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# A Proposal of Indicators for Urban Agriculture Planning in Camaguey

## Propuesta de indicadores para la planificación de la agricultura urbana en Camagüey

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**Abstract**

Presently, the inclusion of urban agriculture in territorial planning, and its development and contribution to urban food safety are being assessed through different parameters. This paper aims to establish a rationale for the inclusion of several indicators to assess urban agriculture planning, which can contribute to food sovereignty and sustainability. The theoretical method for this study was the analysis and synthesis of the theory of the topic presented. The empirical methods included the mixed approach method for the selection of variables and their indicators, and the Iadov technique to validate the proposal. These indicators constitute a useful tool that permits decision-making due to their contribution to urban sustainability and food sovereignty. They will assist in the diagnostic and characterization of urban agriculture within a territory, to link their main components with a territorial perspective, and their planning criteria and actions. The study concluded that despite the limited planning and proper ordering of urban agriculture, it is a way of accessing sustainable foods, improving life quality, and preserving the environment. The insertion of urban agriculture in urban planning entails a methodological response that articulates urban agriculture and

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territorial planning with an agroecological approach that relies on urban sustainability and food sovereignty.

**Keywords:** Planning; Urban agriculture; Sustainability; Food sovereignty.

**Resumen**

Actualmente la incorporación de la agricultura urbana en la planificación territorial, su desarrollo y contribución a la sostenibilidad urbana y soberanía alimentaria está siendo analizada a través de indicadores. El objetivo del presente artículo es fundamentar una propuesta de indicadores para la planificación de la agricultura urbana que contribuyan a la sostenibilidad y soberanía alimentaria. La metodología utilizada consiste en análisis y síntesis para el tratamiento teórico de la temática investigada. Entre los métodos empíricos se utilizaron a partir de una profunda revisión bibliográfica, el grupo de enfoque mixto para delimitación de las variables y sus indicadores y el método IADOV para validar la propuesta. Estos indicadores resultan un instrumento útil que permite la toma de decisiones por su contribución a la sostenibilidad urbana y la soberanía alimentaria. Permitirán diagnosticar y caracterizar la agricultura urbana en un territorio, relacionar sus principales componentes desde una perspectiva territorial, así como criterios y acciones para su planificación. Se concluye que, a pesar de las limitaciones para la planificación y adecuado ordenamiento de la agricultura urbana, constituye para Cuba una vía para el acceso de alimentos sostenibles, mejora la calidad de vida y preserva el medioambiente. La inserción de la agricultura urbana en la planificación urbana presupone una propuesta metodológica que articule la agricultura urbana y la planificación territorial con enfoque agroecológico bajo criterios de sostenibilidad urbana y soberanía alimentaria.

**Palabras Clave:** Planificación; Agricultura urbana; Sostenibilidad; Soberanía alimentaria.

## 1. Introduction

Urban agriculture is becoming popular in several cities of the world, both in developing and industrial countries. The purposes of this practice may be varied: food, recreation, therapeutics, ornamental, pedagogical, sociocultural, economic, and environmental. The contribution of urban agricultural practices to sustainable cities is undeniable due to its multifunctional and multidimensional character, which goes over the local communities.

The relentless growth of cities caused by the concentration of the population makes the urban-rural association closer, as there is a greater need for self-supply.

In that sense, one of the problems faced by this kind of agriculture is the permanent integration into urban agriculture. However, "the design of sustainable cities demands closer ties between farming sustainability and urban sustainability" (Soler and Rivera, 2010, p. 8).

Today, agriculture is beginning to be part of urban designs, regardless of its contribution to city changes. According to Soler and Rivera (2010), the strength of urban agriculture lies in its multiple economic, ecological, social, and even territorial benefits, particularly using an agroecological approach that contributes to better soil use in the cities.

This paper shows that the insertion of agriculture in the urban design is based on the multifunctionality of the soil of farming systems, which, in addition to the important benefits, such as the ones mentioned above, provides greater life quality to their inhabitants.

The contribution of urban agriculture and food sovereignty is being assessed worldwide through planning indicators (Cantor, 2009; Soler and Rivera, 2010; Ortega and Rivera, 2010; Vásquez, 2010; Arlego, 2013; Abadía, 2017; Cáceres, 2020; Franco, *et al.,* 2021), which constitutes a need in Cuba and overseas.

In Cuba, urban agriculture is conducted through the Urban, Suburban, and Family Farming Program, which has a high impact on food sovereignty. Although it is a high-priority program, it demands greater use of planning tools, as well as the design of parameters that help with decision-making actions.

No specific related method was identified for urban agriculture assessment as part of municipal territorial planning. Though several relevant previous research studies call for the need for more engaging urban planning (Cruz, 2001; Cruz and Sánchez, 2003; Moreno *et al.,* 2015).

At the same time, the urban soils available for cropping are temporarily used, which has a negative influence on territorial planning.

Accordingly, this paper aims to establish a rationale for the inclusion of some indicators to assess urban agriculture planning,



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which can ensure food sovereignty and sustainability.

