



| Unsealing Tokyo Suburbs  
A strategy to create an eco-district through Co-housing and Agriculture

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POLITECNICO DI TORINO  
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Kaminarimon  
Picture by the author in Tokyo, Japan





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## | PREFACE

This project was carried out under the supervision of the teacher Claudia Cassatella and Mauro Berta and in conjunction with the work carried out by students of the Politecnico di Torino and the University of Tokyo in the workshop held on March 2018 MTA "Planning for the Global Urban Agenda, Shaping Ecodistricts in Tokyo Suburbs"

I would like to thank all my supervisors for their dedication in guiding my project, in the same way the professors, assistants and students of the University of Tokyo and Politecnico di Torino within the joint project UNI-UNA, my colleagues of the MTA and all those who had to do in some way in the development and finalization of my thesis.

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Cityscape of Tokyo  
Picture by the author in Tokyo, Japan

## | INTRODUCTION

Tokyo is currently considered one of the most efficient, productive and sustainable cities in the world, it is characterized mainly by its concentration of inhabitants per square meter, considering it as one of the densest metropolises in the world, as a result of this there where created new ways of managing, perceiving and designing the space for the context that is presented.

Opposing the aforementioned of the spatial reality, the way in which space is inhabited and used in Tokyo is Nishi Tokyo; a city located on the west of the 23 wards of Tokyo. This city presents characteristics almost opposite to those of Tokyo by being only one hour in public transport of the capital.

Nishi Tokyo is characterized as a low-density residential neighborhood with agricultural labor, spatially the urban grid generates large gaps of green areas in the middle of the residential conurbation; a rapid non planned urbanization because of the conflicts between the parts is currently taking place leaving agricultural areas without connection among them within the urban fabric of the neighborhood.

The urban agricultural lands contribute to the sustainable provision of fresh food, the prevention of floods (environmental problem of the neighborhood), and also as a form of entertainment and hobby for the inhabitants.

These agricultural lands are decreasing considerably due to the lack of farmers and financial concerns of the management of these productive areas and also because the agriculture labor is not recognized as a profitable business.

On the other hand, the unplanned rapid urbanization that extended from Tokyo to Nishi Tokyo results in an inefficient use of the land, in the same way the demand for housing (apartments) is increasing and the necessity to renovate the existing buildings is in force due to the oldness of existing structures (they do not comply with the resistant earthquake norm).

Based on the above, two current scenarios of the neighborhood are identified, in first instance the reduction of production areas (replaced by housing projects) due to the low population of farmers in the area and in second instance, the need to renovate existing buildings and increase the demand for new housing units.

These two scenarios work as a central part for the development of a new model of organization for the productive green areas in relation with new social housing projects. The objective of the project is to create shared common spaces guided to the correct and adequate functioning of the productive areas, thus generating a sustainable district in terms of self-production and spatially suitable for the inhabitants.

By the re-designing of the urban fabric and the implementation of a new model of Housing with shared spaces for the daily necessities and for the agricultural purposes it's possible to maintain and improve the vocation and the quality levels of the people that lives in Nishi Tokyo to convert and mutate the city into an eco-district.





Tokyo Skyline  
Picture by the author in Tokyo, Japan

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## | CHAPTER ONE

### Tokyo

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# 1. Tokyo, Japan

## | Urban Growth

Tokyo is currently considered one of the most efficient, productive and sustainable cities in the world. It is the mega-region that in terms of population and extension is the largest in the world with 35 million inhabitants (2007) comprising the Tokyo Metropolitan Jurisdiction (TMG) and the three prefectures of Kanagawa, Chiba and Saitama, covering approximately 13,551 km<sup>2</sup>.<sup>1</sup>

The metropolitan prefecture of the city of Tokyo is composed of 23 districts, 26 cities, three villages and a small village. The 23 districts are those that form the metropolis of Tokyo in an area of 2,187 km<sup>2</sup> where 13 million people live with a density of 15,000 people per km<sup>2</sup>. Statistically Tokyo is the city with the largest urban agglomeration in the world surpassing other mega cities such as New Delhi (India) with 26 million inhabitants and Shanghai (China) with 24 million inhabitants, Mexico City (Mexico) and Sao Paulo (Brazil),

both with 21 million inhabitants.<sup>2</sup>

The expansion of the city of Tokyo occurred in the twentieth century, the population of the city grew from 7.5 million inhabitants in 1920 to approximately 35 million in 2007<sup>3</sup>, the goal of the city in that time in terms of planning was to expand the urban area in order to deal with the uncontrolled growth that the city was having.

There are different factors that generated the exponential growth and development that the city had in the twentieth century, the principal reasons were the development of suburban railways in 1920, the planning system of 1919 and the earthquake of 1923 of magnitude 7.8 on the seismological scale of Richter who destroyed the port city of Yokohama as well as the near prefectures of Chiba, Kanagawa, Shizuoka and Tokyo with almost 140,000 people dead and missing and

<sup>1</sup> See (Murayama & Okata, Tokyo's Urban Growth, Urban Form and Sustainability, 2010, p. 15) information about actual inhabitants in in Tokyo Metropolitan Jurisdiction.

<sup>2</sup> Data source: United Nations, Department of Economic and Social Affairs, Population Division (2014). World Urbanization Prospects: The 2014 Revision.

<sup>3</sup> See (Murayama & Okata, Tokyo's Urban Growth, Urban Form and Sustainability, 2010, p. 16) Tokyo's growth over the years.

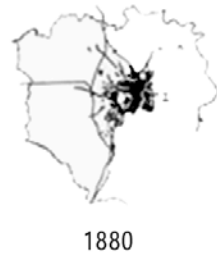


300,000 houses destroyed.

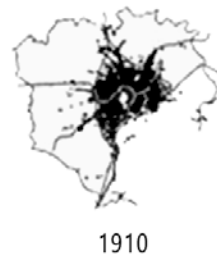
The earthquake worked as a trigger for the reconstruction and new suburban development of the cities of Japan and even more of Tokyo. After the earthquake, a city reconstruction plan started to be developed but because of the high budget, only a part of what was planned was built. In 1930 until 1950 new plans for developing a green belt that controls the ex-

pansion of the city above the suburban areas were purposed but this plan could not be carried out due to several problems leaving behind ineffective and inconclusive actions for the implementation of the green belt.

Much of Tokyo's urban expansion was led by urban and sub-urban railway development. The inauguration of the first subway line between Asakusa and Ueno in 1927 started the big process of growth in Tokyo.



1880



1910



1940



1970

## | Density and Transport - Evolving a Metropolis in a Megalopolis

Tokyo has an extremely high population density, 6,158 persons per km<sup>2</sup> as consequence the most populated city in the world. Taking into account the urban growth that Tokyo had through history, the city began to grow following the development of the railway, leaving as a consequence the conurbation of what was Tokyo with the urban settlements near it such as Yokohama, Kanagawa, Saitama, Chiba, Kawasaki and Maebashi transforming the city in the one of the most populated megalopolis after Guangzhou, China.

Between 1940 and 1945 the population of Tokyo that was 7.35 million inhabitants had a decrease of almost 50 % due to the war and the bombings that the city received ending in a population of 3.49 million people. After the war, the population of the city increased gradually exceeding 8 million people only 10 years after the war.

After 1968 the rate of population growth stabilized and a more gradual growth of the population began to be seen, reaching 12

million people in the 2001.<sup>1</sup>

Tokyo city expansion involves the dispersion of the human population away from the urban centers to low density areas, the sprawl is defined by Robert Bruegmann as a "logical consequence of economic growth and the democratization of society" (Bruegmann, 2005), this is considered as a phenomenon of the modern city caused by economic change and demography change. The urban sprawl is a dynamic process that brings several problems with it as territorial problems, reducing existing green areas in the suburbs due to expansion, lifestyle problems due to increased pollution, greater energy consumption and more stress due to the need for movements between places distant, social problems such as the deterioration of the city itself, the exclusion of the suburbs and transportation problems, increasing the number of vehicles, higher infrastructure costs.

Having such a high population in a large

<sup>4</sup> (Tokyo Metropolitan Government) TOKYO'S HISTORY, GEOGRAPHY, AND POPULATION, Trends in Population in Tokyo

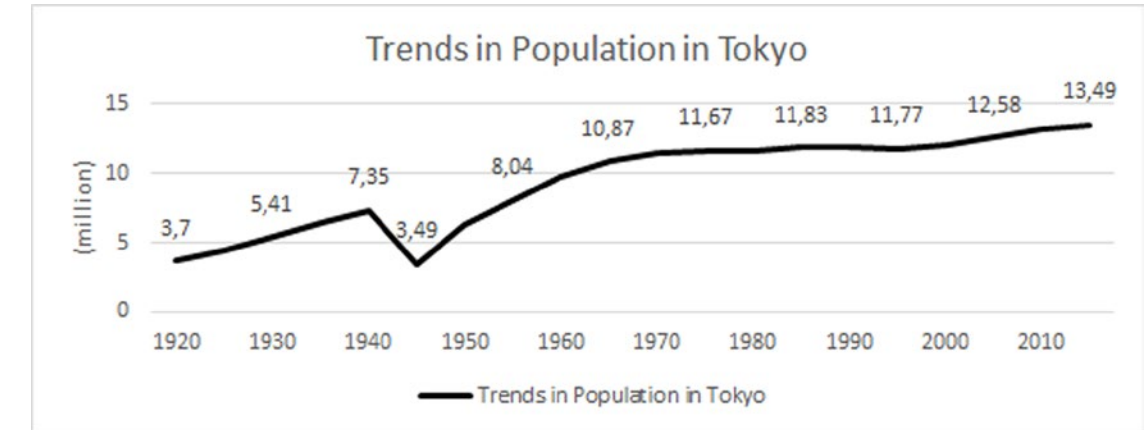


territory the city the transport infrastructure had to respond to the demand of people to move each day long distances in not very long time. It is common for people in Tokyo to last approximately one hour to arrive daily at their jobs, for this reason the railway infrastructure proposed by the Japanese's is one of the most extensive and organized in the world. Tokyo from the beginning was conceived as a transit-oriented city. Near the main stations, it is evident how the mixed uses appear in much denser buildings, in the sub urban stations other characteristics are seen, the densification can continue but the infrastructure and the road profile are not enough, narrow streets without sidewalk characterize this suburban scenarios. The transportation network of Tokyo is composed by public and private rail and highway networks (trams, monorails, subway, trains) and bus companies, the urban railway network includes 158 lines with 2,210 stations that transport 40 million passengers a day.

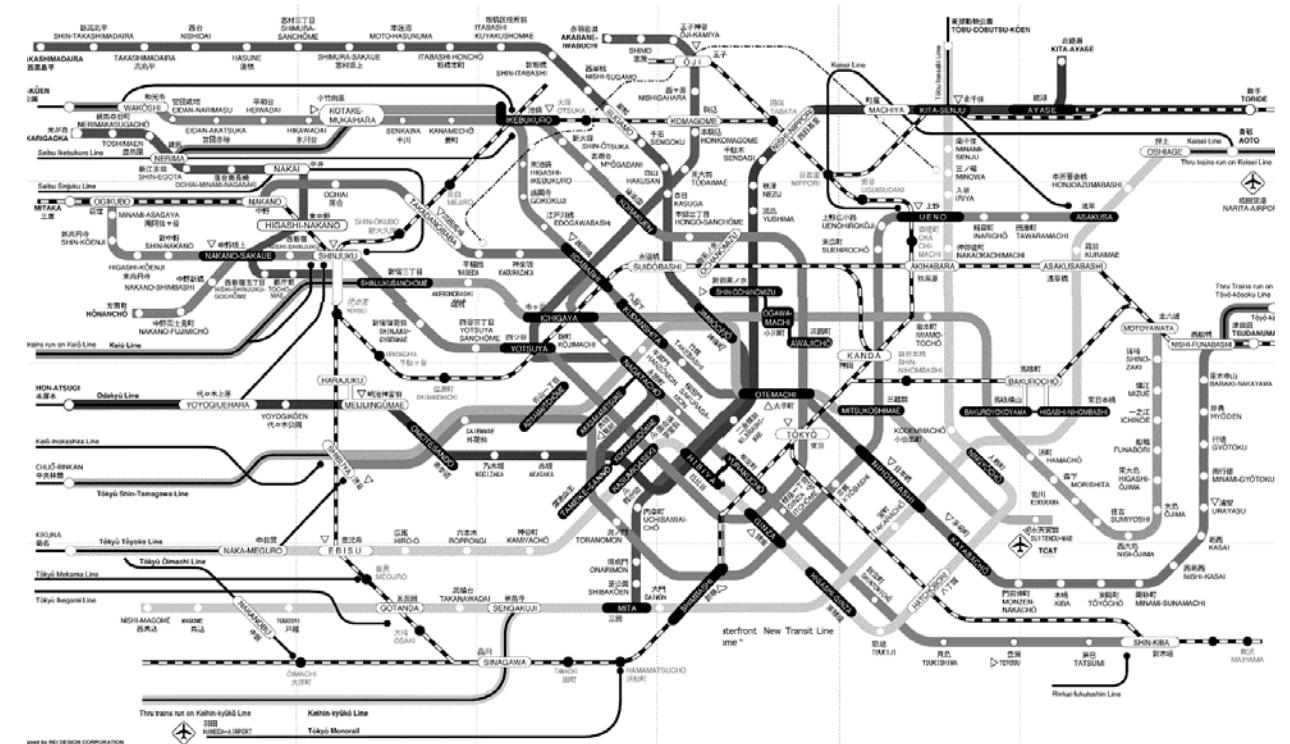
Taking into account the area of Tokyo is 2,188 km<sup>2</sup> the routes of transportation need to be effective to decrease the time that the people spend inside it. There is an urban phenomenon that is called the Pendular Movement, it refers to the displacement from the place of residence to the place where the academic or laborative

activities take place. In Tokyo the amount of time that people spend on public transport to mobilize to their destinations is very high, this does not generate a structural change in the population of the city since it is a transient movement that is generated every day, but from this phenomenon derives social problems for the people of the city as fatigue, reduced social relations, health problems due to the contagion of viral diseases and high amount of money spent.

