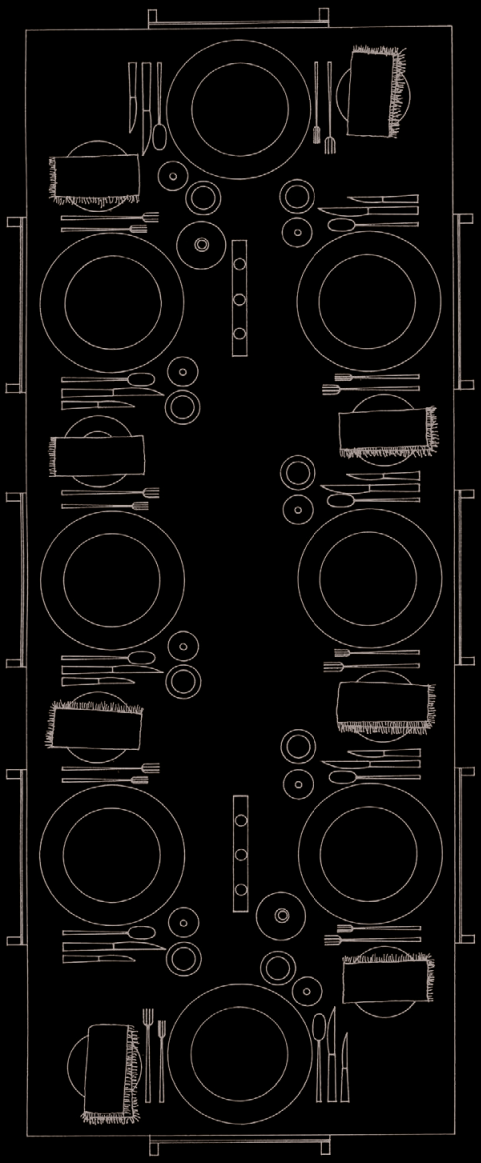
AN IMMOVABLE FEAST

The architecture of a sustainable foodscape



Research paper
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Image cover and right: Wigglesworth, S. (2022). “The Disorder of the Dining Table” UOU scientific journal #04, 122-127.

INTRODUCTION

FOODCAPE OF MADRID

Food plays a major role in the life of every human being; it simply is a basic necessity to feed oneself. It is one of our biggest social and cultural markers and has a central place in both our history and our future. In Rome the government gave out a monthly grain dole to the city's poor. It was not just the obligation of the government but that of the emperor personally. The emperor Tiberius is to have said that to not give out the dole would cause 'the utter ruin of the state'. The Women's March on Versailles during the French Revolution was not a protest in support of revolutionary ideals but a riot against the high price of bread. In the 21st century natural disasters, changing climate conditions and political events across the world are having a major impact on the availability of food (Steel, 2013). When the war in Ukraine started in 2022 it not only caused prices to go up and made sunflower unavailable, but it threatened famine in Africa as Ukraine is a major exporter of wheat to the continent (Harmash, 2023)

It is projected that by 2050 70% of the world population will live in cities. Requiring it to import food not only from its traditional hinterland but also from all corners of the earth. In Europe people spend on average 14% of their household income on food every year. In Africa this percentage is even higher, in some countries rising to 50%. This is making food security a major issue for not only nation states but also the individual person (UNEP, 2023).

Making sure a city is fed for even a day is an awe-inspiring process. To produce, import, sell, cook, eat, and dispose of three meals a day, every day, for every citizen requires an enormous underlaying system. Today this system is setup to produce, process and sell food as a commodity for the biggest profit margin possible, without any consequence concerning the land where it is grown or the people that consume it (Verhoeven, 2018)

Food however is not just politics and economics; it is also culture and community. Its smells, textures and tastes are a mirror of a city's identity and that of her people. Often a sense of community is found over a shared meal or a cup of coffee. Demonstrating that food is not only essential for the body but also the soul. It is no wonder that the word culture finds its origin in 'cultura' which is Latin for growing/cultivation (Steel, 2013). If the saying 'you are what you eat' is true for the individual than it is equally true for our cities. The cultivation, processing, sale and consumption of food influences our cities, leading to the research question:

"How could architecture play a central role in the creation of a sustainable foodscape in Madrid?"

The complexity and interconnectivity of the foodscape concept make it necessary to segment this research question in sub -questions that will examine the different systems and their aspects. These sub-questions are as follows:

1. What is the historic and cultural context of Madrid's foodscapes?
2. Where does Madrid source its food from and what are the local cultivation initiatives?
3. Who are the actors and what is their role when it comes to sustainable food practices?
4. What systems make up the foodscape of Madrid?
5. What constitutes sustainable food practices?

INTRODUCTION

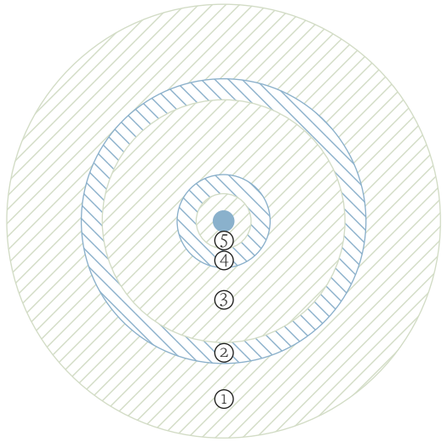
THEORETICAL FRAMEWORK

The spatial development of a city has always had a strong connection with that of its hinterland. For centuries the growth of a city was limited by the amount of food and energy that this hinterland could provide. Very few were able to circumvent this limit by transporting food over great distances. The city of Rome was only able to grow to a million inhabitants by importing grain from its breadbasket in Egypt. The next city to reach this number would be London, but it would take until the early 19th century (Steel, 2013). The basics of this relation can be viewed through the model developed by the German geographer Johan Heinrich von Thünen (shown right). At its basis is a town that is surrounded by flat fertile lands (situation A). The rings surrounding the town each holding a different type of agricultural productivity:

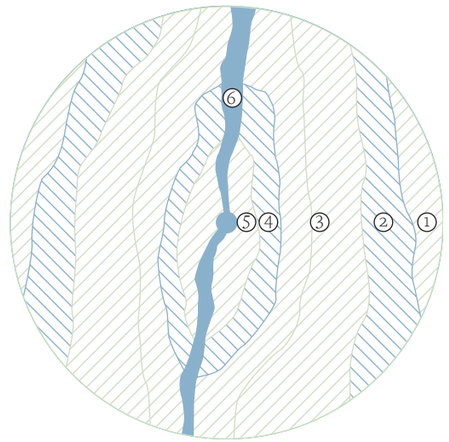
1. Furthest removed from the city are the grazing lands that are used to raise animals for consumptions. This process takes a considerable amount of open space, but the animals are able to walk themselves to town to be sold at the market.
2. Grain & cereals don't perish as quickly as vegetables and are light, making them easier to transport over a larger distance.
3. Crop rotation is used to increase the health of the farmland and decrease the impact and change of disease. Most of these crops keep relatively well once harvested and are staples in the diet of a town.
4. Dairy, fruit and vegetables are the most perishable products and thus located near the town.
5. Forests provide fuel and building materials, but their weight and difficulty to transport require them to be on the outskirts of a town.

