urban food self-sufficiency in order to reduce the scale of food imports, thus highlighting a limitation and challenging aspect of this study, given that urban areas are compromised by population density, limited space capacity, and the impermanence of projects. This investigation clearly shows that using this combined systematic approach of interviews and fieldwork provides an in-depth understanding of authorities' needs and assesses the existence of polycentric governance compliance across multiple units.

Keywords: urban agriculture; food security; city resilience; multi-level analysis; polycentric governance; qualitative research; case studies; France

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1. Introduction

The first and foremost human need after air and water is food, and currently, agricultural production is at risk due to population growth and the scarcity of water resources worldwide [1]. Indeed, food is fundamental to human well-being and development, and sustainability is achieved when people have access at all times to the food they need for a normal, healthy life [2]. Food security is thus determined by food stability, availability, and access, and is linked to livelihood security [3]. The main drivers of current food insecurity are global weather variability, urbanization, and population growth, along with various other factors responsible for changing food consumption patterns [4].

As a result, today's world is a combination of tradition, modernity, and agriculture [5], and where urban agriculture (UA) is currently able to occur wherever humans can cultivate grains, even in the smallest part of the soil [6,7], thereby providing interactions and adaptation to an urban ecosystem [8]. As a matter of fact, besides producing food from these urban spaces, green and sustainable cities enable cleaner air, water, and streets, empowering their environmental, social, and economic outcomes [9,10]. For those reasons, UA is a way to support sustainable development goals, where it includes environmental

protection, ensuring health and nutrition, decreasing poverty, along with societal economic development [11], and where the purpose of this article is to examine these aspects through real cases of UA, considering the polycentric governance (PG) dimension, which is crucial for the proper development of these organizations.

PG is an approach in which a variety of stakeholders come together to formulate regulations adapted to local contexts. With this approach, stakeholders can freely participate in different decision-making, policy formulation, and rule enforcement spheres according to their needs and concerns [12]. To do so, both metaphorical pillars and institutional design parameters are used to show how they can be mutually combined to achieve desired goals and manage spillovers. Within the context of UA, PG is seen as the interaction between multiple stakeholders (farmers, local authorities, non-profit organizations, etc.) within various institutional settings and rules aimed at ensuring that, under different conditions, everyone benefiting from a given commons pays their fair share and decides on that commons.

In other words, when thinking about polycentricity, it should be considered how autonomous actors can, nevertheless, interact formally and informally with each other through cooperation to ensure polycentric order or equilibrium within the system [13]. Such interconnection is highly pertinent in the UA context, as decision-making mechanisms are closely linked at different levels of the urban community, encompassing local projects, district councils, and city administrative structures [14]. This interconnection requires a polycentric approach to effectively coordinate and support the various urban activities and their benefits throughout the city and its inhabitants, in line with aspects of sustainable development, to which the present investigation is contributing.

This paper is structured according to the following chronology: Section 2 describes the various concepts used in this investigation and their application for a better understanding, while Section 3 presents the methodology employed, along with the main inclusion and exclusion criteria allowed to better trace our interviews with the different actors at the various institutional and regulatory levels. Section 4 presents the results of this analysis, highlighting PG and its effects on the involvement and realization of these urban practices, presenting the various similarities, diversities, and obstacles present, as well as evaluating two real-life cases for a more comprehensive assessment. Finally, Section 5 places these results in a clearer perspective, enabling conclusions to be drawn in Section 6, in which an overview of the current situation is presented, along with some recommendations that should be followed for better implementation of the practices.

2. Conceptual Framework and Application

2.1. Urban Agriculture (UA)

UA is defined as any type of agro-industrial activity located in or around the city, intended to provide products and ecosystem services to residents [15], including social, environmental, and economic impacts [6,16]. The benefits include physical and mental health improvement, alleviation of social and economic problems, and community resilience [15]. The primary aim of UA is to build healthier, more sustainable, and resilient communities, and not necessarily to produce large quantities of food [17]. Currently, UA represents a small but important percentage of the food distribution system in cities, since few urban agricultural projects (UAP) aim to replace traditional food distribution, in the expectation of leading to food self-sufficiency for individuals or cities [18].

It is therefore important to recognize that UA is not the only solution to address food insecurity and improve accessibility to food, but rather a transfer of responsibility for policy-makers to expect and institutionalize urban farms to serve as subsistence or primary food environment production sites managed by and for low-income communities operating without external support [19], making it imperative that these projects should be well led and managed by local decision-makers and authorities [20].

Expanding UA in densely populated environments requires complex coordination between different stakeholders, such as local authorities, developers, residents, and private actors [21]. Moreover, UAP encounter significant challenges in terms of governance,

particularly due to the polycentric structure of the decision-making process [22]. In this sense, it is also necessary to underline the importance of collaborative and participatory governance mechanisms, which, in the absence of effective coordination, struggle to ensure strategic coherence between the multiple stakeholders [23].

2.2. Polycentric Governance (PG)

PG can be defined as a self-organizing governance system composed of mutual adjustment and multiple governing actors, decision-making centers, and political issues, along with the relationships between them to better synthesize the concept [24,25]. Indeed, polycentric systems have been conceived as consisting of numerous centers of authority interacting internally and across scales for a shared governance purpose, where they facilitate equal representation of different governance actors, encourage policy innovation and diffusion, and support flexibility through the rapid reconfiguration of policy networks in order to achieve specific goals [12,24], which is clearly explained through Figure 1. PG is therefore a vehicle for specialization, distribution of work between the central, regional, and local levels; subsidiarity; and adaptation of interventions to local–regional circumstances and community preferences, improving effectiveness in the context and scale of the specific challenge [26], which is the focus of this research in order to evaluate this departmental distribution of work between the various local and regional entities.