Tokyo has unique physical characteristics that make it an interesting case study, thanks to the characteristics already mentioned the ways of living, the ways of inhabiting the space and the way in which space is perceived are completely different to how they are perceived in an European or American city.



Sources: Statistics Division, Bureau of General Affairs, TMG; "Population of Tokyo (estimates)" Ministry of Internal Affairs and Communications; "Population Census"



Sources: TokyoMetro.jp

## | Way of Living

Due to the area that Tokyo occupies and its density, the inhabitants have had to adapt to particular conditions of living, the spatial limitations that the city had leaves as a consequence special architectural solutions. The city itself offers products and services anywhere, a model of immediate satisfaction.

One of the solutions that the Japanese found to design and generate diversity of uses in spaces of small dimensions was created by Kiro Kurakawa in his project Nakagin Capsule Tower (1972) where he gives a solution to the disproportionate increase of the population that leads to the increase of the territory of the cities. As a solution he proposes a mega structure designed for people who work in the center of Tokyo but who lived in the suburbs at considerable distances or in some cases in other cities but due to their work they had to stay in Tokyo. The building had the function of hotel, office or dormitory.

The creation of this structure justifies the impediment of taking public transport to return home, giving as a possibility to stay close to work.

The project is composed of two structural

cores of eleven and fourteen stories high that contain the services and facilities to which 140 capsules of 8 different types are added.

This structure was revolutionary in the time being part of the Japanese Metabolist movement, it raises an unfinished architecture that has the possibility of changing over time, but that also does not leave the Japanese tradition aside, the design and the proportion of the capsules is under the concept of the Japanese tatami.

This project can be considered as the pioneer of a bit more contemporary projects of hotels in Tokyo. The so-called capsule hotels come under the same concept as the Nakagin Capsule Tower, this is an economic option of shelter for tourists but also still giving the possibility to the people of Tokyo to stay in the city center close to work avoiding long displacements.

Like this project, Tokyo is full of functional architecture that responds directly to immediate needs as the authors of Made in Tokyo said "They are not "pieces" designed by famous architects. What is nonetheless



Nakagin Capsule Tower  
Source: LEGO



respectable about these buildings is that they don't have a speck or fat. What is important right now is constructed in a practical manner by the possible elements of that place. They don't respond to cultural context and history. Their highly economically efficient answers are guided by minimum effort. In Tokyo, such direct answers are expected. They are not imbued with the scent of culture, they are simply physical "building"" (Kajima, Kuroda, & Tsukamoto, 2016, p. 12).

The functional architecture is a very important aspect of Tokyo buildings, the reduced spaces create the necessity to increase the floors of the buildings but also to combine different uses in the same space. The accumulation of uses in one place results in hybrid buildings where the urban space evolves in a multifunctional space where anything can happen.

A few examples of this hybrid buildings are constructions with peculiar characteristics, the billboard apartment<sup>1</sup> house have special characteristics letting the publicity take the protagonist of almost all the building

and letting the principal purpose of it as a secondary characteristic, this example is important for the understanding of the mixing uses and as a model of the immediate satisfaction society where the publicity takes a huge role. The named super car school<sup>2</sup> shows another type of hybrid building that mix the uses of supermarket and driving school letting the driving school in the roof of the two layer supermarket.

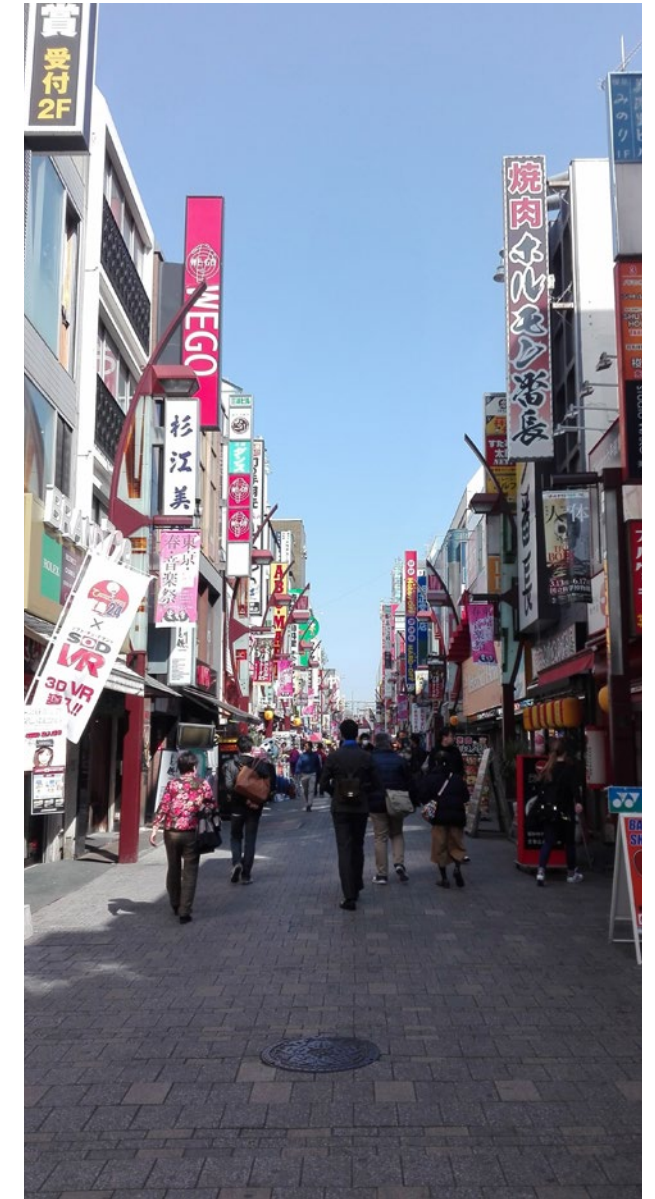
A new conception of development was created by the simple need of the city and the human being who lives in it. As well as the Nakagin Capsule Tower, the capsule hotels and the different and innumerable typologies of "hybrid" buildings, the city of Tokyo created a new way of inhabiting and perceiving the space responding to the needs of the people and the social development of the city.

<sup>5</sup> (Kajima, Kuroda, & Tsukamoto, 2016, p. 80) Billboard apartment house  
Function: billboard + apartment house (the billboard and the building below are almost the same size.

<sup>6</sup> (Kajima, Kuroda, & Tsukamoto, 2016, p. 98) Super car school  
Function: Supermarket + driving school  
On top of a double layer supermarket lands a layer of driving school



Hybrid Buildings  
Picture by the author in Tokyo, Japan



Billboard predominance  
Picture by the author in Tokyo, Japan



## 2. Tokyo Suburbs

Due to the huge expansion of Tokyo after the war, a demographic and a territorial growth started having as a consequence a combination of uses in urban and rural areas. Consequently they began to implement western urban planning concepts such as Zoning and the Green Belts that may help to control and retain the growth of the city towards the sub urban areas. The Zoning was implemented in Tokyo to separate the urban areas from the suburban areas<sup>1</sup>, in this way to contain the excessive growth of the city, likewise the green belts were raised to promote the creation of a specific order between the same.

Because of the economic growth of Japan in the 1960s the people of the rural areas start migrating into the big cities where they can found more opportunities for development. This rapid and massive migration ends in an uncontrolled land use of the suburbs. The city planning zoning act was created by the National Government to manage the situation, under the area division systems

two areas where created, the urbanization-promotion areas (UPA) and the urbanization-control areas (UCA), both differentiated by the urban growth of each area with the objective of creating high quality urban areas. The UPA are zones that include existing urban areas that should be promoted to be urbanized in the next 10 years, the UCA are zones that include rural areas without urban development or with control of it.

In the Urban Promotion Areas (UPA) the Ministry of Land, Infrastructure, Transport and Tourism made the Introduction of Urban Land Use Planning System in Japan that apply for the cities of Tokyo, Osaka and Nagoya where they divide in twelve categories of land use depending of each type of urban area that is analyzed. They are divided by its main vocation residential, commercial and industrial character but also taking into account what they want to be in future instances.

Six Residential land use zones as:

- Category I exclusively low-rise residential zone
- Category II exclusively low-rise residential zone

<sup>1</sup> Implementation of western urban planning concepts (Watanabe, Takeuchi, Yokota, Makoto, & Yokohari, 2008) Abstract

- Category I mid/high-rise oriented residential zone
- Category II mid/high-rise oriented residential zone
- Category I residential zone
- Category II residential zone

Six Non-Residential land use zones as:

- Quasi-residential zone
- Neighborhood commercial zone
- Commercial zone
- Quasi-industrial zone
- Industrial zone
- Exclusively industrial zone<sup>2</sup>

Through the classification of Land Use it is possible to control the height, the volume and the use that they want to give to the area in the future.

After the economic boom that the city of Tokyo witnessed, the city entered in a stable phase of low growth, so the maintenance and improvement of Tokyo suburbs began to be a priority when the population migrated towards the city center. With the sprawl of the city into the suburbs,

the agriculture in the rural areas were directly affected. As a consequence the farmers gave up part of their territories due to the high tax problems letting the suburb develop but at the same time some farmers continued with the agricultural labor in the designated farmland.

The UPA have problems because of the presence of farmlands in some areas, the taxation scheme that they purposed promote the change of use from farmland to residential use but because of political issues the tax rate on the agricultural zones where much lower than the one of the residential uses. In 1992 a great problem arises for the acquisition of houses due to the high price of the land, this generates as a consequence the abolition of the tax rate except in places considered as Productive Greenery Districts that would receive tax reduction; this places are designated by a City Planning decision.

As the authors declare in beyond greenbelts and zoning: A new planning concept for the environment of Asian mega-cities "An unbalanced mixture of urban and rural landscapes must be controlled. However, the application of western urban planning concepts represented by greenbelts and zoning may not be the best solution in the Asian context. Controlled mixture of urban

<sup>2</sup> According to the Ministry of Land, Infrastructure, Transport and Tourism: Introduction of Urban Land Use Planning System in Japan there are 12 different land use zones.

and rural landscapes should be nominated as one of target concepts that reflect the characteristics of Asian cities." (Watanabe, Takeuchi, Yokota, Makoto, & Yokohari, 2008, p. 168)

The agricultural areas in the suburbs did not disappear because of the sprawl that was generated from Tokyo, this areas accept the uncontrolled development of the city and generate another character to the suburban areas.

Segmented patchy zones of "empty" green spaces surrounded by single family houses in urban promotion areas where the agricultural labor struggles to stay immersed in development zones.

Nowadays the suburbs present big problems due to the population that inhabits them and the building infrastructure that they have, the owners of the houses and residences are currently moving or they are old enough to retire, the young population present in this places is very low due to the migration of them towards the center of the city. Also the housing projects that were constructed do not comply with the regulations that the Design of Modern High-rise Reinforced Concrete Structures (1983-1984) explain because of their year of development (1960-1970) and the use of the wood as the principal material

of construction that make them highly vulnerable to natural disasters as earthquakes or fire, at the same time the economic and a physical deterioration of public facilities is leaving as a consequence a territory with few possibilities of development.

Through the evaluation of the state of each zone it is urgent to improve the community services that the suburbs offer to the community and to re-structure the buildings following the actual regulation in the city for reducing the risk of disaster by any natural event.

"Tokyo Metropolitan Government has designated 11 major improvement areas totaling around 2,400 ha where improvement projects are promoted to mitigate potential earthquake disasters in low-rise high-density wooden housing areas." (Murayama & Okata, Tokyo's Urban Growth, Urban Form and Sustainability, 2010, p. 30)



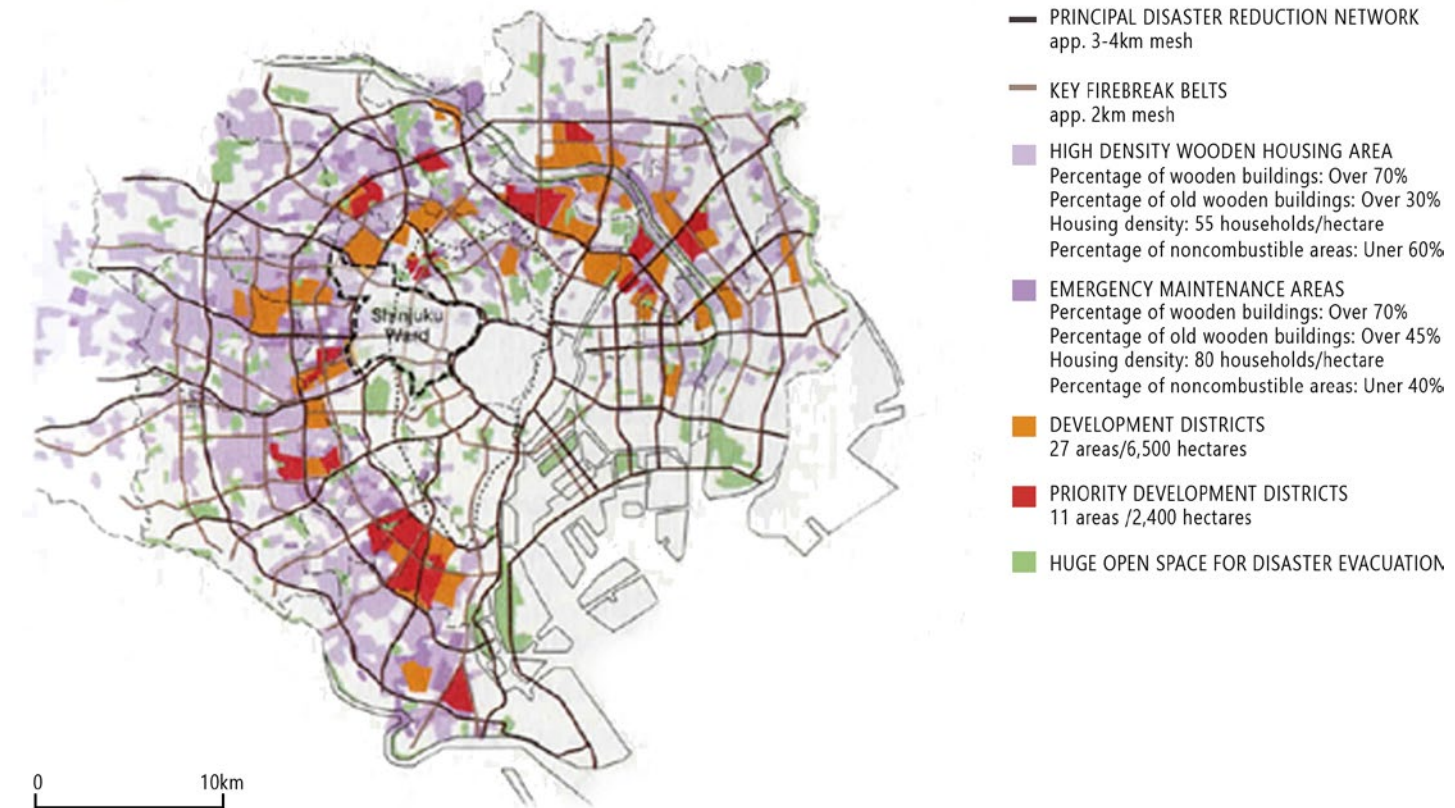
Meanwhile the years pass the subdivision of the squares increase and more properties appear in the city increasing the density of each urban and suburban land, this tendency in the suburbs letting the Productive Green Spaces as big gaps on the urban grid that over the time is transforming the suburbs.