On the one hand, this study used analysis and synthesis of the related theory. On the other, the empirical methods included the mixed approach method for the selection of variables and their indicators, and the Iadov technique to validate the proposal.

## 2. Theoretical rationale

Planning embraces the assessment of urban agriculture, despite the absence of theoretical studies of its role and relation to soil development and use beyond the corresponding variables and indicators.

The utilization of variable indicators derived from the environmental, economic, social, and cultural dimensions aims to monitor the behavior of urban agriculture, which leads to the continuous improvement of planning and decision-making that leads to urban sustainability and food safety.

### *2.1. Urban sustainability and food sovereignty*

The concept of urban sustainability has varied, depending on the author (Munda, 1997; O'Connor, 2002; Whitehead, 2003; León, 2013; Benton-Short and Short, 2013), who asserted that the key element is making cities environmentally sustainable over time.

A deeper analysis was published by Rueda *et al.* (2012); Verdaguer (2014), and the United Nations World Habitat III Summit (2016), in which urban sustainability was assumed with a systematic approach. Moreover, they argued that the potentialities of the existing relationship between the city environment and the territory, environment, population, and economy can be studied in detail for territorial development.

It tackles the environmental side, which gains relevance amidst the current scenario. Falivene *et al.* (2014) noted that a city's sustainability is linked to the number of alternatives available to improve the quality of life of its inhabitants, and it depends on the environmental capacity.

Furthermore, Dimuro (2016) defined urban sustainability from an economic perspective, as a process of changes in the form of production, sales, and feeding, along with the assumption of new urban uses, and collective action strategies. In that sense, new urban sustainability strategies should be designed (Migliorati, 2016), and the local communities should be empowered as social actors capable of planning their development (Calvet and March 2018, p. 37).

In essence, the previous definitions view urban sustainability as the creation of a city that promotes and provides access to an environmentally healthy, safe, resilient, and sustainable urban area that guarantees greater life quality to its inhabitants. Food access is an essential element of this approach, in which urban agriculture plays a critical role in finding the conditions to reach the sustainability of the urban setting and food sovereignty.

Food sovereignty is popularly defined by Via Campesina (1996) as the right of the people to healthy and adequate foods produced through traditional know-how (Heifer, 2006; García and Wahren, 2016), as well as ecological and sustainable methods. It constitutes a choice for family agriculture that focuses on agroecology (Altieri and Nicholls, 2020), and a stable way of ensuring income for small farmers (FAO, 2018).

An early position in this regard is Nyéléni's declaration of food sovereignty (International Governance Forum, 2007), where the concept of food sovereignty was drafted, stressing these six pillars:

1. To prioritize food production for nations.
2. To create incentives for food producers.
3. To locate feeding systems.
4. To promote local control.
5. To enhance knowledge and skills.
6. To work alongside nature.

The political vision of the definition of food sovereignty has been dealt with by Gordillo and Méndez (2013); Butti Al Shamsi *et al.* (2018), among others. They speak for the need of implementing autonomous public policies



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so that the local population can have access to sustainable foods, based on respect to the variety of farming systems, their sales, and the management of rural spaces (Ordinary Session of the Latin American Parliament, 2013).

Moreover, Waldmueller and Rodríguez (2015); Giunta (2018); Anderson (2018); Botella (2018), and Vergara, and Moreno (2019) studied the same phenomenon with an agricultural perspective and encircled it as the production of healthy and harmless foods locally, to eradicate malnutrition and reduce food and technology imports, among others. The main element of food sovereignty is nutrition through sustainable food sales to eradicate undernourishment and poverty (Mata, 2018).

This review concludes that despite the different theoretical definitions, they are not excluding; rather, they respond to specific concepts.

The most significant concept is the proposal of planning indicators for urban agriculture based on urban sustainability and food sustainability.

## *2.2. A methodological rationale for planning indicators of urban agriculture locally*

Even in some countries, urban agriculture planning is absent or poorly developed. However, the study of different models and designs may constitute methodological aspects thanks to the novel proposal of including variables and indicators with environmental, economic, social, and cultural dimensions, which entails information analysis and interpretation techniques.

The international analysis shows interesting experiences associated with this study. The indicators proposal with an agroecological perspective for urban agriculture, sustainability, and food sovereignty, by Soler and Rivera (2010) comprises the design of quantitative and qualitative indicators of sustainability and food sovereignty. Naturally, it permits the collection of relevant information to take supportive actions for this activity looking to achieve greater development.

However, one of the major benefits received by the study of food sovereignty indicators is the clarity of the concept, which responds to the objectives, along with the proposal to take action toward a goal. In that sense, Rivera and Ortega (2010) suggested five-indicator categories: "1. Resource access, 2. Production model, 3. Transformation and sales, 4. Food consumption and the right to nutrition, 5. Agricultural policies and organization of the civil society". (p. 56). Hence, according to the previous categories, Soler and Rivera (2010, p. 13) noted that the criteria for the design of food sovereignty indicators should:

- Focus on food sovereignty.
- Be flexible for application in a broad range of areas (adopting the specificity of the particular context).
- Be dynamic and static.
- Be varied and cover different variables.
- Be accurate and reliable.
- Be based on qualitative and quantitative indicators.
- Be practical, simple, and easy to be measured (if they are quantitative).
- Be participatory: every stakeholder must engage in the process of information generation (from the beginning to the end).