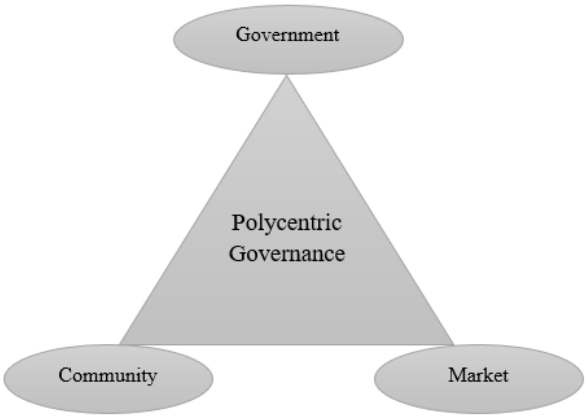

Figure 1. PG on the central Government-Market-Community axis.

PG can be decomposed into different elements, particularly governance actors, decision-making venues, policy issues, etc. [27]. Governance actors include individuals who influence decision-making processes and who have an interest in one or more policy issues or who are affected by decisions taken, with the aim of addressing coordination and conflict for multiple purposes [28] (Figure 1). Actors can include government agencies and civil servants, user groups, scientists and consultants, individuals from the general public, etc. In relation to the decision-making venue, this is a space of collective action with the power to design and adopt public policies and implement them, and where actors engage with each other, which enables actions to be initiated to make a joint decision [29]. In terms of the political issue, these are the topical policy areas or issues they address, and where issues can be both general and specific and vary in terms of importance and complexity. Considering these types of relationships, polycentric systems present multiple links through various actors who affect other places through their political decisions in the form of institutional rules and political decisions [26].

Regarding the PG model, according to Frimpong Boamah (2024) and the purpose of this paper, it enables a more integrative and adaptive management of urban resources [12], thus empowering diverse stakeholders to participate in the policy-making process that is crucial for UA and the socio-political dynamics that influence social patterns of urban food distribution and access. These interconnections within polycentric systems are therefore essential to fostering resilience and equity in sustainable food systems.

2.3. Scope of This Research Article

The aim of this study is to critically evaluate the alignment between metropolitan and urban policy frameworks and the practical implementation of UA initiatives. Indeed, it investigates the implementation and involvement of various UAP in France, more specifically in the metropolis of Rouen and its central city, applying a PG framework and an experimental field approach and focusing on their contribution to building urban resilience. It also considers the way in which these initiatives align with sustainable development goals and the transition to green cities, along with the impact of governance structures on their integration, coordination, and effectiveness within the framework of urban policies. These elements will be reinforced by the presentation of concrete UAP and their evolution over time between 2023 and 2024.

Such an analysis seeks to identify how multiple decision-making centers, such as local authorities, project leaders, and local community groups, can operate independently while simultaneously interacting together at different scales (local, regional, and global). These centers of authority work together to achieve shared governance, i.e., the collaborative management of decision-making and resources through cooperative action and mutual accountability, rather than relying on a single governing body.

3. Materials and Methods

The methodology followed in this paper consists of conducting semi-structured interviews with different actors, along with fieldwork analysis. Indeed, applying this approach makes it possible to control and monitor changes over time and to gain an overall understanding of the process [30].

3.1. Methods and Data Collection

Data were collected through semi-structured interviews, a qualitative method widely used to explore participants' perceptions and experiences at a deeper level, using an interview guide prepared by our research team, providing a clear, structured framework while allowing the order of questions to be adjusted so that the interviewer feels comfortable and flexible as the interview progresses [31], all selected using a purposive sampling approach [32,33]. In fact, this methodology enables an in-depth analysis to be provided at different scales and from several angles, including detailed qualitative information on interviewees' perspectives [34]. Moreover, systematic thematic analysis was used to pinpoint and interpret significant patterns in qualitative field interview data [35], enabling new and emerging concepts to be identified and developed, with rigorous double coding and in-depth analysis.

The interviews were conducted with 28 stakeholders, where n = 15 from the metropolis, n = 10 from the city, and n = 3 for project leaders. A multimodal approach was therefore used, consisting of face-to-face interviews and, in the case of non-compliance, telephone calls and/or online meetings, in order to adapt to participants' schedules and availability [36]. Such an approach ensured broad coverage of perspectives while respecting logistical constraints and stakeholder preferences [37]. Each interview was recorded with the participants' informed consent, in accordance with the principles of research ethics [38]. All interviews were transcribed in their entirety to guarantee the most accurate data analysis and processing possible. Fieldwork experimentation has also been performed in order to evaluate in a concrete way the UAP and to examine the evolution over time [39].

The experiment consisted of two phases, covering periods from 2023 to 2024, in which each phase tested the progress made over time and/or the performance/success of the projects, providing a more comprehensive perspective on project dynamics, encompassing more than concrete progress, challenges and strengths, and even the sustainability of initiatives [31].

3.2. Actors Involved

The aim of in-depth interviews is to include a variety of perspectives and expertise, thus fostering a comprehensive assessment of institutional aspirations and actual expe-

riences in the field [40]. This analysis covered several assessment dimensions, including the metropolis, the city, and real-life UA practices, all selected using a purposive sampling approach and a PG analysis to ensure relevance and diversity of perspectives, resulting in a multi-level governance (MLG) assessment [32,33], as illustrated in Figure 2.