Relatively close to the city, the suburbs of Tokyo offer very different spatial characteristics to those offered by the city



The increasing tendency to subdivide land can be seen in these diagrams of houses from each era in Okusawa  
Source: (Kitayama, Tsukamoto, & Nishizawa, 2010, p. 39)

center, they are generally less congested, have more relationship with nature by being closer to productive areas that benefit at the same time for consumption of people that live there and finally they offer a quality of life different from the one that the city center offers.



Fire belts, development areas, areas with high concentration of wooden houses, and evacuation sites in the 23 municipalities of Tokyo  
Source: (Kitayama, Tsukamoto, & Nishizawa, 2010, p. 35)





Urban Agriculture Nishi Tokyo City  
Picture by the author in Nishi-Tokyo City

### 3. Urban Agriculture

#### | Agriculture and Society

Currently the human being is looking for new options and strategies to generate new forms of food production without the use of chemicals and reducing the consumption of fossil fuels to transport it. Urban agriculture emerges as a strategy for the socio-economic development of a community and for the promotion of food security by growing food without the use of chemicals.

The Urban Agriculture (UA) is defined as the practice of cultivation, processing and distribution of food around a neighborhood, town or city (inside the urban areas), the places where the UA can be developed are private or public open spaces, also in residential areas like balconies, roofs and vertical elements as walls. The "UA tends to develop and to complement rural and foreign sources of food supply to cities. It has been promoted to effectively do so and is important to strengthening poor urban households' food security in particular." (Maugeot, 2000, p. 5)

Normally the places where the UA is placed are wasted and unused spaces where the production of vegetables, fruits, medicinal plants, floricultures among others is carried

out. In some cases, urban agriculture serves as a base for food supply and economic support for middle class communities, it also proposes the possibility of incorporating crops for recreational purposes and self-consumption.

Historically, agriculture has been related to developments in rural areas, but due to social, economic and environmental issues, agriculture began to be transferred to urban environments, becoming a social strategy for the development of urban and suburban communities. Through the production of products, employment, recreational and educational activities more friendly urban spaces are generated.

Urban agriculture, more than providing fresh food, acts as a socio-economic strategy for the population where the community has the most important role for the proper development of this practice. It has a social role because it generates actions that directly affect the communities where it is practiced by providing a job or just a hobby and in the same way because it generates fresh food for the inhabitants. The economic role in the same



way is very important since this labor can be linked directly to a business of buying and selling practice cycle in order to develop the economic activities.

"UA is but one source of supply in urban food systems and only one of several food security options for households; similarly, it is one of several tools for using productively urban open spaces, treating and/or recovering urban solid and liquid wastes, saving or generating income and employment, managing freshwater resources more effectively. . Additionally, it is conveniently managing open spaces, reducing disposal and treatment of urban wastes, generating supplemental income and/or affording cash savings, and providing employment, direct or not, part or full time, on a temporary or longer-term basis." (Maugeot, 2000, p. 25)

## | Study Case – Detroit Michigan

As a case study, the city of Detroit is a great example of how urban agriculture arises as a response to the urban and social decline that this city had. The city of Detroit in 1950 was one of the largest industrial powers in the world. This was fundamental for the development of the United States, having in its time the highest per capita income, with a

Not only affects locally the community where it is developed, it also affects in a larger scale responding to the sprawl of the cities that previously let a few agricultural lands in the urban areas, also increase the importance of the agriculture in the self-sufficiency of the big cities and the carbon footprint of urban agriculture, helps the elimination of food transport from rural areas to urban areas by reducing carbon emissions.

Urban Agriculture takes up concepts from the past, resuming the way in which the food was previously cultivated in terms of the relationship of the food and the origin of these with the community, letting the activity become a sustainable process.

population of 1,800,000 million inhabitants and 225 km<sup>2</sup><sup>1</sup> of land and industrial infrastructure headed as a power for development.

Due to various factors such as the transfer of

<sup>1</sup> Data obtained from: TED Talk Devita Davison, 2017 "How Urban Agriculture is transforming Detroit"

different companies abroad and the banking crisis among other causes the city began an economic decline that led to bankruptcy in 2013. From these facts the city of Detroit becomes a perfect example of urban decadence due to industry. Currently the city has less than 700,000 inhabitants, there is no investment and there are major health problems due to the lack of good nutrition, scarce retail fresh food.

In response, through urban agriculture and food entrepreneurship the people of Detroit are trying to change what is a declining city with industrial infrastructure completely abandoned to a sustainable city in terms of self-production of food. At least 100 km<sup>2</sup> of land they are empty, creating a unique landscape for the development of something like urban agriculture.

Currently Detroit can be an example of urban transformation, from the capital of American industry to being a pioneer city in sustainable development in food security. As Devita Davison says in her TED talk "Urban agriculture in Detroit is all about community, because we grow together. So these spaces are spaces of conviviality. These spaces are places where we're building social cohesion as well as providing healthy, fresh food to our friends, our families and our neighbors."

This case study shows how today urban agriculture can work as a strategy for the sustainable development of a community based on the reutilization of vacant spaces in urban farms for the community. The use of agriculture as a social and economic generation tool of a city.

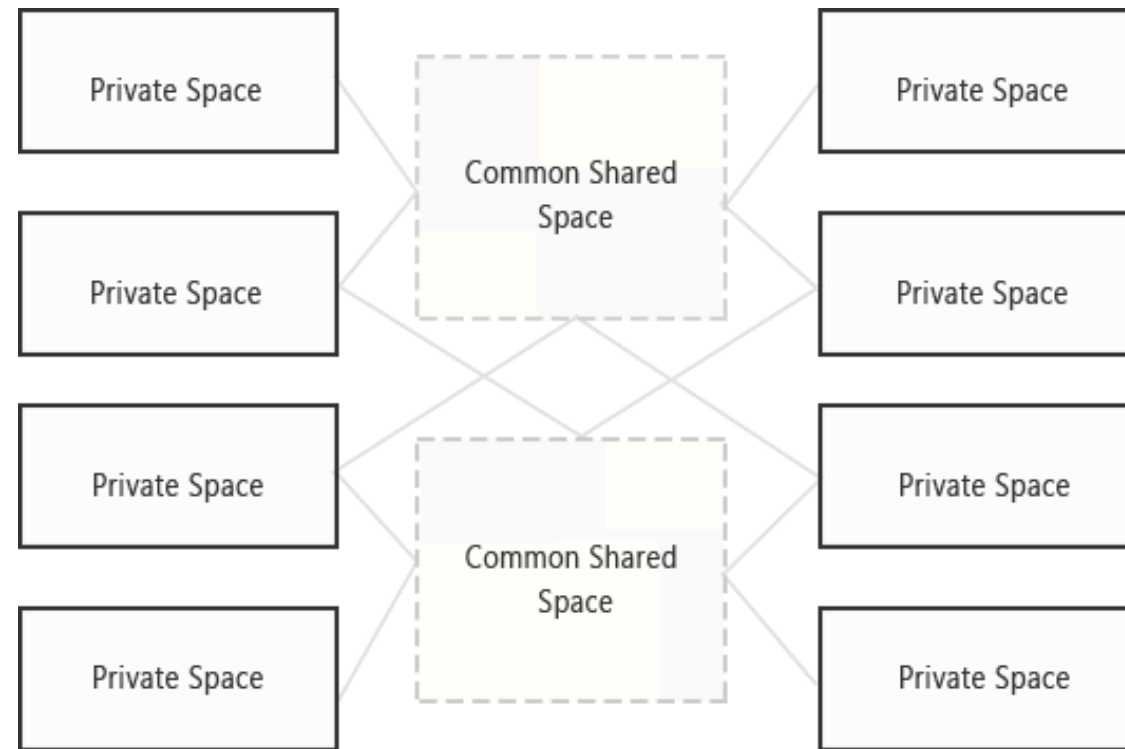


The Michigan Urban Farming Initiative's Brush Street farm, north of downtown Detroit  
Picture by Alex Maclean



## 4. Co-Housing

### | Agriculture and Society



Co-Housing Explanation Scheme

The concept of cohousing was conceived as a new way of living that was born in Denmark in 1960s in groups of people who were dissatisfied with the relationship with their communities, another alternative way of living was created where an intentional neighborhood where people that know each other and look after one and other, it's about the creation of an intentional neighborhood where each person have its own home sharing significant common spaces.

Cohousing is defined as a composition of homes grouped around a common space between them, these spaces in common vary according to the project but can usually include social areas such as the dining room, the kitchen, the laundry areas and the recreational spaces.

The space in common is the key to the operation of cohousing, "It is possible to recognize five characteristics that are necessary and sufficient to define a settlement as cohousing. These are: (1) communitarian multi-functionality, (2) constitutional and operational rules of a private nature, (3) residents' participation and self-organization, (4) residents'

self-selection and (5) value characterization." (Chiodelli & Baglione, 2014, p. 22)

Through the architectural design, the shared spaces generated facilitate the interaction of the people who live within the habitat complex generating different social and economic benefits, as Chiodelli & Baglione expose in their article the coexistence of private and semipublic uses are the principal characteristics of the cohousing letting the privacy as an important issue to take into account in the design. The people that live in this kind of projects are highly participatory within the community, they designate rules of coexistence in order to guarantee the functioning of the cohousing.

By designing a project under the concept of cohousing it is possible to increase the social relationships that occur within the spaces by increasing community levels, thus eliminating the false sense of connection and the sense of isolation of the inhabitants of the project.

## | Study Case - LT Josai / Naruse Inokuma Architects

The project - LT Josai of Naruse Inokuma Architects was developed in 2013 in Japan and is developed under the concept of "shared house" in a single unit of housing. This type of projects over the years have become popular in Japan due to the different architectural solutions that Asian architects give spaces. Through the design of this "shared house" residents share different spaces within this as are the living room, entrance hall and water systems, the spaces of a private nature are the rooms of each person.

The people who live in this house are not family and have no sanguine relationship, they are simply strangers that through the architecture and the ways of inhabiting the space they manage to live and generate community in the architectural piece.

The project was conceived from the beginning as a cohousing where 13 rooms of the same dimensions were projected around the 3 floors that the house has, in the same way the shared spaces were distributed in these 3 floors where is the space to eat, cooking and resting, all these shared spaces aim to generate synergies and relationships between people who live in the house.

he architects who designed the project took into account that in order for social relationships to improve and a sense of "community" among the inhabitants to be generated, there should be a relationship between each space of the house, for this reason in most of the spaces in the house it can be seen that there is a visual connection thus generating a sense of spatial unity.