Various authors have developed indicators to evaluate the sustainability of farming systems (De la Salle, 2004; Blixen *et al.,* 2007; Sarandón and Flores, 2009; Cantor, 2010; Ferrer, 2010; Clavijo and Cuvi, 2017; Silva *et al.,* 2018). Sarandón and Flores (2009) offered a methodology to evaluate sustainability in agroecosystems using indicators, which is a relevant referent for this research.

In Cuba, De la Salle (2004) suggested indicators for urban agriculture, which comprised the four dimensions: environmental, economic, social, and cultural. Similarly, Vásquez (2010) conducted a study based on previous findings on urban agriculture as an element that promotes urban sustainability and emphasized multidimensional, multi-agent multidisciplinary integration into public policy levels so that urban agriculture can ensure sustainability.



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Accordingly, though several studies have demonstrated the many benefits of urban agriculture, it is unable to stand by itself. It must be treated as another urban function with an integrated vision that favors urban sustainability and food sovereignty.

In that sense, Ferrer (2010) evaluated a system of indicators, with emphasis on environmental sustainability for urban and peri-urban agriculture in Havana, including the elements of the agroecosystem. The author claims that city or territorial development relies on parameters.

The utilization of indicators for urban agriculture permits the assessment of the trends of city sustainability and food sovereignty with a planning perspective.

Clavijo and Cuvi (2017) evaluated the sustainability of urban and peri-urban gardens through indicators, following the method suggested by Sarandón *et al.* (2006) and Sarandón and Flores (2009). In turn, they used several indicators suggested by Blixen *et al.* (2007) to evaluate the sustainability of urban and peri-urban agriculture (UPA).

Concerning urban agriculture planning and ordering in Europe, the literature consulted concerning the planning and ordering instruments (Parrado, 2001; Dimuro, 2016; Carrero, 2017), showed some studies associated with this topic, as part of a strategy, though other authors named it a procedure. The documentary review also evidenced the absence of this topic, though there is consensus on the need for theoretical and methodological analysis.

The study conducted by the first author was a significant step forward in urban agriculture planning and referred to insufficient soil use for agriculture in the urban ordering models, and even the ones that exist fail to include agroecology. The study noted that in Seville, Spain, the inclusion of agriculture in the Urban Ordering Plan for 2006 tackled some elements, such as:

1. To protect and manage urban soils for agroecological soils.
2. To acknowledge the significance of urban agriculture as a critical element to achieve food sovereignty, namely.

- To define urban soil use with categories that permit farming.
- To design participatory tools for community management of public spaces for farming.
- To design short sales chains and local markets.
- To include food planning in urban planning.

Despite the usefulness of that study for the current research, it does not recommend tools and indicators for assessment.

In his PhD. thesis dissertation, Dimuro (2016) noted that urban agriculture in Seville was implemented with production and social management of habitat (PGSH), and agroecology, a possible tool for the inclusion of agroecology in urban planning. Besides, it suggests a management strategy to promote farming in the city.

In short, the international evaluation of the main topic of research evidenced that one of the shortcomings of projects or models consulted is the little inclusion of norms and indicators that regulate urban agriculture in the urban ordering plans.

Finally, the main shortcomings identified in the literature for territorial urban agriculture locally could be summarized as follows:

- This practice is not implemented in the design of the most sustainable cities, considering the cultural, social, and environmental values, and the need for food sustainability.
- Although the citizens speak for the introduction of urban agroecology, and they call for a sustainable city, their engagement is still poor.
- There is a need for greater reclassification of crop soils into land for development.
- The development of urban agriculture is based on agroecology, in some cases without proper ordering or support from the local governments.
- Although urban planning includes undeveloped soils for farming, urban agriculture and agroecological practices are still in their early stages.



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- The nonexistence of concrete proposals for planning tools and indicators in agro-ecologically-based urban agriculture to promote sustainability and food sovereignty.

These studies showed the importance of integrating rural and urban discussions. Though it requires a specific theoretical and methodological approach.

The Cuban experience in integrating urban agriculture into urban planning has been dealt with by Cruz and Sánchez (2003). They demonstrated the need for a proposal that articulates urban agriculture into territorial planning. The research aimed to evaluate the growth and possibilities of urban agriculture improvements in relation to food safety and the local economy.

Meanwhile, Moreno *et al.* (2015), in a study of the insertion of agriculture in the Urban Territorial Ordering Plan, argued that the inclusion of methodologies in urban agriculture has been dealt with as part of green areas, regardless of the urban, economic, social, and environmental impact, a thesis assumed in this study. Although they only determine the strategic axes to designing the urban plan, the following results should be regarded as well:

- Improvements in production and investments in urban farming, using the local potentialities in the form of projects and resources.
- Planning and decision-making that aims to increase urban farm production.
- Improvements in agroecological practices, and farm facility assessment for insertion in the urban setting.

