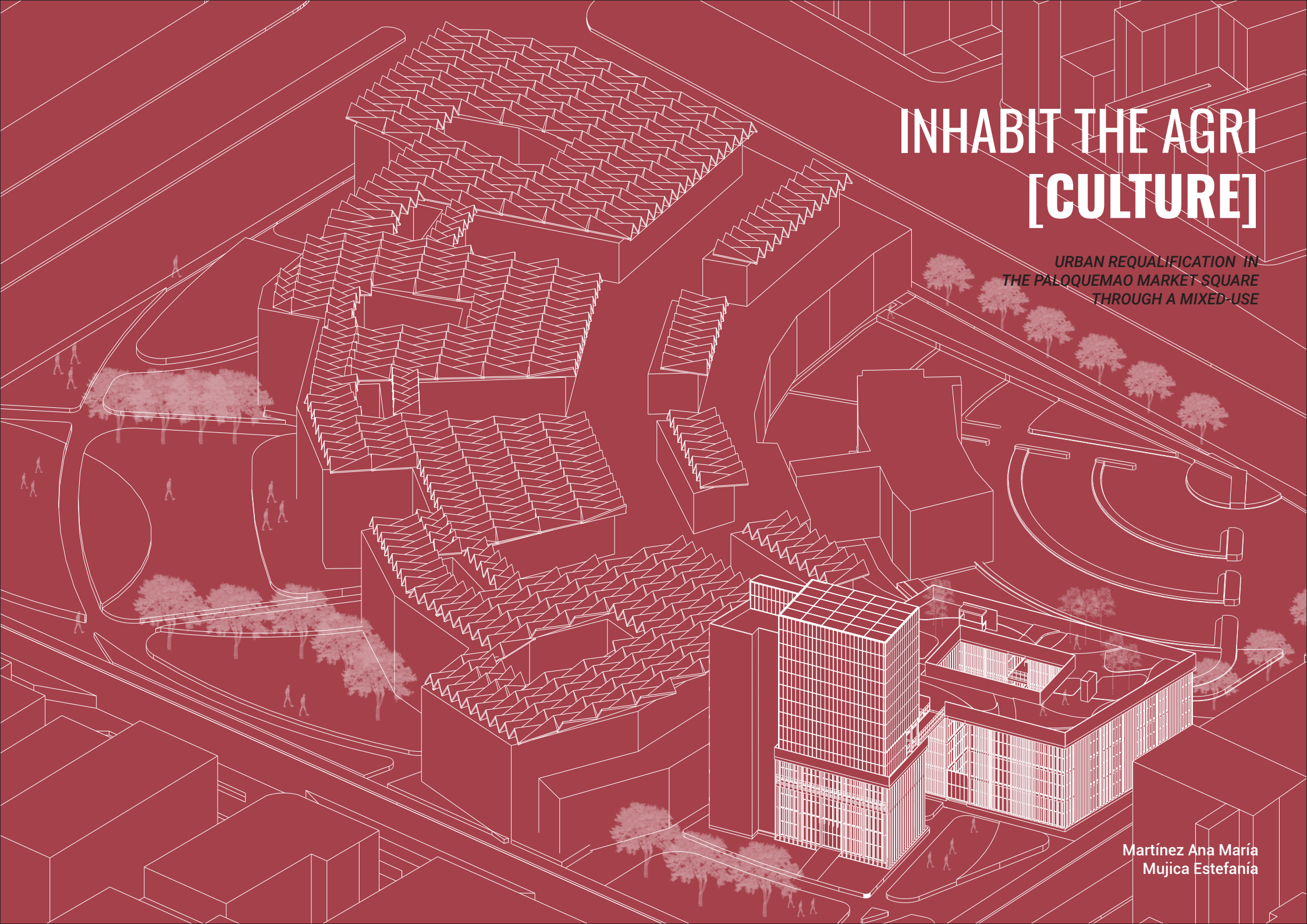

INHABIT THE AGRI [CULTURE]

URBAN REQUALIFICATION IN THE PALOQUEMAO MARKET SQUARE THROUGH A MIXED-USE

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Mujica Estefanía

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INHABIT THE AGRI [CULTURE]

URBAN REQUALIFICATION IN THE PALOQUEMAO MARKET SQUARE THROUGH A MIXED-USE BUILDING + FARMING

POLITECNICO DI TORINO

Tesi di Laurea Magistrale
Architettura per il progetto sostenibile

Politecnico di Torino
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¡Sin todos ustedes, esta etapa de mi vida no hubiera sido igual!

Estefania Mujica

ABSTRACT

According to the Food and Agriculture Organizations of the United Nations (FAO), “Latin America is the breadbasket of the world and has food availability as if there were no other place on the planet.”
Analyzing the importance that agriculture has had in Latin America throughout history and the condition of urban and social degradation that is currently in the territory, this work explores how, based on spaces that are culturally recognized by the population, such as the market places and through the close relationship they have with food, the development of a new concept of food production is proposed, which can be replicated in other Latin American cities and in turn produce as a consequence, the urban regeneration of an area, in this case in the city of Bogotá, Colombia.
The main themes that this work evaluates are: urban agriculture, underutilization of spaces, public space, productive methods and education as a social transformer.

INDICE.

INTRODUCTION

Inhabit the agri(culture), is a thesis of master degree that starts from the understanding how the growth of cities and the creation of new urban centers, in a South American context such as Bogotá, Colombia, has caused problems in the food system of large metropolis despite being culturally rooted to the issue of agriculture by having large hectares of productive land and having hundreds of types of food that can be harvested thanks to their climates and availability of resources. At present, however, the numbers of undernourished people are alarming and people have little knowledge of the food chain and where the food they consume in their daily lives comes from.

For this reason, several investigations regarding urban agriculture and its accelerated development around the world helped to generate questions as: Why not include new methods of food production in Latin America? Is it an opportunity to experiment with new ways to respond to these demands?

Therefore, the work proposes to make a study of the importance of market places in cultural and urban terms, to take advantage of their symbolic load to incorporate an alternative, innovative and sustainable form to meet the demand for food within public spaces that in turn contribute to the regeneration of physically deteriorated urban sectors.

Based on this, the thesis is organized in six parts where, first the food problems facing Bogota are framed, then passes through a historical description of the evolution of the market places, for the theoretical framework of food sustainability and for the study of the development and growth of agriculture in Latin America, in order to reach the last part of the proposal, which seeks to give a solution to the problem through the use of the Paloquemao Market Square as a place of reconnection between the food and the city through a group of activities that feed back each other, to create economic, social, environmental and cultural transformations that promote resilient and sustainable changes within the urban network.

· Research questions

Analyzing the main problem, we sought to answer the following questions: "How to ensure quality food to supply the growing population of a Latin America city? How to introduce agricultural/productive activities in an urban area? This could have a positive impact talking about economics, environmental and social issues?

· Aim of the thesis

The aim of the thesis is to be able to demonstrate that new forms of food production can be inserted within a Latin American urban context generating a positive impact in the city.

· Hypothesis

If Bogota's city continues to expand over time, there will be no more land to cultivate. New food production techniques could be introduced as an urban and architectural intervention inside the urban center because, in this way, the city would guarantee the availability of food for the population.

· General Objetive

Re-qualify the sector of Paloquemao Market and integrate new ways of food production and marketing within the city.

· Specific Objectives

- Identify the problems of the place.
- Recover and enhance heritage through the public space.
- Design an architectural proposal that includes new uses that help to consolidate the sector.
- Integrate new production systems (indoor/outdoor agriculture)
- Propose social and management strategies to potentiate the economic activities of the existing market.

METHODOLOGY

The research and development methods in this document are born under the idea of an architectural intervention that projects a new proposal for food production in response to current world problems, where issues such as social connectivity and cultural development of the city are involved. Therefore, the methodology should be oriented to the understanding of the subject, the construction of the context of the site, its analysis and the design proposal that adapts to the objectives to be achieved.

The information necessary for the development of the thesis was oriented through sources based on books and digital articles that will specifically feed the proposal in question.

1 STAGE

An investigation will be carried out in order to build the theoretical framework that supports the purpose of the thesis.

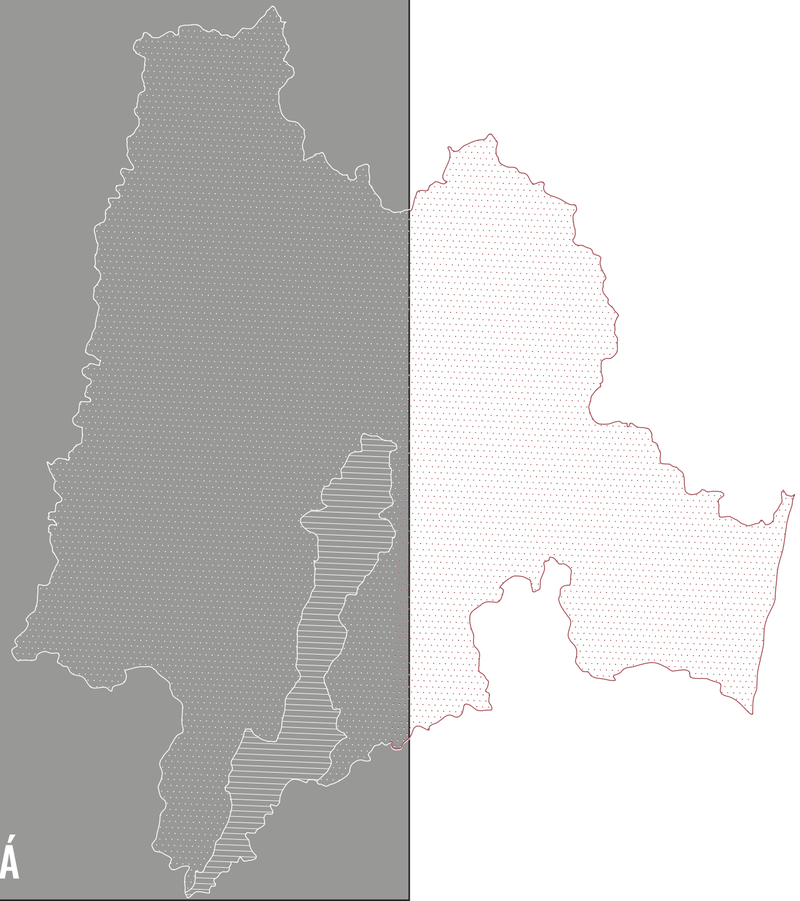
2 STAGE

Diagnosis of the site taking into account its historical aspect, location and relevant characteristics of the place.

3 STAGE

This phase focuses on the proposal, analyzing the design criteria; the concept and conclusions regarding the chosen topic.

01 FACING THE FOOD PROBLEMS IN BOGOTÁ



1.1 URBAN DEVELOPMENT OF BOGOTÁ

In Latin America, cities currently host more than 80% of the region's population, making it the most urbanized region in the world (UN-HABITAT, 2012)In addition, studies indicate that the concentration of the population in urban areas tends to become more pronounced over time, as theoretically large cities have better opportunities and improvements in the quality of life. However, this trend generates major challenges in terms of territorial development, generating overpopulation in cities and metropolitan areas, causing overcrowding, housing shortages, insecurity and, above all, *food insecurity.*

We will talk from the first instance the food problem that has been generated in the capital of Colombia, Bogotá. The accelerated urban expansion of the city, which has now reached its physical limits, has been one of the leading causes of its inability to produce the necessary food for its population. Is because thanks to a demographic analysis based on national censuses, Bogota has presented a continuous population growth since its beginning and today is in the process of constant territorial expansion, generating overpopulation in some sectors of the city, development to the periphery of other nearby municipalities, and depleting natural resources; this process is known as conurbation process [1] (which is defined as a large urban area resulting from the union of several originally separate urban regions), the speed with which the metropolitan area of Bogotá has grown has not allowed a process of territorial planning or creating new economic dynamics and new policies of food security.

Bogota is the city with the most inhabitants in Colombia, according to the official census conducted in 2018, the current population is 8,080,734 million people and has an urban growth rate of 2.3%.
The population in the capital city has increased considerably given by farmers migrations, young people, and families forced to leave their lands, homes, and traditions due to political violence and poverty in some regions of the country.

From these facts, a big problem is generated in food problems; the city does not have enough food production to supply such a large population. Thus, Bogota's agricultural soils and those of the surrounding municipalities have been losing ground to make way for urban development. The lack of their own crops makes these municipalities no longer consume what they produce, which is reflected in living costs. According to the "Agustín Codazzi Geographical Institute" (IGAC), 69.4% of the land with capacity for agro-industrial activities in the department of Cundinamarca has been reduced to 29.4%, *"This indicates that the region of Cundinamarca is running out of land to cultivate. Suppose we do not put a brake on the increase in the loss of the best ground for agriculture, in the medium plane. In that case, the traditional crops of this part of the country will disappear from the map,"* warned Juan Antonio Nieto Escalante, Director General of IGAC.

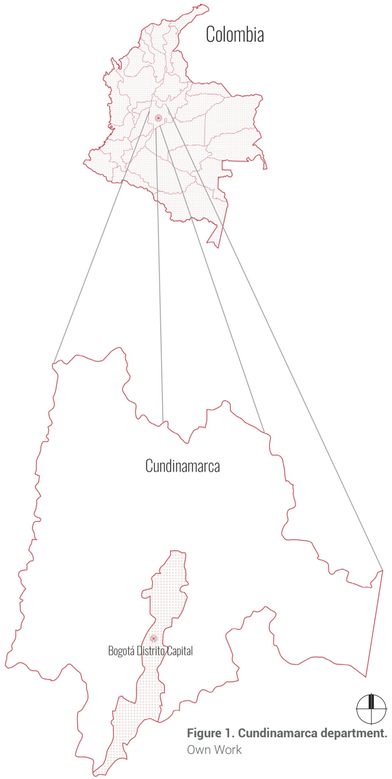


Figure 1. Cundinamarca department.
Own Work

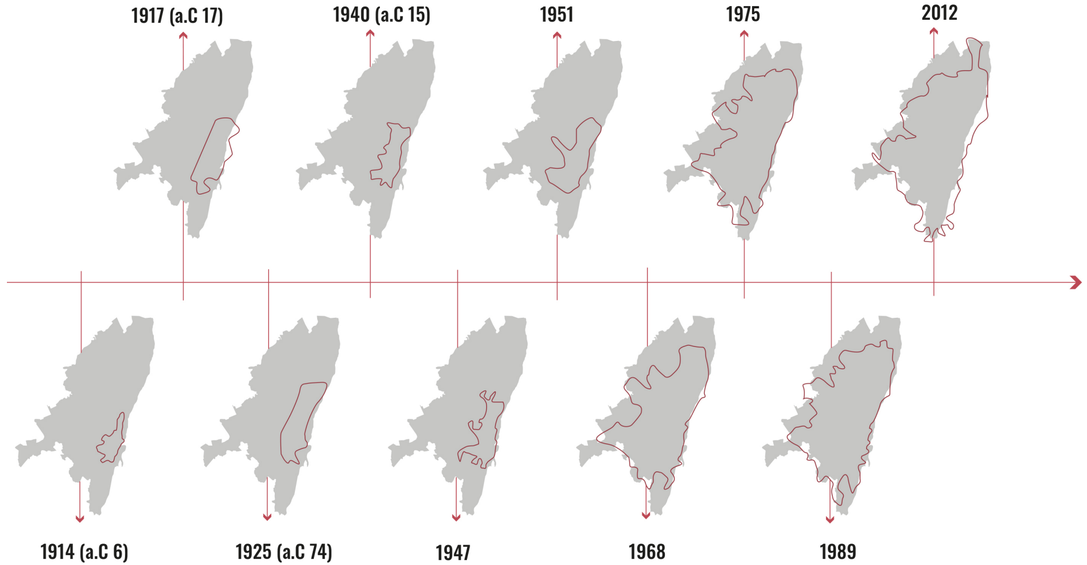
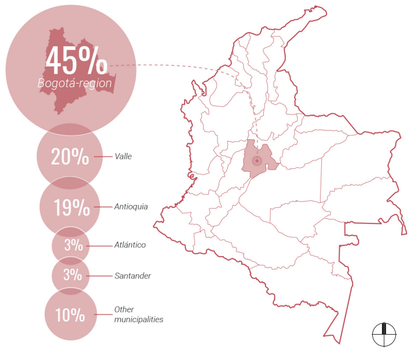


Figure 2. Bogota's urban perimeter
Evolution of the official urban perimeter of Bogotá during the 20th century

1.2 BOGOTÁ AND THE FOOD SYSTEM

The city of Bogotá stands out as an important economic and industrial center. It is the bigger and more populated city in Colombia, as well as being the most important cultural, industrial, economic and tourist center in the country and one of the main in Latin America. One of the major problems that Bogotá faces being a metropolis, is the lack of food production, has a low capacity to produce its own food for consumption. According to José Antonio Mesa, the coordinator of the Central Region Food Plan: "Bogota has a very special condition and is unfortunately not able to produce a lot of food. Its rural area and Urban agriculture are very limited and produce less than 1% of the food consumed. We must also find the best way to supply the capital with fresh and healthy food..." That is why Cundinamarca department has become the pivot of distribution and food provision through municipalities and producer families. Historically the city had its food supply and contributed with agricultural products to other regions of the country. Still, since 2000 Bogota stopped exporting food and now has only supplies in terms of fresh food, fruits, vegetables, and tubers from other municipalities. (figure 5)



BOGOTÁ-REGION IS THE MAIN CENTER OF CONSUMPTION AND SALES OF THE COUNTRY OF PROCESSED PRODUCTS.

Figure 3. Percentage of processed food consumption in Colombia
Own Work

The lack of spaces to practice agriculture is a constant threat to the population of the city of Bogota; since it does not have enough land for production to cover the high demand for food that the city requires, many of the inhabitants do not have the necessary resources to obtain food with the minimum nutrients to enable their physical, intellectual, and social development.
In turn, the city is the main center of consumption and sale of beverages and processed food since the middle class represents 51.6% of the population; this makes it easy for citizens to have an economic level, and therefore, Bogotá has a large market for the processed food industry; the city produces 75% of these foods; therefore the cost of selling is much lower compared to fresh food brought from other municipalities, to which must be added the cost of transportation, distribution, and marketing, this is a latent reality and the main reason for generating food security policies where the basic need for food is met.

Since the decline of 1970, the city began to have problems with food supply, because at that time it had a concentration of almost three million inhabitants, the food distribution system was insufficient and caused losses, the existing infrastructure was not sufficient and the streets were used to meet the need for space for the sale of products.

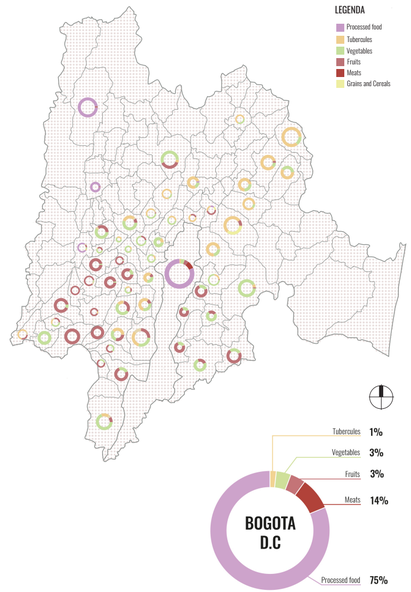


Figure 4. Food supply from the municipality of Cundinamarca to the city of Bogota. Own Work

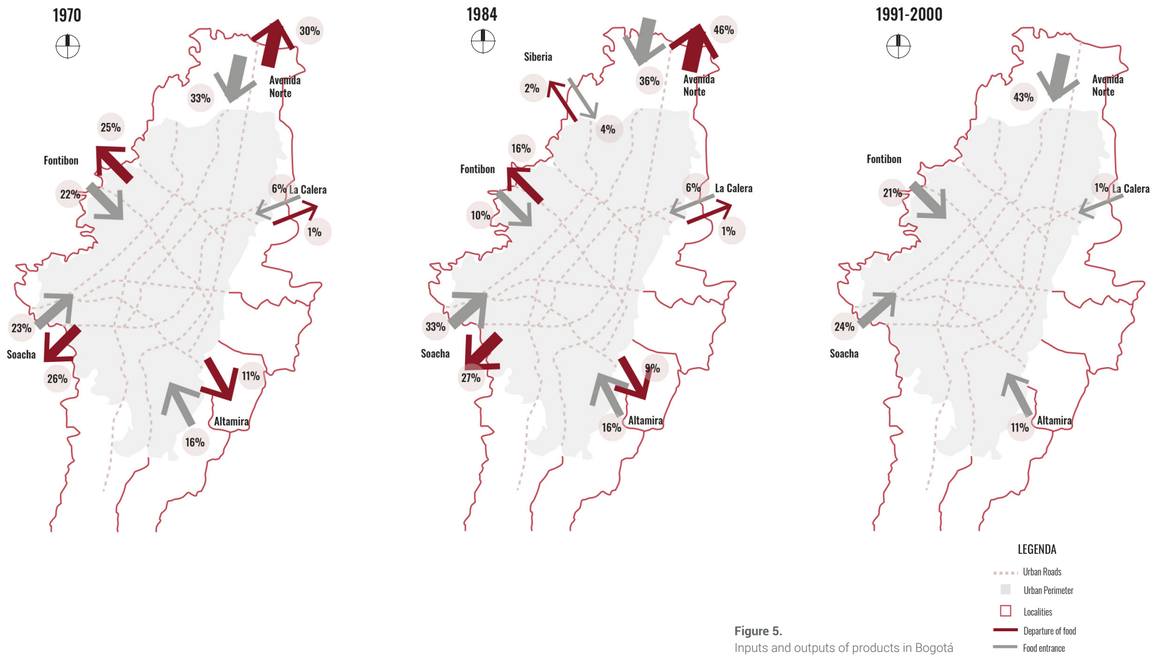


Figure 5.
Inputs and outputs of products in Bogotá

For this reason, it was proposed to organize a food supply system in an organized and systematic manner, an entity with the capacity to guarantee the formation of prices was needed, and the supply of products from the neighboring municipalities to the capital and thus manage to organize the food marketing system, centralizing and rationalizing its distribution. For this reason "The central market Corabastos" was built in 1972 with the purpose of being the place of arrival of all type of agricultural product to the capital, where they would then be distributed to the different urban markets of the city. Today, Bogotá has two food supply models 1. traditional commerce, which has a central collection that supplies to marketplaces, neighborhood shops and street sales points. And 2. Globalized trade, which is shaped by large supermarkets.