Private space



Integration



Common space

LT Josai Function Diagram / Naruse Inokuma Architects



LT Josai Interior spaces  
Picture by Masao Nishikawa, YOSHIKI TSUTSUI





Nishi Tokyo City  
Picture by the author in Nishi Tokyo, Japan

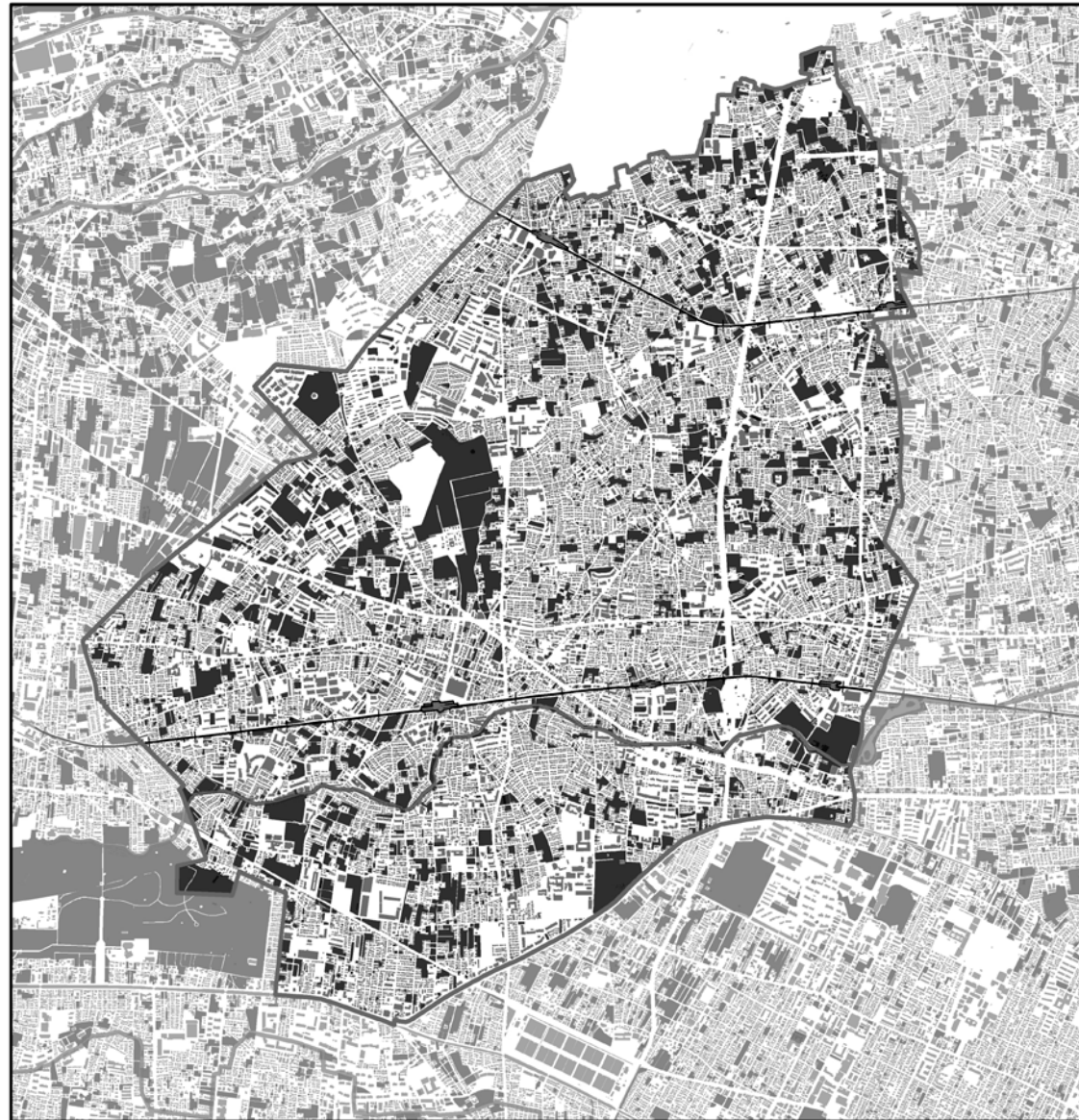
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## | CHAPTER TWO

### Nishi-Tokyo

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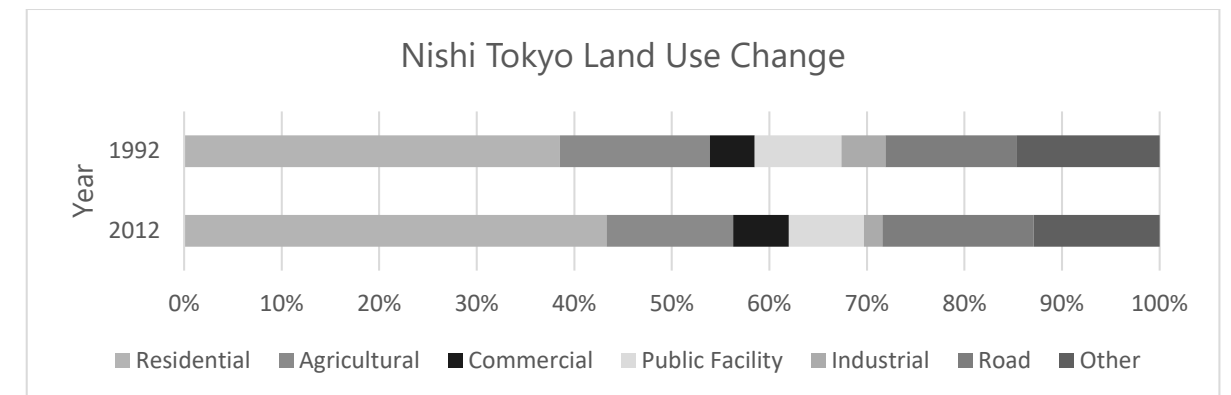
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## 1. General Analysis

### | Nishi-Tokyo

Nishi-Tokyo is a relatively new city located in the suburbs of Tokyo, it was founded on January 21 of 2001, the name translated means "West Tokyo" due to its location west of the 23 wards of Tokyo. It occupies an area of 15.75 km<sup>2</sup> with 200.102 people, the main characteristic of the city is that the urban fabric is different from the one that is present in the metropolitan city of Tokyo by evidencing large portions of green spaces in the urban areas.

The city of Nishi Tokyo since it began to develop was characterized by its residential character and by its large number of empty green spaces that in many cases are productive green spaces for farmers. This is evident in the graph below where from 1992 to 2012 the residential vocation of the neighborhood and the agricultural labor continues to be the predominant use of the city.



Elaborated by University of Tokyo / Census of Agriculture and Forestry, 2015



## | Agricultural Labor

The agricultural work in Nishi Tokyo city is of great importance and gives the city a special character and identity, it is important to highlight the favorable points that it brings to the city and to the community. Among the most important contributions of urban farms and agriculture in Nishi Tokyo are:

- Provision of fresh food to the 40 local markets and self-sufficiency of vegetables that reaches 39% on a weight basis.
- There is a variety on the production of products.
- Mitigation of floods in almost 370,000 tons / h of rainwater that infiltrate the cultivated lands of Nishi-Tokyo.
- Generation of recreational spaces for cultivation (hobby farming).
- 363 lots of home gardens and 310 lots of "experience farms" are provided for urban residents of the city of Nishi-Tokyo
- Greater amount of green open spaces.

Currently the area of urban parks per capita in Nishi-Tokyo is 1.3m<sup>2</sup> / capita, but if this figure is added to the farmlands the total would be 9.8m<sup>2</sup> / capita.

As the years go by, the city is losing this character more and more due to the lack of in-

terest on the part of the farmers to maintain these farmlands, in the same way because of the development that the city of Tokyo has had towards the suburbs and small independent urban areas.

The agriculture in Nishi-Tokyo is losing strength, the decreasing rate of farmers is evident as a result of the change from 398 farmers in 1990 to 274 in 2015. In the same way, according to the statistics, some farmers don't have successors, assuming that in the future the number of farmers in Nishi Tokyo will continue decreasing as it has been happening in the last 25 years.

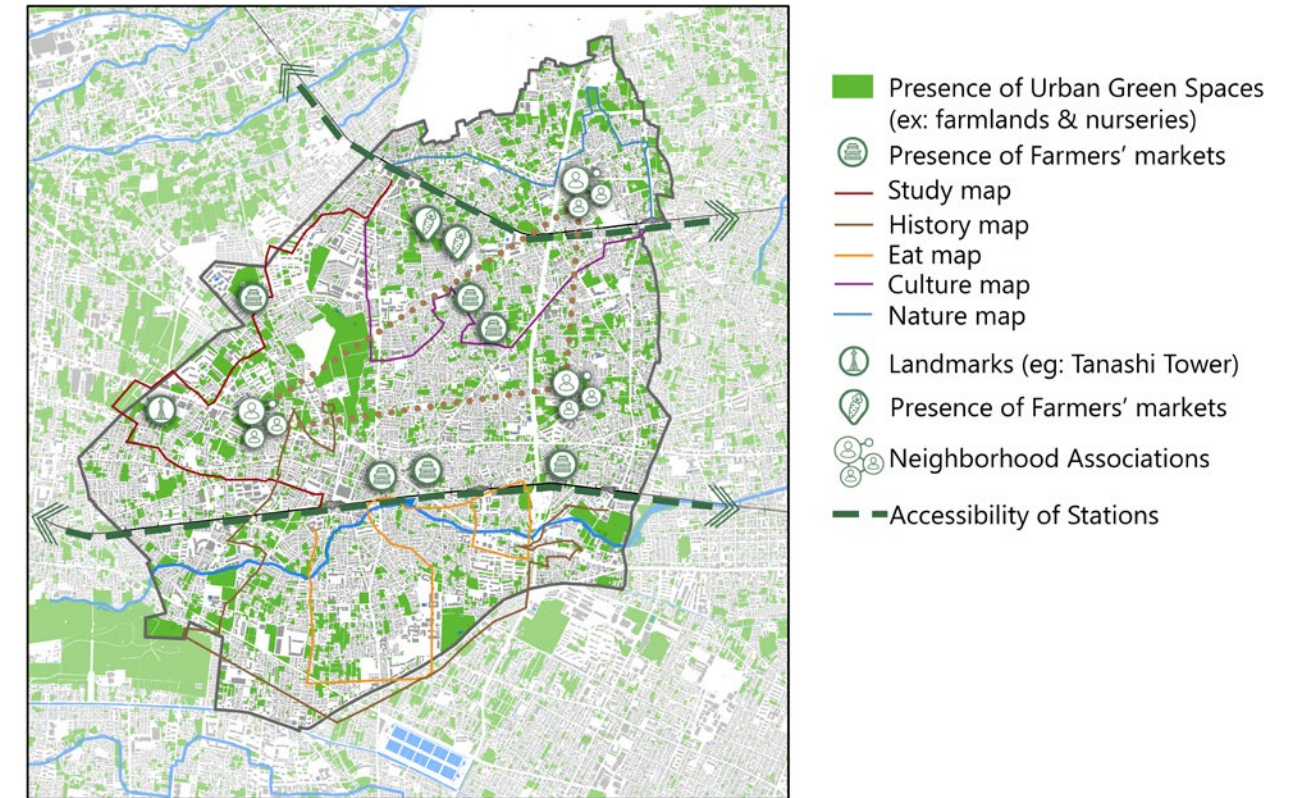
Another important consideration to be evaluated is the age range of Nishi Tokyo farmers and how through time the transition of farmland had changed.

In first instance the farmers are in an age range between 45-80 years, a very high range so that in the future, agriculture will be at risk due to the lack of labor.

In the second instance there has been a reduction in the transition from the area of farmland from 1992 to 2012 reflecting a reduction in Productive Green Zones (PGZ) and other farmlands.

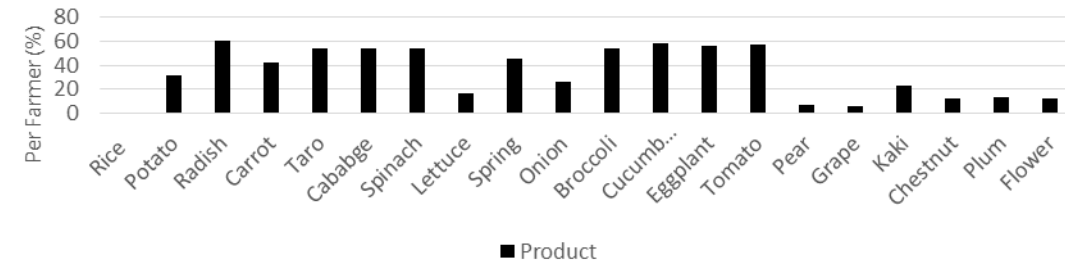
The work of farmers in the Nishi Tokyo area is of great importance for the character of the city, nowadays the data reflects how the character of the city is no longer as strong as before and gi-

ves us clues for evaluating and proposing things in order to maintain and in future scenarios improve the current situation of the city.

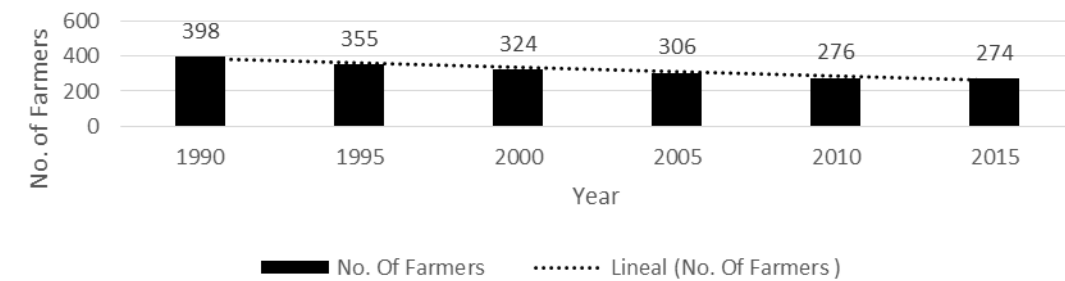


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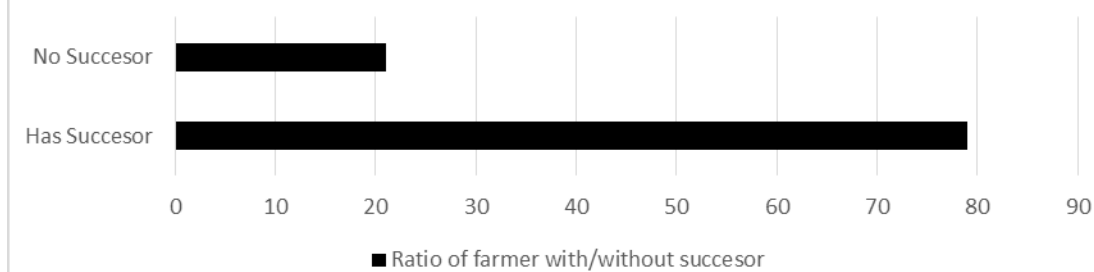
Farmers' Selling Products



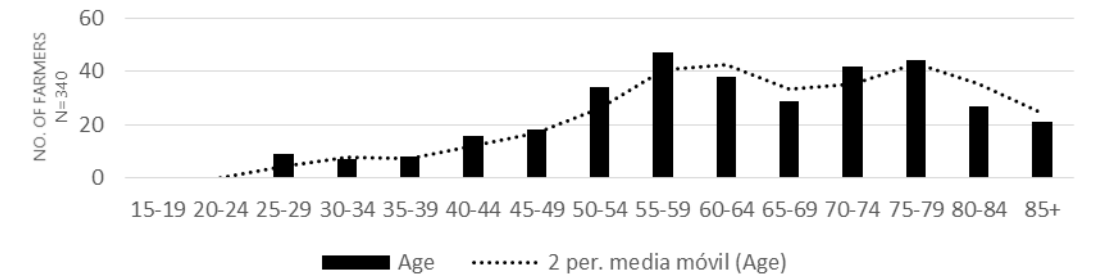
Decrease of Farmers



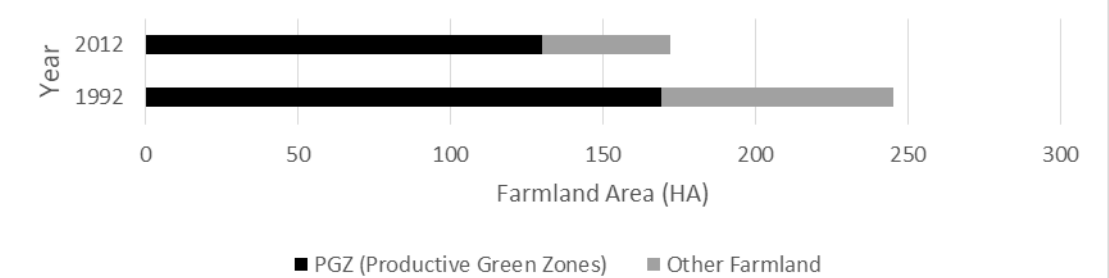
Ratio of farmer with/without sucesor



Farmers Age



Transition of Farmland Area



Graphs:  
Elaborated by University of Tokyo / Census of Agriculture and Forestry, 2015



## | Housing Trend and Concerns

Nishi-Tokyo is a city characterized by its residential use, with a population of 200,102 people the city offers two ways of living, the first one are single family houses, and the second one are apartment buildings.