This circular model is of a simplified version. The presence of geographical elements such as rivers, mountains or access to the sea cause the model to stretch and contract but the basis held true for a long time (situation B) (Verhoeven, 2018). That is until the introduction of the railroad. This made it possible to transport perishable items over long distances at low costs. Thus, distorting the relation between city and hinterland. Rapidly developing technologies such as airplanes, cooled transportation and storage, and processing and packaging have continued to increase this distortion. Cities are no longer dependent on their hinterland but are able to source food on a global scale, making this relation ever weaker and more invisible (situation C, as created by author based on Von Thünen model) (Steel, 2013).

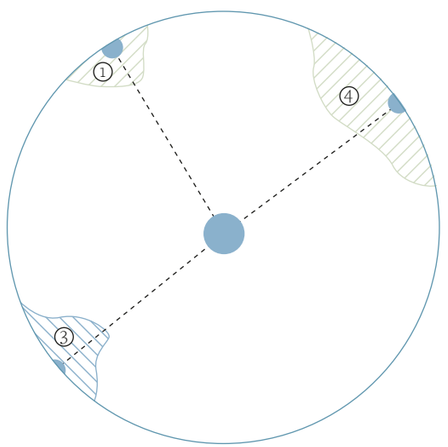
Situation A



Situation B



Situation C



1 RANCHING & LIVESTOCK
2 GRAIN & CEREALS
3 CROP ROTATION
4 HORTICULTURE & DAIRYFARMING
5 FORESTRY
6 NAVIGABLE RIVER

CITY
--- TRANSPORTATION ROUTE

The changing relationship between a city and its food system can be divided into three distinct categories

- Spatial: the development of technology has caused the physical distance between the place of production and consumption to grow larger. The distance that an ingredient travels between production and consumption is called a 'food mile'. Where previously food was produced and consumed locally, it is no become the norm to have a dish where every ingredient comes from a different part of the world, traveling thousands of kilometres adding to the cause of climate change.[9] Consequently the definition of what is 'local' has also been blurred. To define local as a physicality has become increasingly arbitrary as the impact of physical distances has lessened. Instead shifting to a contextual definition of 'locality of specialization' where a product has certain characteristics because of the place of origin. This can range from protected names to shield local heritage and craft techniques to a marketing tool as people link a certain place with certain embedded qualities (Eriksen, 2013).

- Social: the physical distance has also caused the relationship between consumer and producer to fade almost completely and be replaced by a relationship between producer-processor-consumer. More often than not the farmer doesn't know who is eating his food and the consumer doesn't know the origin of what they eat (Kirwan, 2004).

- Values: the replacement of the producer-consumer relationship to that of producer-processor-consumer relationship has directly changed the way actors value food. Commercial and industrial values have replaced civil ones. No longer are animal welfare, fair trade and environmental wellbeing at the forefront when discussing food for most people. Instead price, year-round availability and quality assurance have taken over. If civil values are still present more often than not, they are only part of commercial and industrial practices to market and sell products to a certain demographic (Morgan, Mardsen & Murdoch, 2008).

  The fact that this is the current prevailing state of our relationship with food does not have to mean it has to be permanent. There are alternatives around that seek to strengthen and re-establish our connection between producer and consumer; consumer and consumed.

The spatial-social aspects of food can be understood through the concept of the foodscape. A foodscape is any place where food can be found including the physical, socio-cultural, economic and policy influences on all scale levels (Lake et al, 2010). On the meso scale it is the build environment on a community level, providing food through varies different outlets which the consumer can utilise. On the micro scale it is the domestic foodscape. Here aspects such as physical appearance of food, the preparation of it, and the how, where, and when of serving and consuming it take place (Sobal & Wansink, 2007). These aspects cannot be seen as strictly separate or framed by their scale, instead they are nested in one another and influence each other continuously. What people eat is directly influenced by the outlets that are accessible to them and the type of outlet determines where the food is sourced from. The food that is consumed also directly shapes the people, neighbourhoods and cities. A suburb that sources the majority of its food from a supermarket will get a larger share of processed long-distance transported products than a rural village whose residents go to a weekly market where the food is provided by local farmers.

The complexity and multiplicity of the foodscape means that there are many different variations of all its aspects with not one ideal set. Instead, it is a gradient that is dependent on spatial, social and economic aspects with two extremes on each end. The first of these extremes is the agro-industrial foodscape. Food and everything that is required to produce it is seen in a commodity in a global market. The presiding goal is to minimalize the costs in the production process and to maximize the profits. The second extreme is the agro-ecological foodscape. Instead of efficiency, aspects such as availability, accessibility and affordability are important in the goal for food sovereignty. Unlike the agro-industrial foodscape sustainability within the environmental, social and economical fields are a prerequisite. A streamlined efficient process is not as important as a diversified sourcing process. The foodscape of a city will most likely not even be correctly represented by a single mix of these different elements but instead by a gradient that changes between neighbourhoods and even individual residents (Verhoeven, 2018) (Lang, 2015).

As demonstrated, foodscapes are incredibly complex. Creating an ethical one is no simple task. For all the theory present, the fact remains that when discussing food you are discussing something very human. What we eat and how we eat it has real world consequences if we care about it or not. By researching the systems and aspects that make up the foodscape of Madrid, new ways of using food as a tool to approach the challenges of urban life can be discovered and proposed. Demonstrating that food is both the knowledge and nourishment of a city, representing life itself.

RESEARCH

FOODSCAPE OF THE PAST

The foodscape of a city has deep historic roots dating back to the prehistoric age. Both the ingredients and the dishes they make up are often specific to a certain region, influenced by its history and people. This makes the foodscape of one region unlike that of another.