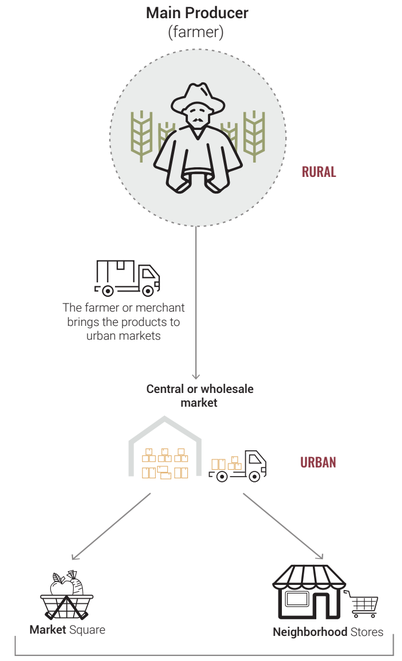


Figure 6. Food distribution conformation in Bogotá.
Own Work

Figure 7. Location of the central supply market "Corabastos".
Own Work

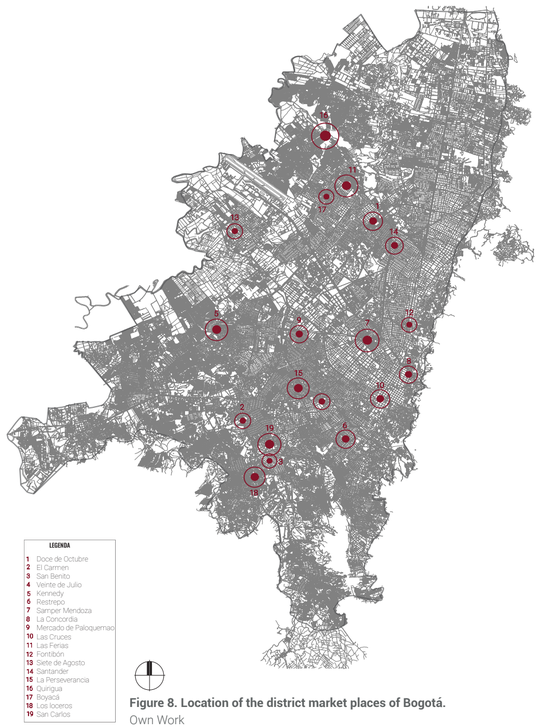
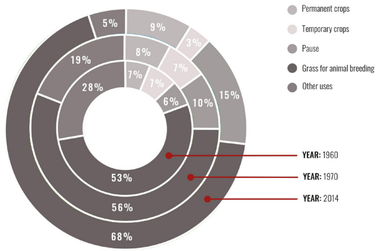


Figure 8. Location of the district market places of Bogotá.
Own Work

1.3 AGRICULTURE SITUATION IN COLOMBIA

Like the city of Bogotá, the reality of the country is no different. Although Colombia is one of the countries in its sights to become one of the great warehouse in the world, since a global level it shows strong potential because it has fertile soil, rich in nutrients to grow all kinds of fruits, vegetables, cereals, grains, among others; It also has the ability to expand its crops, which means that it can become a strong supplier of food. Unfortunately, at this time, the provision of agricultural resources of the country is not being fully exploited, the annual growth of the agricultural sector is 2%, which means that Colombia only uses a quarter of its arable land.

According to figures, data from the last three national agricultural censuses were analyzed and extracted; They show that ***53%*** of the 27.3 million hectares of reference of the 1960 Agricultural Census were used in grassing; for the year 1970, ***56%*** of the 30.9 hectares surveyed were used for grassing too, and for 2014, ***77%*** of the hectares that is equivalent to (43.8 million hectares) were destined for this same use. With these data it is evident that cattle ranching in Colombia is predominant and is the historically most important activity of the agricultural sector; however the environmental impact generated by extensive livestock production and land management practices for grassing, leads to the vegetation degradation, increased soil erosion, and displacement of its fertility and structure.

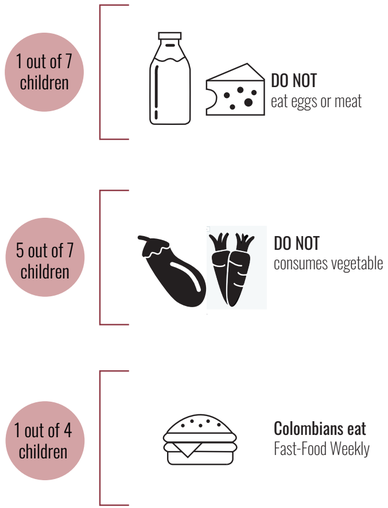


COMPARISON OF DIFFERENT LAND USESS ACCORDING TO THE THREE NATIONAL CENSUSES OF AGRICULTURE

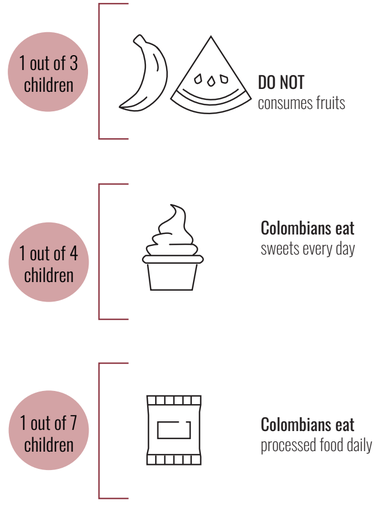
Figure 9. Land uses according to the 2018 National Agricultural Census.
Own Work

Although Colombia has reduced infant mortality due to or associated with malnutrition, regional gaps persist; in Colombia, one in ten children between 0 and 5 years of age (10.8%) suffers from chronic malnutrition according to Ensin 2015 figures *(National Nutritional Situation Survey)*.
Extreme poverty in some country sectors means that the availability of and access to fresh food in the country is very limited and is considered a significant cause of malnutrition.
Seven problematic factors determine the problem of easy access to these essential foods:

1) The inefficient agricultural production structure of the regions.
2) Poor quality of internal and external marketing and distribution systems
3) Scarce productive factors of land, economic financing, water, technology, human resources)
4) Ecosystem conditions (climate, genetic resources, and biodiversity)
5) Production and trade policies
6) The armed conflict
7) Additional factors such as poor road conditions and transport systems have to have very high prices.



Thanks to these data, it is notable that there is a huge need to develop and implement a new alternative to cultivate in Colombia, a new way of supplying the food need which is focused on the production of organic foods, which do not require chemicals and long storage time before going to market, a more sustainable way of cultivating should be sought since these organic practices can reduce the environmental impacts that some agricultural practices generate.



02 URBAN REVITALIZATION THROUGH MARKETPLACES

2.1 THE MARKET SQUARE IN A HISTORICAL PERSPECTIVE

The marketplaces are types of equipment that historically have potentially influenced the urban environment. These equipment link the commercial activity and the supply for the city to maintain and increase the constant urban activity, high density in mobility, and commercial areas.Throughout history, the marketplaces have become a fundamental axis in the development and urban growth strengthened by their social and cultural link between the countryside and the city, a fact that is repeated in different cities of the world, where the marketplaces become the mechanism that creates supply routes and distributes products needed for urban life, not only bringing to houses products for urban life but also opening up usable spaces in the city economy, thus generating commercial opportunities for the inhabitants.

In Europe of the Middle Ages, the stage of the commercial exchanges, the public square of market, were essential for the growth of the cities and ended up being a symbol of the city. In the past, market squares spontaneously occupied public space on certain days of the week; several medieval cities were born from the commerce provided by these markets. The exchange places were one of the axes of urban life and we can say that certain cities developed urbanly around this activity, essentially around the sale of food products.

Figure 10.
The Fish Market, 1807, painting by Nicholas Condy. New Panier market, an enclosed market from Plymounth, England

If we take into account its historical evolution the market places due to its high concentration of activity has always been a reference point in the neighbourhoods, which, over time, has become a place that contributes to reinforce the local identity of an area.
In the Latin American context, a similar situation occurred during the Spanish colony, where the “Plaza Bolivar” was usually the place of commercial meeting until the middle of the century XIX.

Figure 11.
Historical photography “Plaza de Santander” de Bogotá by Guillermo Cuellar (1932)

Figure 12.
“Plaza de Santander” de Bogotá by José Santiago Castillo (1837)

2.2 EVOLUTION OF THE MARKET PLACES IN BOGOTÁ

Since the Spanish conquerors in Colombia, each region had spaces assigned to indigenous people, farmers and artisans where they could go to commercialize their products, these spaces were named “Plaza Mayor.” Over time the Plaza Mayor evolved into the “Plaza de Mercado” marketplace ; a place that represented an active business center, meeting between producers and merchants. Most of the products sold in the squares have been harvested recently, meaning that they are fresh and with less agrochemicals.

In Bogota, the marketplaces have developed from the planning of the city’s supply, which has contributed to social and economic interaction and commercial activity growth. The configuration of the market places in Bogota from the colony until today has maintained a strong influence on the urban dynamics, emphasized in the development of commercial centers around the market square that have influenced urban centralities development over time. The market in Bogota previously concentrated in the “Plaza Mayor” or known as “Plaza Bolívar” once a week; however, this began to cause problems of insecurity and hygiene and became an obstacle to urban growth in the city. The accelerated expansion of the merchants in the Plaza Bolívar forced the square to be centralized to organize the areas of high occurrence of people and to be able to control commercial aspects.

This was when the idea arose of building a supply station where its main objective is to contribute to the improvement of the wholesale distribution of food in the city of Bogotá and its surrounding municipalities.
In Bogota, there are two structures of a market square; 1) the private 2) the districts, but both of them at the present time has come to an end to be considered a space of main supply for the city because of the deterioration, the poor health, accessibility, insecurity, mismanagement in the garbage, among other factors that are negatively affecting these areas of tradition and shopping for citizens.
For this reason, the intervention of the market places is not merely an architectural issue but transcends the urban environment. From a broader perspective, this research is based on the hypothesis that interventions for the improvement and good management of market places contribute to the urban regeneration of degraded sectors, producing cultural roots and permanence of historical inhabitants in symbiosis with new inhabitants.

Figure 13.
The Plaza de Bolívar, the main axis of all the history and culture of Bogotá.

Figure 14.
"Plaza Bolivar" Photography by José Santiago del Castillo from the INDEPENDENCE MUSEUM - CASA DEL FLORERO

2.3 MARKETPLACES AS A KEY PIECE IN THE URBAN REGENERATION

Urban markets, regardless of their scale within cities, have been recognized as important places for the economy and culture where the heritage and values of a city can be evidenced, playing an important role even for tourism.
Its dynamics and sensations make it a lived public space, where inhabitants and tourists can get local crafts, food, and products that generate a vision of each city's lifestyle. It is considered an inclusive place where social classes, ages or ideologies do not matter because everyone has the opportunity to live the experiences that are lived there.
The market can be defined as a space, whether small or large, closed or open, where food or products and merchandise are traded; it is also a place where people meet and socially interact while doing business or shopping. Weiss (1998) writes that the market is "a city within a city, with its economy and a way of life."

In this sense, the market becomes origin and destination, helping community residents recognize and value public space as an integral part of their collective identity. The market is more than just a place where food and other necessities are obtained. It also represents the unique sense of belonging of the community. It becomes what Ray Oldenburg called a "third place" that forms the "central environment of informal public life" and houses "the regular, voluntary, informal, and happily anticipated" gatherings of people "beyond the realms of home, life and job."

Through this daily process, a sense of community and belonging is built and strengthened between the local community and the market traders who somehow create an identity within the city's sector.
When talking about urban regeneration and cultural conservation, the sense of place of the markets is a fundamental and critical piece because in them are the customs and characteristics necessary to understand how the experience of new spaces should be, being aware that the success and sustainability of an urban market project depend on this.
Urban and cultural regeneration is a complex and dynamic process that includes understanding the physical, social, environmental, and economic needs of cities, which serves to revitalize and contribute to cities' development through strategies that help improve specific spaces add value to the town.

The impacts of architectural design influence the revitalization of the urban marketplace because today, users seek different experiences outside their homes. The architect is capable of designing spaces that meet the needs of other societies. In this case, architecture can modify the social behavior of the inhabitants and revitalize areas with social degradation. In marketplaces, customers increasingly seek ease of communication and personal interactions in their shopping experiences.

Farmer's markets have become both a shopping destination and a preserver of such businesses. Opportunities have emerged from this trend to change consumers' social habits, take advantage of public spaces in urban communities, and provide a necessary and widely desired human and pleasant experience for buying food.

Some of the benefits that a marketplace rehab can bring are:

- Adding to the economic diversity of the community
- Providing meaningful employment
- Supporting local businesses
- Utilizing local resources
- Adding to the tourism industry

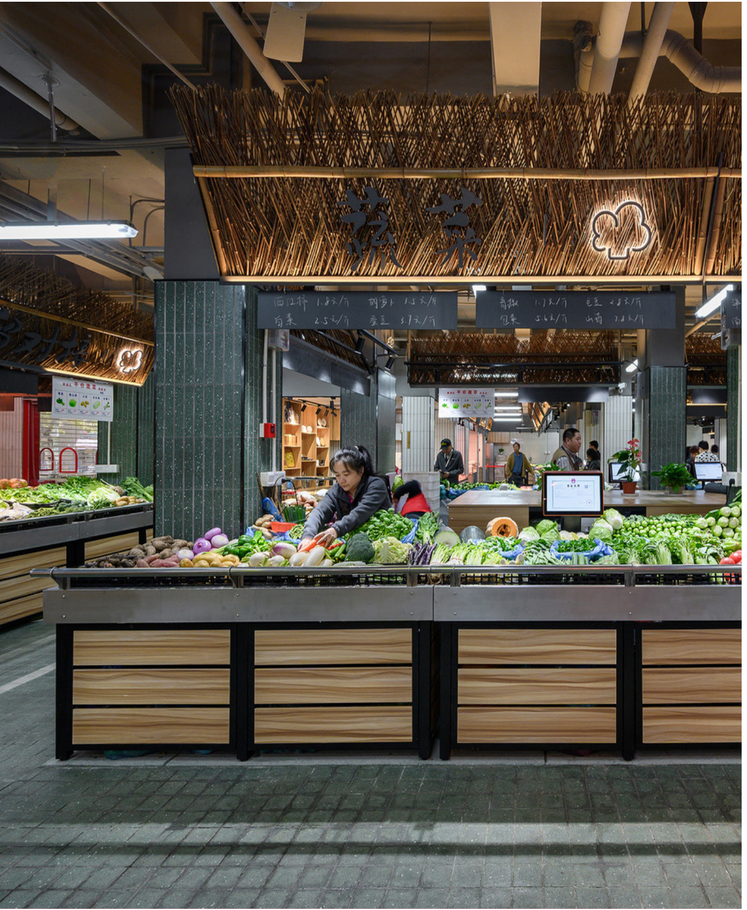
According to Roth, farmer's markets are "proven business incubators" that have "helped revitalize urban centers and regain a sense of community" (Roth 1999).

At this time, different cases of market renovations can be found around the world that has notably favored urban revitalization, erasing physical boundaries and creating fluid spaces where commercial and cultural needs, but also recreational and lifestyle needs, are met.

URBAN REVITALIZATION THROUGH MARKETPLACES

The Markthal is a sustainable combination of food, leisure, living, and parking. a building in which all functions are fully integrated to celebrate and enhance their synergetic possibilities.
The building's most striking feature is its central market hall, which provides a home for 96 fresh food stalls and shop units, ranging from Rotterdam based businesses and market vendors to established local heroes.

Figure 15.
Markthal Building. MVRDV



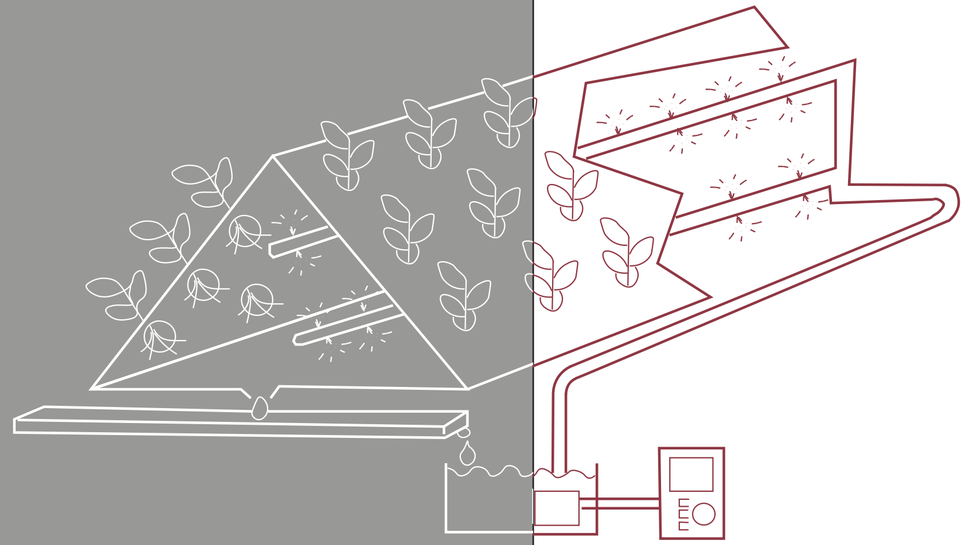
The renovation project aimed to significantly improve the surroundings of the block and the community as a whole, focusing on the renovation of the market. For this reason, the design was based on proposing a new façade capable of maintaining the commercial attributes of the market but which, in turn, would become an element of interaction between the exterior and the interior, acting as a public space capable of attracting new users to the interior, from the market

Figure 16.
Mengxi Food Market of Julu Foods Group / Roarc Renew.

In 2020, the Grand Paris Express will provide a new metro ring route around Paris. The Arcueil-Cachan station will be built on the site of the current municipal market. This project aims to create a new covered market visible from the future station and give it a vital role in the district's regeneration. The new Cachan covered market provides a simple response to demanding technical, commercial, town planning, and architectural constraints. It is an elegant and dynamic example of urban renewal and croixmariebourdon architectures' development of context-sensitive and ambitious architecture.

Figure 17.
Cachan Covered Market / Croixmariebourdon Architectures

03 FOOD SUSTAINABILITY



3.1 URBAN AGRICULTURE

The 20th century marked a change in the way cities established their ties to food. Before beginning the industrial period, cities settled organically and thought about how access to food would be; this can be observed in the locations of markets and slaughterhouses within city centers. Once cities began to expand and, in turn, to be governed by hygiene policies, urban planning began to push food production and agriculture to the peripheries[2], resulting in distancing and disconnection between citizens and the food that today makes us rethink the way we create the city.

Urban agriculture is an act that has always existed, represented by gardens and orchards. Since the 1980s, it has been gaining relevance. It has begun to be related to food sovereignty, the quality of the products we consume, and the generation of employment, environmental education, social relations, social transformation, and urban regeneration.
As established by the FAO[3], the concept is linked to sustainable development, food insufficiency, ecological agriculture, environmental education, quality of life, and ecological degradation.
Therefore, the term "Urban and Peri-urban Agriculture" (AUP) was proposed in 1999 by the FAO to refer to a type of agriculture established within the framework of food security in underdeveloped countries. However, it is also in expansion in developed countries with other objectives.

2. Peripheries: The outer limits or edge of an area or object.
3. FAO: Food and Agriculture organizations of the United Nations.

According to the same organization, the term Urban and Peri-urban Agriculture (AUP) refers to "agricultural practices that are carried out within limits or in the surroundings of cities around the world and includes production. In some cases, processing of agricultural, fishing, and forestry products."

As a general concept, it could be defined as integrating food production within the border of a metropolitan area, using methods that seek spatial, environmental, and social efficiency, where food is produced close to the population. This initiative would result in obtaining fresher products, with less need for storage, preservation, and transport.

The question is: what is the purpose of urban agriculture today? If, despite being an issue that has been developing for a few decades now, today, there are significant tracts of agricultural lands that continue to use the soil for these practices without considering the impact they generate ecologically on the environment.
This is because while many developed countries try to include these new forms of food production within their cities, there is also a diverse reality in developing countries where a large portion of the population depends on these lands for their economic and social development.

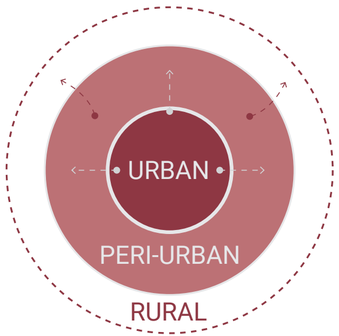


Figure 18. Urban and periurban agriculture
Own work

In recent years, expanding this peculiar type of agriculture, practiced within the cities, or by urban citizens in the periphery, is a reality and is progressing by leaps and bounds. On the one hand, it reduces the difficulties caused by the rise in food prices that occurred in 2007-2008, which hit the poor population in developing countries hard; As an FAO document explains:

"Agriculture can help cushion the effects of these crises. While agriculture is a rural phenomenon, for the most part, urban agriculture can help increase the resilience to external shocks of part of the urban poor and improve their access to fresh fruits and vegetables and animal products. This mechanism will be particularly important in areas where inadequate infrastructure and high losses during transport add to the scarcity and high cost of agricultural products. Some urban farmers may also offer their products in local markets, generating income for themselves and their families."
By integrating this type of food production within the urban fabric, the knowledge of the inhabitants about food is reinforced, becoming a society more aware of what they eat and how it affects their health and well-being. Today, being in contact with food is much more significant, and the world policies confirm that it is positive to think in this type of project. Only in Copenhagen, there are more than 40 projects that are being developed nowadays. That shows that it is possible to include this type of activity within the city. In turn, there is a positive impact on how society is educated and participates in the process production [Vores Omstilling, October 2013].

3.2 IMPACT OF THE URBAN AGRICULTURE

Urban agriculture is considered a source of supply in urban food systems and only one of several security options for homes. It is also a tool used to increase productivity and the impact of open spaces. In addition, the products made under this system complement those from the field and from abroad to supply the cities and are included in the food supply.

This brings the recovery of solid waste, the treatment of urban liquids, generating jobs, income, and new forms of social interaction.

Urban agriculture has become an essential supplier of certain food products for urban growth. Industrial sectors, poor and not so needy people, bet on this way of food production that benefits everyone and has a positive environmental impact.

It can be beneficial for all pillars of the sustainable development, be it social, ecological/environmental or economic, that is why it must be classified in different perspectives, such as:

• **Social:** Can be used for community development, where the activity helps to increase social cohesion between different groups in the society, to provide work and training experience for unemployed workers, and as a tool for crime prevention. Involving a diverse range of people through volunteering, training, employment, leisure, or education through workshops, courses, and tours,

Figure 19. Urban Orchards.