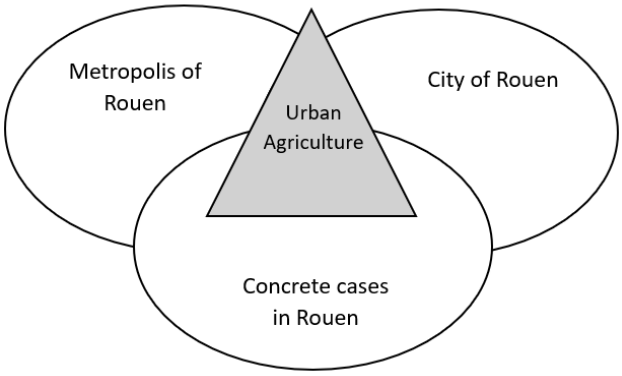

Figure 2. MLG analysis of UAP.

The MLG strategy provides generated, rich, narrative qualitative data, which are necessary for nuanced insight into systemic relations and social interaction, and where the outcomes are a very useful empirical basis for strategic recommendations and reinforcement of future urban planning [41]. Moreover, this methodology of MLG combined with a PG analysis is important in drawing attention to disparities and similarities between public policy and existing operational practices, which can enhance the ability to chart an effective pathway to plan urban transformation for sustainability [42,43].

Interviewees and Their Positions

Several actors occupying different positions were involved in this investigation in order to guarantee a PG approach and an MLG analysis of the context studied, as shown in Figure 3:

Actors from the three entities interviewed in this investigation		
Metropolis of Rouen	City of Rouen	Real-life cases of Urban Agricultural cases
Director of environmental transition: biodiversity, agriculture and green cities; Director of the Ecological Transition Department: Sustainable gardening and urban agriculture projects. Unit managers for sustainable gardening and urban agriculture: Promoting sustainable urban agriculture practices	Urban renewal project managers: Leads an urban renewal program to transform neighbourhoods and public spaces. Leaders of the plant sciences and ecology department: Activities and events around gardening. Biodiversity, ecology, resilience of green spaces, etc.	"Le champ des Possibles": - President of the garden: management of the garden to feed people, and to have awareness-raising around food. - General Delegate and Responsible for all operational aspects: Implementing the ambitions of the Administrative Council at association level. "Le Jardin de l'Astéroïde" - President of the garden: Management of the garden, contact with authorities and solving issues when needed

Figure 3. Key actors, their roles, primary functions, and presidents of urban practices in the metropolis and City of Rouen.

A total of 28 semi-structured interviews were conducted with local authority representatives, UAP managers, community leaders, and experts in urban planning and sustainable development (Figure 3). These interviews provide a better assessment of the coverage of the three entities towards the same objectives or whether there is divergence or non-complementarity. This analysis consist of evaluating the MLG perspective approach together with the PG framework in order to make it possible to understand the current situation of UAP through the expectations and real-life cases of UAP while anticipating and monitoring future evolution and changes.

3.3. Study Area

This investigation has been carried out in the Region of Normandy (Rouen metropolis and Rouen city), located in northern part of France.

3.3.1. Normandy Region

The French region of Normandy is widely known for its potential for agricultural production [44], partly unexplored in other studies, and for the ongoing urban support of local authorities from the different PG levels, including the metropolis, the city, associations, etc. The following Table 1 shows the main economic variables of this region, including population, agricultural area, gross domestic product (GDP), agricultural value added, etc.

Table 1. Key economic variables of the Normandy Region of France.

Economic Variable	Value	Reference
Population	3.3 million inhabitants	[44]
Area	29,906 Km^2	[45]
Agricultural area	22,000 Km^2	[46]
GDP	EUR 95 billion in 2018	[44]

Table 1 clearly shows that Normandy's agriculture covers 70% of its territory, making it a major component of the region's economic system. It is also, through its practices and diversity, an activity that shapes the Normandy landscape [46]. The local economy in Normandy is very strong, particularly in the agricultural and agri-food sectors, but still relatively modest compared with the rest of France, especially the Ile-de-France region [44]. However, to better assess UA practices in this area, it is necessary to apply a PG analysis across multiple actors and at different scales, assessing what is requested by local authorities and what is actually performed and applied in real UAP cases in the city.

3.3.2. Metropolis of Rouen (MR)

The MR Normandy is an intercommunal group of 71 communes that includes the CR [47] and covers most public transport (especially in Rouen) as well as managing waste, etc. The metropolis is a pivot point in the sustainable development of the region, where optimization is oriented towards quality of life [48], promoting innovative ideas like urban farms and community gardens that increase biodiversity along with recreational and educational opportunities for citizens [23].

3.3.3. City of Rouen (CR)

The CR is situated on the banks of the Seine River in France and is the historic capital of the Normandy Region [49]. The city is famous for its extensive cultural and historical heritage, featuring a number of emblematic monuments. Regarding UA, the CR is engaged in promoting initiatives to integrate green spaces and UAP, where community and allotment gardens are established to promote local and sustainable food production while strengthening social links and promoting environmental awareness [23].

3.4. Urban Agricultural Cases Evaluated

«Le champ des possibles» (CP)

A non-profit association located in two sites, one within the CR, the other in Sotteville city in the MR, and which is engaged in the development of UA and the ecological rehabilitation of derelict spaces in urban areas. Its main objective is to transform urban wastelands into areas dedicated to biodiversity and local agriculture and to ensure access to healthy food [23]. Moreover, awareness-raising, animation, and training activities around food, fostering a collective and participatory approach on the part of local residents, make this association a key reference for all other UAPs in the region. Such actions help to reconnect inhabitants with nature and encourage ecological practices in an urban framework [50]. To maximize the impact of its actions, the association collaborates with public institutions, schools, etc., and is supported by CR and the MR with the aim of enriching urban spaces with food production while strengthening social cohesion [51].