Although the most relevant aspect of this study is that it goes beyond the conception that urban agriculture not only consists of green areas, but that the urban impact gains relevance, and that the agroecological side remains unattended.

The whole analysis demonstrates the theoretical and methodological gaps in ordering urban spaces that could be used in food production, due to the strategic significance of this sector nationally. Moreover, a set of indicators to assess urban agriculture and contribute to sustainability and food sovereignty should be designed with an agroecological perspective.

The methodologies consulted for this study showed that:

- The agroecological approach is present, but the supporting methodologies are inexistent.
- There is a need for urban transformation, though they lack the method.
- They refer to the methodological inclusion of urban agriculture in territorial ordering, but only in the strategic axes.

## 3. Theoretical development

### *3.1. A proposal of indicators for urban agriculture planning locally*

Territorial planning in Cuba is within instruments like the Urban Ordering Plan (UOP), for short-term and long-term decisions. The document states that agriculture is located in the physical-spatial structure of the green system. UOP looks to propose an order that contributes to better soil use, the structure, image, and physical-spatial functioning of the city. One of its specific objectives is to make optimum soil use and make improvements in the quality of the lives of residents, guided by sustainable criteria, with the engagement of the community members (IPF, 2020).

Urban agriculture is within the physical-spatial structure of production. This condition encourages farmers to get production and economic benefits in the short and mid-terms (Cruz, 2001). Under this conception, it would only be a vulnerable activity, so it must become permanent, as it helps set up ties with other spaces.

In that sense, the Food Sovereignty and Nutritional Education Plan designed by the Ministry of Agriculture (MINAG, 2020) is a national strategy to achieve food and nutritional sovereignty. It embodies the conceptual bases, objectives, strategic topics, tasks, and indicators to be met; as well as



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projected food development and production that involves the socioeconomic and cultural settings, and the transformation and sales to the end user. It comprises four components of the concept of food sovereignty, and component one is a Model for sustainable production. The first and second elements to achieve this goal includes ...” broadening the agroecological approach and proper space management through territorial and urban ordering” (MINAG, 2020, p. 13).

Pondering this consideration, there is a purpose of providing greater autonomy to the government so they can use local resources efficiently, and be entitled to check all the planning control mechanisms. However, the integration of every actor and instrument is necessary, which will permit measuring the impact of actions that lead to higher life quality to the residents.

The Physical Planning Institute (IPF, 2020) was responsible for the municipal ordering plan of Camaguey; among its actions for urban farming soil planning is the implementation of technology-based irrigation projects that optimize water use, the promotion of intensive exploitation of areas for urban agriculture, which does not interfere with previous studies on other land uses.

Despite the methodological limitations identified, this study concluded that urban agriculture assessment through planning must have the following scope:

- To provide environmental, economic, and social indicators with urban sustainability criteria and food sovereignty for the design and management of territorial plans.
- To create the need for urban agriculture assessment, including its features, in the diagnostic of the territorial reality to be ordered and planned.
- To include the behavior of indicators as part of municipal planning to achieve urban sustainability, and provide greater citizen satisfaction.
- To insert urban agriculture in urban planning, which is the least studied aspect by developers, though it is conducted internationally.

So far, there is evidence that the selection and contribution of indicators is a complex task due to the diversity of criteria. Accordingly, this issue must be dealt with through a proposal of a set of indicators and their corresponding variables, as shown in (Table 1).

**Table 1. A proposal of indicators for urban agriculture planning**

| Variables | Indicators |
|---|---|
| **Environmental** | Diversity of plant species |
| | Diversity of animal species |
| | Agroecological trends |
| | Implementation of traditional or rebuilt practices |
| | Water sources available |
| | Water sources used |
| | The monthly cost of water for irrigation |
| | Water use efficiency on the farm |
| | Expected and executed water supply investments |
| | Inventory of stationary entities that emit polluting gases into the atmosphere |
| | Soil surface by use |
| | Use intensity (surface in $m^2$) |
| | Yields (crop unit by surface) t ha-1 |
| | Farming area by crops (ha) |
| | Production volume |
| | The volume of organic fertilizers produced |
| | The volume of organic fertilizers used |
| | Seed use |



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| | |
|---|---|
| | Type of land ownership |
| | Soil classification and qualification |
| | Soil use coefficient |
| **Economic** | Local resources consumption |
| | Dependence on external supplies |
| | Diversity of products for sales |
| | Market integration level (sales forms) |
| | Monthly income by an entity |
| | Cost-benefit ratio |
| | Monthly costs |
| | Expected production |
| | Returns |
| | Labor structure (%) |
| | Age of laborers (age composition) |
| | Percentage of the population |
| | Economically active in agriculture (%) |
| | Labor |
| | Diversification of production |
| | Role of household work |
| **Social** | Engagement level and type |
| | Organization level and type |
| | Role of women in UA |
| | Diet and nutrition quantity and quality |
| | Beneficiary empowering |
| **Cultural** | Inclusion of traditional knowledge |
| | Sociocultural diversity |

Source: Authors' own elaboration based on de la Salle (2004); Sarandón & Flores (2009); Blixen *et al.,* 2007; Cantor, 2010; Ferrer, 2010; Clavijo & Cuvi, 2017; Silva, Pérez, & Álvarez, 2018).