Figure 20.
Urban farming Copenhagen/Space10. Alona Vibe, 2016

urban farmers increase the awareness among citizens about the origin and production of food. Also, as an essential element of food security strategy, it is used to feed citizens and fight hunger in developing countries and cities.

• **Economical:** Could be used as an innovative way of generating incomes, research, and knowledge development. Many high-tech urban farms function as pilots for new (indoor) vertical growing technologies and closed-loop systems. It can also be proposed as a tourist and marketing place where the farm could be open for the public and organize tours. Moreover, working on a farm is a smart way to spend free time and escape stressful daily life, especially for workers with a high income. This also refers to 'crop mobbing' in which participants pay to work on a farm.

• **Ecological/environmental:** Has various benefits like reduction of pollution, works to reach the climate mitigation and adaptation, reuse resources as stormwater, increase biodiversity, brings green areas inside the urban downtowns, reduce the percentage of land use for agriculture exploitation, is also applied to create closed-loop energy systems between different types of agriculture (e.g., between fish farming and crop production) and between agriculture and other activities. However, in many cases, urban agriculture's main objective is not on food production and commercial purposes but on social and ecological development.

Urban agriculture generates a remarkable and integral impact inside the cities according to the type of urban agriculture used or the scale of the project because it could range from urban gardening projects for community construction, education, and/or leisure purposes to professional, often high-tech, farming activities for commercial purposes. It's possible to make infinitive combinations with all kind of sectors or activities (e.g., housing and farming, restaurants and farming, school and productive areas, etc.) Another important point that influences the results o benefits of urban agriculture is the inputs used in a project because there will come out a list of outputs in the base of this.

The figure shows on the left a list of elements that must be present to carry out some food production, in it, the typical necessary elements that are needed both in traditional urban agriculture as well as in the new proposals focused more on high -tech processes, as seen in is the part of business services and research and development. All these inputs influence the impact that its application can generate. This translates into a list of outputs categorized in benefits concerning food and other secondary benefits that are not directly related.

Based on all the above, it can be seen how the introduction of this type of technique within cities can become an excellent tool for urban regeneration and also to solve food security and food supply issues in cities that do not have the physical spaces or the logistics to ensure that their population, which is continuously growing, get the primary food for their nutrition.

Figure 21. Pillar of sustainability.
Own work.

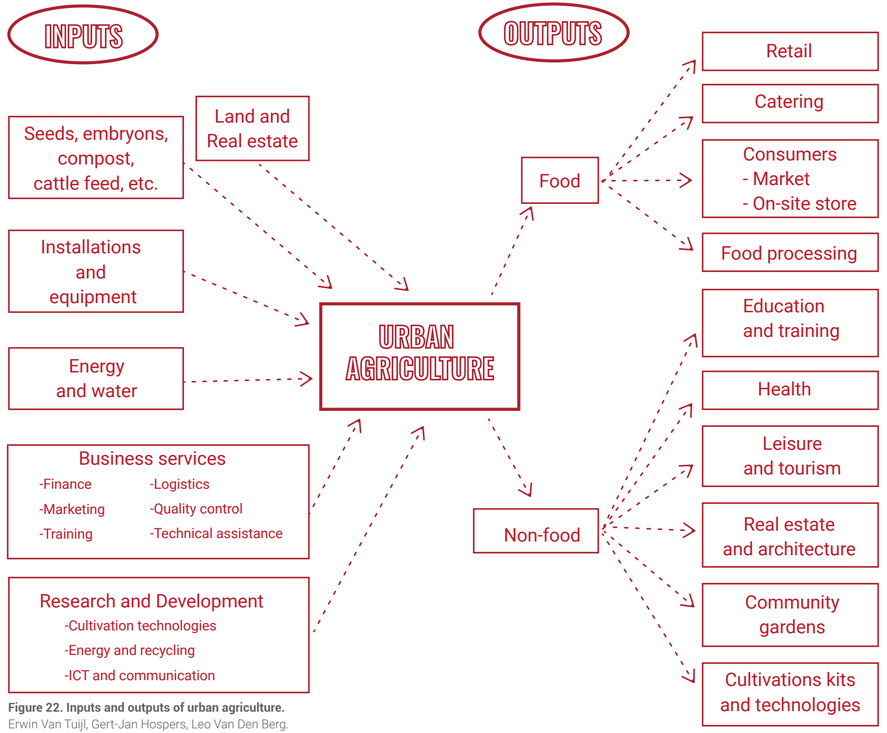


Figure 22. Inputs and outputs of urban agriculture.
Erwin Van Tuijl, Gert-Jan Hospers, Leo Van Den Berg.

TYPE	DESCRIPTION	REFERENCE(S)
Residential Gardens	Food production for household consumption and/or hobby purposes.	Pulighe & Lupia (2016)
Community Gardens	Broad term covering various types of gardens, including demonstration gardens, horticultural therapy gardens, job-training gardens, neighbourhood gardens, inter-cultural, etc. Those diverse gardens can play a role for various purposes, such as promoting urban health, social inclusion, and active civic participation.	Turner et al., 2011 Guitart, et al.,2012
Institutional Gardens	Food production management by institutes, such as schools, hospitals, prisons, and other non-profit organizations.	Pulighe & Lupia (2016)
Guerrilla Gardening	Gardening public space with or without permission, in the latter case also known as "illegal gardening".	Tracey,2013
Urban Farm	Commercial food production by professional farmers using intense and advanced growing systems.	Pulighe & Lupia (2016)
Vertical Farming	Indoor farming based on hydroponic, aeroponic and aquaponic technologies.	Despommier,2010
Plant factories with artificial lighting	Indoor farming combined with resource utilization efficiency and closed plant production system.	Kozai,2013
Zero-Acreage Farming	Specific forms of food production that are characterized by the non-use of land, covering various forms and technologies.	Thomaier et al.,2014
Agro-park	Clusters of agro-activities in which various links of the food chain are located in one place. The concept has been developed to apply industrial ecology in the agro-sector.	Smeets,2009 Metze & Van Zuydam,2013
Agro-tourism	Farming in agro-recreational parks in the peri-urban locations combined with the provision of facilities and services for urban tourists (e.g. food accommodation, guided tours, and horse riding).	Yang et al., 2010

Depending on the purposes, the place, and the location, there is a type of urban agriculture that could be chosen. A brief description of the different types available is shown in the table to give an overview of the different types. The table includes the new technologies based on energy cultivation systems (vertical farming, plant factories with artificial lighting, zero acreage farming, agro parks, and agro-tourism) resulting from the convergence of different technologies. The different categories can be mix between them, making an infinitive of combinations possible.

Figure 23. Type of urban agriculture.
Erwin Van Tuijl, Gert-Jan Hospers, Leo Van Den Berg.

3.3 INDOOR CULTIVATION TECHNIQUES

With the spread of urban crops and vertical farms, the use of new agricultural systems that save space, water, and fertilizers are increasingly being considered. These guarantees excellent results in terms of quality and quantity of harvest, where the inhabitants can be sure they are consuming quality food. Food produced without pesticides and a positive environmental impact is generated by returning green to cities and reducing transport emissions. These projects are taking hold to transform many citizen's desire to grow the vegetables they eat every day for themselves.
Within indoor farming, the most widely used techniques are hydroponic, aquaponic, and aeroponic cultivation.

Hydroponic cultivation

Among the various indoor growing techniques, this is the most common.
With the hydroponic technique, it can grow without soil because the nutrients dissolve in water, becoming the plants' main habitat.

What is hydroponic?

In this type of cultivation, the soil is replaced by an inert substrate that can be, for example, expanded clay, rock wool, or coconut fiber. An irrigation system sprays the water reused in a continuous cycle to feed the plants (even the evaporated water) and fertilizers, mostly inorganic, necessary for growth. Artificial lights (LEDs) promote chlorophyll photosynthesis. Circadian (day-night) cycles can be sped up to increase final performance.

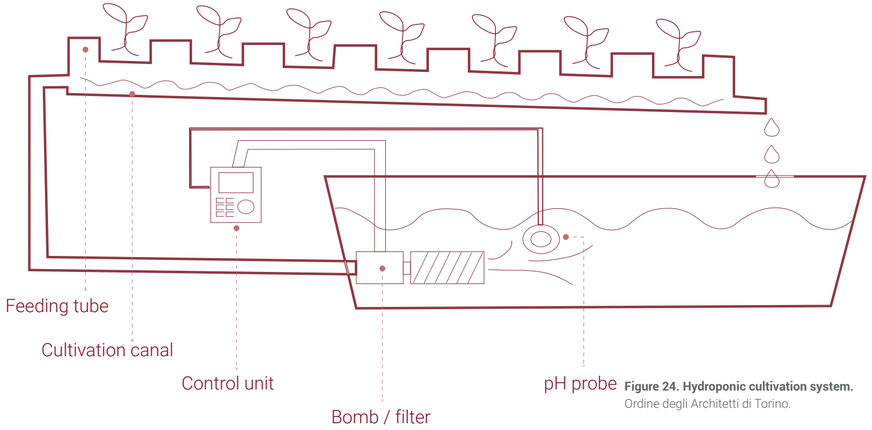


Figure 24. Hydroponic cultivation system.
Ordine degli Architetti di Torino.

Benefits

-Water

It is estimated that these types of crops need, on average, 70% less water than a traditional crop.

-Growth

Plants grow 50% faster with this technique and use 80% fertilizers less, which translates into no contamination of the soil and air with harmful substances and much healthier and cleaner food.

-Case studies

Vertical Harvest, USA, is a large vertical farm building dedicated to hydroponics, which occupies only 400 square meters and provides about 1700 square meters of cultivated area. It will be a source of km zero production, with a series of education spaces, combining production, sale, consumption, education, and teaching.

Aeroponic cultivation

This technique allows plants to develop in a more evolved way. Uses channels that allow the roots to come into direct contact with the water and the air.

Figure 25t. Vertical Harvest, USA.
Caroline Ballard.

What is aeroponic?

A technique that does not make use of a soil substrate, leaving them free for the roots to come into direct contact with water vapor and nutrients necessary for the cultivated plant's growth.

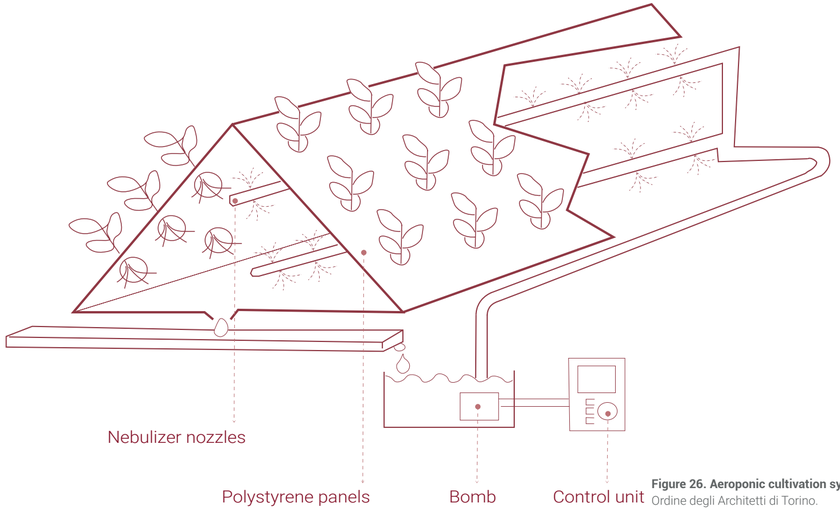


Figure 26. Aeroponic cultivation system.
Ordine degli Architetti di Torino.

Benefits

-Water

While in traditional systems, a large amount of water is wasted, with this system, it is possible to save almost 90% of it, thanks to the fact that when using water vapor it is absorbed practically all by the roots.

-Growth

The estimated growth of aeroponic urban gardens is 30% higher and half the times compared to crops in the ground. Low energy consumption LED lights are used to get each plant to photosynthesize.
The most important thing is that no chemicals are used, which are harmful to the ecosystem.

-Case studies

AeroFarms in New Jersey is the largest aeroponic vertical farm in the world, with an estimated production of 900,000 kg of vegetables produced in one year. The system will be located in an old disused factory, where photovoltaic systems will be installed for the self-production of energy.

Figure 27. Aerofarm, USA.

Aquaponic cultivation

What is aquaponic?

This technique is a bit more complicated when combining plant growth with fish farming.

The sewage liquids from the tanks are used to irrigate crops that grow rapidly thanks to the fertilizing substances present in the sewage that would otherwise be discharged into the waterways. The plants feed on the harmful substances and return clean water to the tank.

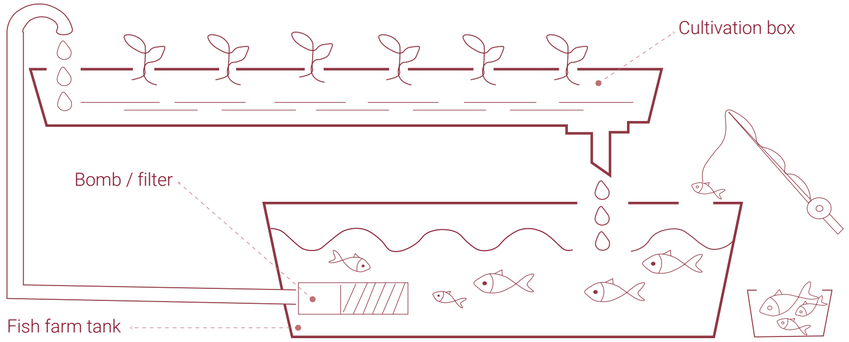


Figure 28. Aquaponic cultivation system.
Ordine degli Architetti di Torino.

Benefits

-Water

90% less water is used than with traditional systems, and the plants grow directly above the tanks, sinking their roots into the filter that cleans the water for the fish.

-Growth

The plants grow at a time of 30 to 50% shorter than a traditional crop thanks to the constant fertilization of the roots given by the flow of wastewater. One of the strengths of this type of cultivation is that it reuses water, recycles it, and minimizes waste, allowing significant economic savings.

-Case studies

The Baniyas center in Abu-Dhabi, in the United Arab Emirates, the world's largest aquaponics plant was inaugurated in 2012, producing 300 kg of lettuce twice a week and 10 tons of fish a year.

Figure 29. Baniyas Center, Abu-Dhabi.
Veronica, 2018.

04 DEVELOPMENT AND GROWTH OF AGRICULTURE IN LATIN AMERICAN COUNTRIES

4.1 REFLECTIONS ON CONTEMPORARY LIVING AND ITS RELATION WITH FOOD

Urbanization is an irreversible global trend. Population growth is increasing and based on that the ONU estimates "the world population will increase to 2 billion people in the next 30 years, going from the current 7,700 million to 9,700 million in 2050, being able to reach a peak of about 11,000 million by 2,100."

The accelerated growth brings as a consequence an increase in urbanization processes and migratory movements; generating repercussions in the current cities for not being prepared physically or institutionally to assume the great demands that this requires, consequently bringing problems related to infrastructures, basic services, food security, environmental contamination, informal settlements and growth of surface of the cities, consuming large area of productive land that together with the emigration of people has resulted in a decrease in the number of agri-food production units, food supply and the aging population of rural communities. Likewise, urban pressure on agricultural and forest land is increasing each minute.

On the other hand, the global consequences in terms of climate change, the appearance of new diseases and contamination, show us that the way we are acting is not adequate and that we must change the way of thinking, being more aware of the damage we generate. The rhythm of life that people lead mainly in big cities does not allow them to see their actions and how they affect the environment. As an example, the United Nations says that "cities consume 75% of energy resources and emit 80% of the carbon that pollutes the environment".

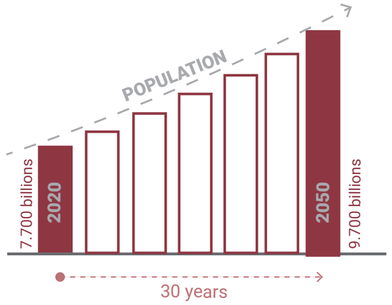


Figure 30. Population growth rate.
Own work.

We must take into account that today there are a large number of private institutions that have as aim to improve the impact that we generate on the planet through initiatives related to education, health, equality, well-being, environmental impact, new technologies and food management. The idea is to reverse the damage caused and to have sustainable growth, where not only our impact is the least possible, but we contribute new resources for future generations.

4.2 THE IMPORTANCE AND IMPACT OF AGRICULTURE IN LATIN AMERICA

According to the Food and Agriculture Organizations of the United Nations (FAO), "Latin America is the barn of the world and has the availability of food like there is nowhere else on the planet."
Agriculture in Latin American countries has always been of transcendental importance, since the agricultural sector has played a predominant role, either as a source of food, raw materials and energy, as part of agro-industrial production chains, as the axis of regional economies, or as source of employment and export earnings throughout history. "This becomes relevant when it is understood that these countries depend not only on agriculture to achieve development goals and poverty reduction, but also for the survival of many of their inhabitants, since 18 to 22% of their economically active population depends on it." (González Martínez, 2005).

In Latin America, the agri-food production represents more than 25% of the regional gross product, and more than 40% of exports. The great majority of these countries have shown great and important developments in terms of modernization in terms of growth and productivity in agro-industrialization. However, only a few small groups of producers that are linked to the huge companies that dominate the food market, are favored with respect to development, causing exclusion, since most farmers own less than two hectares of land, taking them to face several limitations that do not facilitate its development at the industrial level, such as the incipient local research, poor market access, lack of financing and advice, little education and little investment in infrastructure.
Agricultural industrialization has led this small "favored" group of producers to respond to a massive and demanding production demand in a short term, generating bad actions trying to produce more food from each hectare of land, leading them to implement industrial agricultural practices such as the use of synthetic fertilizers and monoculture that leads to the creation of "green deserts" that consume the nutrients of the land, leaving it weak and unable to support the healthy growth of crops. The impacts of industrial agriculture are devastating to the environment and human communities. Intensive agriculture and livestock farming cause land degradation, the massive use of toxins, land grabbing and the consequent displacement of communities, among other impacts.

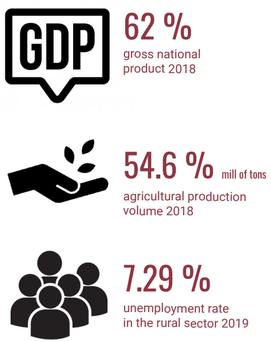


Figure 31. Agri-food.
Own work.

Due to the difficulties, lack of opportunities and lack of income necessary to meet their needs, people are moving to urban areas, the reason why in recent years the growth rate of agricultural production and the performance of crops have decreased, causing fear that the world from traditional agriculture will not be able to sustainably increase the production of food and other products to ensure adequate food for the future population, since millions of people in the world they continue in severe malnutrition continues to increase. There is no doubt then, that agricultural production should increase in the coming years, but where and how should this occur?

This is why this project is proposed as "an example of a strategy that can be replicated in other cities in Latin America," as it is a new way of introducing urban agriculture within cities through the mix of new technologies + culture. And what better place to replicate it than in market places that are generally in poor condition in these countries and that nevertheless continue to be a place of convergence between different actors in the city.

Considering the link that exists between citizens and culture for the land, these spaces could begin to become productive public spaces where education is encouraged through workshops and educational gardens, social inclusion, the economy with the generation of new jobs and new food commercialization points, and environmental awareness by demonstrating that there is the possibility of guaranteeing food security within cities by making use of these new systems with which quality food is produced and in turn have a low environmental impact.

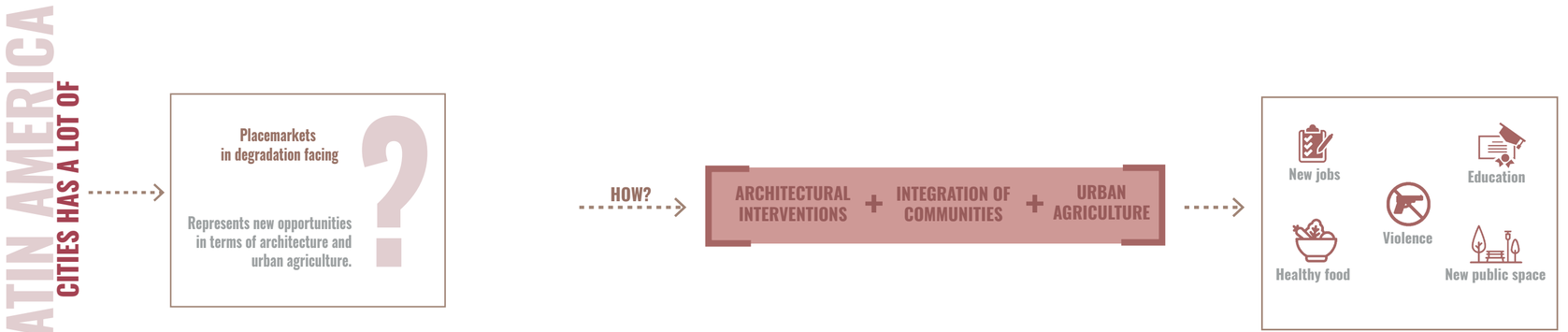
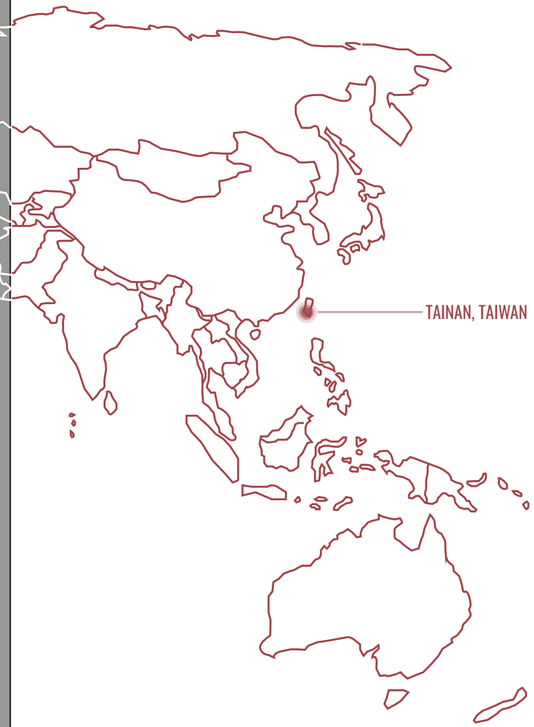


Figure 32. Replication strategy.
Own work.