«Le jardin de l'Astéroïde» (JA)

Allotments which operates on a non-profit associative model and whose main objective is to promote agroecological practices in an urban environment while enabling residents to grow their own fruit and vegetables and participate in garden activities [26]. Prior to its creation, this site was used as an unauthorized parking lot. Its transformation into an allotment not only improved the value of the area but also contributed to environmental protection and the enhancement of biodiversity [52]. The garden is made up of small plots of 20 square meters and two large plots of 40 m^2, where each member has their own plot and is obliged to maintain and cultivate it properly while not being allowed to use chemicals or make any kind of sale [26]. The project is supported by the CR and works with other local associations to strengthen UA initiatives. This partnership makes it possible to create quality green spaces that meet the challenges of urban reappropriation while integrating an educational and green community dimension [53].

4. Results

Interviews and fieldwork enabled us to gather all the information needed to answer our problem, which is to study the interest of an MLG framework to assess the actual implementation of local authorities' mandates at different levels of decision-making devices, along with an assessment of the objectives of UA schemes and their role in strengthening urban resilience.

4.1. Stakeholders' Objectives

The interviews revealed a number of strategic objectives that encourage the development and promotion of urban areas. Figure 4 illustrates the main objectives that the metropolis, the city, and the two UA cases aim to achieve while ensuring compliance with the PG approach, emphasizing empowerment and decentralized decision-making.

From Figure 4 above, the MR asserted that the creation of these spaces is aligned with the French law on zero net artificialization. The effort hopes to reduce the future environmental impact and foster the re-naturalization of regions affected by urbanization at a rate of 66%. Furthermore, it is worth mentioning that this approach represents a concern in today's progress of the MR, signaling commitment to locally ecological sustainability, raising urban air quality and life conditions, and fostering food self-sufficiency/autonomy, which has been mentioned by all metropolitan respondents.

Regarding the CR, employability was highly mentioned by the stakeholders interviewed, with a rate of 66%, as it enables individuals to be inserted and/or reintegrated into the job market, thus emphasizing the human aspect and the social link. Furthermore, guaranteeing the social link remains a central objective that was mentioned by all our interviewees (rate of 100%), underlining the desire to integrate the notions of neighborhood and intergenerational interactions (Figure 4). Interveners from the CR also emphasize at 100% that one of their main objectives is to improve certain plots of previously unused fallow

land by giving them a cultivated character, thus promoting environmental sustainability and food self-sufficiency.

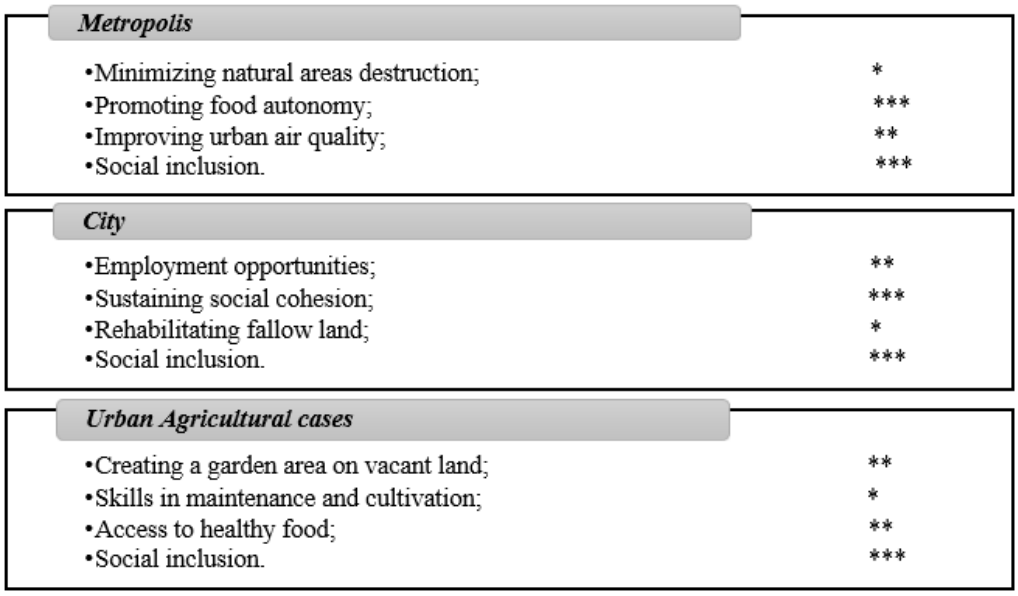

Figure 4. Main objectives that each of the metropolis, city, and UA cases in Rouen are aiming to achieve. The symbol * refers to the citation's intensity, where: * least cited; **: moderately cited, and ***: highly cited.

Last but not least, the presidents from the two real-life cases of UA evaluated stressed at a rate of 100% the importance of converting vacant lots into shared gardens to prevent them being used as parking lots or for other purposes by residents. This initiative aims to optimize the use of urban spaces while promoting the learning of the skills needed to maintain and cultivate the plots, thus guaranteeing participants' food self-sufficiency. In addition, they have expressed a desire to maximize the greening of the city while integrating a greater proportion of vegetation into the urban landscape. More broadly, this is a part of an integrated, beneficial approach that provides soil conservation and human wellness while building social bonds between neighbors to increase the connection and positive environment within the cities (Figure 4). However, only 33% of participants mentioned the need to have maintenance and cultivation skills developed beforehand, as for them, these skills are acquired over time.

4.2. Effect of UA on Residents

Interviews with different actors were performed to examine the effect of UA on local inhabitants. Figure 5 summarizes the main aspects cited by our interviewees, highlighting the effects of these urban spaces on residents.