During the prehistoric age, the Iberian Peninsula consisted of a large variety of climates. The diet consisted mainly of wild fruits and plants with the irregular addition of meat from smaller animals and shellfish. This source of protein increased through the Paleolithic era after the mastery of fire, with deer, horses, and bovines often being prey for hunters. Vegetables and roots such as nuts and wild fruits were, however, still the primary food source (Medina, 2005).

The Neolithic era saw the permanent settlement of humans throughout the peninsula with the start of animal husbandry and agriculture. Grains such as wheat, rye, and oats were cultivated alongside beans, peas, fruits, vegetables, roots, and mushrooms. A migration of tribes over the Pyrenees introduced millet, lentils, and cabbage, and the improvement of farming techniques. This sedentary lifestyle also caused a rise in meat consumption, specifically pig, and processed products such as beer, wine, and butter (Medina, 2005).

The Greek colonies formed during the Bronze Age engaged intensely in trade with the Celtic tribes near their trading ports. They traded fabric, jewellery, and, more importantly, wine (made from the vines introduced by the Greeks) with the Celts in exchange for metals and salt mined further inland. Wine slowly displaced beer as the drink of choice and would remain so for the next millennia. Alongside, they introduced almond and olive cultivation, which before were only found in the wild. Greek kitchen staples such as olive oil, bread, wine, fish, and poultry also became essential parts of Iberian cuisine (Medina, 2005).

The Roman Republic invaded Iberia in 218 BC in an attempt to remove their rival, Carthage's, influence from the Mediterranean. After three wars, Rome was victorious, gradually absorbing more Iberian land. However, it would take more than 200 years before Rome would have the whole peninsula under its control. Roman colonization transformed Iberia. Villae (rural estate houses) were constructed, becoming centres of production for grain, grapes, and olives, with traces of such buildings found around Madrid. Irrigation systems were introduced, increasing the production and consumption of wine and oil manifold. The peninsula became one of Rome's primary granaries; wheat packed in trading ships, along with those from Egypt, fed the ever-growing Roman Empire. Their trade routes would carry back a variety of fruits and vegetables such as peaches, apricots, melons, and lemons from Persia, along with Roman culinary traditions (Medina, 2005). The culinary traditions of Rome and Iberia evolved accordingly. This early process of globalization improved the diet of the privileged initially and eventually that of the poor (Sevilla, 2019).

An invasion of Germanic tribes around 408 put an end to Roman rule. A Romanized tribe took over control of the peninsula, founding the Visigothic Kingdom encompassing most of Iberia by the end of the 5th century. Even though some sophistication was lost under the Visigoths, Roman cuisine did not wholly disappear. Grains and bread remained staple foods together with meat, wine, beans, and lentils. Flavour was added through the use of spices such as cinnamon, ginger, and saffron. The latter was imported from the east, demonstrating that trade of food had not stopped after the fall of Rome (Medina, 2005).

In the year 711, Muslim Berbers from northern Africa invaded Iberia during a period of instability, conquering the majority of the peninsula before being stopped in France. The Muslim presence would endure for the next seven centuries, having a lasting impact on the culture and cuisine of the peninsula, especially in Andalusia. Food became a marker to distinguish the different religions living in the peninsula, with Christians separating themselves from their Muslim and Jewish neighbours by keeping their tradition of cooking and consuming pork. At the same time, this cohabitation created a melting pot of dishes still consumed today, such as the stews that can still be found in Madrid. New varieties of beans, chickpeas, lentils, and lupines were introduced in Andalusia and produced alongside chard, artichokes, spin-

ach, cucumbers, onions, garlic, eggplants, turnips, leeks, celery, and squash. Rice was already present but was not yet seriously cultivated until the introduction of new farming techniques by the Muslims (Medina, 2005).

The northern Christian kingdoms slowly gained ground through the Middle Ages, forming several powerful kingdoms in the peninsula. During this period, the population increased steadily along with agricultural output. The nobility made extensive use of their right to hunt, both for sport and to provide meat during lavish banquets. However, there were periods of scarcity and even famine. Sourcing of food varied greatly between city and countryside. In the city, the market was the most reliable way of obtaining food, supplemented by small kitchen gardens and larger gardens and orchards on the periphery of the city (see appendix A), while in the countryside, farmers would be as self-sustainable as possible, only buying what they could not produce themselves. Stews and porridges became the staple for the lower classes who would not have a large variety of dishes. Meat became the marker for the upper class. The decline in variety was further helped by the bubonic plague, which ravaged the population, and agricultural output declined as a consequence. Because meat was often not available, it was substituted by pulses and vegetables such as onions, cabbages, lentils, and beans. Seasoning was provided by wild herbs such as thyme, bay leaf, fennel, rosemary, and sage. Fruit was not a common presence at the table, especially for the lower classes, instead being eaten by the upper class on special occasions. Other products consumed were cheese, eggs, and a small amount of fish. To supplement their diets, people would often gather seeds, roots, and bracken from the wild, especially during times of scarcity (Medina, 2005).

The beginning of the 16th century saw Spain rise to the status of a major world power. The reconquest was completed in 1492, and an expedition reached the American continents in search of a route to Asia, discovering the New World instead. The Habsburg dynasty succeeded to the Spanish throne, creating an empire stretching from the Low Countries to the Mediterranean Sea and across the Atlantic Ocean into the New World, with Madrid as its capital (Sevilla, 2019). Food from the Americas, such as maize, peppers, potatoes, and turkeys, found their way into the European continent through Spain. The acceptance of these new foods was mainly because they acclimatized well to the environment of the old world as well as its cuisine. The values of flavour, texture, and colour were only of secondary importance. Some were immediately accepted, such as peppers, which were seen as a vegetable, condiment, and even a medicine. It would only take two decades for farmers to already grow 20 unique varieties. Other items, however, would take longer to be incorporated into Spanish cuisine.

Lacking the context of their native land, they would assume an entirely new role, most of the time by the lower classes who could not be picky about their diet during times of scarcity. In this way peppers and beans became a common ingredient in the stews that most people relied on and that are still a hallmark of Spanish cuisine (Pérez, 2014).