05 CASES STUDIES



Over the years, it can be seen how every day there are more projects interested in creating spaces within the city that help people's demand for food, with a much lower environmental impact. These initiatives testify to international attention to sustainable development, both in the food system and in the urban one, as a solution to the challenges of the future.

These spaces are designed at different scales, starting from small urban gardens that promote greater awareness and serve as an engine for urban transformations, to large factories with mass productions that use new technologies to satisfy local markets. In turn, it can be seen how nowadays there are more and more buildings that integrate different functions with the intention of improving places in terms of safety and social welcome, becoming integral projects within the urban fabric.

In this sense, the projects presented below were selected with different locations, to emphasize the global interest in these interventions, highlighting that today there are no buildings of this type in Latin America, becoming an opportunity to replicate them, adapting them to their culture and their most eaten types of food.

These projects have in common, that they are buildings in the first place that are mixed buildings that integrate different functions and then that in all of them the social integration within the agricultural production process and its relationship with food is promoted as a key element.

5.1 Santa Caterina Marketplace

- **Place:** Ciutat Vella, Barcelona
- **Year:** 2005
- **Tipology:** Public Building, Public Space

Retrofitting

- **Extension:** 7.000 square feet
- **Function:** Market Building

The Santa Caterina market, renovated by the architecture studio led by Enric Miralles and Benedetta Tagliabue (EMTB) in 2005, is located in Ciutat Vella, a sector of the historic center of Barcelona that, since the 1980s, suffered a strong architectural and social degradation.

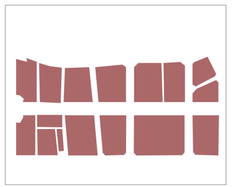
The choice of the Santa Caterina project as a reference in this research is mainly due to the importance of the market place in the renewal of the sector. Miralles uses the commercial piece as a tool to achieve certain objectives by achieving that the impact of an architectural project transcends the urban scale.
The purpose of the study of the reference is to analyze its urban contribution and highlight the urban strategies for the transformation of the Santa Caterina Market that are replicable in the market places of Bogotá.

Likewise, it is interesting how the meaning of the equipment is rethought, understanding it as a set of activities that feed into each other. It can be understood as an 'urban fact' (Rossi, 1982), where the market is not limited only to what happens inside the building, but goes out into the urban environment and creates synergies with other types of activities - pre-existing or new - around it.

Figure 33. Aerial Rooftop photo.
Santa Caterina Marketplace

Before talking about the strategies that were used, it is important to contextualize the market intervention, since one of the important aspects of the project was to continue the **Francesco Cambó avenue** (a road that was born from a series of urban plans) that then the EMBT studio recovers with the medieval vision of the street, understood as empty, and therefore, of public space that could connect the different important places of the zone, generating a public circuit that allows pedestrian connection between them.

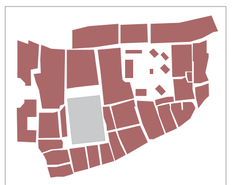
Previous urban plans



1859

The Cerdá Plan

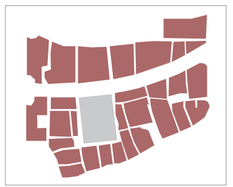
Rectilinear layout, in the historic center, in order to
combat health and communication problems. This Plan did not reach its final end due to lack of resources and only the Via Layetana was built later with the Baixeras Plan.



1935

Regenerationist Plan

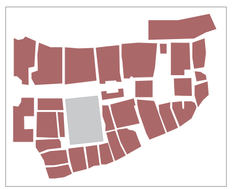
Proposed the demolition of the plots in worse conditions as a solution to the excessive density and the lack of equipment. Here was the first proposal of the market as new facility inside of the neighbourhood.



1976

General Metropolitan Plan

The plan promotes the opening of large roads in the historic center of Barcelona, in order to improve communication between the old and new cities, prioritizing vehicular traffic. This is the case of Avenida Cambó, which is projected to cross the entire sector.



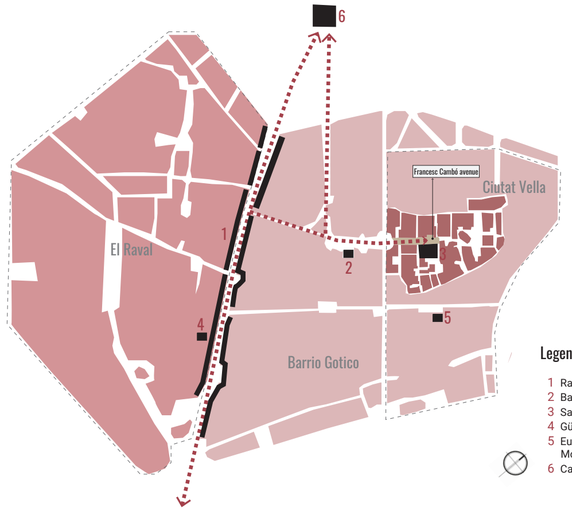
1983

Special Interior Reform Plans

Eliminates the extension of Av. Cambó as planned, giving it the character of a neighborhood access road.

Urban masterplan

The drawing shows how Enric Miralles' urban proposal focuses on including the new market within the pedestrian circuit of the different emblematic places of the historic center, generating a route that requalifies the Ciutat Vella, by encouraging the presence of new users within the area, improving security and the urban vitality inside of the neighbourhood.



Legend

1 Ramblas
2 Barcelona's cathedral
3 Santa Caterina Market
4 Güell Palace
5 European museum of Modern Art
6 Catalunya square

1

2

3

4

5

6

Those urban aspects of the transformation of the Santa Caterina Market that are interesting to replicate in the Bogota context are:

1. Treat the market place as a symbolic reference through a powerful architectural and / or artistic element.

2. Take advantage of the condition of urban landmark and the intense commercial activity, capable to attract flows of movement and transfer them to the interior of the neighborhood.

3. Include the market place as a cultural reference of the city, thus putting in value the heritage of the country.

4. Adopt the improvement of the market place as a strategy of revaluation of the sector.

5. Design the public space around the building as an inseparable part of the draft.

6. Understand the market place as a set of activities, in which new services facilitate its revitalization.

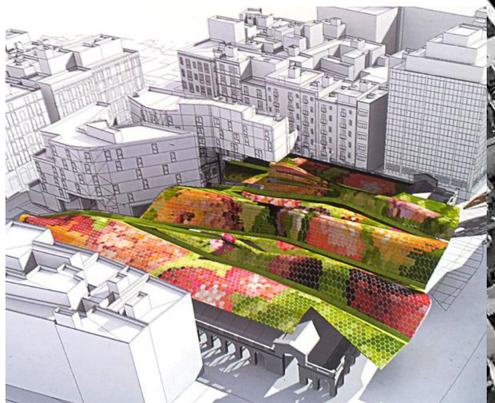


Figure 34. Relation with the context
Author: Marco Busca. 04/08/2018

CASES STUDIES

MIX USE BUILDINGS

"Today, cities require a mix of users, bringing different types of activities to spaces at all times during the day. The most effective way to achieve this is by joining different functions within the same building where they not only mix, but also interact and enrich each other".

MVRDV

5.2 La Cité Maraîchère

- **Place:** Romainville.France
- **Year:** 2020
- **Tipology:** Mix use building

New building

- **Extension:** 1,000 square feet
- **Function:** Indoor farming, educational spaces, educational gardens, public square
- **Type of cultives:** aeroponic and hydroponic

Different species of fruits, vegetables and aromatic plants, oyster mushrooms, edible flowers or microgreens.

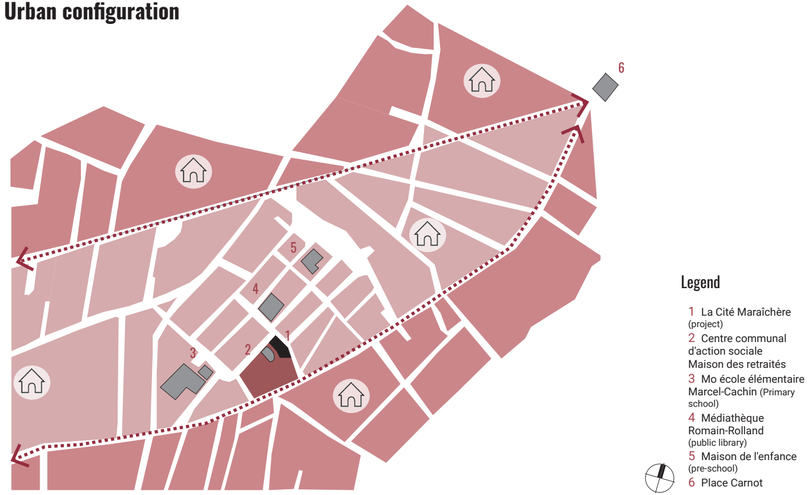
This project was considered as a case study because it is a mixed-use building that integrates urban agriculture as a fundamental part of the urban renewal of a mostly commercial / residential sector.
It is a multifunctional project that is dedicated to indoor agriculture and is currently in the culmination phase.

The aim of the project is to create a new public service that will make a healthy and high quality diet as well as educational activities accessible to the greatest number of people in a disadvantaged area where many people today do not have the financial means to obtain them.

Figure 35. Interior view of the agricultural area.

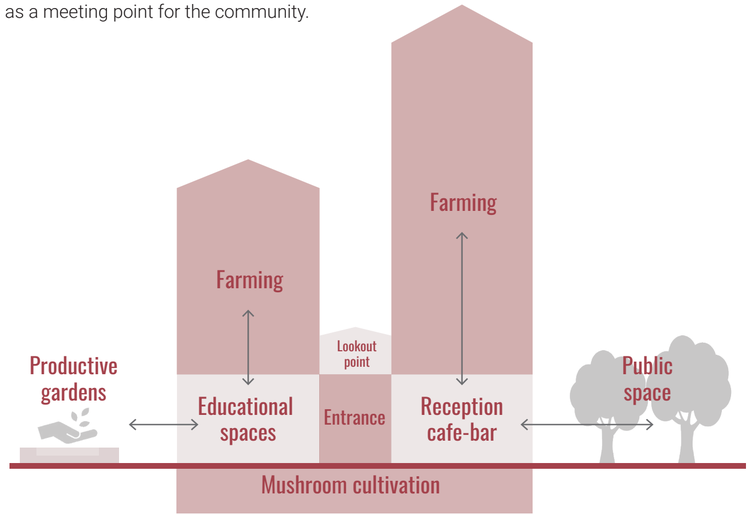
The urban configuration of the area is mostly residential and is located in the vicinity of an important square that connects with different zones of the city. In the surroundings of the intervention area, there are some educational buildings and a public library that in some way attract different types of users, making it an urban meeting point.

Urban configuration



The mix of uses allowed the creation of a farm with low environmental impact where fruits, vegetables and mushrooms will be produced that will complement the food supply of the environment; educational gardens where citizen participation is considered a key point; a restaurant where fresh food will be sold through a culinary program; spaces dedicated to education and a public space that serves as a meeting point for the community.

Functions



This project was considered a case study because they make use of strategies that would be applicable in the context in which our project is developed as it is an inclusive design from different points of view. Below are some of the reasons:

1. Ensures access to fresh and healthy products for low-income households.
2. Offers environmental education for all audiences.
3. Create a place to live and meet in a neighborhood by improving your social relationships.
4. Promotes urban participation, reducing crime rates and in turn giving a sense of belonging to the inhabitants of the place.

Figure 36. Street view.

Figure 37. Perspective view.

5.3 Tainan Xinhua Fruit and Vegetable Market,

- **Place:** Tainan, Taiwan
- **Year:** 2016
- **Tipology:** Architecture, public space

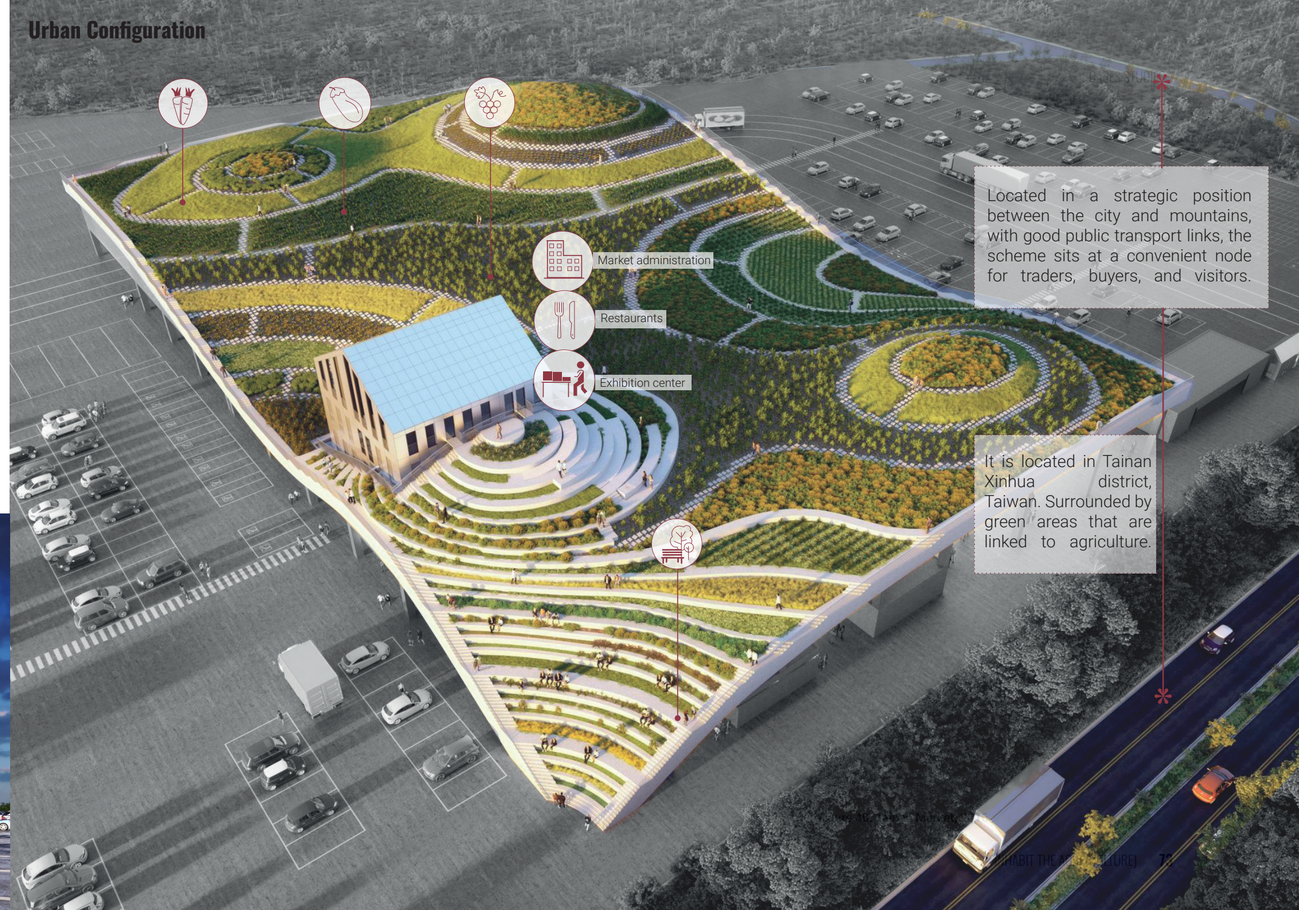
New building

- **Extension:** 11.000 square feet
- **Function:** Mix used, offices, retail, restaurants, public spaces
- **Type of cultives:** public gardens, pineapples, rice, roses, tea, and more.

This project is based on the new wholesale fruit and vegetable market in Tainan, Taiwan. A building in which the food chain is reinforced and combined with a liveable and productive terrace that makes it a new public space for the city.

This project is located in an area of the city that has a good geographical location since it is easily accessible both from the surrounding agricultural lands and from the city, which makes it equally convenient for merchants and buyers, and visitors.

Figure 38. Tainan Market, 2016



The building is designed by an open structure, thus allowing the entry of natural ventilation inside where the market takes place, a volume passing through the roof contains the administrative offices of the market, a restaurant, and an exhibition center where agricultural products are be exhibited.
The concept was to create an iconic roof that would allow to appreciate the views of the landscape but at the same time that it would reinforce the food chain, turning the experience of the public space into a productive experience.

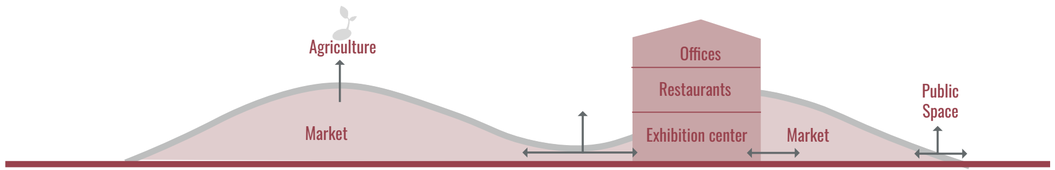
This building is taken as a reference because is the example that:

1. A wholesale market together with productive spaces and public space; can be fully functional and satisfy the needs of auctioning, selling, and purchasing products.

2. A new urban meeting point that, being well connected with the rest of the city, atracts new users and requalify the sector.

Dynamic terrace

Functions



The market building in Tainan, offers a balance between agricultural productivity and recreation, becoming a fully functional building, covering and connecting 4 important pillars: education, social relations, culture and economy development.

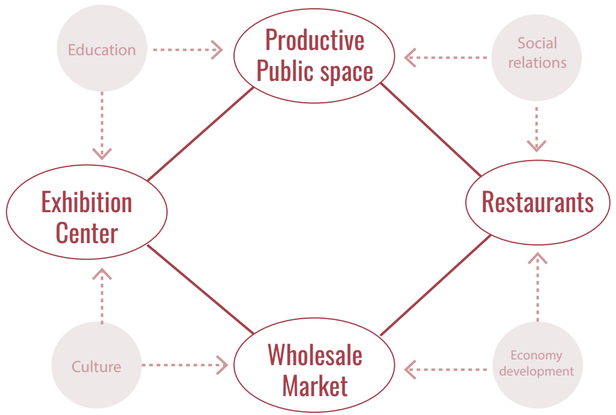


Figure 42. Functions flow.
Own work.

Figure 39. Tainan Market, 2016. Terrace roof

Figure 40. Tainan Market, 2016. Interior view

5.4 LufaFarms. Ahuntsic Rooftop Greenhouse

- **Place:** Montreal, Canadá
- **Year:** 2011
- **Tipology:** Office building + Food hub

Extension

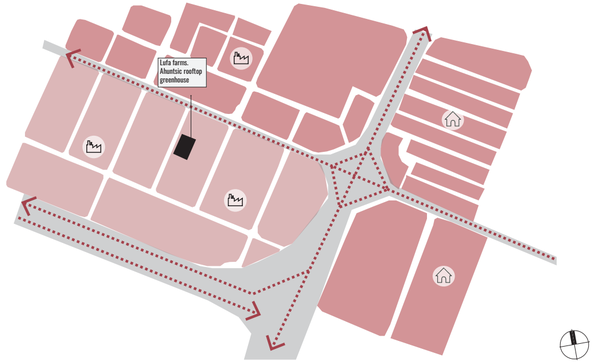
- **Extension:** 31.000 square feet
- **Function:** Office building with Indoor farm with spaces for packaging and shipping of products.
- **Type of cultives:** hydroponic
  Herbs, microgreens,cucumbers, and peppers.

This project is based on the reuse of disused spaces, turning them into productive areas. In this case, the physical space was a roof of an office building that proposes indoor agriculture using hydroponic crops where irrigation uses recycled water through an ingenious recirculation system that treats rainwater.

This building, in turn, functions as a food hub. This 0 km distribution system supplies shops, markets, and restaurants. Parallel that, they also include a service to families where they can order their needs online and collect them with totally fresh products.
On this farm, various salads and vegetables are grown, and food from other local producers is also offered to satisfy the local market's demands.

Figure 41. Food Production system

Urban Configuration



The project is situated in a fully industrial and commercial context, because of this, it is easy to transport and deliver its products to customers. By 2019 the company Lufa Farms built their third rooftop greenhouse, obtaining nearly 12,820 square meters to feed more than 10,000 Montreal homes throughout the year.

Functions

Lufa Farms believes that the current food system is not sustainable and therefore cities should choose to transition to a new food production model that is sufficiently self-sufficient to continue feeding a metropolitan population in growth.For this reason, the project is committed to producing quality food in spaces that can be reused for this purpose, such as rooftops, giving a purpose to unused constructions and avoiding using new land for cultivation.

This project was considered as a case study for the following reasons:
1. Serves to understand that it is possible to cultivate in height without interrupting other functions carried out within the same building.

2. Assert that it is possible to manage a food distribution network through a foodhub.

3. In technical terms, being a large-scale internal production building, it allows understanding the different methods and processes involved in urban agriculture according to the plant, thus understanding how to adapt the physical space for optimal production in terms of quality and quantity .

Figure 42. Germination phase

Figure 43. Food Production system

Process of cultivation

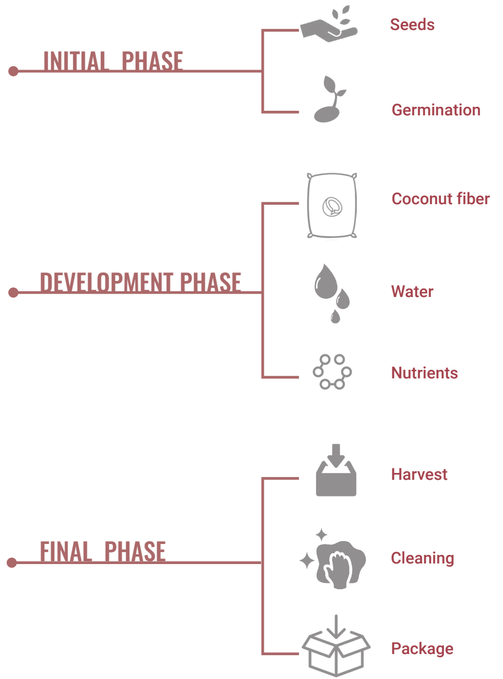


Figure 44. Food Production system

5.5 INTERVIEW

Below, we have included an interview with Germán Sáenz Léon, an agronomist and manager of *SA AGRO*. Mr Sáenz gives his opinion on urban agriculture from a professional point of view, which allows us to know the position of a person who knows the farming and food sector and thus obtain a starting point for making decisions on the design and its feasibility in terms of the proposed functions.