A questionnaire was designed to evaluate satisfaction through the urban agriculture indicators in territorial planning. The answers were processed using the Iadov technique (Kuzmina, 1970, cited by Fernández *et al.,* 2020).

Professionals from several universities were invited to answer the questionnaire; their expertise made them eligible for the study. The population consisted of professionals and technicians from the province and municipality of Camaguey with a wide experience in planning.

The final version of this technique was designed by a Russian scientist to study satisfaction with the profession, and for pedagogic degree research. It comprises five questions: three were closed and two were open, their relation overlooks the subject, so they were reworded to evaluate satisfaction with the suggested procedure. These three questions are related through "Iadov's logical chart, which was adjusted for this research (Table 2).

This technique helps calculate the group satisfaction index (GSI), which includes all the different satisfaction levels found in the number scale between +1 and -1, as follows:

Group satisfaction is calculated through this equation:

$$ISG = \frac{A(+1) + B(+0.5) + C(0) + D(-0.5) + E(-1)}{N}$$

In the previous equation: A, B, C, D, E, represent the number of subjects with an individual index 1, 2, 3, or 6, 4, 5, where N represents the total number of subjects in the surveyed group. The group index was between + 1 and - 1. The values between -1



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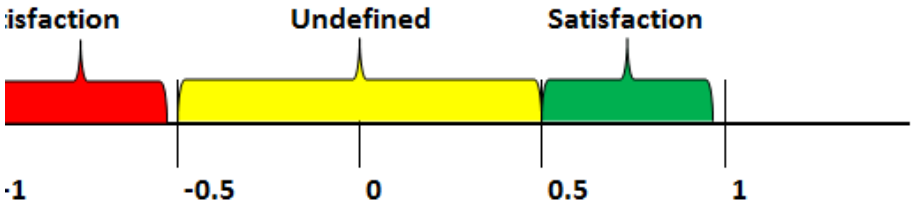
**Table 2. Iadov's logical chart**

| Do the indicators suggested meet the planning needs of urban agriculture? | Do you think that these indicators are suitable for urban agriculture planning locally? | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Yes | | | I Don't Know | | | No | | |
| | Would you use the procedure suggested? | | | | | | | | |
| | Yes | I Don't Know | No | Yes | I Don't Know | No | Yes | I Don't Know | No |
| Clear satisfaction | 1 | 2 | 6 | 2 | 2 | 6 | 6 | 6 | 6 |
| More satisfied than dissatisfied | 2 | 2 | 3 | 2 | 3 | 3 | 6 | 3 | 6 |
| Undefined | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| More dissatisfied than satisfied | 6 | 3 | 6 | 3 | 4 | 4 | 3 | 4 | 4 |
| Clear satisfaction | 6 | 6 | 6 | 6 | 4 | 4 | 6 | 4 | 5 |
| Contradictory | 2 | 3 | 6 | 3 | 3 | 3 | 6 | 3 | 4 |

Source: Authors' own elaboration based on Kuzmina, 1970, cited by Fernández *et al.*, 2020.

**Figure 1. Satisfaction value**




Source: Authors' own elaboration

and -0.5 indicated satisfaction; between -0.49 and + 0.49 showed some contradiction; whereas the values between 0.5 and 1 indicate satisfaction.

The formula was applied to the responses of the 13 subjects, and the GSI was obtained and expressed through this formula:

$$GSI = \frac{g\,(+1) + 1(+0.5) + 2(0) + 1(-0.5) + 0(-1)}{13} = 0.70$$

The GSI was 0.70, thus evidencing acceptance of the proposal.

Lastly, the authors concluded that there is no single methodology to deal with this topic, as seen in the outcome of the study, the review, and the synthesis of the sources consulted for the design of the proposal consisting of a set of indicators that can guarantee sustainability and food sovereignty. The results of the different methods used to design sets of indicators are assessed below.

Of the eight case studies consulted, two used the method suggested by MESMIS Blixen *et al.* (2007) to build sustainability indicators in urban agriculture; Silva *et al.* (2018), for assessment in agroecological farms. Other methods were used as well (Sarandón, 2006; Sarandón and Flores, 2009), by Silva *et al.* (2018), and Clavijo and Cuvi (2017) in urban and suburban gardens with economic, environmental, sociocultural, and technological indicators. Some of the indicators suggested by Blixen *et al.* (2007) were used as well.

Cantor (2010), in a study to assess economic, environmental, and social sustainability suggested the inclusion of urban agriculture indicators through participatory and non-participatory observation, though more centered on the living means. Vásquez (2010), used two types of tools for data collection: 1) a semi-structured interview based on an interview guide (Patton, 1990 and Grinnell,



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cited by Hernández *et al.*, 2006), and 2) field observation using a spreadsheet.