Figure 5 highlights the impact of the insertion of UA practices on local residents and shows that there is considerable diversification between the entities examined, revealing both similarities and differences, all related to the three aspects of sustainability, categorized into social, economic, and environmental. Firstly, the social aspect is highlighted by all three entities with a rate of 100%, emphasizing its central role in facilitating interactions and exchanges between participants. In addition, this aspect contributes to improving the health of residents, fostering their social integration, personal development, and a reconnection with nature, which today tends to fade away in urban environments.

The second aspect is the food dimension, mentioned with a rate of 80%, where participants emphasize that gardening brings tangible satisfaction through the production and consumption of healthy, diversified food. Not only does this practice reinforce reconnection

with daily eating and food self-sufficiency, which also acts as an economic lever, helping to reduce expenses while maintaining a high-quality diet.

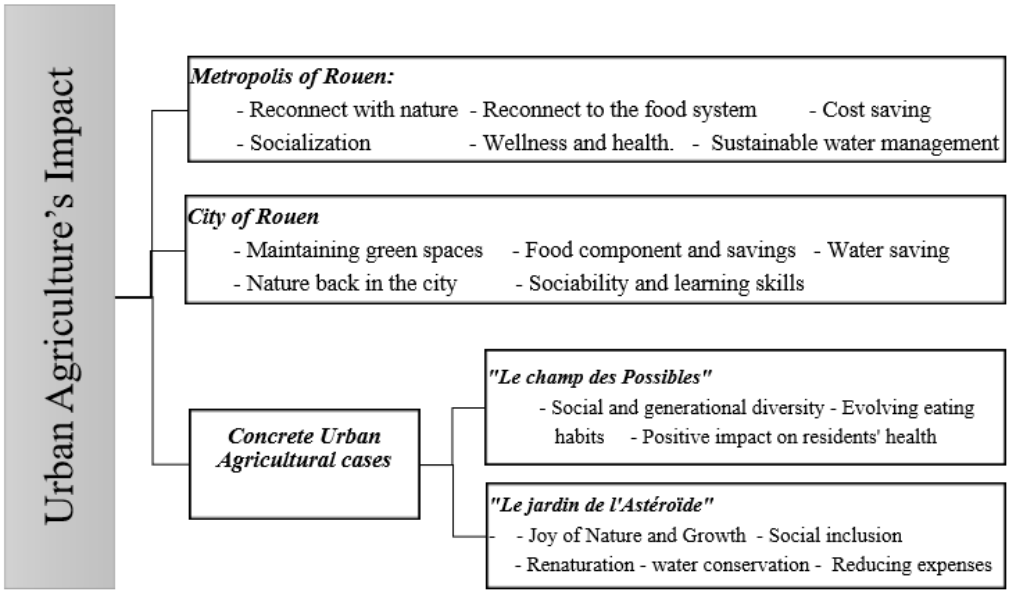

Figure 5. Impact of UA on local residents, according to the metropolis, city, and UA cases in Rouen.

Furthermore, from Figure 5, the third most frequently mentioned item relates to the preservation of biodiversity and water resources by promoting renaturation and protection of the environment, and thus, with a rate of 60%. Indeed, with the expansion of green spaces in urban areas, it is ensured that protected natural habitats are largely designed because of the additional space, and these areas act, therefore, as formidable water filters, increasing infiltration and enabling the replenishment of water tables.

4.3. Baseline Criteria (Indicators)

The creation or development of an urban area is subject to a number of requirements and indicators, prompting local authorities to choose one project over another. The local authorities evaluated share a number of common criteria, including soil analysis prior to implementation, the pursuit of food self-sufficiency, and the efficient use and preservation of water resources. In addition, other indicators have been mentioned and guaranteed by the UAP, as shown in Figure 6 below and explained below.

With regard to the common indicators mentioned by the three entities, our interviews reveal that local authorities (MR and CR) require soil analyses to be carried out beforehand, in order to guarantee two aspects. Firstly, to ensure that the land is suitable for the production of good quality fruit and vegetable crops, and secondly, to identify any missing nutrients so that they can be adequately compensated in the right way. The CP president explained that, to ensure the smooth running of the project, 40 cm of soil had to be removed and new soil had to be added, which is a measure imposed even though it had not originally been requested.

The second aspect concerns food autonomy (Figure 6), in which a key condition is that members have access to healthy, fair, and sufficient food. This aspect is indeed fundamental and must be achieved, whether partially or completely, as emphasized by the presidents of the UAP evaluated. The third common element involves sustainable use, protection, and management of water resources. In fact, the protection of catchment areas for drinking water is a crucial requirement long regulated and compelling local governments to make drastic arrangements to keep water resources healthy. These regulations are essential to meet the growing demands of urbanization and environmental constraints.