AM: "Given the experience you have working in the field, how do you see the possibility that urban crops can generate food products?"

GS: *"The possibility is high because the population has increased since the 1950s. Globalization also requires new production techniques to feed the demanding world population. Also, due to the decrease of labor in our fields, the increase of monopolies in the crops. I think it is pertinent that the city population gets involved. Urban crops generate in their terraces, small plots or gardens, walls of buildings, courtyards, would be strategic locations for the establishment of these urban agriculture projects."*

AM: "Do you believe that knowledge in rural production can be applied to urban agriculture?"

GS: *"I would say yes, but it is necessary to do a study since we have different production models, which would generate new challenges to catalogue people, different cultures and lifestyles, that would force us to match ideas to the needs of people and models of urban agriculture."*

AM: "Which crops are harvested the most? And which are the least? Why?"

GS: *"The crops that are harvested the most are 7 and are the basis of the industry because of the large capacity to use and process in global food. The crops are Corn, wheat, rice, potato, tomato, soy, and coffee. In Colombia and worldwide, the avocado has been gaining strength. The least are exotic or native crops, and they are little known. In Colombia, an agro-diverse country, we find native species with a portion of high food, pharmaceutical, and artisanal potential.*
The crops are Chontaduro, borojó, chirimoya, anon, mamey, chachafruto, guama, badea, carambolo, guineo, and cimarrón, among others.

AM: "Are there currently the same number of farmers as before?"

GS: *"Given the number of people who work the land, I would say no, due to the displacement of people from the countryside to the city. But in terms of hectares of cultivated land, I think there are more currently, but these are in the hands of large multinational companies and landowners."*

AM: "Climate change, how does it affect? How should agriculture adapt to it?"

GS: *"Climate change has generated new challenges in agriculture because it works with living organisms that respond to environmental stimuli all the time, which leads to special conditions for the incidence of insect pests, diseases, floods, erosion, droughts, etc. This leads us to adapt to changes in thermal production floors, extinction of some species, which would have to establish new models that are friendly to our environment, with water. Technology must move forward to generate greater efficiency in the use of this resource."*

AM: "Do you think that in the city of Bogota this type of vertical farms can work?"

GS: *"Yes, but with the study of species that adapt to the height of Bogotá and its temperature".*

AM: "How open is the average farmer to adapt to new technologies?"

GS: *"The average farmer is still the few smallholder farmers who still exist, who are still relegated and hit by the low incomes of traditional agriculture, but in my opinion, I consider that farmers would adapt to new technologies, provided that they are assisted by the governmental entities responsible for promoting the development of Colombian agriculture."*

AM: "Knowing that you are an agronomist, and knowing that you can manipulate the conditions of a building climatically speaking, what is the crop that considers that it should be produced and supplied? (difficult crops that are given or that are costs to make them)."

GS: *"I would say as an agronomist that the crop I would produce is tomato, which is a challenging crop and is very exposed to the application of agrochemicals. I would grow it in modified greenhouses so that I would have control of the environment and adverse conditions."*

06

URBAN AND ARCHITECTURAL PROPOSAL

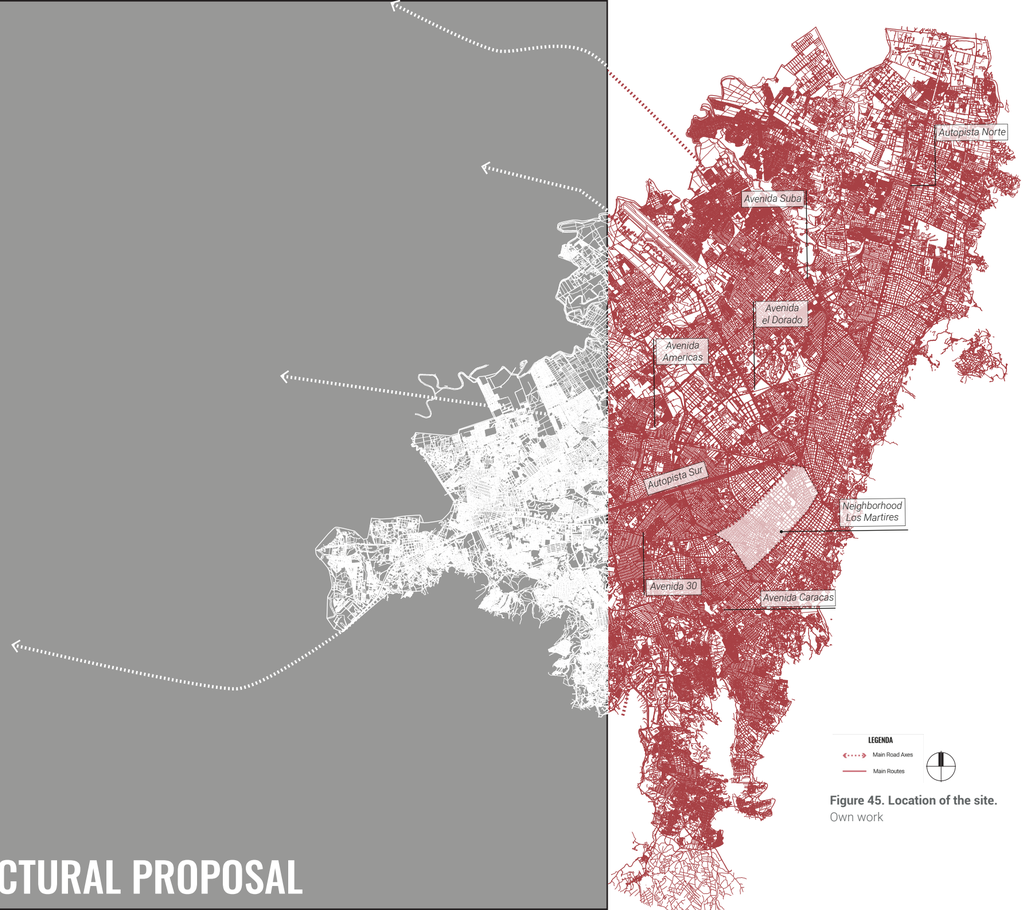


Figure 45. Location of the site.
Own work

6.1 LARGE SCALE ANALYSIS

This chapter attempts to analyze the location of "Los Martires" in order to identify the characteristics of the project area. In relation to this, within the urban history of the city, this sector has great importance because it was the center of arrival of immigrants since the old train station was located in this neighbourhood. In addition, it was considered an important part of the food chain, gathering together the 3 marketplaces with the most social and economic impact within the urban area, that later, with the creation of the wholesale market of Corabastos were evicted leaving for consequence only the square of Paloquemao as equipment of cultural good and food supply established in the local ordinances of 2009.

Likewise, this sector is strategically located between the main roads that run through the city of Bogotá from north to south and from east to west. The locality of Los Mártires has a direct relationship with the locality of La Candelaria, considered the historic center of the city of Bogotá; where the main cultural facilities are located, such as: museums, churches, cultural centres, government institutions and the presidential palace, attached to this, is located the first most important square in the city, therefore it is considered a tourist area because it has an important architectural character, and due to the constant growth of the city, in the seventies it was declared architectural heritage. Today the locality of La Candelaria is partially disconnected from the neighboring towns since in terms of viability, the pedestrian and cycling conditions are in a state of deterioration; avoiding urban connections that ensure the safety of citizens.

On the basis of the subsequent urban analysis, a clear understanding of the needs of the sector will be reached in order to define the strategies needed to propose a plan for urban regeneration and for the connection between the study area and the historic centre of the city.

6.2 CLIMATE CONDITIONS

Bogota's climate is characterized by being cold oceanic with a relatively dry summer and a humid winter. The temperatures of the year range between 10 ° C (50 ° F) and 18 ° C (64.4 ° F) in periods of rain, and between 6 ° C (42.8 ° F) and 19 ° C (66.2 ° F) on sunny days.

January is considered the coldest and driest month with the daytime temperature reaching 22 ° C (71.6 ° F) and nights falling to an average of 7.6 ° C (45.7 ° F). The average rainfall is 856 mm (33.7 "), with October being the rainiest month.

Due to Bogotá's proximity to the equator and a high altitude of 8,800 feet, there are no distinct seasons and there are hardly any experiences of extraordinarily high or low temperatures.

Winter equals the rainy season and summer equals the dry season. Dry weather runs from December to February, while wet conditions are experienced in April, May, September, October, and November. These months are marked by low, cloudy skies. Expect to find fine air and strong ultraviolet light at this altitude, but with few absolute sunny days.

Temperature
6 °C - 21 °C

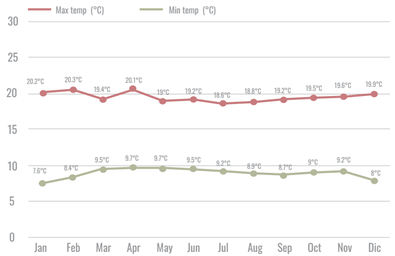
Humidity
70 -75%

Daylight
11-12 h

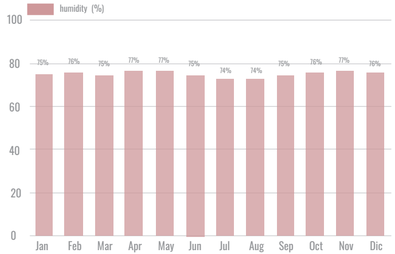
Insolation
2.7h - 5h

Figure 46. Climate graphics. Own work
Source: https://www.weather-atlas.com/es/colombia/bogota-clima

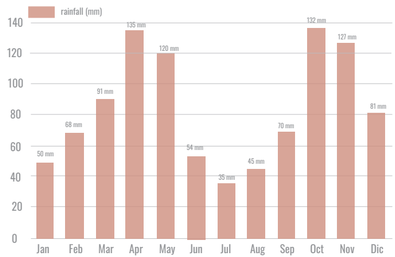
TEMPERATURE



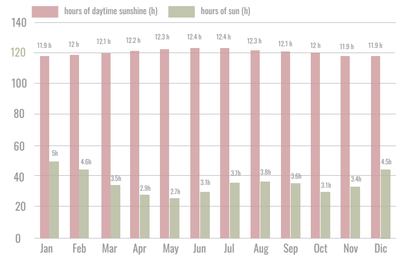
HUMIDITY



RAINFALL



DAYLIGHT / AVERAGE INSOLATION



6.3 HISTORICAL BACKGROUND

The Paloquemao market square was chosen as a place for urban regeneration design; because it is currently one of the most important retail centers in the city and the country. This square was built on Carrera 30 with 19th Street, in the town of **"Los Martires"** in Bogota, Colombia; the neighborhood is a central sector of the city, characterized by having historical spaces from the beginning of the republic and has subsequent urbanistic developments, but unfortunately it is part of the pre-donimian condition of degraded center. The diversity of this town is due to the fact that it has witnessed the development and evolution of Bogota.

From its beginnings, in the 50s, the sector was a residential area, where people of "high level" and important characters lived. Later the growth of the city towards the North made the inhabitants of this locality migrate towards that new area, abandoning hundreds of houses that now work as warehouses and shops. In this sector is also located the old building of the railway station "La Sabana", this railway station, was the starting point and arrival of rural immigrants in search of new opportunities, therefore the station meant,a great commercial development of the area, because of the large-scale construction of warehouses for the storage of agricultural products.

Figure 47. Railway station "La Sabana"

Figure 48. Plaza España and Hospital San Jose

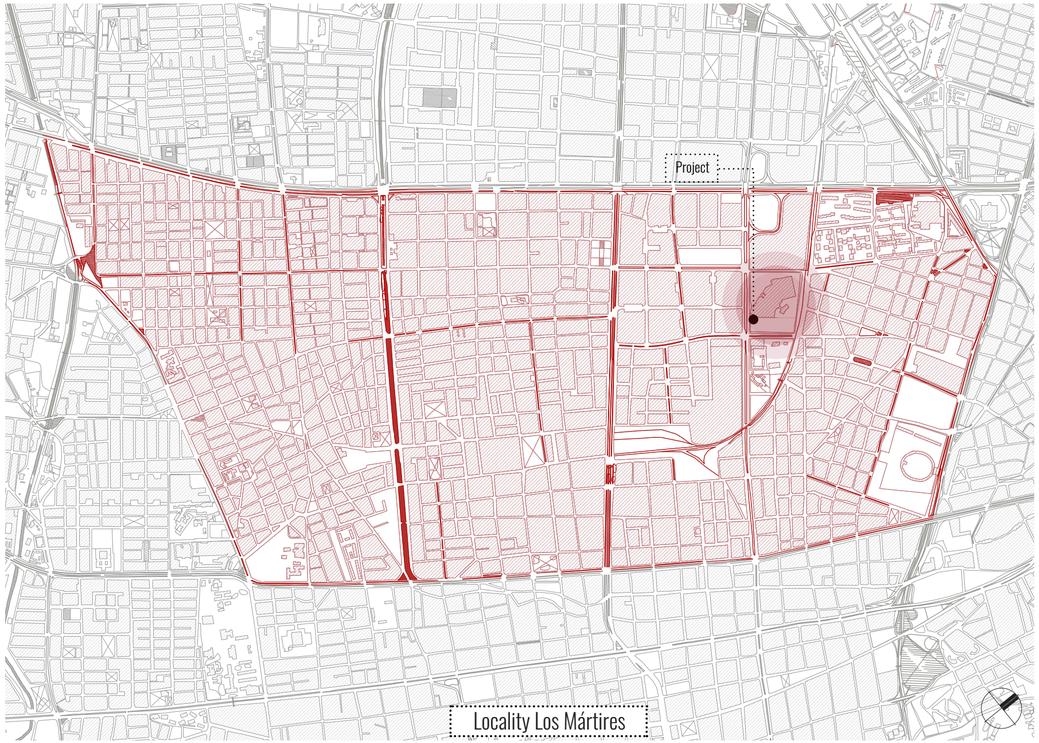


Figure 49. Locality Los Martires

6.3 URBAN ANALYSIS

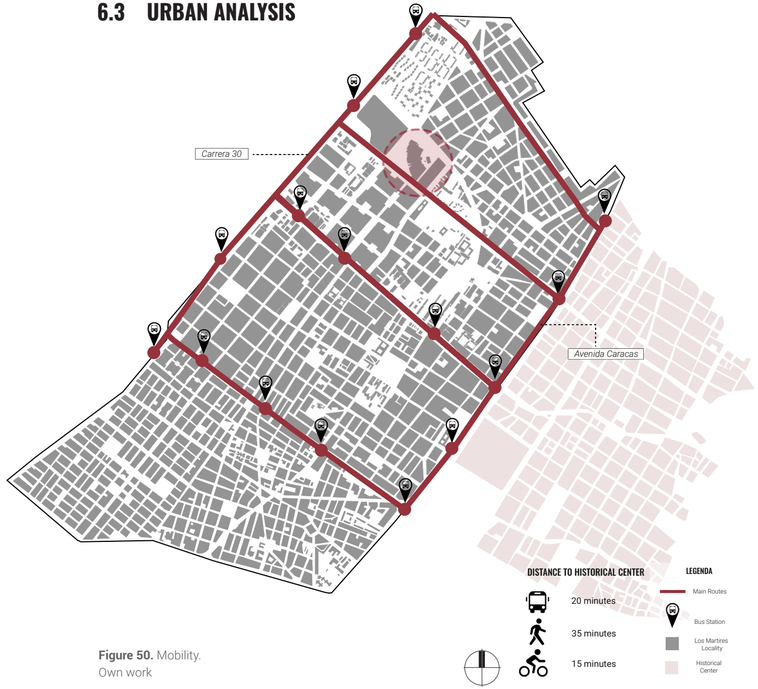


Figure 50. Mobility.
Own work

Mobility map

From the point of view of mobility, although the locality is surrounded by some of the main roads of the city, such as Avenida Caracas and Carrera 30, through which public transport passes. However, the neighborhood does not have an internal system of bicycle paths, its sidewalks are of poor quality, which do not have the optimal dimension to guarantee the safety of the pedestrian, giving priority to the vehicle..

The location of the project being on one of the main roads in the sector, is connected with the historic center in approximately 35 minutes by foot, making it a place that can be included within the route of social facilities within the city.

The neighborhood of Los Mártires has few public transport lines within it that go from east to west. The internal mobility is mostly automotive and the existence of few sections of bikeways does not lead to specific points of the sector generating discontinuity in the route that often ends on unsuitable vehicular roads.

Zonification map

Regarding the zoning of uses, this is a mixed-use sector where mainly industrial, commercial and residential areas stand out. The immediate context to the market, as seen in the map, is surrounded by commercial and industrial areas generating a node that creates dynamics and urban relationships that often end up being chaotic and due to a lack of planning within the sector, generating a high environmental impact as they are the main reason for pollution in the sector and also increasing the insecurity.

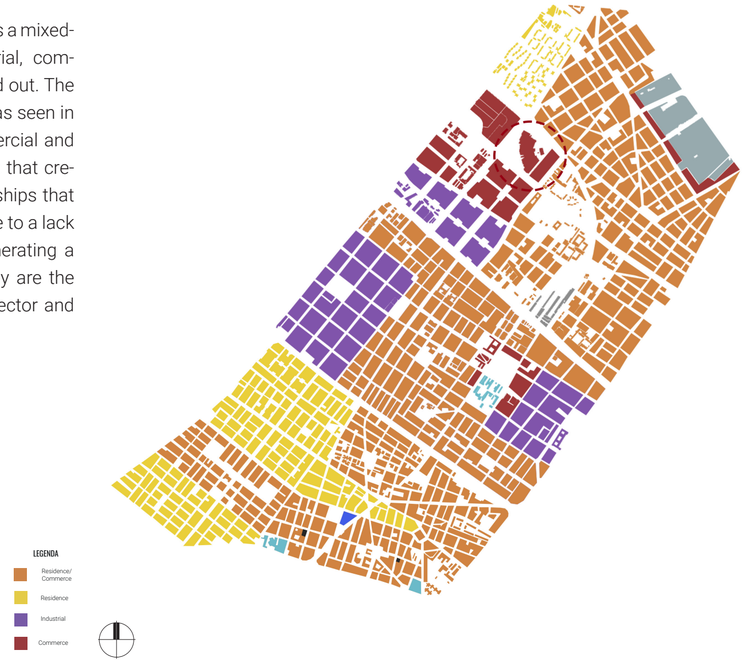


Figure 51. Zonification.
Own work

Urban facilities map

Furthermore, it is an area equipped with different urban facilities, where religious, educational and cultural buildings, influences the dynamism of the sector alongside the commerce that covers most of the neighborhood and that consequently creates a flow of external people, turning it into an urban node within the city.

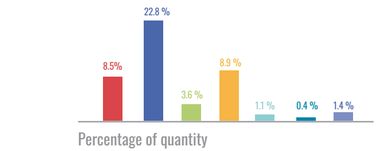


Figure 52. Urban facilities.
Own work

Cultural facilities map

Likewise, there are cultural facilities of great importance such as: the central cemetery, the train station La Sabana, Paloquemao market, Plaza España and the metropolitan park El Milenio; which in some way were designed there because of the proximity to the historic center.

1. Park "El Renacimiento"

1. Memory Centre for Peace and Reconciliation

2. Marketplace of Paloquemao

4. Hospital "San Jose"

4. Plaza España

7. Presidential House "Casa de Nariño"

3. Old railway station "La Sabana"

6. Metropolitan Park "Tercer Milenio"

5. Plaza "Los Martires"

8. Plaza Bolivar

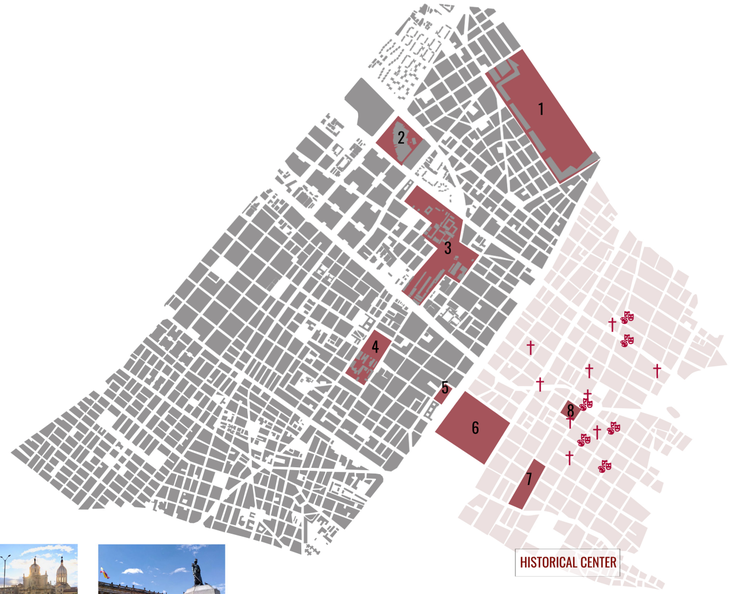


Figure 53. Cultural heritage.
Own work

Figure 54. Nolli.
Own work

Nolli map

The neighborhood has a compact and homogeneous urban tissue, configured by a grid that orders the streets parallel to each other. It can be seen how there is a high density, because the built area predominates with respect to the voids. This results in the absence of green and public spaces, making it a sector where the perception is of overcrowding.

Green areas map

Analyzing previously the Nolli map, a lack of empty spaces in the neighborhood is evident, which represent the few existing public spaces. These are considered small-scale parks, which do not allow holding the entire population that the neighborhood owns.
Therefore, Los Martires, for being a sector with a high demographic level, does not have the possibility to expand and generate new public spaces. Based on this, an urban opportunity is created by rehabilitating spaces to include more green within the city, which in turn helps the problem of pollution and insecurity within the neighborhood.