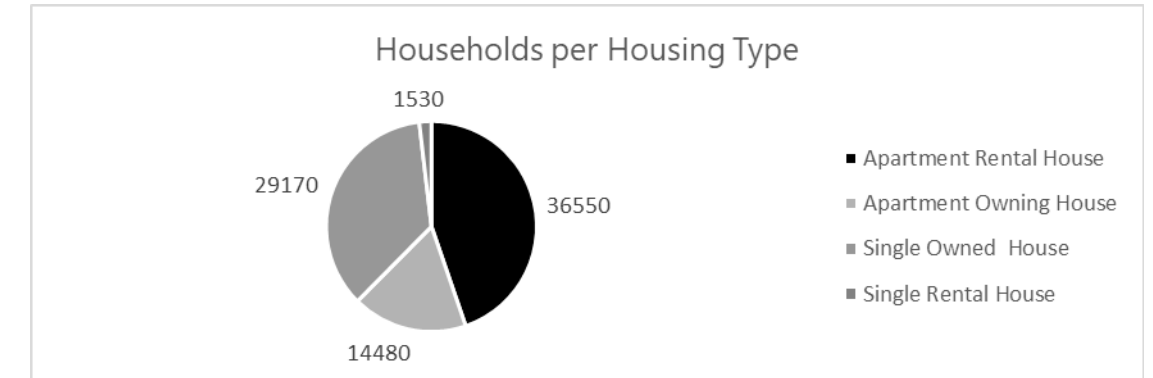
More than the half of the households in the city are located in apartment buildings and the number is increasing over the time. Almost all of the single housing is mainly owned occupied, while apartment housing is mainly rented.

The apartment housing in the city is a current trend but a huge amount of apartment projects and single family houses do not comply with structural regulations proposed by the Design of Modern High-rise Reinforced Concrete Structures (1983-1984) norm, these projects urgently need a renewal to avoid problems in the future. This apartments do not comply with the norm in the first instance because of the material in which they are made, and secondly because of the age of the buildings.

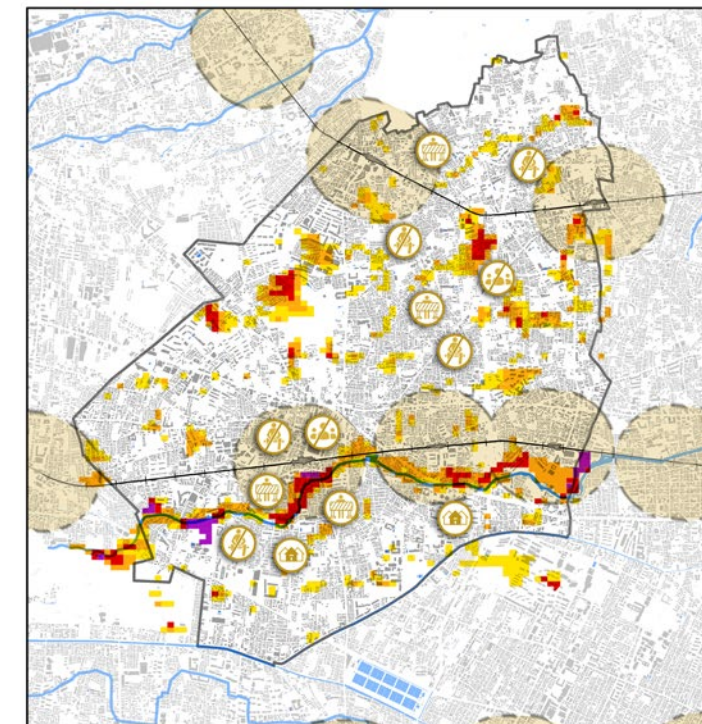
The city of Nishi-Tokyo is currently vulnerable to disasters due to the development it had over the years, the earthquakes, the fires and the floods are always a risk for the population, In the same way there are vulnerable

zones in the city where wooden housing projects are concentrated increasing the danger to earthquakes and fires. As the map below shows in the city there are several risk points to flood. Currently where the risk is higher is around the river that crosses the city, in rainy seasons the capacity of it is overcome and it overflows causing problems in the habitat units near this one.

The city of Nishi-Tokyo because of its development over time needs a re-structuring of a large part of the buildings due to the age of these and the material used, in the same way it is important the implementation of new apartment projects to cover and meet the need for housing and thus improve the needs of the inhabitants of the city. On the other hand, by improving the buildings, the risk of earthquakes and fires will be mitigated, but the risk of flooding will still be present. The intervention in different nodes of the river where there is more risk is of vital importance for the execution of a complete project.



Elaborated by University of Tokyo / Census of Agriculture and Forestry, 2015



Politecnico di Torino and Tokyo University, 2017-2018

- 2.0m
- 1.0m - 2.0m
- 0.5m - 1.0m
- 0.2m - 0.5m
- ⓘ Physical Barriers into Entry of Public Spaces
- ⓘ Uneven Distribution of Public Spaces
- ⓘ - Distance between Citizens & Administration  
- Separation of Municipal Planning Divisions
- ⓘ Low Quality of Social Housing
- ⓘ Limited Accessibility to Train Stations from some neighborhoods





TMG Social Housing Project  
Picture by the author in Nishi-Tokyo City



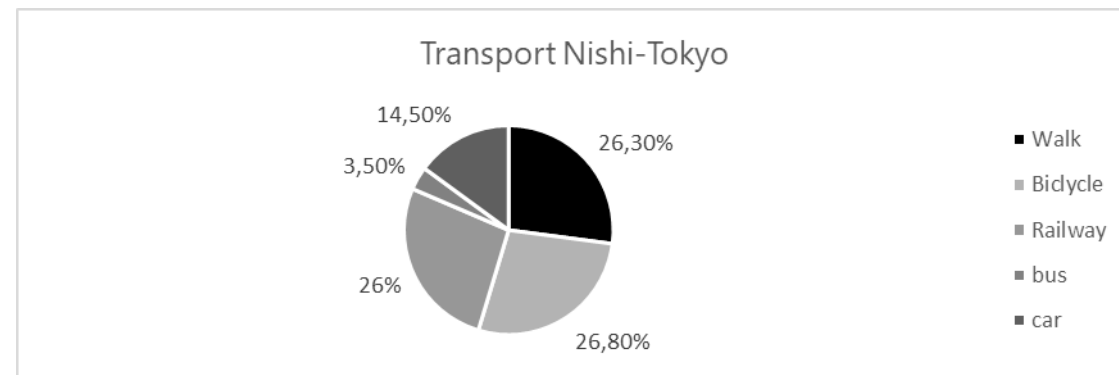
River Treatment  
Picture by the author in Nishi-Tokyo City



## | Accessibility Analysis

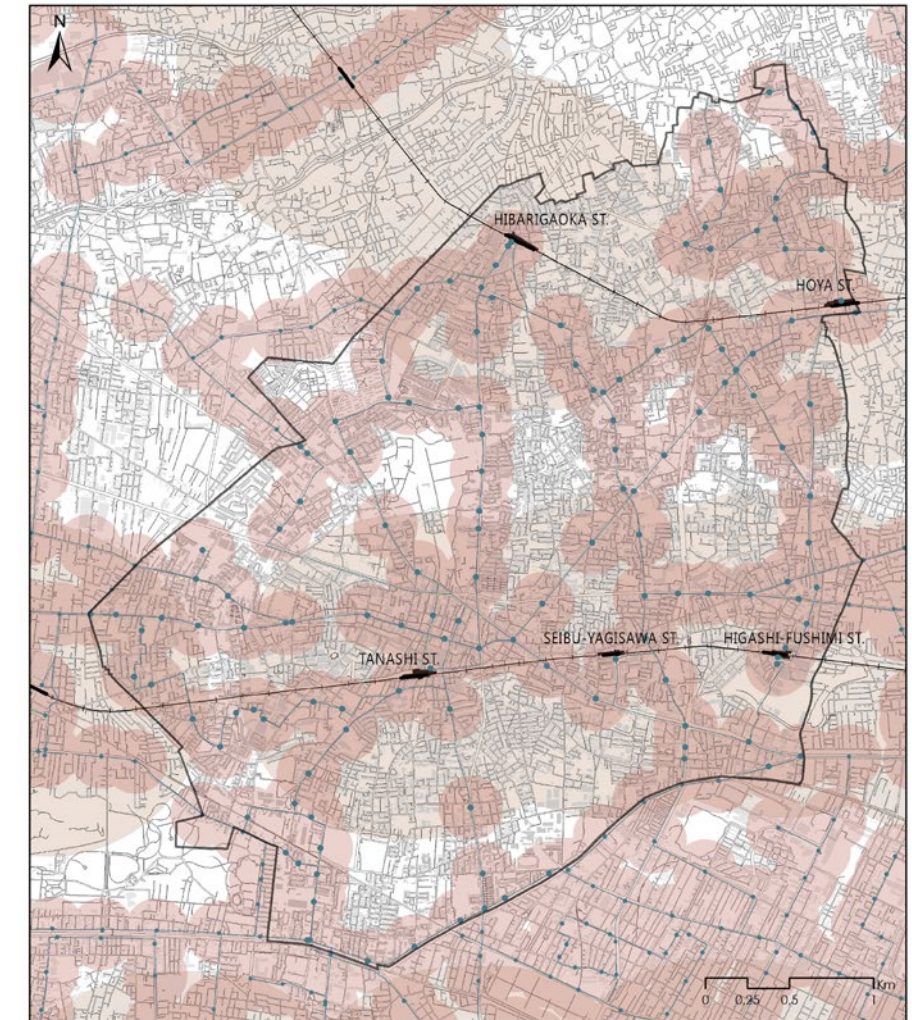
Within the perimeter of the city we can find different ways of transport vital for the connection of the population with the city of Tokyo and the rest of the wards, within the most important nodes of the city are the 5 train stations belonging to two lines that go through the city. In the same way, within the city, several urban bus routes pass through that facilitate accessibility. Having only these two ways of transport, some points of the city are slightly isolated. The cartography below shows the accessibility that people have to these two types of transport with a radius of 200 square meters.

The parts of the map that are not marked with

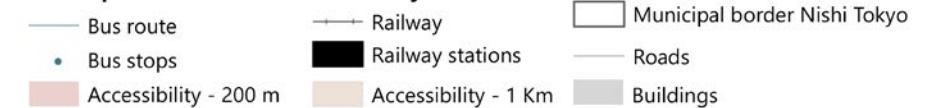


Elaborated by University of Tokyo / Census of Agriculture and Forestry, 2015

the red color are those that have the greatest difficulty of accessibility because the transport routes do not reach those points. As a result of this the inhabitants of Nishi-Tokyo have to transport themselves from one place to another walking. The data at the same time show the most common transport and displacement methods in the city, the trend shows that walking, the use of the railway, the bicycle are the methods most used by the inhabitants of the city. Although there are several bus routes within the city the use of this is not very popular with the inhabitants.