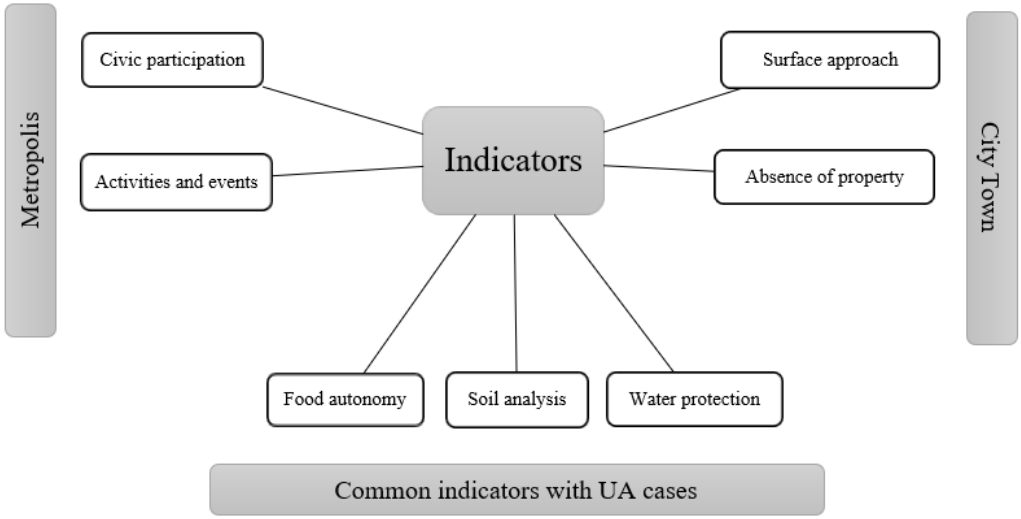

Figure 6. Criteria by entity that were mentioned by participants to ensure UAP.

Besides the three core criteria covered by the three distinct entities being evaluated, additional indicators were identified as priorities, highlighting the MLG perspective, particularly for MR and CR (Figure 6). The metropolis emphasizes the need for citizen engagement in the learning of agricultural practices and agronomic processes but also participates in various activities related to green community life that contribute to strengthening social ties. Some of the key metrics also include the number of events organized annually, annual visitors, and frequency of public access to these initiatives. On the other hand, the CR is concentrating on compliance with certain regulatory constraints, in particular maintaining a minimum surface area of 10 m^2 for UA spaces and ensuring that no real estate projects are planned on the land, in order to guarantee its long-term use.

4.4. Institutional and Collaborative Partnerships

According to our investigation, relationships between local authorities (city and metropolis) and UA project leaders, as revealed through interviews, are structured around regular exchanges and well-defined collaborations:

MR: At the outset, coordination takes place mainly with the project leaders, while the involvement of local residents takes place on the ground via public consultations. In addition, a service provider accompanies each project individually, with annual reviews to assess progress, as mentioned by a metropolitan authority stakeholder, "At the outset, our contacts are the promoters, where there is often preparation for the application. . . Then, there's the part where we set up individual support . . . And after that, we're back in touch with them for a review at the end of the first year".

CR: Regular feedback and consultations are organized to define and adapt projects according to needs. Partnerships with associations, such as support in signing the urban gardening charter, are formalized. A Rouen city official said, "Essentially there are three steps: first phase of consultation, second phase, of formalization and third phase we let the ground to the association.

In both cases, MR and CR representatives meet regularly with UAP presidents and members to monitor the impact of their project on the local population, as well as to follow up on signed agreements, thus promoting the accountability of those managing the initiative. By sharing responsibilities and providing a flexible framework, the unified action program can be successful and sustainable over the long term.

This institutional and collaborative management mode emphasizes the respected PG process, where various decisions are taken at all levels, thus promoting local autonomy and flexibility in management. However, it is necessary to integrate and respect the global rules imposed by the various local and regional authorities through an MLG perspective.

4.5. The UAP Evolution over Time

UAP were the subject of field visits in both 2023 and 2024, following the completion of the interviews carried out to follow up on their progress and evolution. At JA and CP, a mix of causes were responsible for noteworthy differences at both plots. In the case of JA, the CR financed the installation of fencing and supported the maintenance of various infrastructures, such as the management of wetlands and the repair of deteriorated parts of the garden. Lighting has also been improved with the installation of light poles. The most important transformation concerns the change in ownership of the project's presidency between now and 2023–2024, where the president (the founder of the project, itself) has ceded his position in favor of a loyal member who has been fully committed to the project from the outset.

A part of the park was also allocated for an agroforestry pilot project, named CP, to demonstrate that growing trees within a farm can reduce water consumption. Between the two visit periods, an information panel was installed at the entrance to raise public awareness of the project's objectives. Work is currently underway to extend the infrastructure and accommodate a wider public, while it is planned to double the number of activities, particularly workshops and events. The extension of the growing area is also part of a new operation in support of isolated pregnant women, funded by the MR. Besides the salaried employees already in the organization, the project's governing bodies have added a full-time coordinator, two full-time animators in 2023, and a master-trained gardener. Furthermore, new agreements have been signed to ensure the expansion and sustainability of these initiatives.

4.6. UAP's Alignment with the Authorities' Priorities

One of the main questions of this research study is to determine the relevance of UAP in the CR and its metropolis in meeting the needs and expectations of local authorities and to evaluate the effectiveness of the links and the interaction between the three entities. The interviewees' contributions provided answers to this question, revealing a wealth of information on each of these points, as shown in Figure 7.

According to the stakeholder responses presented in Figure 7, there is effective complementarity and coordination between the positive and negative responses in terms of meeting the needs identified. The MR emphasizes the importance of public health, as well as the organization of events and awareness-raising days to inform the public of the benefits of UA. It affirms that UAP fully meet these objectives and that the metropolis is generally satisfied with the results obtained while motivating local entrepreneurs to become actively involved, believing that there is always the opportunity to learn and do better. Urban project managers agree: "We are finally starting to address the underlying factors of a healthy society and most importantly food". Together with the CR, the local authorities confirm that the social and economic aspects are also satisfied, in that participants of all generations and nationalities are well integrated into the projects. Moreover, the local production of fruit and vegetables enables residents to make some savings, even if these remain modest.