Figure 55. Green spaces.
Own work

URBAN PROPOSAL

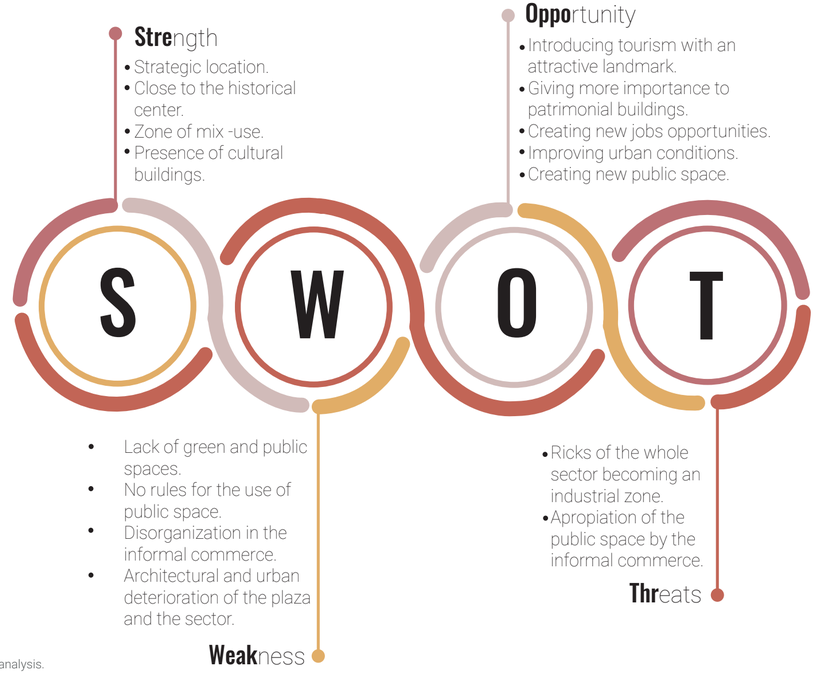


Figure 56. SWOT analysis.
Own work

It was necessary to analyzed the functional and physical characteristics of the neighborhood of "Los Martires", for this, we used the **SWOT** analysis tool that allows to highlight the deficiencies and potentials of the area. The market square, is bared by having a proximity to the historic center of the city, this aspect represents a great fortress since it can be exploited by a direct connection between these two points, through an urban intervention on 19th Street. The lack of green spaces in the neighborhood is very evident, this aspect can be taken as a weakness point of the area but at the same time there is an opportunity to include new green spaces that promote different dynamics for citizens.

As a mixed housing and commercial area, the design of a new building offering new methods of food production, reducing transport distances and the environmental impact generated by traditional techniques, will complement the commercial activities of the current market place, generating economics growth and well-being for citizens through new employment opportunities and public spaces, becoming a tourist reference inside the city.Through the **SWOT** analysis, we can also highlight the criticality of the area and the threats presents.

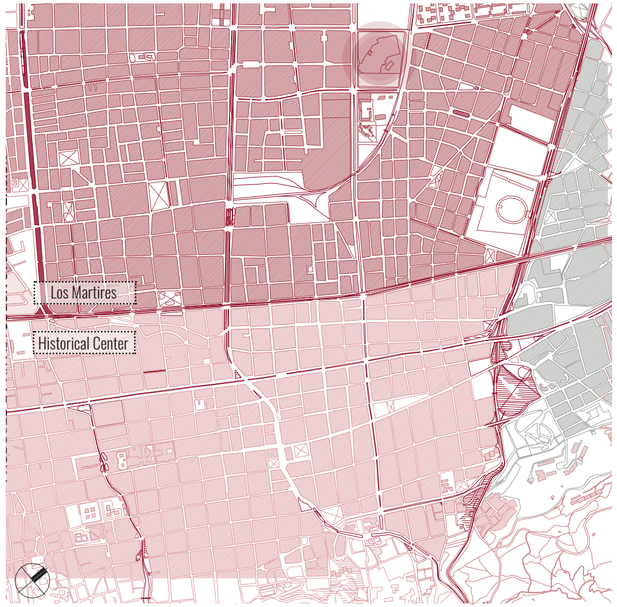


Figure 57. Framing of the site.
Own work

The condition of urban and architectural deterioration of the sector and of the market square, is due to the fact that it is mainly a sector of lower-middle class that together with the bad management of the market square brings as a consequence indeterminate appropriation of the spaces, unsafe and food wasted.

The previous urban analysis study of "Los Mártires" neighborhood, provided the necessary information to understand the context of the project area and thus to generate a proposal whose main objective is to take advantage of the location of the Paloquemao market square, in order to promote the connection between the historic center and the neighborhood, as part of an urban regeneration that seeks to connect two points of convergence within the city. The urban design starts from understanding that exist a lack of meeting spaces and green areas in

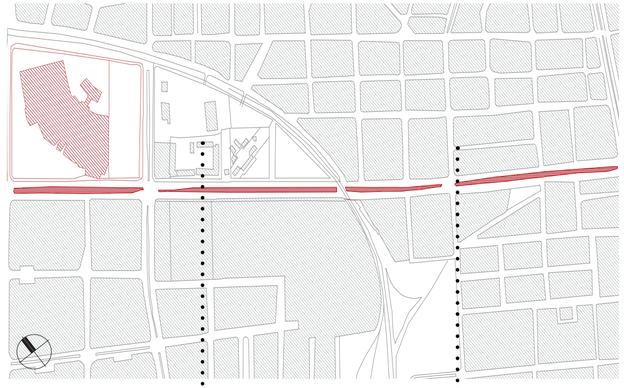


Figure 58. Urban proposal.
Own work

SECTION 1

SECTION 2

the neighborhood; consequently, the idea of greening the city becomes the main concept of the proposal by integrating urban agriculture and the link that can be established between a building of cultural and commercial goods, as is the market square of Paloquemao and the proposed new building of food production methods within the city.

Therefore, 19th Street is one of the main streets of the neighborhood that leads directly to the historic center of the city in 30 minutes of walking; that is why, **a new boulevard is proposed, connecting the intervention area of the Market Square of Paloquemao with the center, bringing as result, a new space for production, comerce and meeting within the city.**

URBAN AND ARCHITECTURAL PROPOSAL

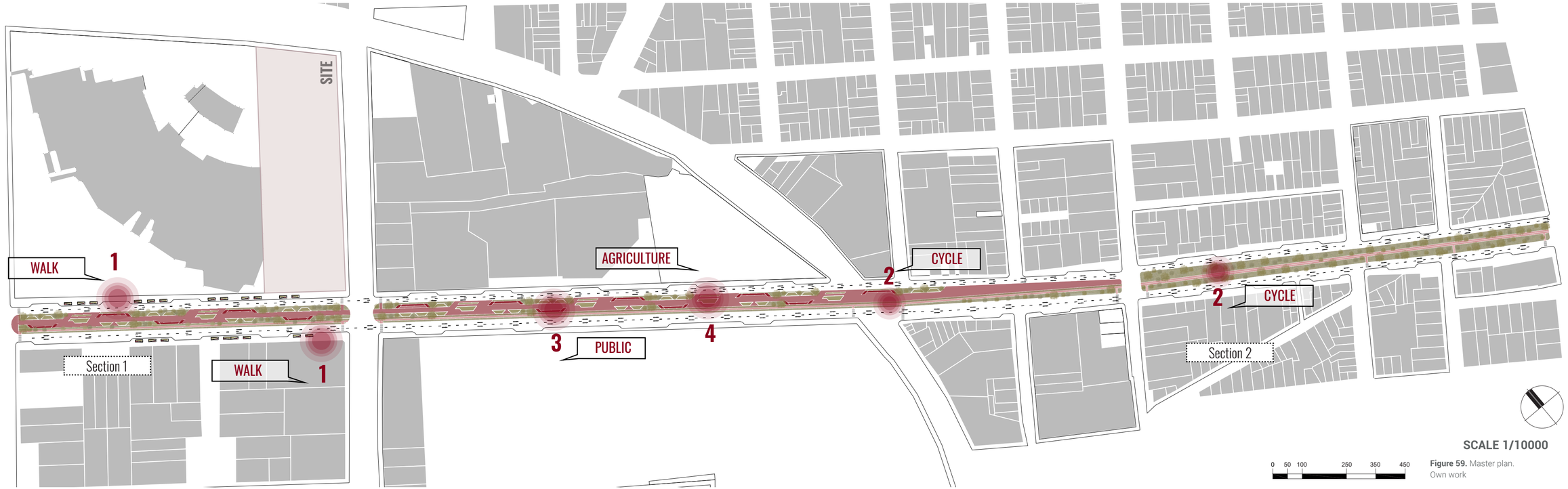
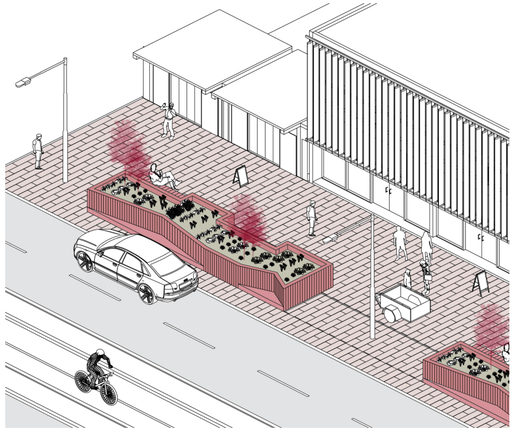


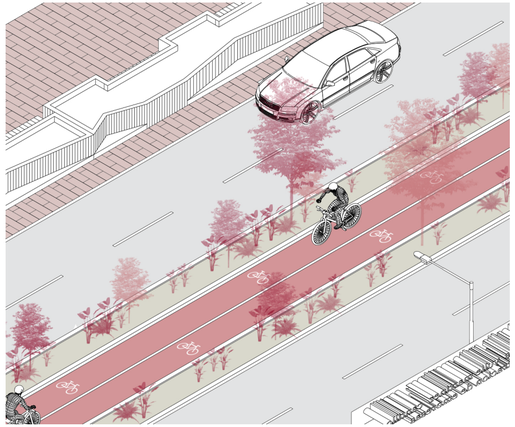
Figure 59. Master plan.
Own work



1

WALK

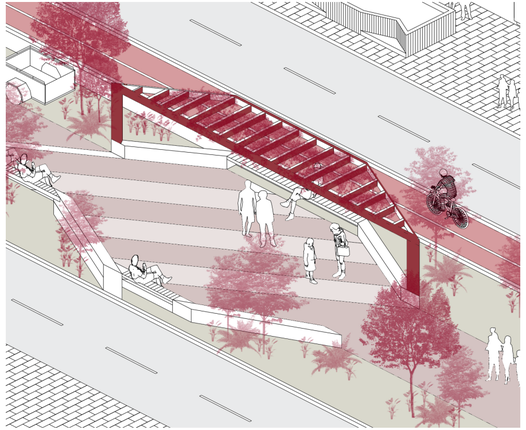
High quality unobstruted pedestrian footpath provide basic mobility for all. Furniture, landscaping elements that transforms the main street in a vibrant public space.



2

CYCLE

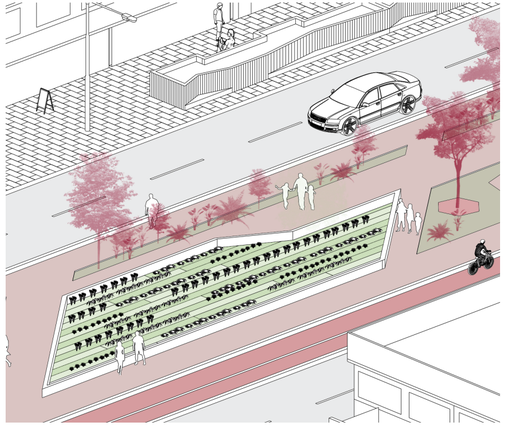
Street design ensure safety for cyclists by creating a separate cycle track that arrives to the historical city center.



3

PUBLIC

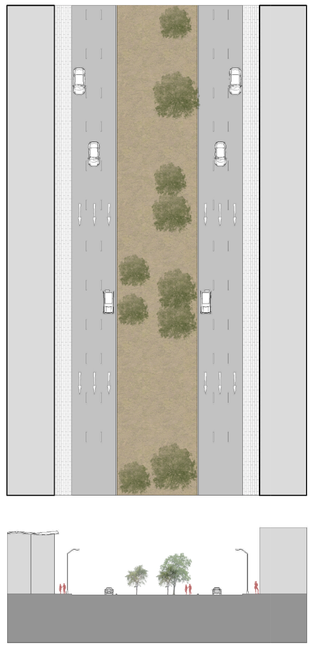
Due to the lack of green spaces, is design a public space where vegetation predominates on the way, creating more pleasant weather conditions.



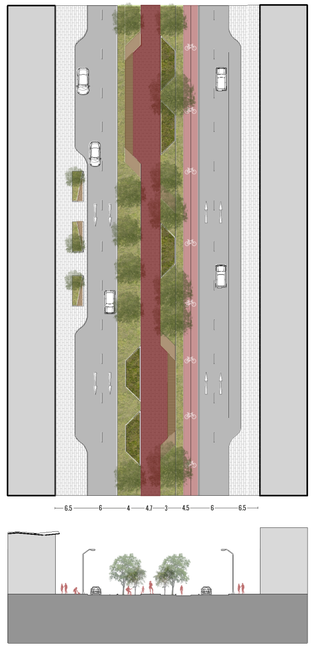
4

AGRICULTURE

Include urban gardensas an alternative of food production and to create a sense of belonging and identity within the sector.

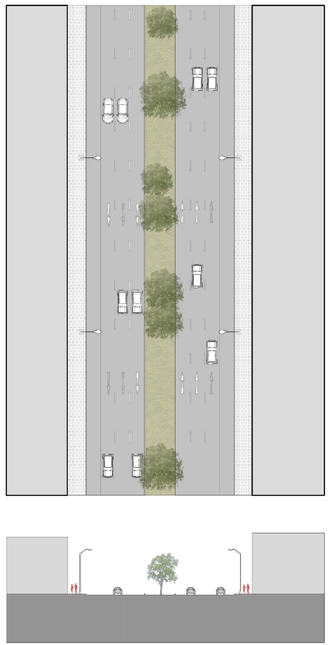


SECTION 1 - Actual situation

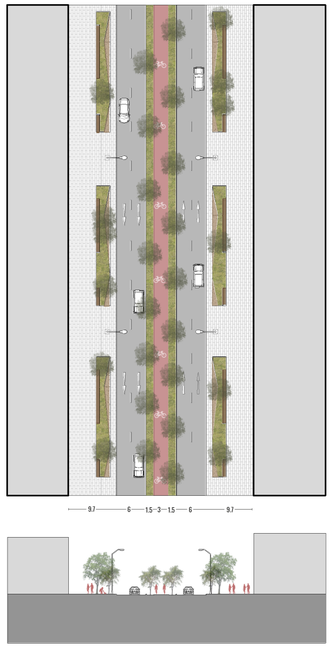


Proposal SCALE 1/500

Figure 60. Section 1, Urban proposal. Own work



SECTION 2 - Actual situation



Proposal SCALE 1/500

Figure 61. Section 2, Urban proposal. Own work

6.5 ARCHITECTURAL ANALYSIS

Actual state of the marketplace

The Paloquemao Market Square became an articulating axis for the commercial, social, and cultural activities of the area; It is also characterized as an architectural icon of the city that reflects the city's growth in urban and commercial terms. The proximity it has with significant road axes evidence how an intervention in the square would be a fundamental part of an urban transformation that enhances long-term social solutions.

Today the building is deteriorated and does not have enough capacity to house all the merchants. This is found by not having good management; the state of unhealthy and disorganization that prevails is evident.
The market current state has changed since it conceived of the initial design, the original project was not fully built, and only 70% were built. The part of the design that was not built was left to future fate, so the citizens themselves built a metallic structure with roof of tiles in pvc and with simple height; This space does not have the quality of lighting and spatiality offered by the original design.

Figure 62. Interior of the market
Clásicos de Arquitectura: Plaza de Mercado de Paloquemao / Dicken Castro, Jacques Mosseri (2014).

Figure 63. Halls
Clásicos de Arquitectura: Plaza de Mercado de Paloquemao / Dicken Castro, Jacques Mosseri (2014)

The project of the “Plaza de Paloquemao” born from the hand of the architects Dicken Castro and Jacques Mosseri in the year 1967.
The implantation of the building in the place is arranged diagonally, which allows covering most of the space. This generated greater benefit for the circulations inside the building; the architects create an imposing facade is of great amplitude that invites the buyer to enter the building. To avoid the proliferation of other businesses than those contained in the market, the architects decided to close the facades completely so that no sales areas were leading to the street, so the building does not open the city, but the city enters it.

The building is planned as a permeable mass that contains the activities that a marketplace may have. To correctly separate the amount of organic material that enters and leaves the establishments, they designed corridors to separate the areas that were thought as three primary and three minor nuclei, which communicate through large patios configured in size for each need. To optimize the supply of warehouses, exclusive corridors were created for this function. The concept is based on a building where the warehouse areas and the sales areas are linked together. The circulations become the appreciative spaces that generate the sensation of fluidity within the market, where each area has courtyards that help with the entrance of light and air.

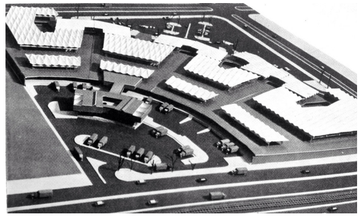


Figure 64. Physical model
Karina Duque. (2006). Clásicos de Arquitectura: Plaza de Mercado de Paloquemao / Dicken Castro, Jacques Mosseri. 2006, de ArchDaily.

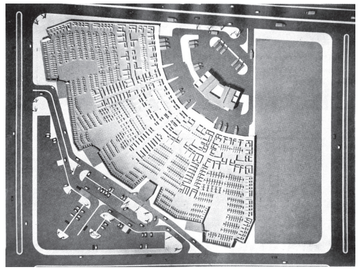


Figure 65. Physical model
Karina Duque. (2006). Clásicos de Arquitectura: Plaza de Mercado de Paloquemao / Dicken Castro, Jacques Mosseri. 2006, de ArchDaily.

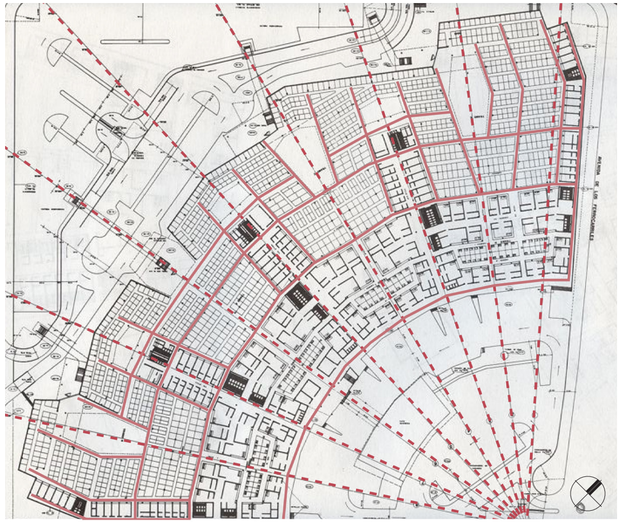


Figure 66. Architectural plan .
Castro, Dicken. Forma viva: el oficio del diseño. Bogotá, Escala Fondo Editorial, s.f.

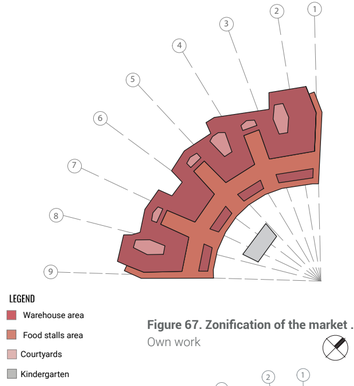


Figure 67. Zonification of the market .
Own work

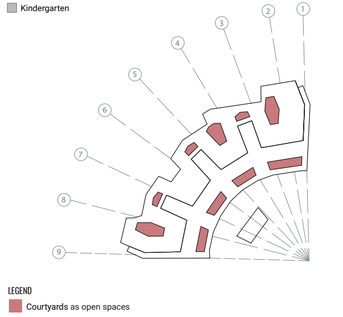


Figure 68. Open spaces .
Own work

Distribution and access system

The market square is composed of three major and three minor nuclei, each of them adjoining with expansive courtyards and a central nucleus, the circulations (axes) of progressive amplitude communicate these courtyards according to the needs and activities.
As shown in the above sketches, the building counts with axes thar rotate around a common point that allows the implantation and accommodation of all services so that they communicate with each other by well-structured linear corridors that allow ventilation from one end to the other of the project. These axes define the main corridor areas and the sales areas clearly. The entrances are in an east-west direction, guaranteeing transversality along the internal route.

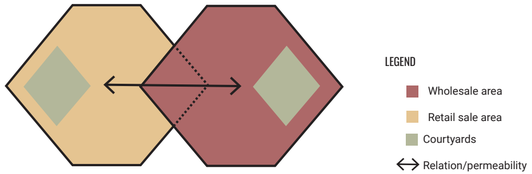


Figure 69. Concept.
Own work

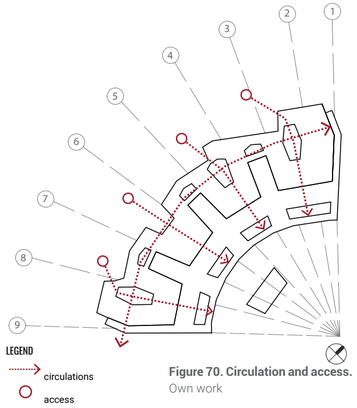


Figure 70. Circulation and access.
Own work

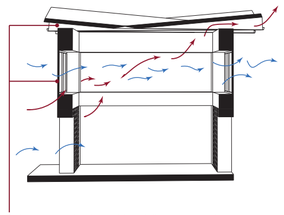
As an internal distribution system, being a volume of a single level of a height of 9 meters, businesses are categorized into categories such as meat, fish, vegetables, flowers, etc. They are organized horizontally on the level + -0.00 mts. The cargo loading/unloading areas are located in the northwestern part of the site as it is the best access point for trucks from the city's main roads.

Figure 72. Roof of the market
Karina Duque. (2006). Clásicos de Arquitectura: Plaza de Mercado de Paloquemao / Dicken Castro, Jacques Mosseri. 2006, de ArchDaily.

Structure and Roof

As it is a building that requires particular security and health controls, it is not open to the city but rather the city enters it in a unidirectional way. The structure and perimeter walls are made of reinforced concrete, lined with bricks. One of the essential elements within the market design is the roof. It generates a rhythm throughout the entire building that transforms the spatial quality and allows the triangulation of precast concrete in the form of folding to provide spatiality to the sales areas. Indirect lighting and ventilation spread through the folds generates a pleasant internal thermal comfort.

The roof is the most characteristic element of the building and essential within the architectural analysis gives rhythm to the interior of the building and becomes the natural language of the building. The roof is composed of concrete prefabricated triangular elements; they work with folding principles, supported on reinforced concrete porticos. They rise at double height over the sales areas, allowing natural light and ventilation inside.