At the beginning of the early modern period, Spain's empire and its power were at their height. The monarchy, nobles, and upper class were flooded with wealth from the overseas colonies and their extensive estates on the continent. At the same time the divide between upper and lower classes grew ever larger (Campbell, 2017). Although Iberia was one of the largest producers of what during the Roman times, its production had steadily declined, making starvation a major issue and causing large swaths of the peasantry to migrate to the cities. This caused prices within cities to rise and scarcity to increase in a continuous vicious cycle. These hard times were worsened by the heavy debt under which the Spanish crown found itself. The country defaulted several times on their foreign loans, destabilizing it further and disproportionally impacting the lower classes (Sevilla, 2019).

The divide between social-economic classes was very much represented by the food each class had present on their table and especially in their bread. Bread was by and large the biggest source of calories for most Spaniards (at times up to 70% of daily caloric intake). However, what kind of bread was consumed strongly tied with class. The softest white wheat flour being exclusivity reserved for the aristocratic courts with even the rich merchant class not being allowed to buy it. The lower classes would be left with other cereals and during harsher times flour made from acorn and chestnut. This divide was further reinforced by the belief that God created the natural world and the world of humans was created in parallel. This meant that fruits and vegetables that were grown close the ground such as garlic and turnips were meant for peasants, while tree fruits were only fit for the aristocracy (Campbell, 2017). As the food that was considered fit for the upper class was naturally more difficult to farm it would cost significantly more than that of their peasant counterparts. This would mean that a lord that was often expected to host a large number of guests and in sufficient style, with a table overflowing with a large variety of food, that his food expenditure would be relatively as high or even higher than that of the lower classes whose diet mostly made up of soup and bread along with eggs, cheese and olives. For them meat and sweets would only be available during festivals and celebrations (Medina, 2005). Such occasions were important social and religious functions

throughout Spain (and still are partially). The citizens of a town and village would come together, break bread and share wine. All classes would partake in these occasions and these rituals would be important in forging a collective identity and sense of community between the highest and the lowest inhabitants of a city (Campbell, 2017).

The 17th century was a turbulent time for the Iberian Peninsula with successive revolutions causing a turndown in economic prosperity and agricultural production that would not abide until the final quarter of the 18th century. The Spanish court would be majorly influenced by the French kitchen as the Habsburg dynasty ended and the French Bourbons came to the throne (Medina, 2005). During this period food was not only a way to demonstrate who you were but also who you wanted to be. The breakdown of the old class orders (nobility, church and peasants) had already started in the previous century with the rise of a wealthy merchant class who often could be richer and more powerful than the lower nobility. They would closely watch and imitate the trends and behaviour of the nobles as to show that they were not so far removed as had been the case in previous centuries. To be invited and to invite one to share a meal was an important step in the forming of social bonds. Through these bonds an apprenticeship for one's son, an important business deal or even a marriage alliance could be achieved. Many of the noble class opposed this attempt of those they saw as social inferiors to break into the upper class and behave like does that had hereditary rights. This caused them to put limitations, when possible, on who was allowed to consume certain kinds of food. Game animals such as birds and deer for example always had a strong connection with the aristocracy, who had the exclusive right to hunt them, but more stringent limitations were placed on the consumption of any game animal. Peasants who had previously supplemented their diet with animals such as rabbits saw this source of food taken away from them (Campbell, 2017). The cuisine of the average citizen still remained centred around stews and bread, but because of slowdown in agricultural production and artificial limitations they would have to be less selective in their ingredients. This caused peppers to be incorporated during the 17th century with other New world products such as tomatoes and potatoes slowly becoming more prevalent in times of scarcity and steadily being more accepted during the coming century (Medina, 2005).

At this time a large percentage of the fertile land was still in the possession of the nobility and the church. Both would often have little interest in managing their estates efficiently. The government tried to put measures into place to increase the birth rate and increase production. This included giving uncultivated land to families that had a large number of children and to foreign immigrants. Although Spain had been a world power during the two preceding centuries it was only second class at the end of the 18th century. The government's inability to manage its finances correctly and feed its population went hand in hand. The countries taxation system was badly set-up causing two of its most profitable taxes to be placed on the production and sale of food. Making it harder for the lower classes to afford their already basic diets (Sevilla, 2019).

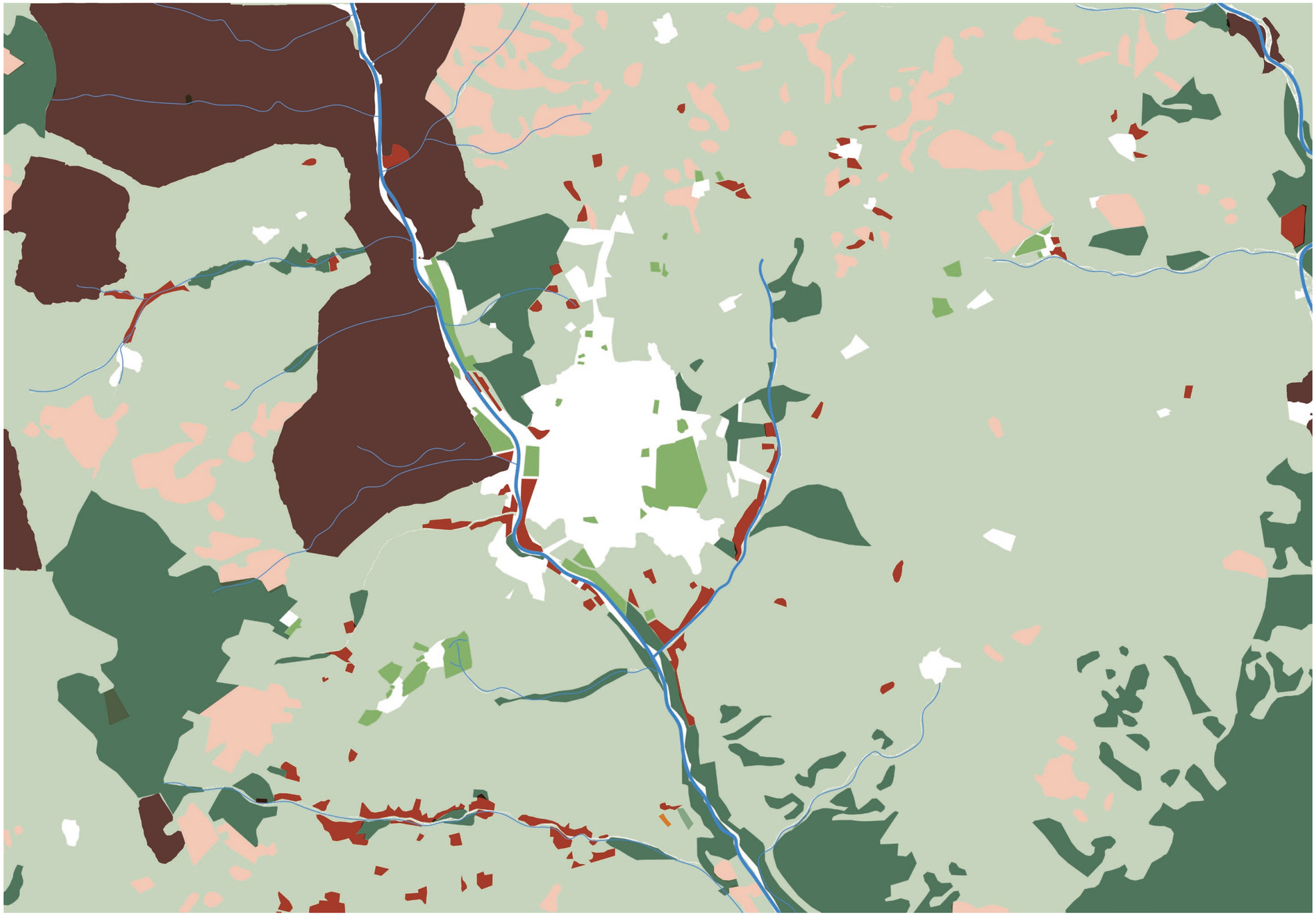
The 18th century saw the appearance of a strong national cuisine. Cookbooks were published in this period describing traditional recipes such as stews, made from locally grown ingredients including some that had their origin in the New World. Many of these books were written by the frayers of monasteries who used the ingredients that they grew and produced inside their monasteries (Sevilla, 2019).