However, as far as the unmet expectations of local authorities are concerned, it is noted that the capacity of UAP to feed the whole city remains limited. As the president of CP pointed out, "UA won't be able to feed the city". Nevertheless, it is already contributing to this objective, which is seen as a positive result. However, institutional stakeholders strongly suggest that UAP should aim to achieve exceptional initiatives, such as the introduction of innovative crops, in order to attract greater public interest and thus reinforce their impact (Figure 7).

These interactions occur in the context of PG, where the local government at different levels (metropolis and city council) and civil actors (project developers) coordinate to manage UAP. This governance model strongly encourages shared, decentralized management, in which each stakeholder can respond to specific local requirements while maintaining coordination of all practices. This form of multi-centric cooperation helps to increase the

flexibility and adaptability of urban systems to address local challenges such as public health and social integration, enhancing the resilience of urban systems.

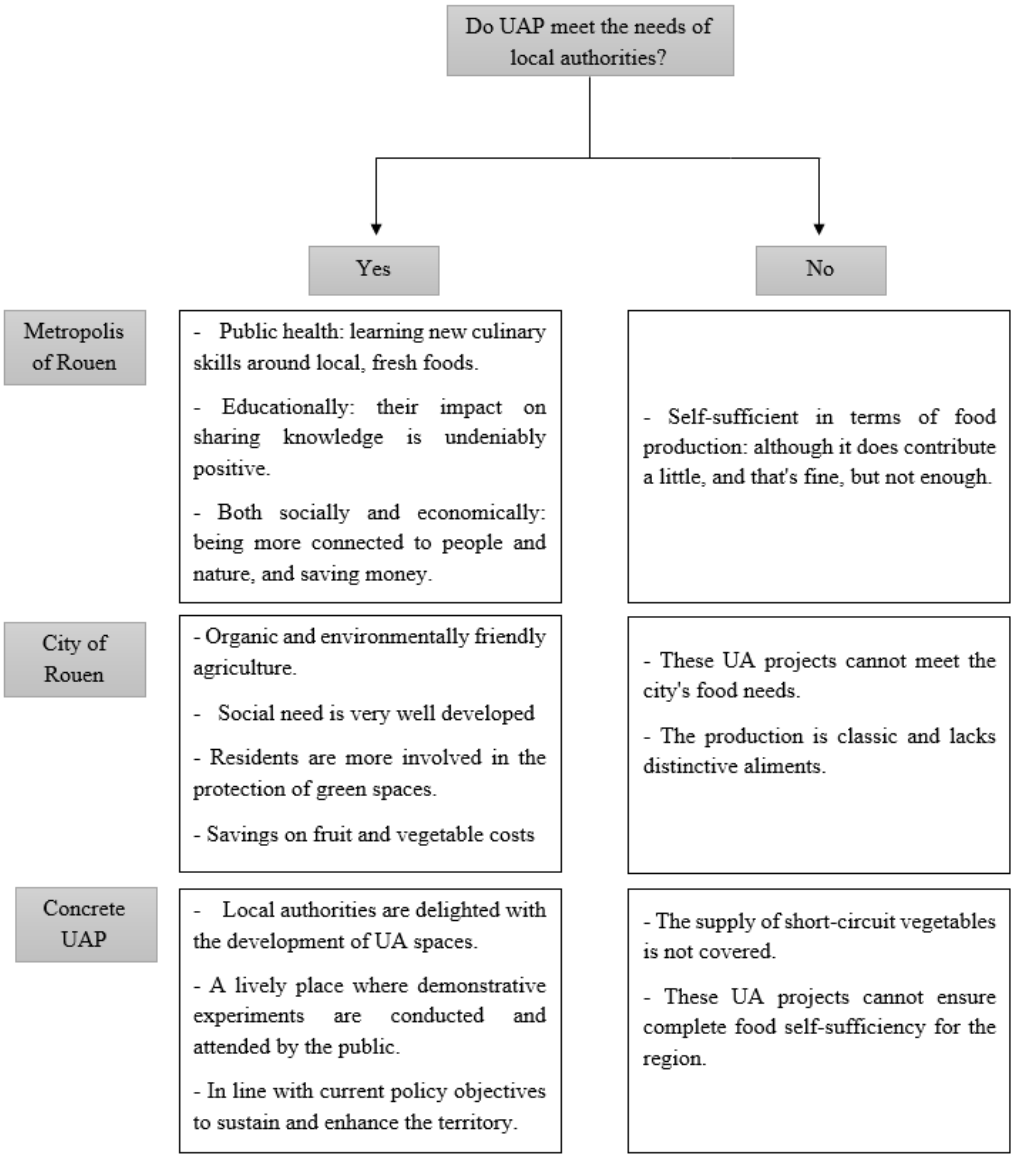

Figure 7. Evaluation of the effectiveness of the established links and the assessment of the extent of governmental interaction between the three entities.

4.7. Limitations and Potential Directions

This research revealed various limitations, focusing in particular on an aspect that is difficult to address in the short term: the city's food sufficiency and the long-term viability of UAP. Indeed, the findings from all three entities confirm that one of the main purposes of implementing such projects is to feed the city's inhabitants. However, this is a challenging objective given the region's high population and limited urban areas. As for long-term viability, local authorities have indicated that this is a major obstacle, as they are keen to contribute to the realization and implementation of the UAP but need to be sure that it will last for many years. On the presidents' side, these same limitations concern the urban areas available for the creation of such projects, since they complain that "it's difficult to find land on which to create an urban space given that today all the land is left for the construction of buildings".

Although the three entities recognize that significant improvements cannot be accomplished so quickly, they strongly believe that potential directions and future improvements can be achieved through the implementation of new forms of UA (vertical farming, rooftops, etc.) as well as through efficient water management and, in particular, through the implementation of future plans to integrate UA into city plans contributing to both sustainable food systems and city resilience.