The large perimentral windows and the roof allow a constant cooling of the air and help to reduce the thermal transmittance

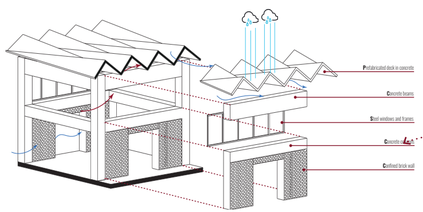


Figure 73. Section and axonometric view of the roof.
Confort system. Own work

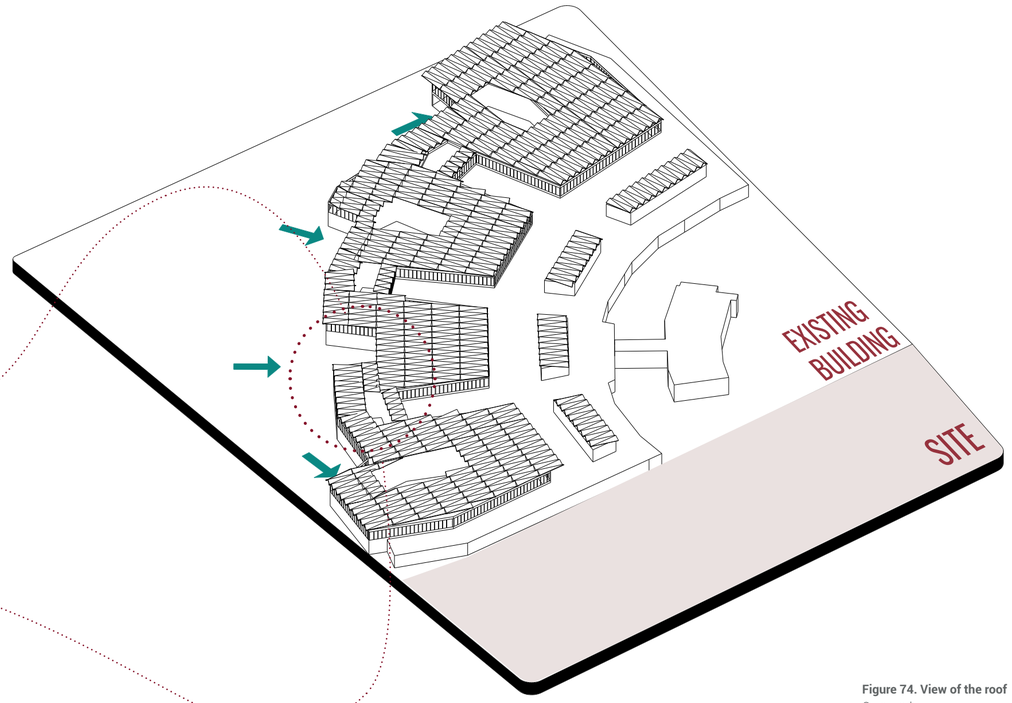


Figure 74. View of the roof
Own work

ARCHITECTURAL PROPOSAL

Proposal for urban requalification in the paloquemao market square

The choice of the proposal - occurs by analyzing and considering the different aspects described above. Being a physically and socially degraded sector with a good geographical position that has a collective memory by the city's citizens, it is considered a space with opportunities to significantly impact **urban agriculture**, it can be consider a benchmark in innovation within Latin American cities—promoting culture, economy, production, and social inclusion through public space.

The design criteria point to create permeables, didactics, and flexibles spaces; that attract new consumers and observers within the project. The idea is that through the connections between productive, educational processes and people, economic growth is also promoted by showing how food is produced while a collective interest is generated to acquire this kind of product. The flexibility of the spaces is also one of the strategies considered. Since being a sector with great dynamism, the proposal must respond to this differents social and urban demands.

By having all these elements, the idea is to start from the concept of circularity as it is a self-sustaining building that also improve the actual situation of the existing market.

Users involved

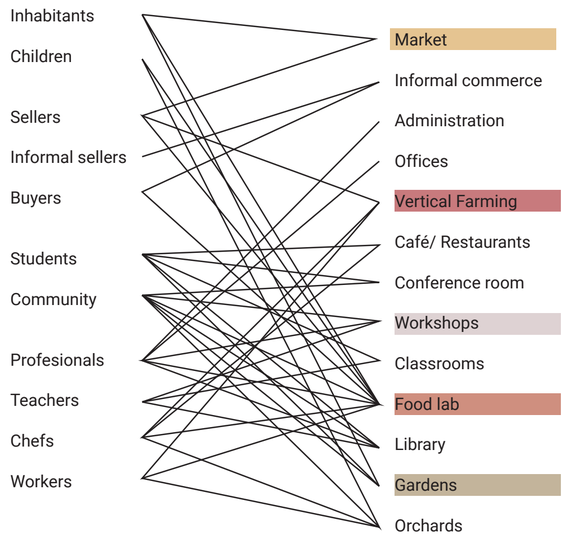


Figure 75. Users/Functions
Own work

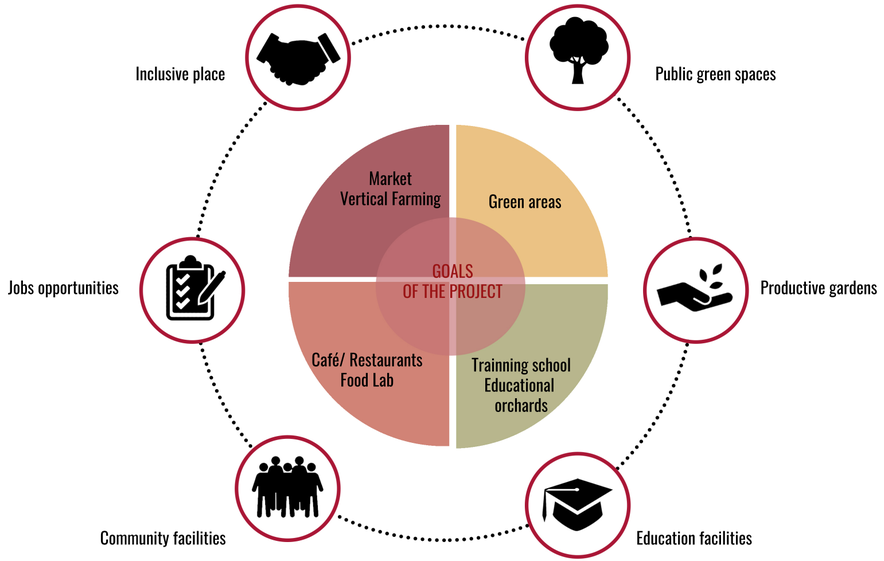
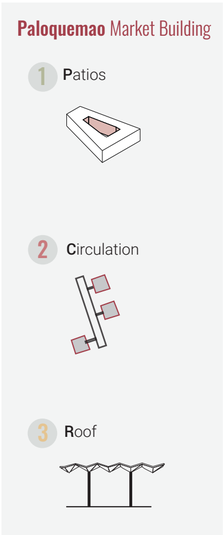
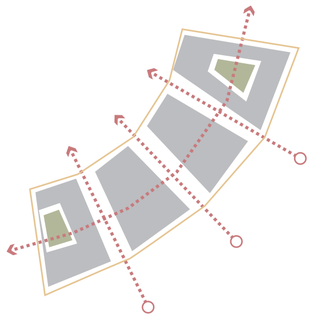
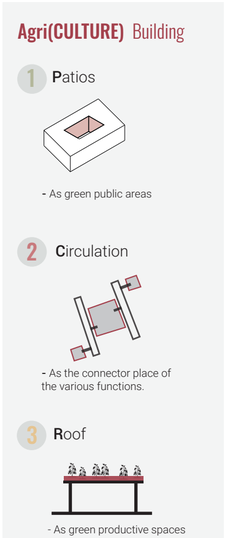


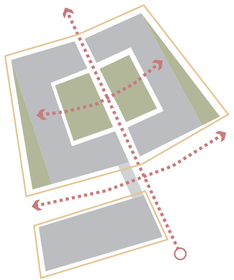
Figure 76. Goals of the project
Own work

Concept





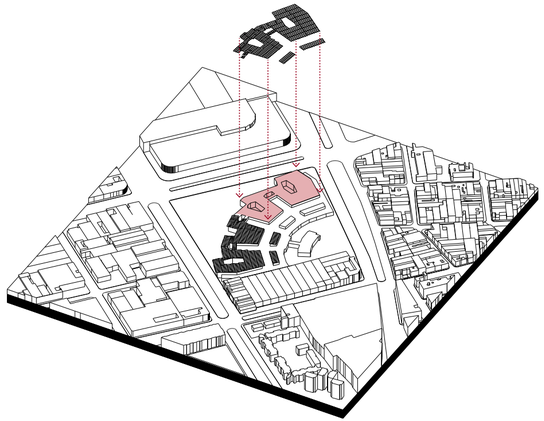




Once the architectural analysis has been made, the identification and reinterpretation of the existing elements, whose define the shape of the spaces and the current dynamics within it, allows to create the concept of the new building, which aims through urban agriculture to generate a direct relationship with the existing market, thus creating a single square, taking into account the courtyards, the circulations and the roof as key components in its design.

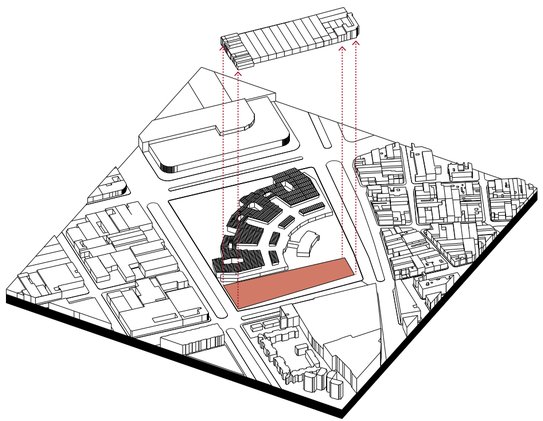
Figure 77. Building Concept
Own work

Design Process



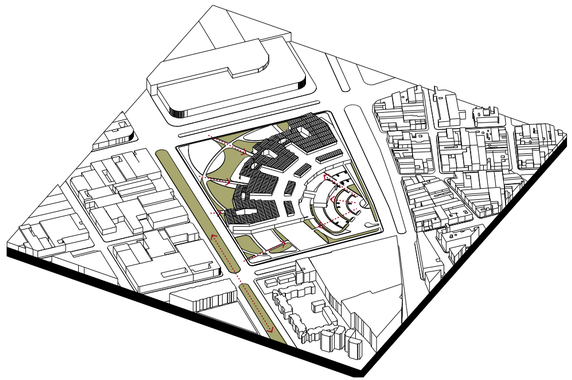
1 ADDITION

The rehabilitation of the market consists of finishing of the roof part that is missing nowadays, as it has an appreciable architectural value and, inside, proposing the remodeling of the commercial stands.



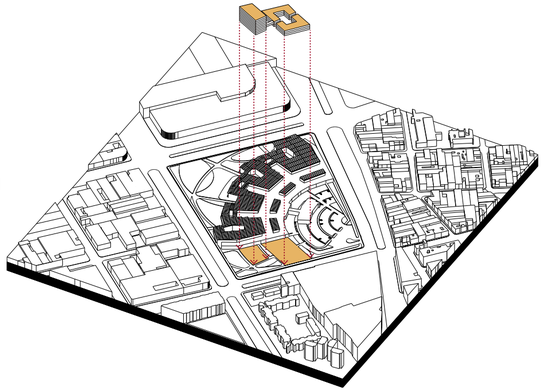
2 SUBTRACTION

The demolition of the actual warehouses to liberate that facade of the lot that does not allow a relationship between the market and the surrounding context.



3 INTEGRATION

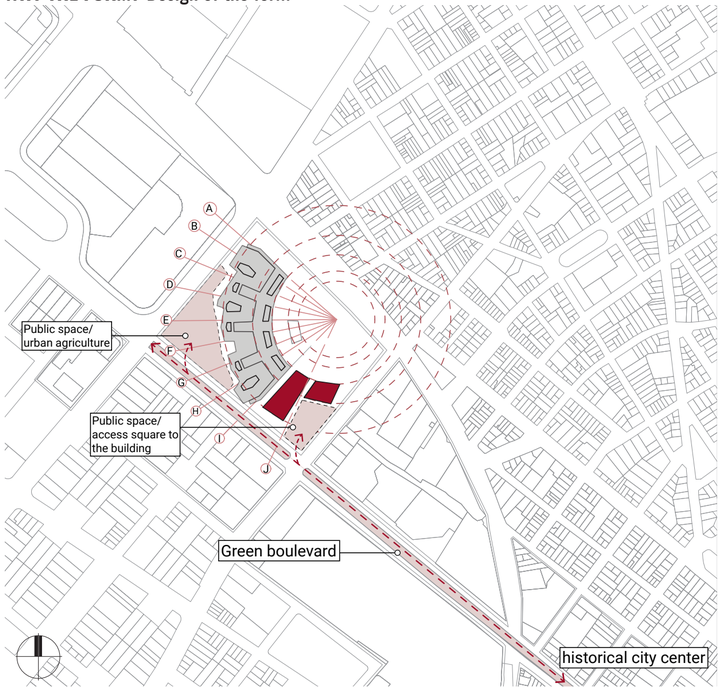
In the space that currently has no defined use, the integration of a flexible public space is proposed that serves as a connection between the neighbourhood and the city and also a meeting point between the inhabitants, where also, are include urban gardens to promote new ways of food production.



4 CREATION

Designing a new building where uses that promote culture and agricultural production meet. A mixed-use building is proposed, consisting of vertical farming, gastronomic school, co-working spaces and restaurant areas, which will attract new users to the sector and become a benchmark within the city.

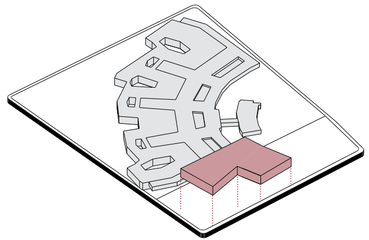
WHY THE FORM? Design of the form



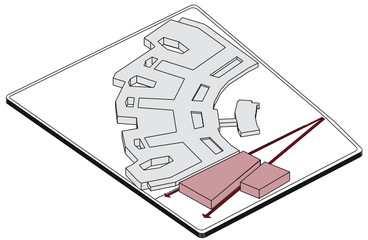
For the design of the building, we take as reference the existing axes and circulations, in order that the new building does not compete with the current structure of the market, but on the contrary, that it complements it. The building is thought of as separate volumes that join each other through circulations that in turn connect with the rest of the context, generating a permeability between the current dynamics of the square and the proposed new functions.

LEGEND
- Circulations
- Axis
- Existing building
- New Building

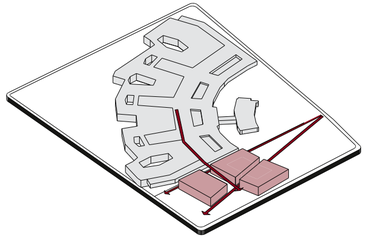
Figure 78. Design of the form
Own work



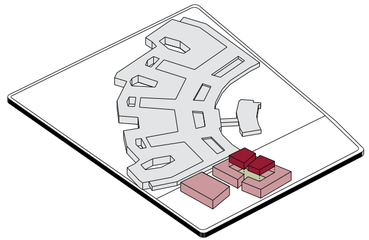
Base Volume



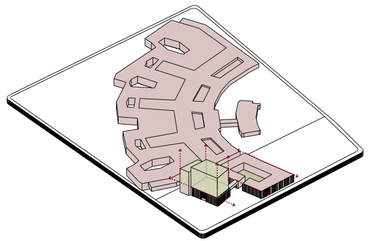
Divide the volume to generate circulation in public space



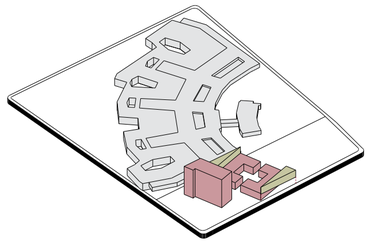
Extension of the transverse circulation of the existing building



Volume extraction for general internal patio



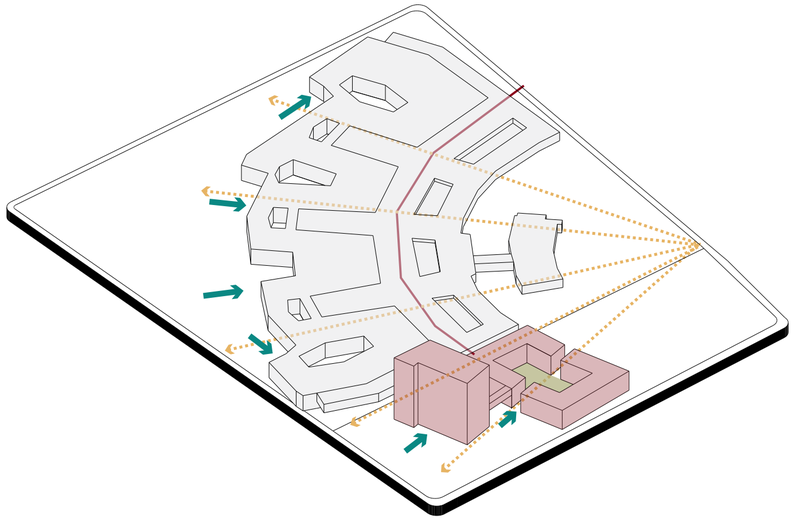
Alignment of the height of the project with respect to the market, only the vertical farming building grows up.



The internal shape of the building is regularized for the correct operation of the program and green patios are inserted adapting the building to the external morphology of the lot.

Approach to the building

Accesibility

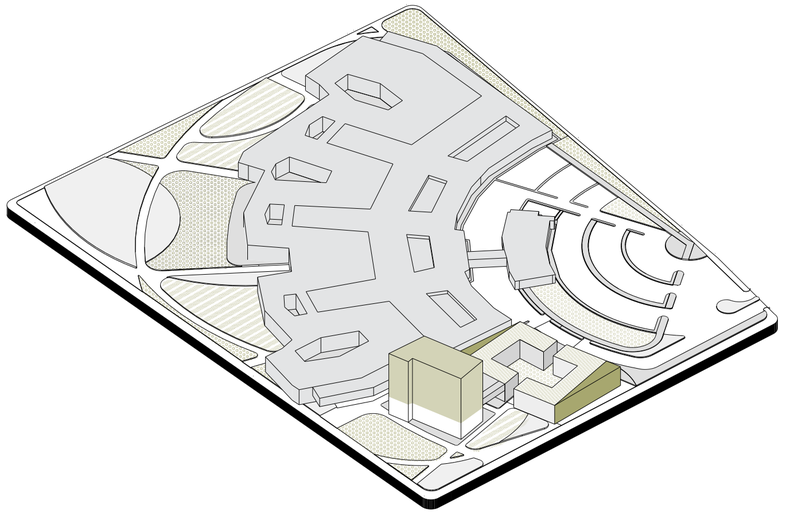


LEGENDA

- Entrances
- External/Internal paths
- Internal paths

Figure 79. Accesibility
Own work

Green Areas



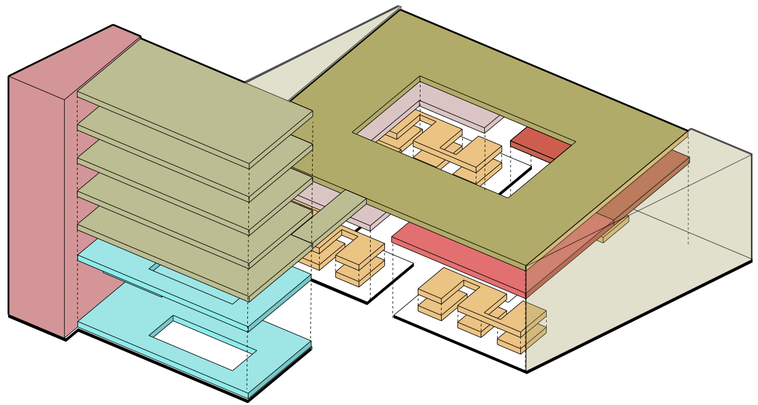
LEGENDA

- Urban Farming
- Internal garden
- Public green spaces
- Urban Orchards
- Green roof

Figure 80. Green spaces
Own work

Program

Funtions

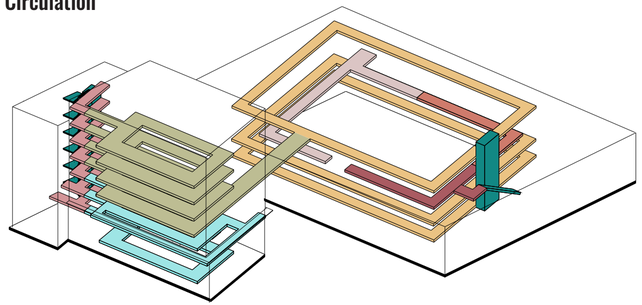


LEGENDA

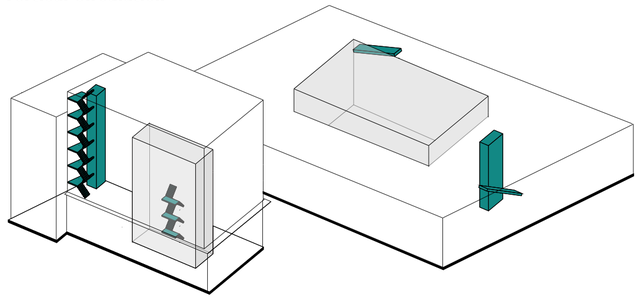
- Administration
- Services
- Urban Farming
- Restaurants/Bars
- Food lab
- Exhibition space
- Trainning school
- Public terrace

Figure 81. Program
Own work

Circulation



Vertical Circulation



The circulation is proposed as a continuous journey, with the intention to generate a relationship between the users and the different functions proposed by the building, understanding circulation as a perceptive line that is linking different spaces. For this reason, circulation develops around the voids; these cause the circulation to be divided into three main types:

1. Large circulation spaces at ground level, which opens up the function of commerce and restaurants *(public)*.
2. Uninterrupted horizontal circulation leading to food lab, exhibition area and trainning school *(semi-public)*.
3. Vertical circulation cores.