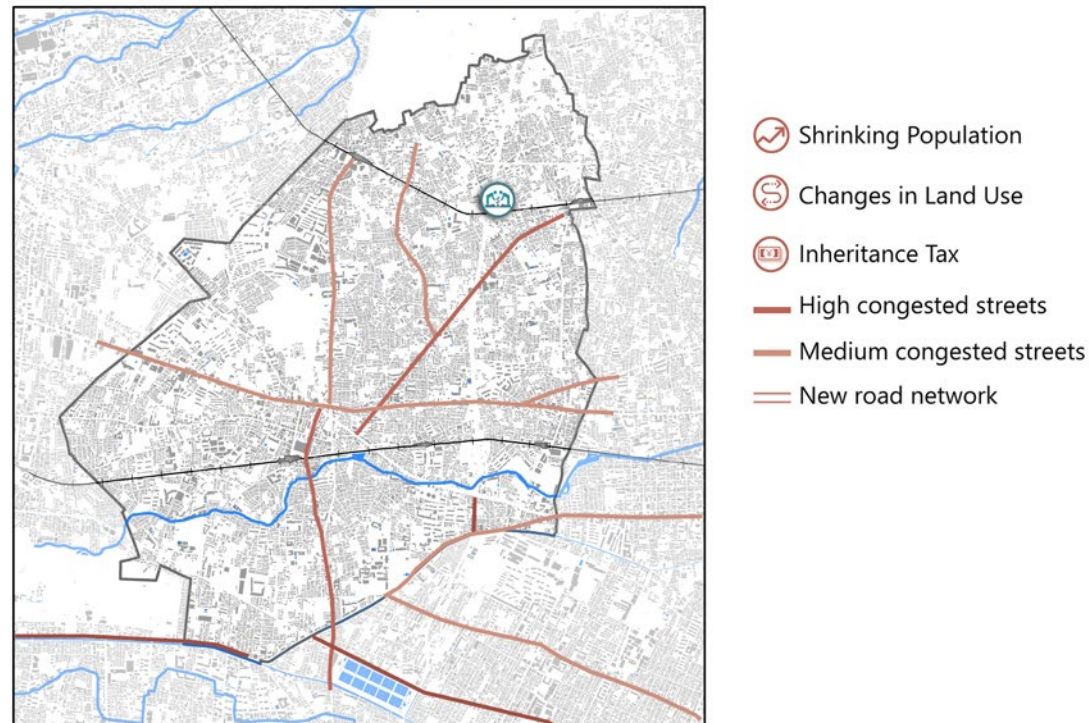
### Bus stop and train stations accessibility



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Another problem to evaluate that the city has is the new road network that is being proposed to mitigate the congestion of the current roads and thus improve the connection with the city of Tokyo. This new road network has

different problems at several points, it crosses the river and large farms in different parts reducing the percentage of green spaces and increasing the traffic.



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## | Conclusions

After the evaluation of the previous data from the different points of view that concern the city of Nishi-Tokyo as the agricultural labor, the housing and the accessibility

and transportation we can conclude with certain problems, opportunities and also declare some objectives for the proposal of a specific project.

### Problems:

- Urban farmlands are decreasing due to financial concerns
- There are no successors for actual farmers
- The farmland areas are decreasing
- Rapid unplanned urbanization (inefficient use of the land)
- Flood risk in some points of the river
- Earth quake and fire risk because of the materials of construction

### Opportunities:

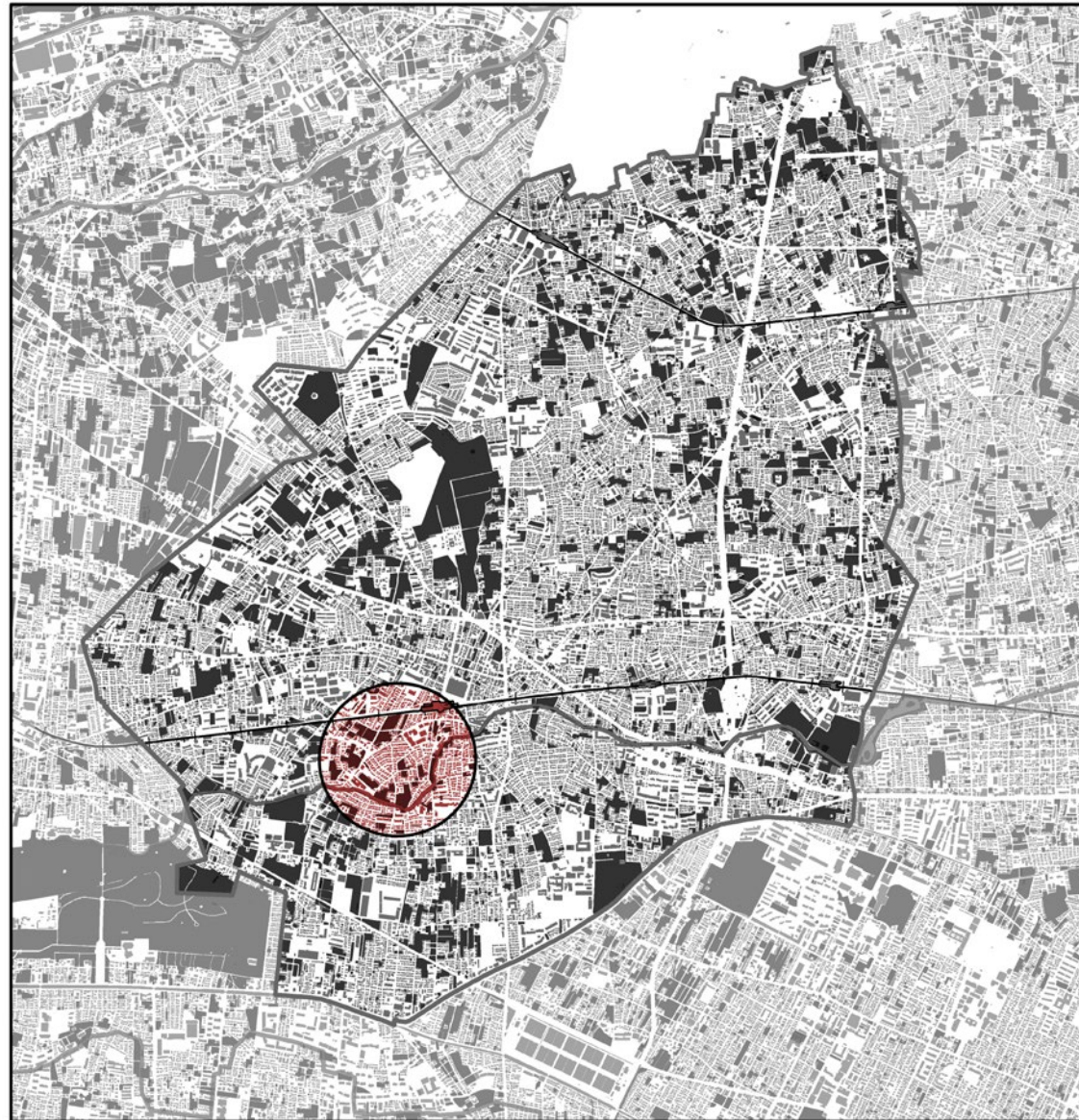
- Agriculture provides fresh food supply for the community
- Agriculture as a way of entertainment and employment
- Demand for apartments is increasing
- Existing apartment stock renewal
- River as a focal point of renovation

### Aim:

Taking into account the problems and opportunities that through the analysis of the city were found, the project to be proposed will be based on how to recover the strength and character that agriculture had in the city through the increase of m<sup>2</sup> of farms and in combination with the generation of a model of affordable housing for people.

By proposing a model where agriculture and housing are combined, the problems identified in the city could be mitigated in a certain way, thus providing more housing units, larger spaces for agriculture, more green spaces and giving it a much stronger character. to the city of Nishi-Tokyo





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## 2. Mukodai-Cho

### | Urban Analysis

Mukodai-cho is a district of the city of Ni-shi-Tokyo, it is located in the south of the Tanashi station, through this district passes the Shankuji River and likewise the Tamako cycling road that is of great importance for the connectivity and development of the district and city.

The choice of this district for the project pro-

posal was not random, the reasons why this district was selected is initially because of the large amount of green spaces, the flood risk that a large part of the district have because of the presence of the river, the numerous amount of already developed projects of social housing and the deterioration of the existing houses due to the age that they have.

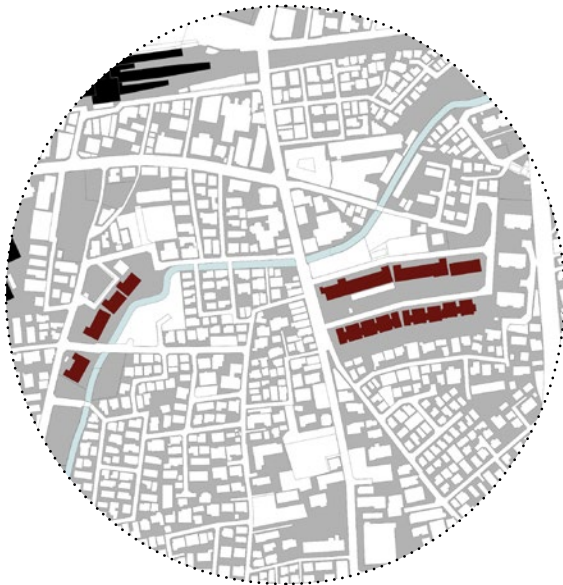


## | Built and not Built



As can be seen in the map, a large part of this area of Mukodai-cho is already built, characterized almost in its majority by single-family homes. The public space (urban space) is not an element that identifies this area of the city due to its proximity to the Tanashi station. The buildings closest to the station (at the top) are much larger and denser.

## | TMG Housing Projects



Due to the proximity of this area to the Tanashi station several housing projects were developed decades ago where the amount of flats was increased compared to the other existing buildings. Within this space you can see nine buildings developed by the TMG (Tokyo Metropolitan Government). These buildings are of great importance since they reflect a possible future development in terms of buildability and housing that the city may have in some places

## | Heights



Due to the vocation of the existing buildings in this part of the city the present heights are very low (approximately 2 floors), the buildings that are higher are newer social housing projects or commercial buildings near the Tanashi station where the regulation allows to densify more.

## | Green Spaces



Being a city characterized by agriculture and green spaces, this part does not evidence this character mentioned above, agriculture does not appear in the mapped part, the only thing that can be identified is how green spaces appear next to the social housing projects of area.

Apart from these small green spaces, the built elements and paved empty spaces destined for parking lots predominate.

A main focus for which this place was selected was the proximity of the constructed elements with the river.



## | Streets



In this part of the city there are streets of great importance as it is an area very close to the Tanashi station, likewise being most of the residential uses in this part it is possible to identify a lot of secondary and tertiary streets that allow accessibility to each one of the small houses present in the city .

## | Free Spaces



The black color shows the free spaces between buildings, it can easily be identified that where the TMG Housing Projects are there is more free space for the inhabitants since in making them they made the decision to densify a little in height and in this way free space in the ground floor.



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## | CHAPTER THREE

Project

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## | Design Process

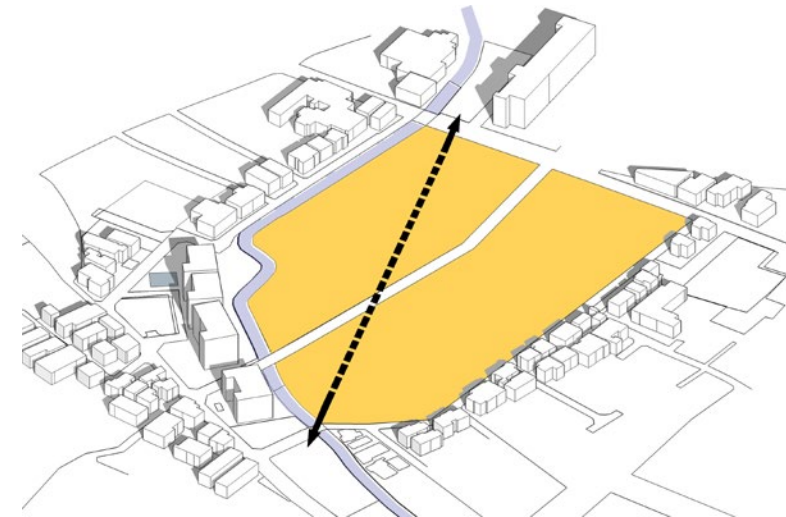
The design process was developed under a main premise that was to connect different points of the city to generate more permeability and connectivity to the interior of the existing urban fabric, also the densification of the new purposed building in order to generate more square meters of public space for the city and more amount of housing for people who live there.

Through a step by step it is easy to understand how the materialization of the proposal was carried out with each of the different factors mentioned in the previous research, thus resulting in a Co-Housing / Urban Agriculture project for the inhabitants of Nishi Tokyo city.



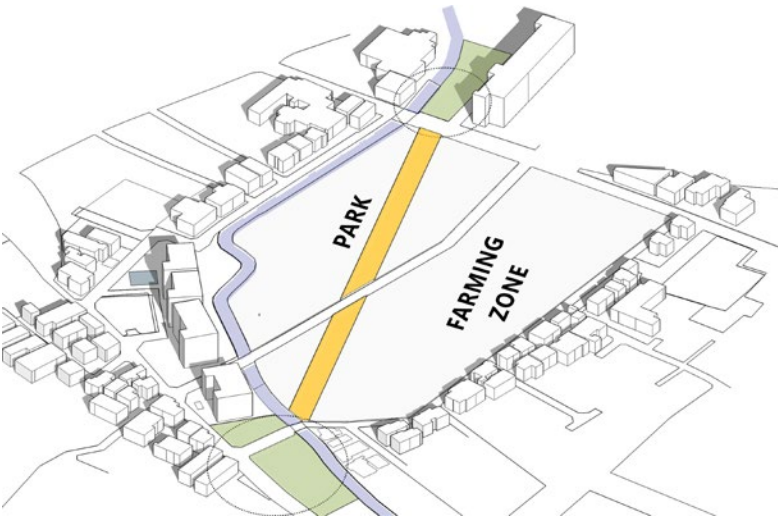
| 1

As a first approximation to the intervention area, the properties that were going to be affected by the project were identified. These were chosen under the criterion that under seismic regulations they did not comply with the minimum requirements due to the year of their construction. In this way 114 single-family homes were chosen to create the intervention space



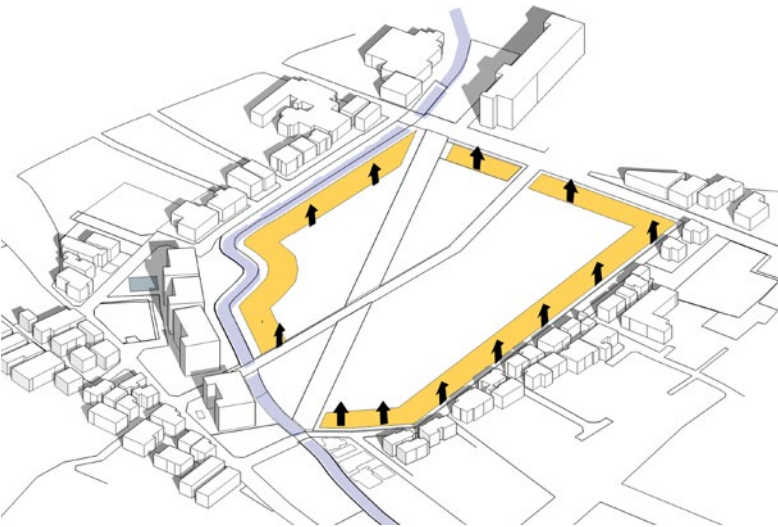
| 2

After having already had adequate space for the intervention, a connection considered of great importance was created for this part of Mukodai-cho. Trying to connect through a pedestrian path two important parts of the city, this pedestrian path crosses the entire project area drastically and will give a design criteria for the project proposal.