In Cuba, Cruz and Sánchez (2003) used a flexible and descriptive method of induction-deduction to further study the aspects related to urban agriculture introduction within territorial ordering, and determine their contribution to the local economy. De la Salle (2004) used a set of sustainability indicators based on key elements found in the literature that refers to sustainable cities and urban agriculture.

Based on the review of various methods, Ferrer (2010) combined these indicators when suggesting the environmental parameters. The pressure-state-response model designed by the Organization for Economic Cooperation and Development (OCDE) was used to implement the proposal, based on the original pressure-response model suggested by Friends and Raport (1979).

Consequently, the bibliographic review found no particular case studies related to this topic. In this paper, the Iadov technique was used, as previously described, thanks to the expertise of specialists in this area, in which they are fully engaged.

## 4. Conclusions

In the Cuban context, urban agriculture is an essential way for people to access foods sustainably, respecting the variety of farming systems. It also means improvements in the life quality, and the preservation of the environment, despite the planning limitations and proper ordering.

The insertion of urban agriculture in urban planning entails a methodological response that articulates urban agriculture and territorial planning with an agroecological approach that relies on urban sustainability and food sovereignty.

The proposal consisting of a set of indicators for urban agriculture as a planning tool showed 0.70 GSI in the groups of experts surveyed, thus evidencing accepted usefulness.

## 5. Conflict of interest

The authors declare no conflict of interest.

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## 7. References

Abadía, V. K. (2017). Evaluación de la relación entre sostenibilidad y soberanía alimentaria - en el municipio de Turmequé Boyacá, Colombia [Tesis de maestría, Universidad Distrital Francisco José de Caldas]. https://repository.udistrital.edu.co/handle/11349/6803

Altieri, M. A., Nicholls, C. I. (2020). *La Agroecología en tiempos del covid-19* (pp. 1-7). http://celia.agroeco.org/wp-content/uploads/2020/05/ultima-CELIA-Agroecologia-COVID19-19Mar20-1.pdf

Anderson, F. (2018). *¡Soberanía Alimentaria YA ¡Una guía por la Soberanía Alimentaria!* (pp. 1-32). https://viacampesina.org/en/wp-content/uploads/sites/2/2018/02/Food-Sovereignty-a-guide-ES-version-low-res.pdf

Arlego, L. A. (2013). A Agricultura Urbana como estratégia de sustentabilidade da cidade do Salvador, Bahía, Brasil [Tesis doctoral, Universidad de Salamanca]. https://dialnet.unirioja.es/servlet/tesis?codigo=80964

Benton-Short, L., Short, J. R. (2013). *Cities and nature.* Routledge.

Blixen, C., Colnago, P., González, N., Márquez, C., y Chiappe, M. (16-17 de octubre de 2007). *Propuesta de evaluación de sustentabilidad a través de indicadores en agricultura urbana para las huertas vinculadas al PPAOC*. Ponencia presentada en el Seminario de Cooperación y Desarrollo en Espacios Rurales Iberoamericanos. Sostenibilidad e Indicadores, Universidad de Armería, Almería, España. http://www.indirural.ual.es

Botella, E. (2018). Políticas agrarias, Seguridad Alimentaria y Nutricional y Soberanía Alimentaria: luces y sombras del caso cubano (1900-2015). *Mundo Agrario, 19*(42), e096. https://doi.org/10.24215/15155994e096

Butti Al Shamsi, K., Compagnoni, A., Timpanaro, G., Cosentino, S., & Guarnaccia, P. A. (2018). Sustainable Organic Production Model for "Food Sovereignty" in the United Arab Emirates and Sicily-Italy. *Sustainability, 10*(3), 620. https://doi.org/10.3390/su10030620



https://doi.org/10.25100/cdea.v39i75.12202

Cáceres, L. A. (2020). Agricultura urbana como alternativa para la soberanía y seguridad alimentaria y nutricional de agricultores urbanos, caso Bogotá Colombia y Aracaju Brasil [Tesis de maestría, Universidad Nacional de Colombia]. https://repositorio.unal.edu.co/handle/unal/78143

Calvet, L., March, H. (2018). Nuevos paradigmas de sostenibilidad urbana (p. 37). *En ¿Cómo hacer ciudades más equitativas y sostenibles?* Oberta UOC Publishing. SL. https://docplayer.es/229744439-Como-hacer-ciudades-mas-equitativas-y-sostenibles.html- Eliminar es lo que entiendo

Cantor, K. M. (2009). Agricultura urbana: sostenibilidad y medios de vida. Experiencias en Ciudad Bolívar, Altos de Cazucá y Ciudadela Sucre [Tesis de maestría, Pontificia Universidad Javeriana]. https://repository.javeriana.edu.co/handle/10554/665

Cantor, K. M. (2010). Agricultura urbana: elementos valorativos sobre su sostenibilidad. *Cuadernos de Desarrollo Rural* 7(65), 61-87. http://www.scielo.org.co/pdf/cudr/v7n65/v7n65a04.pdf