5. Discussion

This research paper analyzes the interactions between different entities in a framework of MLG, focusing on the insertion of the urban sector within cities in order to analyze whether the expectations of local authorities are being realized by urban practitioners in the field. Conducted in the CR and its metropolitan area, this research is based on in-depth interviews with actors from each entity, including representatives of the MR, the CR, and presidents from two UAP, which yielded 28 interviews, a sufficient number to answer all our questions and solve our problematics. The methodological approach used in this article is well chosen to elicit the diversity of opinions on the various topics [30] and offers a valuable qualitative approach to the analysis of the various thematic and stakeholder contributions at different levels while also including quantitative results to make the analysis completer and more accurate.

Common features between the three entities were observed on the basis of the strategic objectives resulting from this investigation, where local entities emphasize that the creation of urban spaces ranges from the need to ensure healthy, cost-saving, and appropriate food to sharing new learning and connecting city dwellers to local environments, where this is perfectly achieved by the urban practices evaluated. These dimensions match those outlined by Menconi et al. [15] for the three pillars of sustainability: social, economic, and environmental, which are key objectives in the application of UAP. These urban projects aim not only to save money on a day-to-day basis but also to provide employment for retirees or job seekers. This finding has also been confirmed by [54,55], who reported significant potential savings after their involvement and employment in UAP.

The analysis also focuses on ensuring an integrated framework between the various entities to facilitate collective action among them. Indeed, the results obtained from the three entities underline the importance of an appropriate participatory approach through PG to facilitate fruitful partnerships and reconcile conflicting stakeholder interests by improving communication mechanisms and aligning objectives while ensuring combined efforts can have a greater influence on UA and make our cities more sustainable and healthier places to live. In the case of this research, this approach is positively affirmed by all stakeholders, since there is a reciprocity of satisfaction at different scales and levels. This perspective is also supported by Saint-Ges et al. [56], who assert that such an approach maximizes synergistic interactions between stakeholders while ensuring the resilient use of resources and infrastructure.

Apart from the common criteria mentioned above, in terms of food self-sufficiency, divergences remain, as the local authorities are keen to have independent and local cities and regions through the UAP, while urban practitioners do not and cannot meet the city's needs in terms of food supply due to the limited available area set aside for the UAP and the city's soil and pollution limitations. Moreover, our interlocutors at the MR and CR recognize these limitations but are nonetheless very satisfied with the current results that UAP is having on the residents and the city itself. However, local authorities still consider some indicators for the proper operation of the UAP, where the metropolis includes criteria relating to the number and integration of participants in projects, as well as the quantity of activities carried out per season and per year. The city, on the other hand, focuses more on setting standards for the surface area allocated to UA while imposing verification by urban planners to ensure the absence of future projects that could compromise the sustainability of UA initiatives. In this case, we need to consider the principle of subsidiarity, which means that responsibilities should be decentralized to the lowest level of governance that

can do the job and manage the task, something that was also mentioned by Marshall in 2008 [57] as a way of better understanding how responsibilities should be distributed between different levels of governance and that higher levels should not take on tasks that lower levels can manage.

The results reveal another important constraint related to the criteria imposed on UAP developers. These differences can be explained by the availability of land: at the metropolitan level, vacant spaces intended for the insertion of urban spaces are considerably more extensive than within the city. As a result, the latter must comply with strict surface area requirements and future planning regulations drawn up by urban planners and architects. These dynamics highlight the need to adapt the criteria for implementing UAP to the contextual specificities of each entity while considering space constraints and urban planning objectives. Nevertheless, UAP presidents and owners respect these requirements and would nevertheless appreciate greater flexibility.

6. Conclusions

UA is seen as a key lever for promoting sustainable and balanced nutrition in urban areas [20]. It also plays a role in social integration and well-being while generating economic and environmental benefits [26]. To achieve these objectives requires rigorous and sustainable management of PG in the implementation of these projects [20], and that is what this research article has investigated.

This investigation highlighted an essential aspect of the governance and institutional framework of UAP, particularly in the context of PG. Indeed, the results show that the MR and CR monitor the implementation of these projects and provide regular support to long-term project leaders. This support for collaborative working is underlined by the feedback from CD and JA project leaders, who express their satisfaction with working with local authorities, stating that they are "happy and satisfied to work with them". This underlines the strength of the organizational structure and the dynamic collaboration facilitated by the PG between local authorities and project leaders, providing an encouraging supportive environment for potential UAP owners to become more actively involved and committed to this field.

This research is one of the first to investigate the link between different entities in the UA field through a PG analysis and using an MLP approach, thus highlighting its original contribution. Indeed, this analysis assesses the results of three different entities separately, in order to reach a single comprehensive statement, which in this case is to analyze whether the expectations of local authorities are aligned with the reality of projects implemented in the CR, France. Future research might consider using this paper as a reference while following the same methodology of a combined approach between what is stated and mentioned by local authorities and what is actually implemented in different cities and countries, in order to have a complete picture of the actual situation and to determine in this case whether there is complementarity between the needs and main objectives of local authorities in implementing UAP and the real-life practices implemented. Furthermore, this document could be useful for planners, architects, and urban specialists to better understand, design, and shape the future dynamics of the UAP by promoting sustainable local food and resilient cities for the future, in line with the three aspects of sustainability, grouped into the economic, social, and environmental dimensions.

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Abbreviations

CR	City of Rouen
CP	«Le champ des possibles»
JA	«Le jardin de l'Astéroïde»
MLG	Multi-level governance
MR	Metropolis of Rouen
PG	Polycentric governance
UA	Urban agriculture
UAP	Urban agricultural projects

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