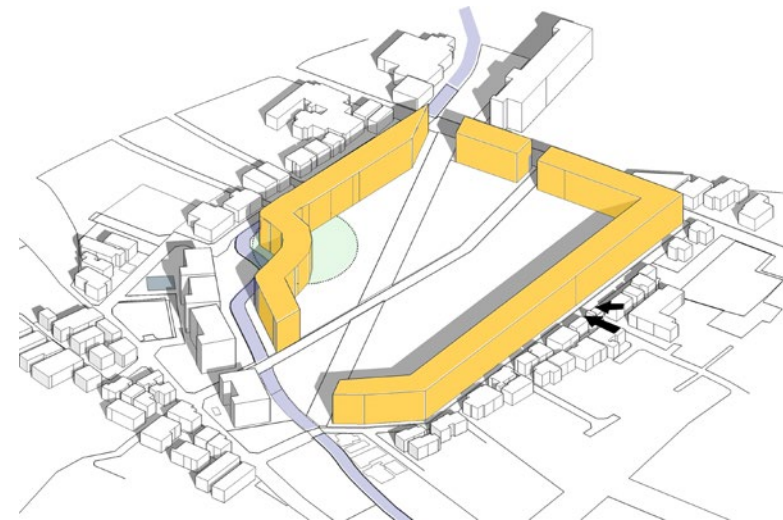
| 3

The pedestrian crossing geometrically affects the place where it is decided to implement the project. The areas to be connected generate more inclusive urban dynamics for the people who live in this part of the city. By the creation of this axis, two different spaces were created; one destined to a public park and the other one to agriculture activities.



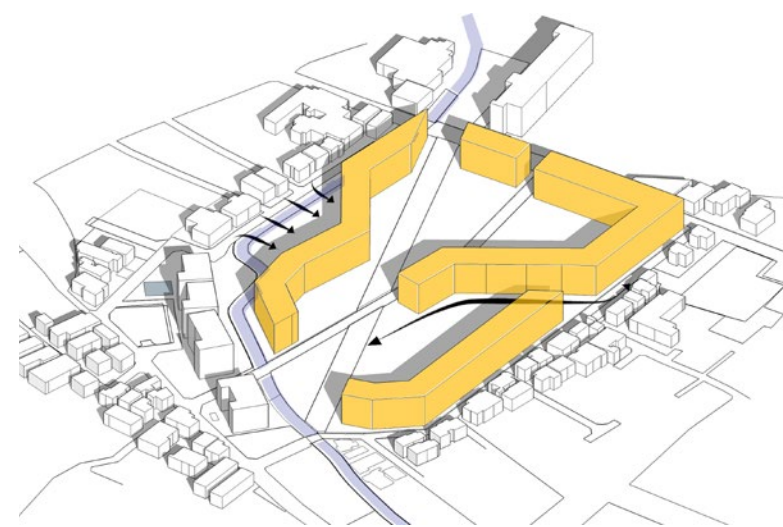
| 4

Continuing with the geometry of the squares, a project is proposed that continues with its shape. This form is densified in 5 stories in height to thus meet the needs of the homes that were initially eliminated. Through the simplicity of continuing with the shape of the squares and increasing the floors it is generated a vacuum in the interior of the block that will be later destined for the creation of a park and more importantly of areas for agriculture.



| 5

After densifying the raised form, two nodes of great importance were identified, the first is the one near the river where through a backward movement of the building a space is generated that will be designed as a park. The second one is on the opposite side where it was considered important to generate an entrance to the project due to the flow of people and how closed the initial approach was.



| 6

These two nodes mentioned above generated a fracture and a subdivision in the design of the building. To mitigate this fragmentation and improve geometrically the approach of the building was decided by softening the vertices of the geometry of the building, backing it up in the access points in the main roads. In this way the buildings change from an invasive and massive shape into a more organic approach.





| 7

Through the staggering of the volumes a certain of movement was given to the building and terraces where created. These spaces will serve as places where recreational agriculture and community activities can be exercised.

In the same way, the activities that will be carried out in the central spaces would be dedicated to agriculture, the space was de-

signed with optimal conditions for the labor due to the amount of sunlight allowed by the staggering of the volumes.

A complex habitat is created where the principal objective is to meet the needs of the people and to give the appropriate conditions for the development of urban agriculture in the city of Nishi Tokyo.



| Agriculture Implementation

As it is evidenced in the scheme the agriculture is implemented in the terraces of the new buildings (destined for productive uses for the people that inhabit project). The central zones in the ground floor are destined for two different uses, the one of park and the one of productive zone for

the city of Nishi Tokyo.

By designing a co-housing project and promoting the concept of urban agriculture it is possible to meet the main objective of the project which is to generate community through architecture and agriculture.

## | Architectural Intervention

The architectural intervention consists of 14400 m<sup>2</sup> of residential development divided in three different buildings in the city of Nishi Tokyo, Japan. This is located in the suburbs of the city of Tokyo, an important characteristic of this city is the agricultural work that takes place in different parts of it. In the same way, the specific location of the project involves an important water basin for the city.

The intervention proposes a new architecture scheme based on urban agriculture, public spaces and residential units. The residential proposal is based on a co-housing scheme where the focal point are the community spaces that are created for the people who inhabit the project. Formally the building oscillates and generates different heights of common terraces for the personal cultivation of vegetables and fruits.

The central space offers the community a space dedicated solely to agriculture as a business and another a shared park with a recreational landscape for the inhabitants of the city. These two central spaces are

surrounded by different typologies of apartments created based on the ideology of community through agriculture and co-housing.

The project is conceived from a central axis that divides the block into two parts. This axis serves as a direct connection of two important points in the area and as a pedestrian path for people.



| Ground Floor





| 3th Floor



| 5th Floor

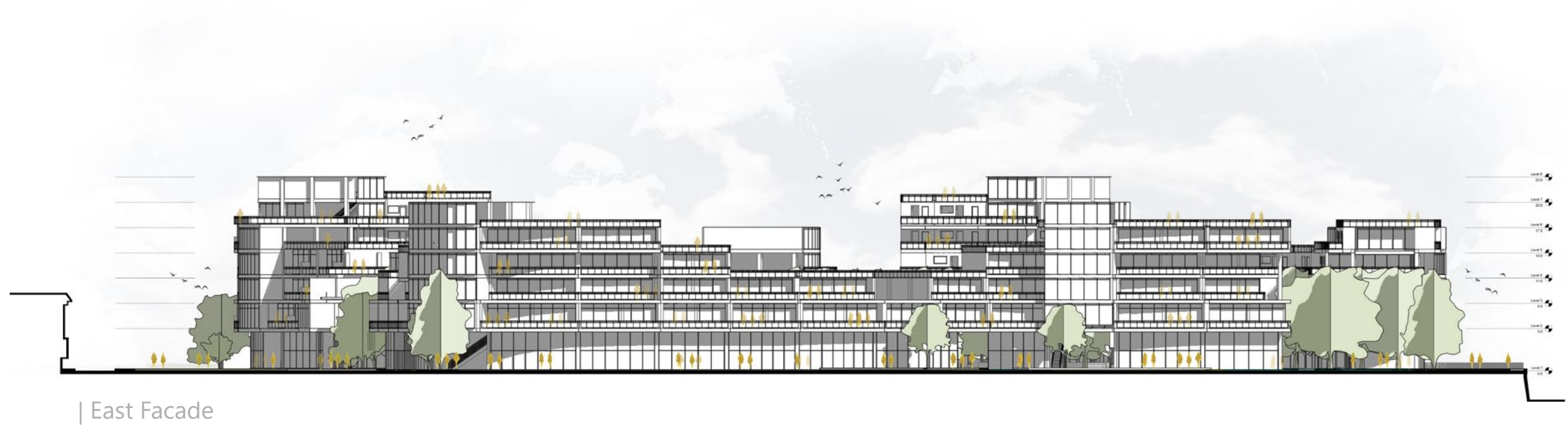


| North Facade



| South Facade







| Section A'A



| Section B'B





| Before Intervention / Actual Urban Fabric



| After Intervention / New Urban Fabric





| Axonometry

## | Before Intervention

## | After Intervention

## Housing Units

114 Houses

144 Houses (100M2 each )

## Farmlands

0 M2

2400 M2 (First Module)  
 1700 M2 (Second Module)  
 1000 M2 (Third Module)

Free Space  
(Ground Floor)

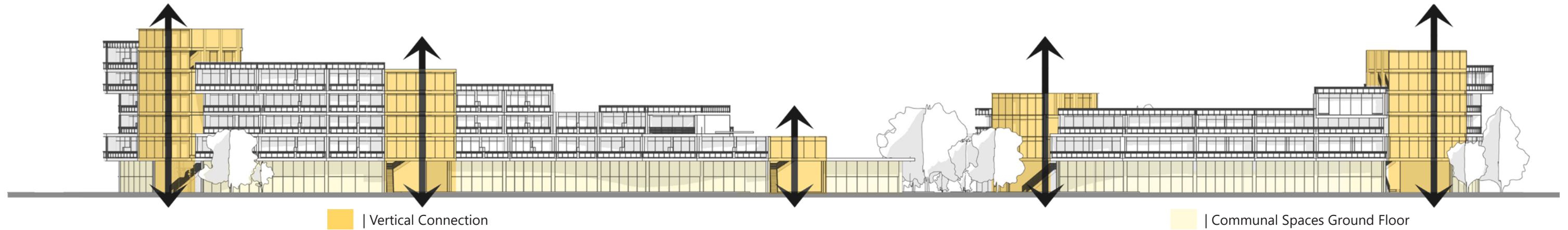
0 M2

No community spaces in the ground  
 floor of the existing family houses

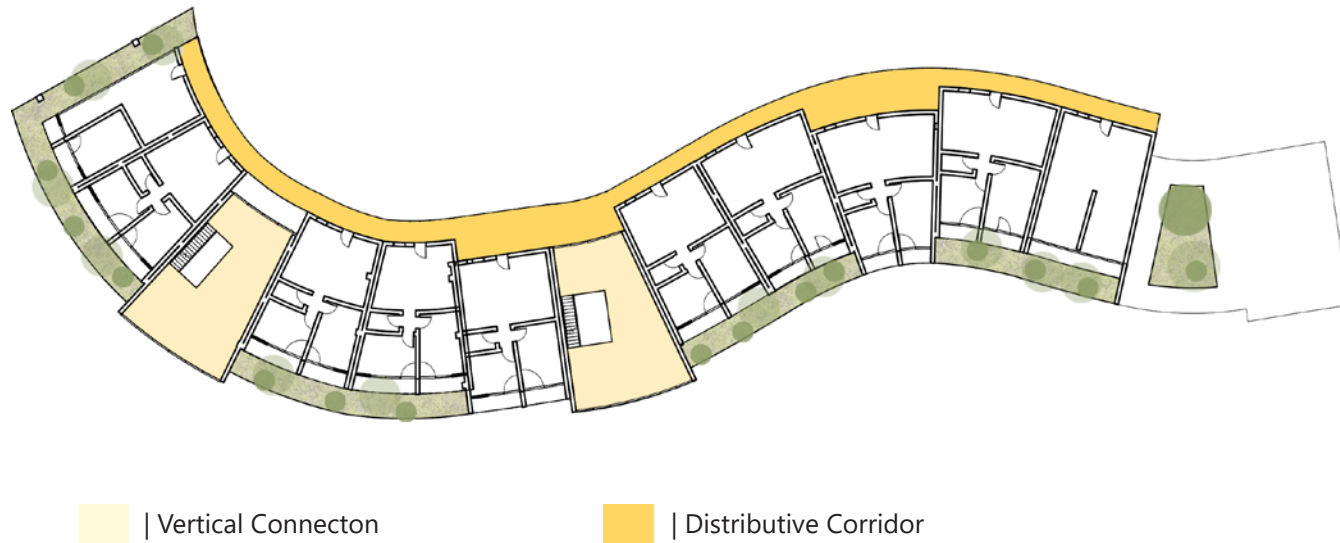
3400 M2 PARK

1400 M2 (First Module)  
 2600 M2 (Second Module)  
 1800 M2 (Third Module)





### | Vertical circulation and uses scheme



### | Horizontal circulation

In the project were handled two concepts of circulation, the first is the vertical which allows access to the upper floors from a fixed point where there are community services for the same inhabitants of the project, these fixed points are connected to the horizontal circulation present in each floor of the project, it is composed of a corridor inside the perimeter that distributes to each apartment present on each floor. In this way the main facades of the project towards the outside are free for the lighting of the main spaces of the apartments, and

the internal ones have restricted lighting for secondary spaces.

Within the initial conception of the design each apartment was taken as a single and independent unit where the circulation was adhered as an independent structure. From this, each of the modules of the apartments was receding in a certain way for generating different movements in the facades and also for the creatin of terraces / gardens on the outside facade of the project.

## | Apartment units



Each apartment unit is composed of two rooms, a bathroom and a social area, giving an approximate totality of 100m<sup>2</sup> where a family of 3-4 members can comfortably inhabit.