During the 19th century, urbanization and industrialization caused a major population increase. The industrialization of the mining and textile sectors was distantly followed by that of the food industry which started gaining more importance in the latter party of the century. This caused a major stream of migrations from poor rural areas to industrialized cities such as Madrid. The average labourer still relied upon soups and stews that mostly contained vegetables such as beans, peppers and potatoes with little meat for their daily diet. The cuisine of the upper class however was decidedly different from previous centuries being strongly influenced by the French. Some peasant dishes like paella and pa amb tomàquet however were consumed by the poorest and richest citizens. Pulses, vegetables (chickpeas, beans, lentils, squash, spinach, asparagus, tomatoes, peppers and potatoes) and fruit (pears, apples, peaches, oranges, lemons, pomegranates) both fresh and dried were frequently eaten all over the peninsula (Medina, 2005).

Industrialization and urbanization continued into the 20th century, lasting until the Spanish Civil War broke out in 1936. The nationalist faction would be victorious in 1939. The Second World War broke out that same year and even though Spain would be nominally neutral the post war years were harsh with hunger being a consistent issue for the majority of the population. The country was socially and economically isolated from the world for supporting the Axis powers and the Francoists' agrarian policies proved to be failures. The lower classes made do with wheat, vegetables, oil, and small amounts of meat (often the left-over cuts) and herbs. The typical dishes remained the same as the centuries prior with the quantity and quality of meat increasing as the social-economic status of the household increased. Food scarci-

ty would only become less common through the 1950's when Spain again became internationally accessible. Economic prosperity started increasing throughout Spain as well as technological progress both in the household and food industry. Most products became available year-round through advances in preservation, quality assurance and agricultural technology. Variety, quality and taste however suffered as a consequence of this. With food scracity becoming less of a major issue the horticulture gardens within and on the border of the city that had long been part of the image of the city also started to dissapear (see appendix A).

The cuisine of Spain has remained decisively Mediterranean but habits have become more in line with other Western European countries, consumption of meat and milk has increased to the detriment of lentils and bread (Medina, 2005). The flavours and dishes which are deeply rooted in the past three millennia which make up Spain's history are however still at the forefront of Spanish cuisine. The traditions and values surrounding them however have waned from those of community and variation towards those of convenience, availability and price-value.



Green space surrounding Mardrid around 1875

Categorized green surrounding Madrid in 1875 highlights the location of the horticulture gardens located on the banks of the Manzanares river and its tributaries. Some smaller gardens are not located near rivers or streams but make use of underground wells.

Vineyard or olive grove
Grasslands and scrubland
Ornamental green
Agriculture
Woodland
Horticulture
Water

Green space surrounding Mardrid around 1900

In 1900 many horticulture gardens are still present on the outskirts of Madrid and on the banks of the Manzanares. However, the slow transformation has started that will replace gardens with boulevards and urban build up.