Figure 82. Circulations
Own work

Solar Estrategies

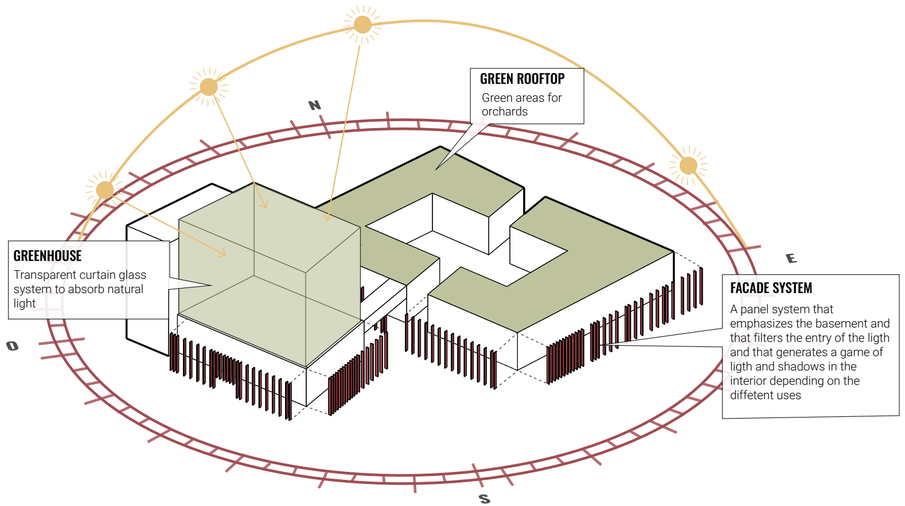
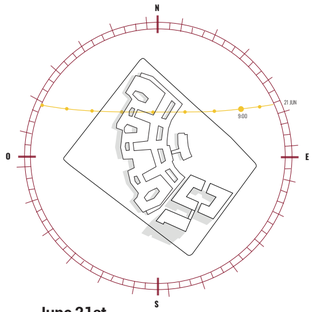
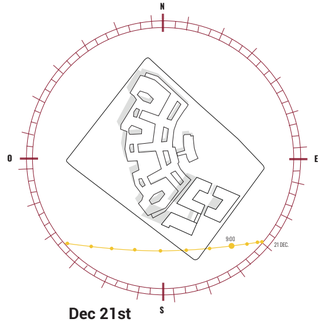


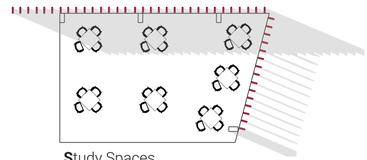
Figure 83. Solar strategies
Own work



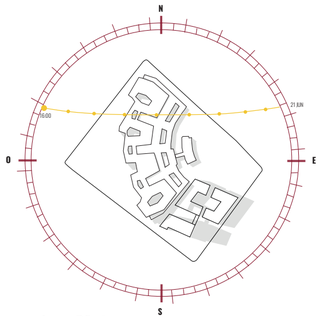
June 21st
9:00 am



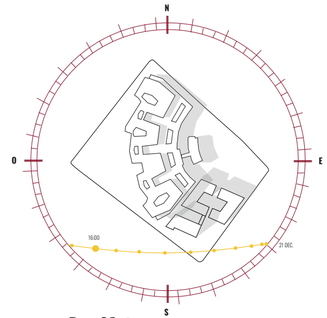
Dec 21st
9:00 am



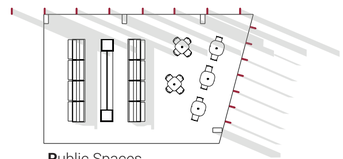
Study Spaces



June 21st
4:00 pm



Dec 21st
4:00 pm



Public Spaces

The double façade is proposed as an architectural solution to take advantage of the natural lighting within the project, where each space has the right distances to allow the proper sunrise depending on the privacy of the same.

Figure 84. Solar analysis
Own work

URBAN AND ARCHITECTURAL PROPOSAL

Architectural References

01

Pabellón de España. Expo Zaragoza

Location: Zaragoza, España
Year: 2008
Tipology: Public Building
Relation with the proyect: Facade System/ Geometric layouts

02

DINAMIZA Business Park

Location: Zaragoza, España
Year: 2008
Tipology: Office Building
Relation with the proyect: Facade Solutions

03

Urban Farmers

Location: The Hague, Netherlands
Year: 2012-2016
Tipology: Vertical Farming
Relation with the proyect: Plans layout

04

Horticentro de Utadeo

Location: Bogotá,Colombia.
Year: 2019
Tipology: Greenhouse
Relation with the proyect: Food production system in the city.

05

Mercado del Río

Location: Medellin,Colombia.
Year: 2016
Tipology: Market
Relation with the proyect: Café/ Restaurants solutions.

06

Pasona H.Q. Tokyo

Location: Tokio, Japan.
Year: 2011
Tipology: Commercial- offices building
Relation with the proyect: Offices areas.

07

Escuela Bancaria y Comercial Aguascalientes

Location: Aguascalientes, Mexico.
Year: 2018
Tipology: Commercial- educational building
Relation with the proyect: Structure

08

Lotte World Tower

Location: Seoul, South Korea.
Year: 2017
Tipology: Mix-use building
Relation with the proyect: Inside green spaces.


GENERAL PLAN
SCALE 1/1500
0
5
10
15
20

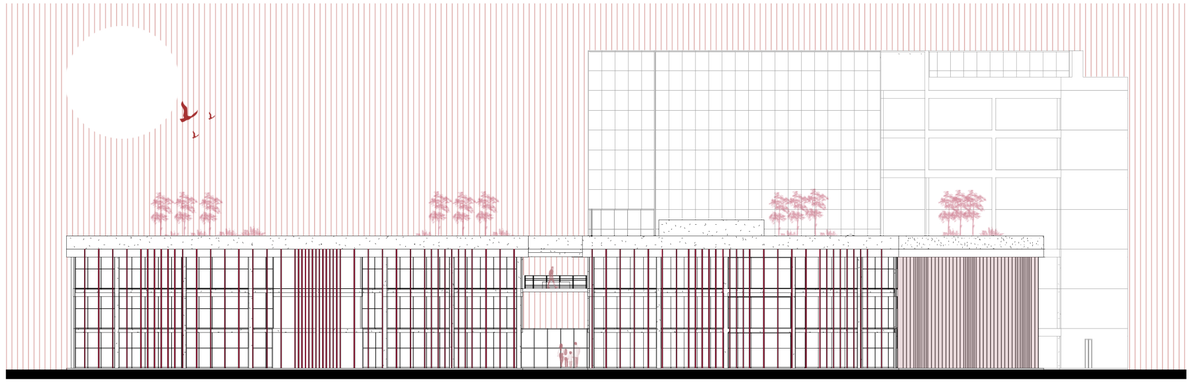

PALOQUEMAO MARKET


GROUND FLOOR
SCALE 1/500
0 5 10 15 20

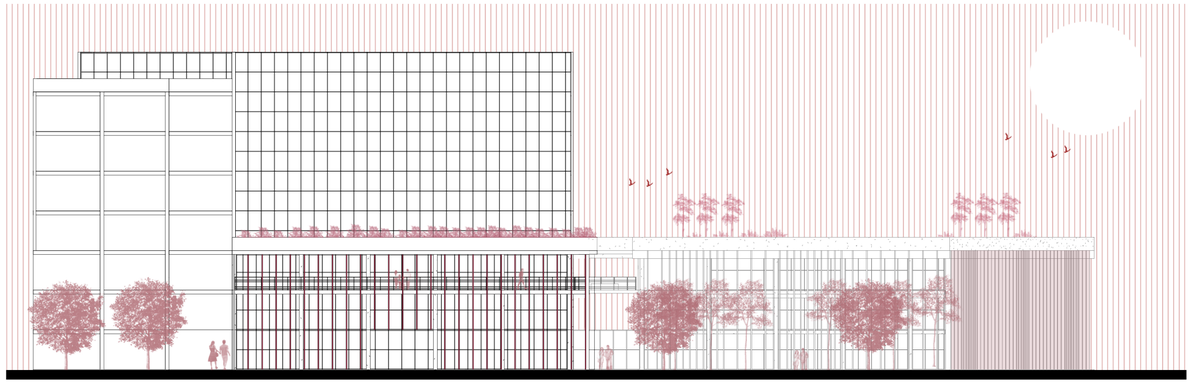

+3.00
SCALE 1/500
0 5 10 15 20


+6.00
GROUND FLOOR
0
5
10
15
20

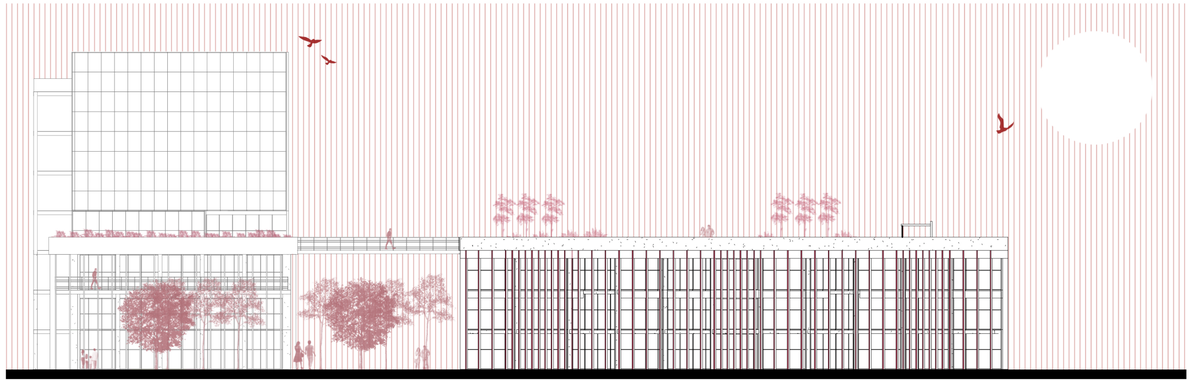

+9.00
SCALE 1/500
0
5
10
15
20



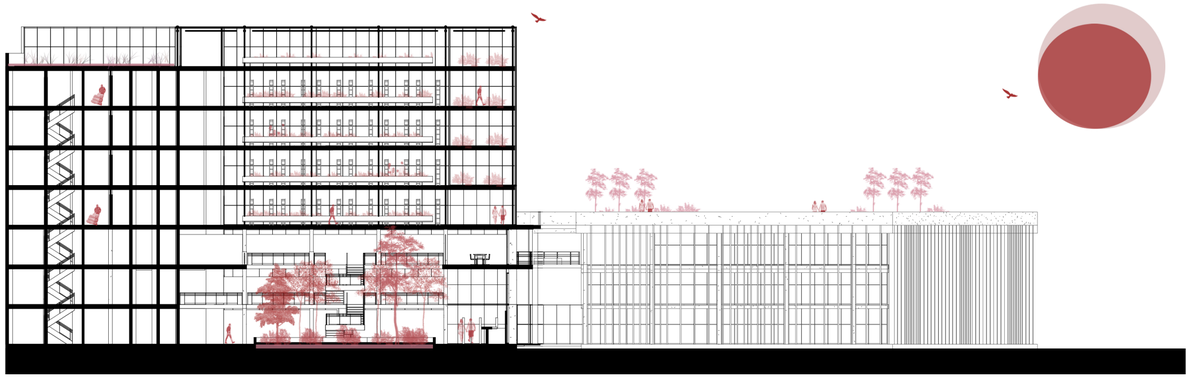
NORTH FACADE
SCALE 1/250



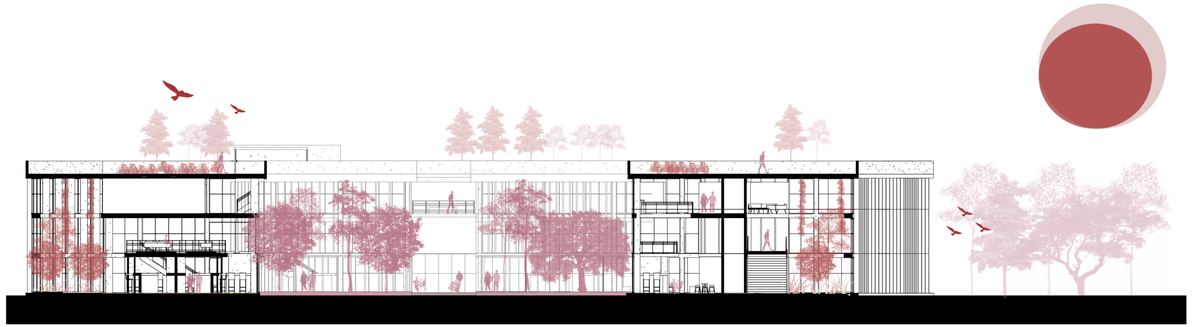
SOUTH FACADE
SCALE 1/250



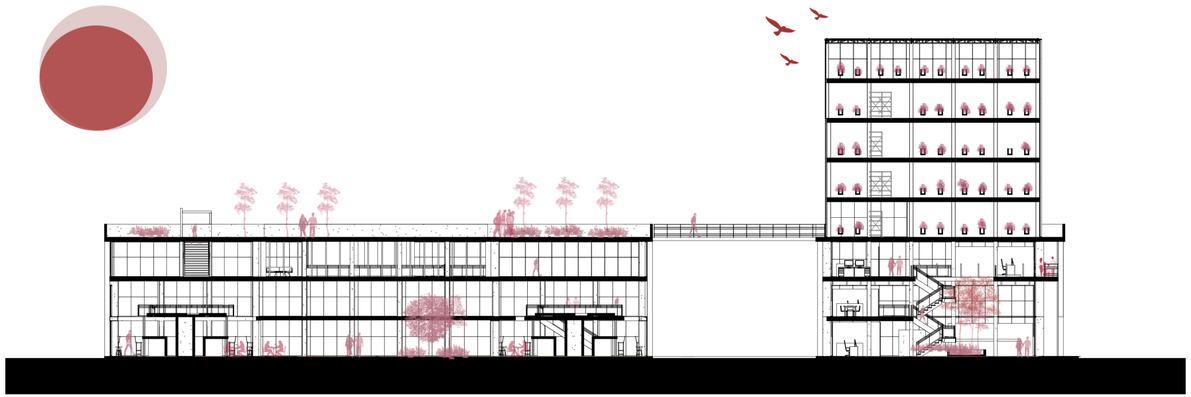
EAST FACADE
SCALE 1/250



SECTION 1
SCALE 1/250



SECTION 2
SCALE 1/250



SECTION 3
SCALE 1/250

Sustainable Strategies

Masterplan scale

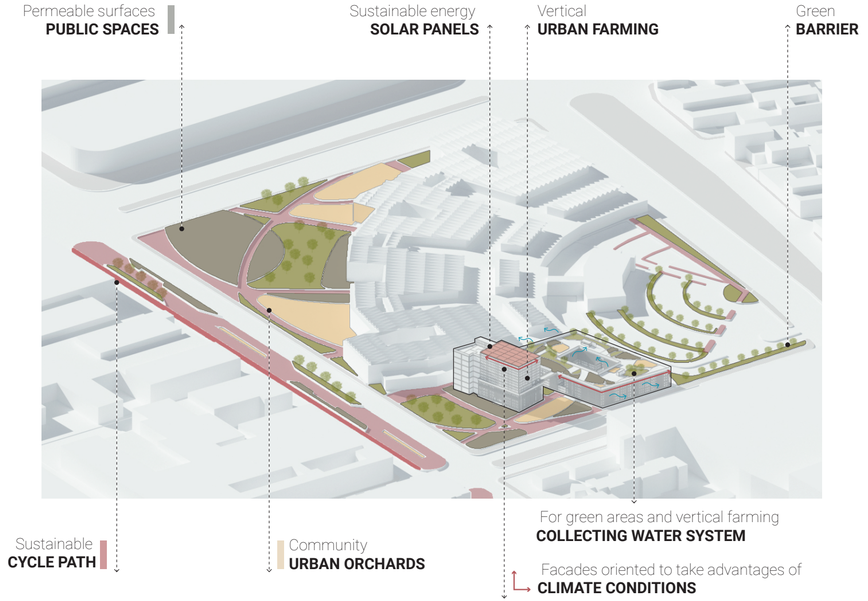


Figure 85. Sustainable strategies
Own work

Food Production

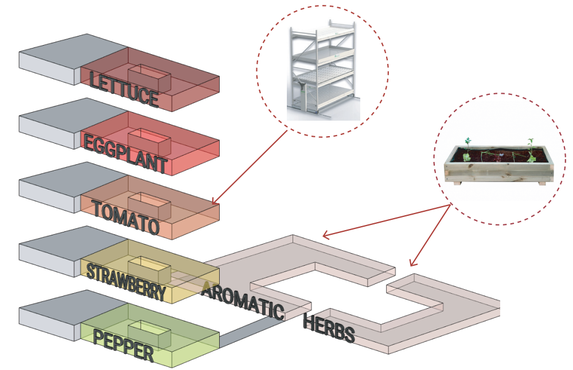
The diversity of geographic, climatic and biological characteristics that shape the different ecosystems in the country, the cultural wealth, its equatorial location and the interaction between these factors make Colombia a territory with the potential to produce a great variety of plant species throughout the year, including fruits and vegetables, for internal and external consumption.

Colombia produces around 30 different vegetables mainly destined for the domestic market where, among the most consumed are: rice, eggplant, coffee, onion, lettuce, corn, potato, pepper, tomato and carrot. Regarding its production, it was found that the regularity of the supply depended mainly on short-term decisions of the farmers determined by reasons of price, supply and the health status of the crops.

Based on this, **the 5 vegetables that could be produced under hydroponic techniques** were chosen, incorporating them into the project and making an approximate calculation of how much their annual productive capacity could be.

Figure 86. Products most consumed by Colombians
Own work

Organization



*Each floor has 84 mq of growing areas
+ 164 mq of green roof (urban orchards)

2-3 KG/MQ
Annual crops: 03

5-6 KG/MQ
Annual crops: 02

7-10 KG/MQ
Annual crops: 04

8-12 KG/MQ
Annual crops: 06

30 UNITS/MQ
Annual crops: 04

Figure 87. Distribution and calculation
Own work

Approximate Output

972 kg/year

1.008 kg/year

3.360 kg/year

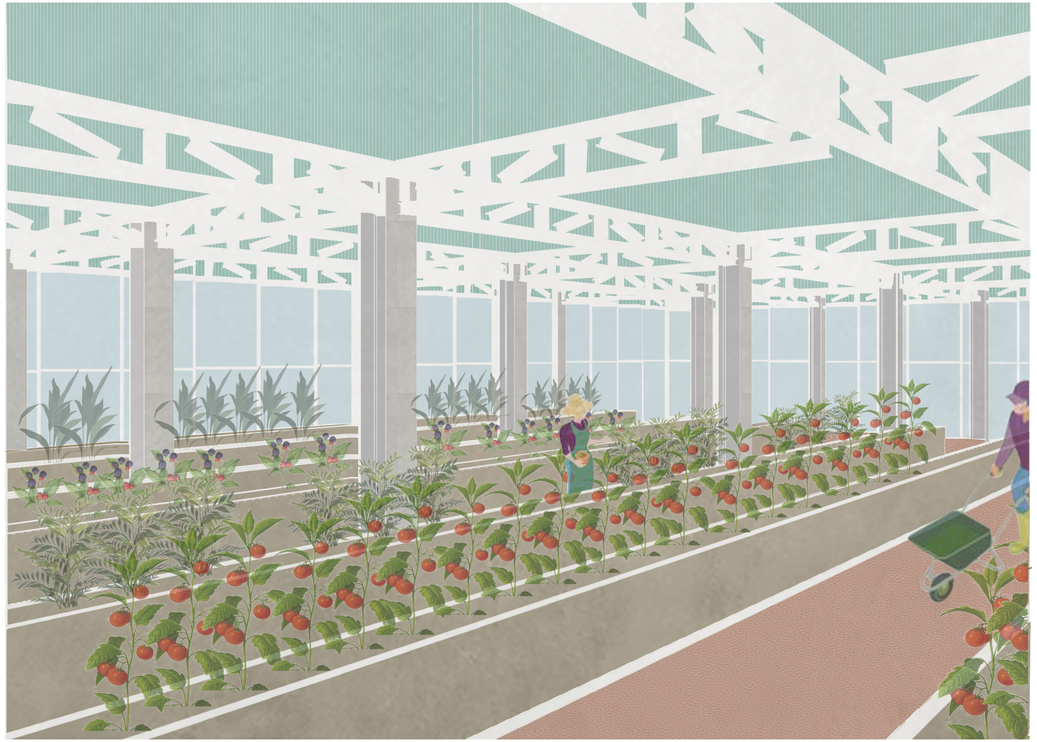
4.536 kg/year

10.080 units/year

How was it calculated?

1. The area of each growing rack was considered to know the useful area for food production.
2. The types of food to grow were selected according to the food preferences of the Colombian population and those that could be cultivated with a hydroponic system.
3. Then, the cycle time of each food was calculated and the space required to know the production per square meter.
4. Finally, that value was multiplied by the area available for each food.


FOOD LAB



CONCLUSION

Inhabit the agri(culture) represents an investigation of the relationship of agriculture with Latin American cities, specifically studying the case of Bogotá, Colombia. We analyzed the aspects that defined urban growth and how as a consequence these generated a negative impact on the relationship between the countryside and the city, producing a problem in the food chain of a metropolis city such as Bogotá.
This provided an important starting point for reasoning about the future possibilities of the city, and the role that an architectural project can take to be the link between a new food production system and urban development itself. Understanding that the insertion of urban agriculture within cities is a subject urgently pursued in recent years in many parts of the world to promote greater awareness of the food consumed and its origin.

The proposed project, takes as a workplace the neighborhood "los martires" and specifically the market building of Paloquemao. This neighborhood over the years has presented different social moments that have defined the character of the sector, in turn being one of the first neighborhoods to be founded in the city, and has suffered the consequences of the accelerated economic and population expansion generating in the sector social segregation and government abandonment. Thus, understanding the neighborhood as a mostly industrial and commercial area, has been put aside the development of public space and the abandonment of cultural assets that are located in that neighborhood. Based on this socio-economic problem, it is considered to implement a new mixed-use building that, through indoor food production, commercial, educational activities and urban regeneration can create new dynamics that support and strengthen the commerce of the zone, consolidating the role of the marketplace in an economic, historical and cultural aspect and making it a point of reference within the city and thus integrate community with agriculture and architecture.

In conclusion, the design of this new building can be considered an innovative model inside the Latin American cities that are constantly expanding, being the first indoor cultivation building within the country, that beyond producing food, creates an experience, from production to consumption, fostering food chains in km0 by complementing existing activities within the current market and ensuring more conscious food choices, towards the definition of an increasingly sustainable city.
Becoming a key point in the urban regeneration of a sector that today is deteriorated, with high levels of insecurity and with few green spaces that allow a better quality of life.

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