Each one of the apartments has a terrace and a view towards the exterior face of the project.

## | Vertical circulation / Common spaces



Every certain number of apartments there is a vertical point of circulation where elevators, stairs and community spaces such as living rooms are arranged. These vertical points serve as a direct connection between the lower and upper floors and as a point of reference for access to the green roofs that the project has.

The common spaces are also on the ground floor allowing the community to enjoy and have additional services in the city





## | Proximity to public space



The relationship between the apartments and the common areas is very close allowing you to have a quieter environment always surrounded by green areas and recreational places for the inhabitants.

## | Facade Movement



The retreat of the apartment modules allows generating movement in the facades, in this way it is possible to create small gardens on the outskirts of the apartments thus involving more green elements in the project.



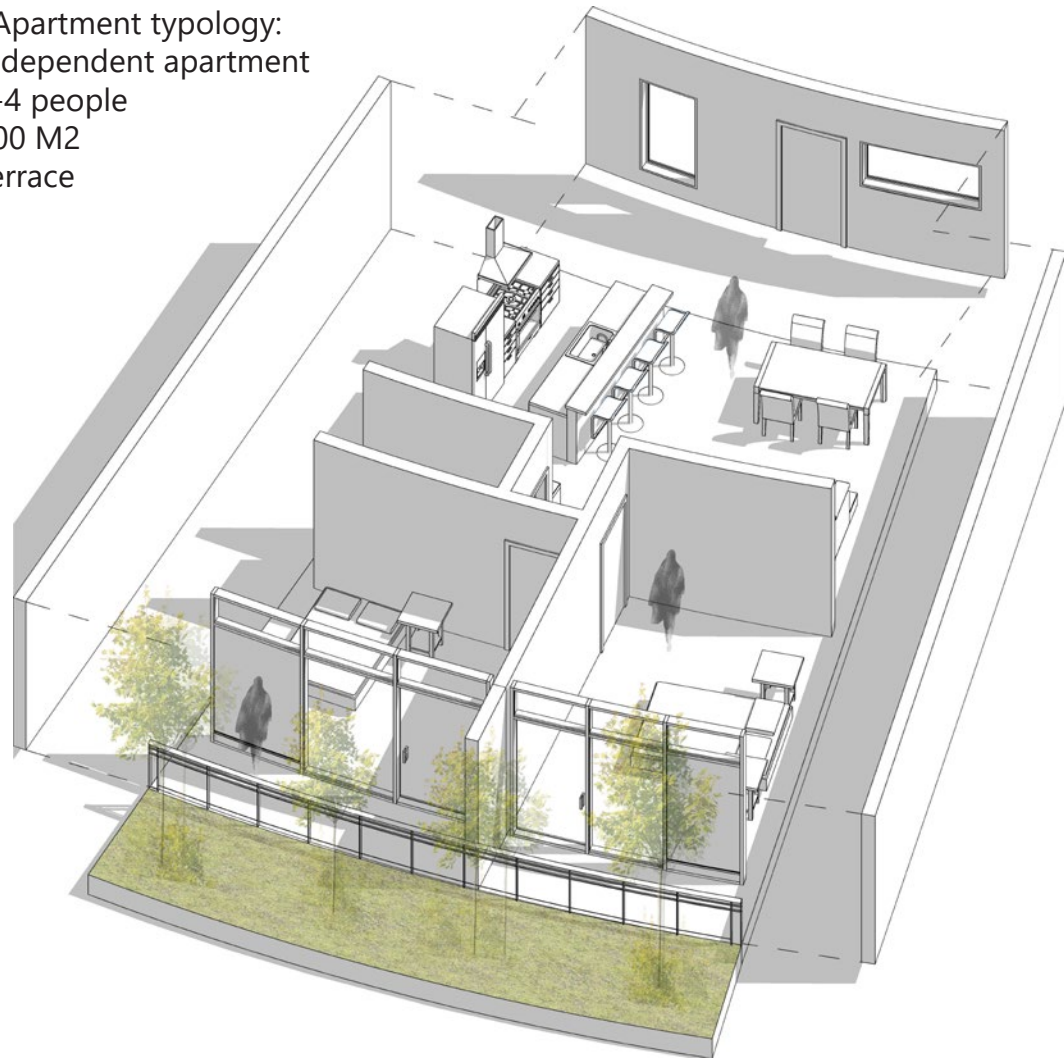
## | Urban Farming



## | Apartment units



| Apartment typology:  
Independent apartment  
3-4 people  
100 M2  
Terrace

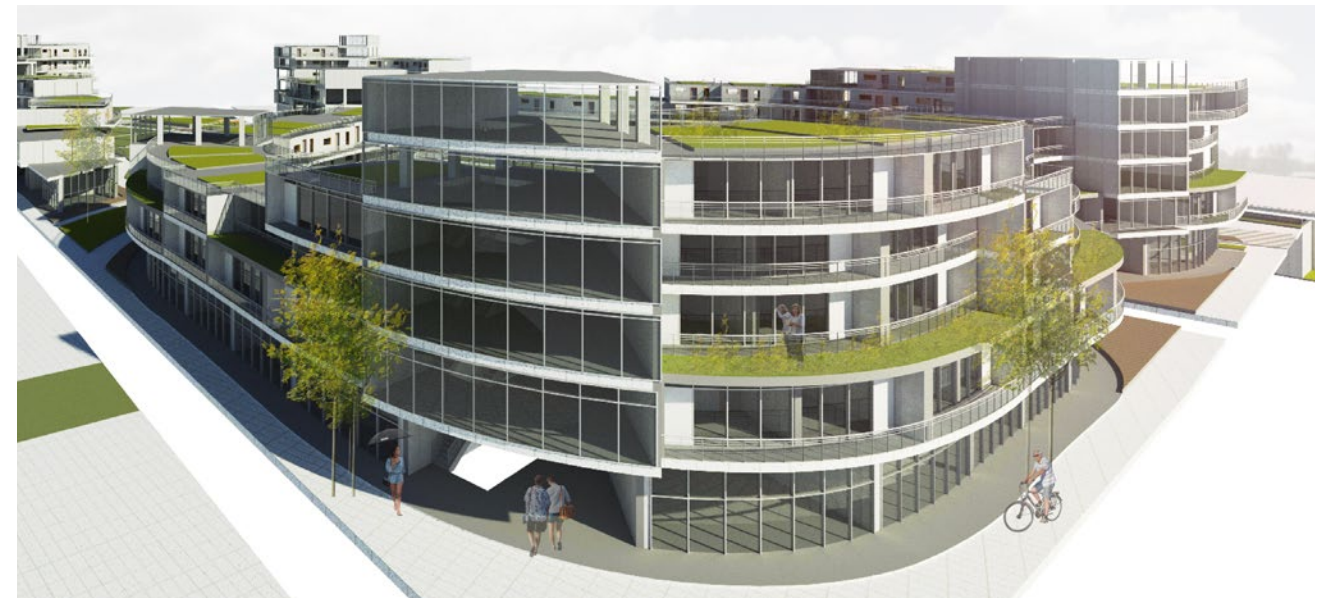


## | Apartment Units

The apartments that make up the project are all for families of 3-4 people, these are arranged in such a way that the terraces of the rooms are oriented towards the exterior of the project and the social area towards the interior patio of the project. Each of the apartments is approximately 100 square meters where each one varies depending on the position where it is located in the project,

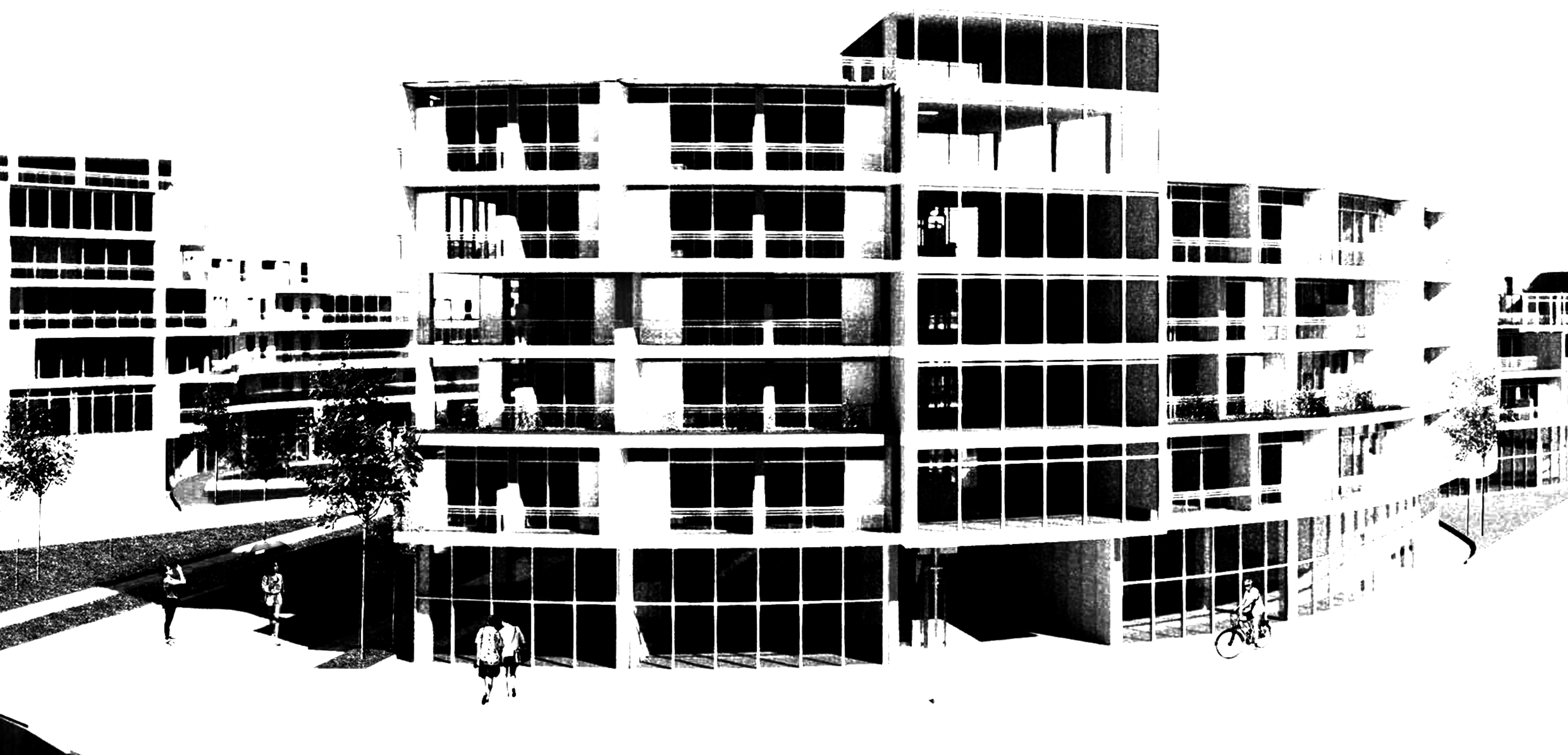
thus making each housing unit unique.

The apartments contain the necessary basic spaces, in addition to the space of the apartments in each of the buildings there are communal areas of recreation and coexistence where the inhabitants can go there and share doing different activities











## | CONCLUSIONS

Today, Tokyo is one of the most populated cities in the world with 13 million people. Its suburbs likewise make the urban extension as a whole and as a result, ways of inhabiting and seeing architecture from different points of view. Due to the current global situation, it is necessary to discover the possibilities of the spaces from a point of view much more friendly with the environment that each place has.

On the other hand the city of Nishi Tokyo by being the periphery has very different characteristics to those of the city of Tokyo in physical terms and in population. This city has a strong agricultural labor, making in the urban grid big gaps of free spaces for the cultivation and the development of production activities.

Nowadays, the city presents different problems that can be solved gradually through different approaches by the formulation of strategies and projects in medium and long term periods, these problems begin with the decrease of the agricultural work in the city due to the lack of people who work the land and the age of each of these. Similarly, there is a housing problem due to the fact that a large part of the houses or buildings in the city do not comply with the current seismic-resistant regulations, they are made of materials that are inappropriately (made of wood - risk of fire) and according to the data there is a deficit in the number of housing units.

Taking into account the problems of agriculture and housing and through the implementation of two concepts such as urban agriculture and co-housing it was possible to implement a habitat model where the main objective was to solve current problems and meet the spatial needs of the people.

Taking these concepts into account and by the unseling of some squares of the city, it was possible to implement a new model where the number of floors in the buildings was increased so that in this way it would be possible to obtain more free spaces and replace the buildings that were eliminated at the beginning of the proposal.

The result of the design was a perimeter building that changes it's height creating in this way arable terraces in each one of the floors, and a central courtyard dedicated specifically to agricultural production in the first place and second place to a public park for the inhabitants of the city.

The way in which the building was conceived is based on the way in which people can begin to generate community by sharing different spaces (common spaces) on the inside and outside of buildings.

These design decisions result in a new way to conceive and see the urban fabric in order to create a new habitat much more friendly to the needs of the inhabitants of the city and much more consistent with the requirements of our society today.

Evaluating the result obtained after months of research and design work it is possible to see how positive the solution was for medium and long term periods in relation with the problems presented throughout the investigation, but it is important to highlight factors and variables that were not taken into account for the final design of the proposal; one of these factors that in the development of the project was not taken into account was the presence of the river and the extension and landscape work that could have been done in this place, in the development of my project the river remained as a design constant because my main objectives were to work on agriculture and the development of a new habitat model for people.

Nowadays, due to the situation in which humanity is immersed in environmental terms it is important that the architecture labor goes hand in hand with the environment in order to begin to renew, propose and create new ways of living and to conceive spaces in a much more friendly way and according to the problems that we are experiencing today in our planet.



Temple in Tokyo City  
Picture by the author in Tokyo





Temple in Tokyo City  
Picture by the author in Tokyo

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