Carrero, L. (2017). Agricultura periurbana. Perspectivas desde la planificación territorial en la comarca del Maresme estudio de caso Las Cinc Sènies – Mataró [Tesis de Máster, Universidad de Barcelona]. http://diposit.ub.edu/dspace/bitstream/2445/118277/1/TFM_Carrero_Ni%C3%B1o_Liliana.pdf

Clavijo, C., Cuvi, N. (2017). La sustentabilidad de las huertas urbanas y periurbanas con base agroecológica: el caso de Quito. *Letras Verdes. Revista Latinoamericana de Estudios Socioambientales,* (21), 68-91. https://doi.org/10.17141/letrasverdes.21.2017.2608

Comisión Internacional de Dirección de Nyeleni. (2007). *Declaración de Nyéléni 2007.* http://nyeleni.org/DOWNLOADS/Nyelni_SP.pdf

Cruz, M. C., Sánchez, R. (2003). *Agriculture in the City: A Key to Sustainability in Havana, Cuba.* IRP, IDRC.

Cruz, M. C. (2001). *La agricultura de ciudad y el desarrollo urbano sustentable. Teoría y práctica.* https://repositorio.geotech.cu/jspui/handle/1234/1935

De la Salle, J. (2004). Growing cities: Cuba's experiment with urban agriculture during the "special period [master's thesis, Dalhousie University]. https://www.cityfarmer.org/cubaThesis.html

Dimuro, G. (2016). *La producción y gestión social la agroecología urbana en Sevilla* [Tesis doctoral, Universidad de Sevilla]. https://idus.us.es/handle/11441/39640

Falivene, G., Costa, P., y Artusi, J. A. (2014). *Aplicación de indicadores de sostenibilidad urbana a la vivienda social. Primeras Jornadas de Planificación Económica y Social 2013.* Comisión Económica para América Latina y el Caribe [CEPAL]. https://www.cepal.org/sites/default/files/publication/files/36654/S2014040_es.pdf

FAO (2018). *Panorama de la Seguridad Alimentaria y Nutricional en América Latina y el Caribe 2018* (p. 132). https://doi.org/10.37774/9789251310595

Fernández de Castro, A., Sánchez, N., y Reyes, Y. (2020). El proceso de validación mediante la Técnica de Iadov en cursos por encuentros. *Revista Ingeniería Agrícola*, *10*(1), 66-70. https://revistas.unah.edu.cu/index.php/IAgric/article/view/1211/2070

Ferrer, E. (2010). Sostenibilidad ambiental en la agricultura urbana y periurbana. *Revista Vinculando.* https://vinculando.org/documentos/indicadores_sostenibilidad_ambiental_agricultura_urbana_periurbana.html

Franco, C., Andrade, V., y Baldeón, S. (2021). Identificación de modelos de producción sostenible de alimentos en el cantón Píllaro como aporte a la soberanía alimentaria. *IDESIA*, *39*(3), 125-134. http://dx.doi.org/10.4067/S0718-34292021000300125

García, L., Wahren, J. (2016). Seguridad Alimentaria vs. Soberanía Alimentaria: La cuestión alimentaria y el modelo del agronegocio en la Argentina. *Trabajo y Sociedad*, (26), 327-340. http://www.scielo.org.ar/pdf/tys/n26/n26a19.pdf

Giunta, I. (2018). Soberanía alimentaria entre derechos del buen vivir y políticas agrarias en Ecuador. *Revista THEOMAI*, *38*(38), 109-122. http://www.revista-theomai.unq.edu.ar/NUMERO_38/7_Giunta_38.pdf

Gordillo, G., Méndez, O. (2013). *Seguridad y soberanía alimentaria.* http://www.fao.org/3/a-ax736s.pdf

Heifer. (2006). *Soberanía Alimentaria y Agroecología* (pp. 820-821). http://www.heifer-ecuador.org/wp-content/uploads/2018/03/10.-Agroecologia-y-Soberania-Alimentaria.pdf

Hernández, R., Fernández, C., y Baptista, P (2006). *Metodología de la investigación* (4ª ed., pp. 581-683). McGraw Hill. https://www.academia.edu



https://doi.org/10.25100/cdea.v39i75.12202

Instituto de Planificación Física municipio Camagüey. (2020). *Plan General de Ordenamiento Territorial Urbano municipio Camagüey.*

La Vía Campesina. (1996). *Qué significa soberanía alimentaria.* http:www.nyeleni.org/spip.php?article38

León, S. (2013). Indicadores de tercera generación para cuantificar la sustentabilidad urbana. ¿Avances o estancamiento? *EURE, 39*(118), 173-198. http://dx.doi.org/10.4067/S0250-71612013000300008

Mata, F. (2018). Soberanía alimentaria. *Reportatge*, *5*(9), 160-168. https://dialnet.unirioja.es/descarga/articulo/6542630.pdf