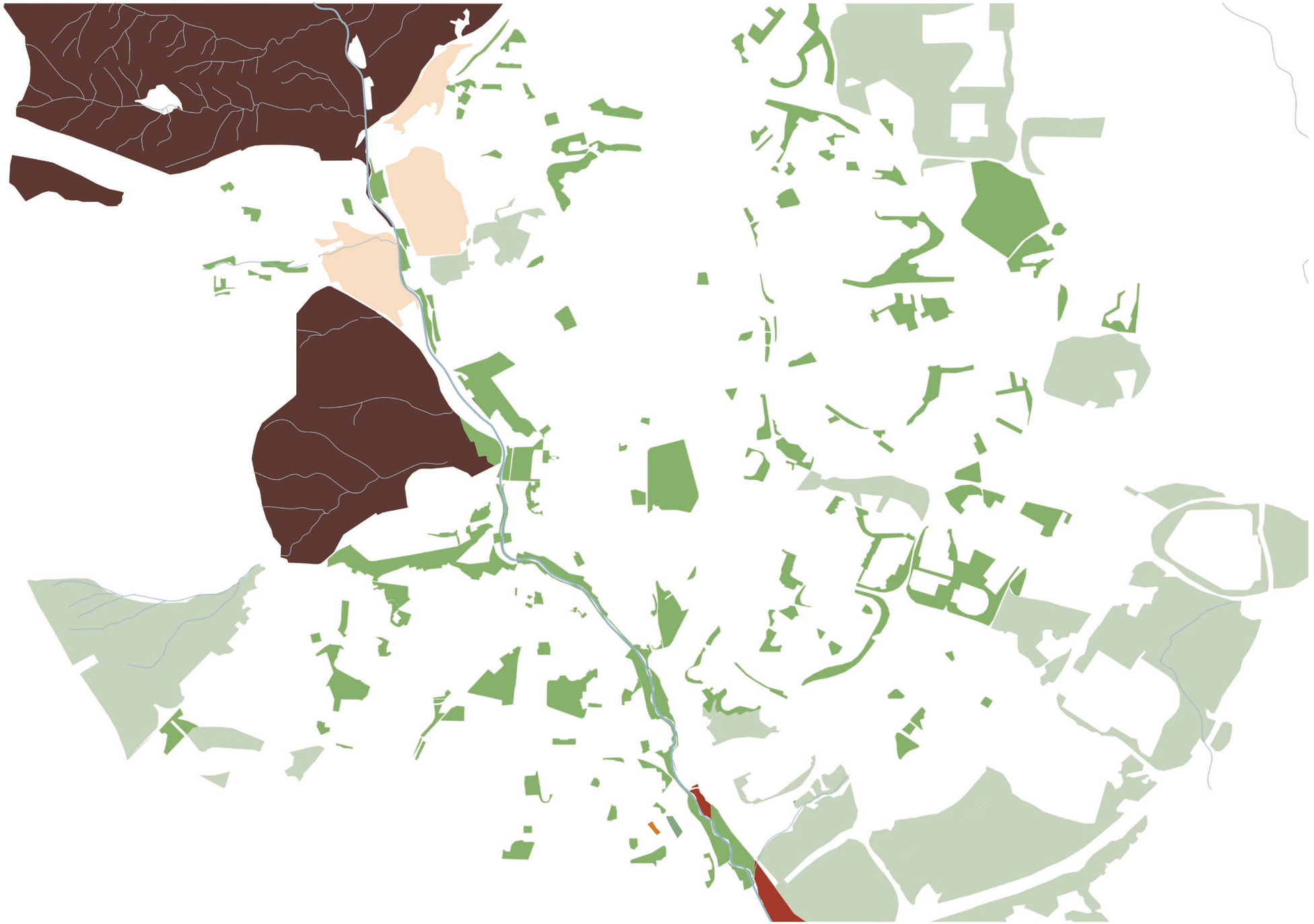
Note that the white space surrounding the map is present because the base map of this drawing was smaller than the one from 1875. The extend of the base map is marked by the dashed line.

Vineyard or olive grove
Grasslands and scrubland
Ornamental green
Agriculture
Woodland
Horticulture
Water

Green space surrounding Mardrid around 1910

In 1910 urban buildup is slowly displacing the horticulture gardens. Some streams will be rerouted underground in the next decade transforming them into boulevards, a process that has already started on the north side of the city.

Note that the white space surrounding the map is present because the base map of this drawing was smaller than the one from 1875. The extend of the base map is marked by the dashed line.

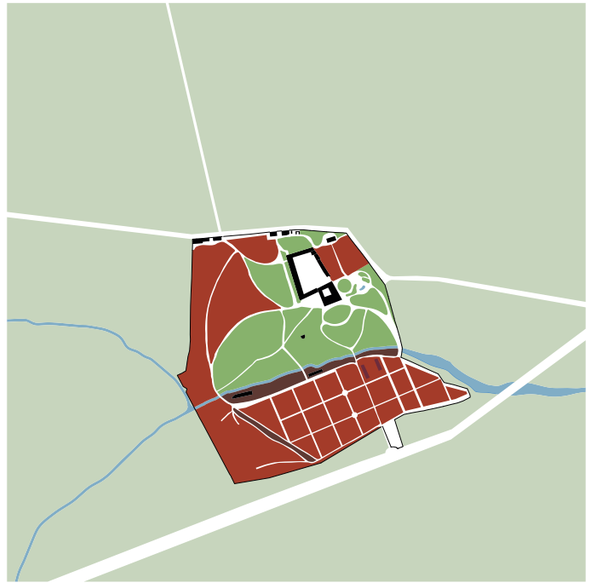


Green space surrounding Mardrid around 2015

In 2015 the horticulture gardens have almost completely disappeared. Some small ones are still present in the city but are invisible on this scale. The only large remains are in the south of the city along the banks of the Manzanares where local residents have claimed unused land to grow plants and food.

Note that all the white space in this drawing consists of urban buildup.

Public garden: Calderón



Private estate: Quinta de Torre Arias

Royal garden: El Retiro

Six cases of green space in Madrid around 1875

These six cases demonstrate the three different typologies of horticulture in Madrid: the public garden, the private estate and the royal garden. The private estate Quinta de Torre Arias has been selected as the site for the design project.

Public garden: Manzanares river

Private estate: Finca de Vista Alegre

Royal garden: Huerta de la Partida

Public garden: Calderón

Private estate: Quinta de Torre Arias

Royal garden: El Retiro

Six cases of green space in Madrid around 2015

These six cases demonstrate the three different typologies of horticulture in Madrid: the public garden, the private estate and the royal garden. The private estate Quinta de Torre Arias has been selected as the site for the design project.

This site was selected because of its historic qualities, the fact that the entire estate is still one continuous whole and that the current conditions (such as adequate amounts of space, vicinity to local actors and resources, and already present biodiversity) make the production and processing of food possible.

Public garden: Manzanares river

Private estate: Finca de Vista Alegre

Royal garden: Huerta de la Partida

RESEARCH

SOURCING FOOD IN MADRID

The city of Madrid has a population of 3.2 million citizens with about 10,000 establishments selling food in one way or another. This makes tracing the sources of Madrid's food supply a difficult task, and there are bound to be exceptions that cannot be anticipated or accounted for. Because of this, this chapter is divided into multiple typologies which will account for the majority of supply sources.

Mercamadrid

Mercamadrid is the main wholesale market for Madrid and the surrounding region. It is responsible for the majority of the food supplied to restaurants and independent shops, supplying 3,159,482 tons of product in 2022. The site, which consists of 222 hectares, lies on the outskirts of the city near major highways to facilitate easy distribution. The company functions as an overarching platform/facilitator for 800 companies located on its grounds. These companies supply everything from perishable products such as produce and meat to general services such as catering. The market employs around 20,000 people and is not accessible for private individuals. Instead, it functions as a hub for the companies located there to negotiate and sell to one another and then sell on, either directly to a private individual, restaurant, or shop. An example of this is the meat market. Here, butchers break down slaughtered animals and then sell the meat to either a distribution company, which will then sell it onward or supply directly to restaurants and shops (Mercamadrid, 2022).
The market, however, is more of a distribution, marketing, and commercial facilitator than anything else. It does not produce what it sells. Instead, supply is sourced from a large number of suppliers on a regional, national, and even international level. The company claims that 77% of its supply comes from the national level, with 144,500 tons coming from within 100 km of the site in 2022 (Mercamadrid, 2022). However, it is impossible to determine if this also takes into account the original source of products that are processed by companies within Spain.