Migliorati, M. (2016). Agroecología, una alternativa viable. *Revista de Investigaciones Agropecuarias*, *42*(3), 226-233. http://www.scielo.org.ar/pdf/ria/v42n3/v42n3a02.pdf

Ministerio de la Agricultura. (2020). Plan de Soberanía Alimentaria y Educación Nutricional de Cuba. MINAG. https://www.minag.gob.cu/sites/defaul/files/noticias/documentos_complementarios.rar

Moreno, X. A., Rodríguez, R., y San Marful, E. (2015). La agricultura urbana en la ciudad de Cienfuegos: ejes estratégicos en pos de la sostenibilidad agrícola. *Novedades en Población,* (22), 98-107. http://scielo.sld.cu/pdf/rnp/v11n22/rnp11215.pdf

Munda, G. (1997). Environmental economics, ecological economics, and the concept of sustainable development. *Environmental Values, 6*(2), 213-233. https://www.environmentandsociety.org/sites/default/files/key_docs/ev6_2_munda.pdf

Naciones Unidas. (2016). *Nueva Agenda Urbana* Naciones Unidas. https://habitat3.org/wp-content/uploads/NUA-Spanish.pdf

O'Connor, J. (2002). ¿Es posible el capitalismo sostenible? *Youkali*(11), 117-130. https://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S1405-74252000000200002

Ortega, M., Rivera, M.G. (2010). Indicadores internacionales de Soberanía Alimentaria. Nuevas herramientas para una nueva agricultura. *Revista Iberoamericana de Economía Ecológica, 14,* 53-77. http://www.oda-alc.org/documentos/1365184499.pdf

Parrado, C. C. (2001). Metodología para la ordenación del territorio bajo el prisma de sostenibilidad (Estudio de su aplicación en la ciudad de Bogotá D.C [Tesis doctoral, Universitat Politécnica de Catalunya]. https://upcommons.upc.edu/handle/2117/94302

Rueda, S., Cáceres, R., Cuchí, A., y Brau, L.(2012). El urbanismo Ecológico: su aplicación en el diseño de un eco barrio en Figueres. En M. Hernández (Ed.), *Arquitectura ecoeficiente* (pp. 295-324). BCNecología. http://hdl.handle.net/10810/15093

Sarandón, S., Flores, C. (2009). Evaluación de la sustentabilidad en agroecosistemas. Una propuesta metodológica. *Agroecología, 19*(4), 19-28. https://revistas.um.es/agroecologia/article/view/117131/110801

Sarandón, S., Zuluaga M. S., Cieza, R., Gómez, C., Janjetic, L., y Negrete, E. (2006). Evaluación de la sustentabilidad de sistemas agrícolas de fincas en Misiones, Argentina, mediante el uso de indicadores. *Agroecología*, *1*,19-28. https://digitum.um.es/digitum/bitstream/10201/23804/1/14-36-1-PB.pdf

Silva, J., Pérez, S., y Álvarez, J. (2018). Evaluación de sostenibilidad agroecológica de dos experiencias de producción con énfasis en hortalizas, Venezuela. *Revista colombiana de ciencias hortícolas*, *12*(3), 632-645. http://doi.org/10.17584/rcch.2018v12i3.7881

Soler, M., Rivera, M. (1-3 de julio de 2010) *Agricultura urbana, sostenibilidad y soberanía alimentaria: hacia una propuesta de indicadores desde la Agroecología* (pp. 1-17). Ponencia presentada en el X Congreso de la Federación Española de Sociología, Pamplona, España. https://core.ac.uk/download/pdf/227044231.pdf

Vásquez, L. (2010). La agricultura urbana como elemento promotor de la sustentabilidad urbana. Situación actual y potencial en San Cristóbal de las Casas, Chiapas [Tesis de maestría, Colegio de la Frontera Norte]. https://www.colef.mx/posgrado/wp-content/uploads/2011/04/TESIS-V%C3%A1squez-Moreno-Larissa-MAIA.pdf

Verdaguer, C. (2014). *Vías para la sostenibilidad urbana en los inicios del siglo XX.* Ayuntamiento de Málaga. https://oa.upm.es/25590/1/Informe_Sostenibilidad_OMAU_arc_87_.pdf

Vergara, A. A., Moreno, A. N. (2019). Soberanía alimentaria en Ecuador: Fundamentos teóricos y metodológicos para un modelo de medición. *Revista Científica ECOCIENCIA*. *6,* 1-18. https://doi.org/10.21855/ecociencia.60.256

Waldmueller, J., Rodríguez, L. (2015). La soberanía alimentaria más allá de la técnica: Una aproximación global hacia su monitoreo intercultural. *Revista del Centro Andino de*



https://doi.org/10.25100/cdea.v39i75.12202

*Estudios Internacionales*, (15), 254-286. https://revistas.uasb.edu.ec/index.php/comentario/article/view/482

Whitehead, M. (2003). (Re) Analysing the sustainable city: nature, urbanization and the regulation of socioenvironmental relations in the UK. *Urban Studies*, *40*(7), 1183-1206. https://doi.org/10.1080/0042098032000084550

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