Restaurants

Madrid contains over 4,000 restaurants (this number does not include the over 760 fast-food places). Restaurants vary greatly from each other in clientele, price range, and cuisine. However, most are supplied by the companies in Mercamadrid. Most restaurants aim to limit their number of suppliers to three or four main vendors for their basics such as vegetables, meat, fish, and common ingredients, with two or three supplemental vendors for odd items. There are, of course, exceptions to this, with lower-end restaurants perhaps using only two main vendors to limit the amount of items and thus their costs, while high-end haute cuisine restaurants will have a greater number of suppliers as, for them, price per item is of lesser concern than their quality (flavor, variation, and origin). Higher-end restaurants will also have a more direct relationship with their producers. This not only ensures their quality but also gives them the ability to work together in the creation of new ingredients.

Independent Specialty Stores

Although a large amount of the food supply in the city is sourced from Mercamadrid, there are other sellers that have a shorter network from producer to consumer. These are often specialty shops selling a single kind of product like wine, cheese, meat, etc. These shops can be part of a mercado or be an independent storefront. Although not all stock will come directly from local producers (Mercamadrid is still partially responsible for some supply), they will have a more direct relationship with local producers as they don't require large upfront quantities of stock like supermarket chains do.

Mercados

Mercados are large market halls consisting of a collection of shops that rent space within the hall. The city of Madrid has a total of 46 mercados, either privately or publicly owned, varying from small neighbourhood ones to multi-story ones focused on tourism. The stalls inside are often specialized in certain products or cuisines, with their supplies coming from Mercamadrid and directly from local producers. The municipality has designated certain mercados as gastronomic markets which focus on providing a gourmet experience and high-end locally produced products (Comunidad Madrid, 2023c).

Supermarkets

The city of Madrid contains 723 supermarkets (data from 2023), with 63% being part of a large brand name chain like Lidl and Carrefour. These brands use a corporate supply structure, buying large amounts of stock directly from producers and using their own distribution centres to distribute it to their stores. Supermarkets have a large selection of items ranging from name brands imported from overseas to generic items repackaged to carry the supermarket's name. Chain brands aim for consistency across all their branches so no matter which one a customer enters, it will carry the same stock as any other. The consequences of this aim are, however, that products are selected for their consistency and price stability, not flavour or the conditions surrounding their production (Steel, 2013).

Markets

The Agrarian Chamber is a department of the Community of Madrid that, together with local producers, organizes a Market Day every first Saturday of the month. During this market, local farmers, ranchers, and small agri-food producers sell and promote their products. Besides the market days, the Chamber also runs a web shop with a smaller selection at which orders can be placed for home delivery (Cámara Agraria, 2023). The former Matadero slaughterhouse turned into a cultural centre hosts the Matadero Market every weekend. It is the largest such market in Madrid with 70 farmers and food producers and occupies 5,000m2 of space. It sells everything from vegetables produced in the Community of Madrid to artisanally made vermouth (Mercado Matadero, 2023).

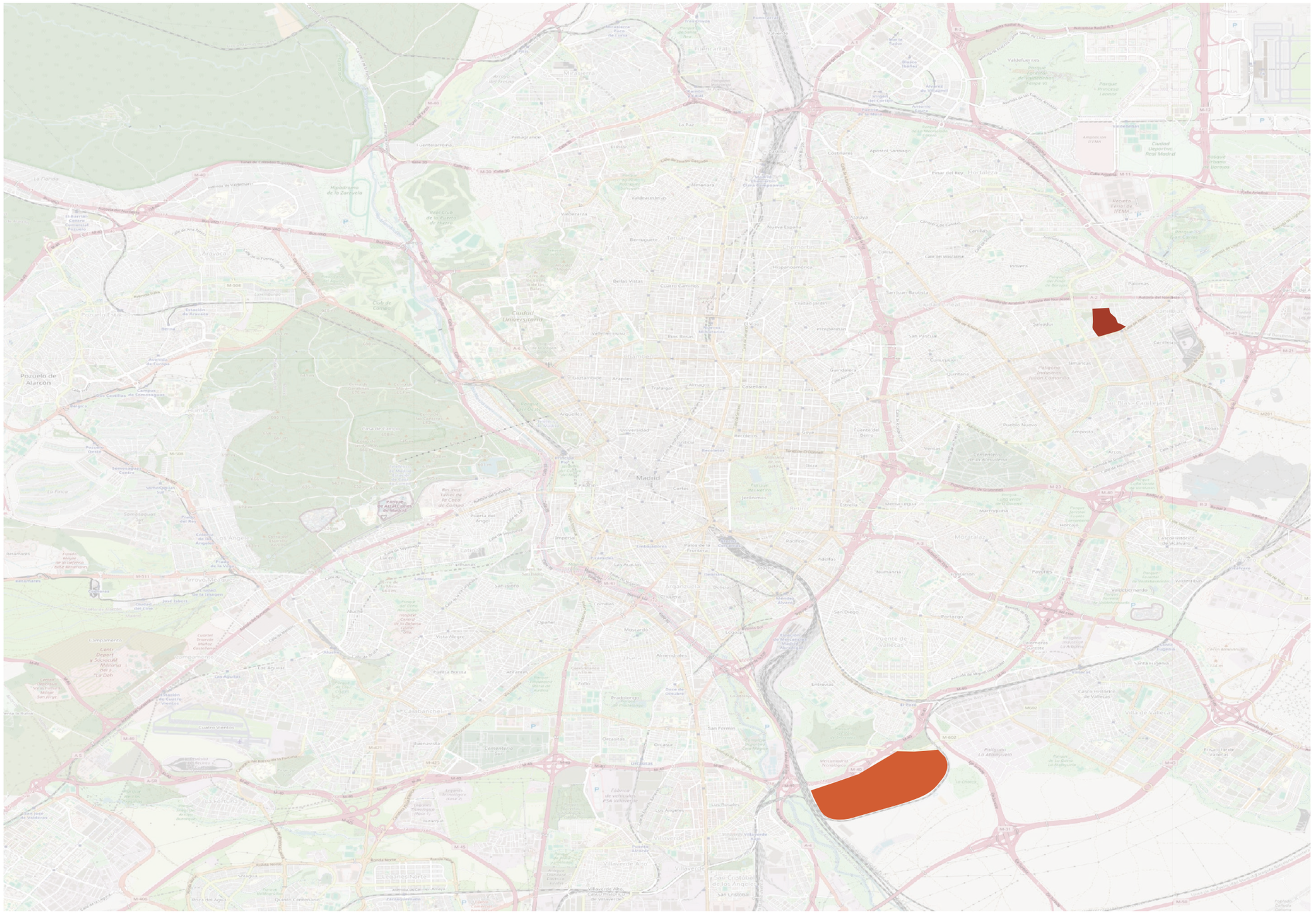
Huertos de Madrid

Huertos Urbanos is a municipal program to promote urban horticulture and educate citizens on the local cultivation of plants and produce. The project started in 2010 and is self-governed with support from the municipality for funding, resources and sites. In 2023 the project encompasses 57 gardens across Madrid with the smallest being 200m2 and the largest being 3000m2. Many of the sites are located on public land that was in disuse and either already coopted before being incorporated into the program or made available by the municipality. As many of the sites are of a small size with an aim on education, social interaction and leisure, the production of the gardens is negligible for the supply of food in Madrid outside of the participants (Departamento de Educación Ambiental. 2023). The project however is a good example of the other benefits of urban horticulture outside the production of food.

Labels and certifications

To identify food that has certain characteristics such as being organically produced, locally sourced or that are protected, the city of Madrid uses a variety of labels. There are currently nine different labels in use. The requirements of these labels are covered in appendix B. There existence demonstrates that the city of Madrid strongly prioritizes the promotion of food products of high quality that are locally and/or traditionally produced.

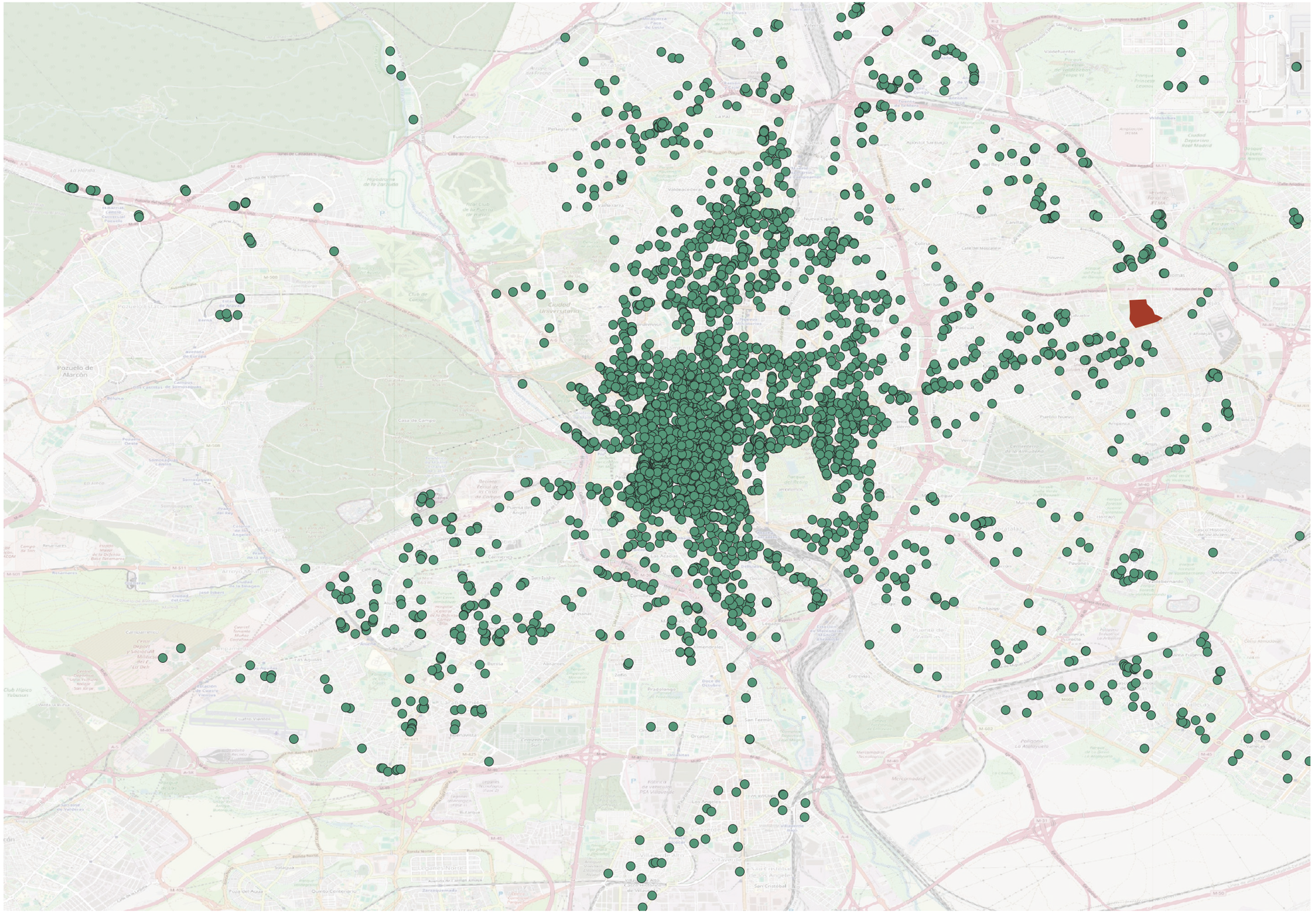
The different typologies of the food sourcing of Madrid demonstrate an ecosystem wherein every typology place its own distinct role. In the centre of it lies Mercamadrid which distribute a large majority of the food that is consumed within the city. Especially within the many restraurants (with the exception of higher-end fine dining). This major distribution node is joined by that of the supermarkets which offer the modern convenience of large standardized offerings in exchange for a reduced emphasis on provenance and artisanal qualities. However, the presence of Mercado's and independent speciality stores along with local initiatives such as markets and the Huertos de Madrid demonstrate a desire among consumers to engage more directly with producers and the food they consume.



Food sourcing: Mercamadrid

Mercamadrid is located on the south of the city near major road junctions and railway yard, making the import and export of food as efficient as possible.

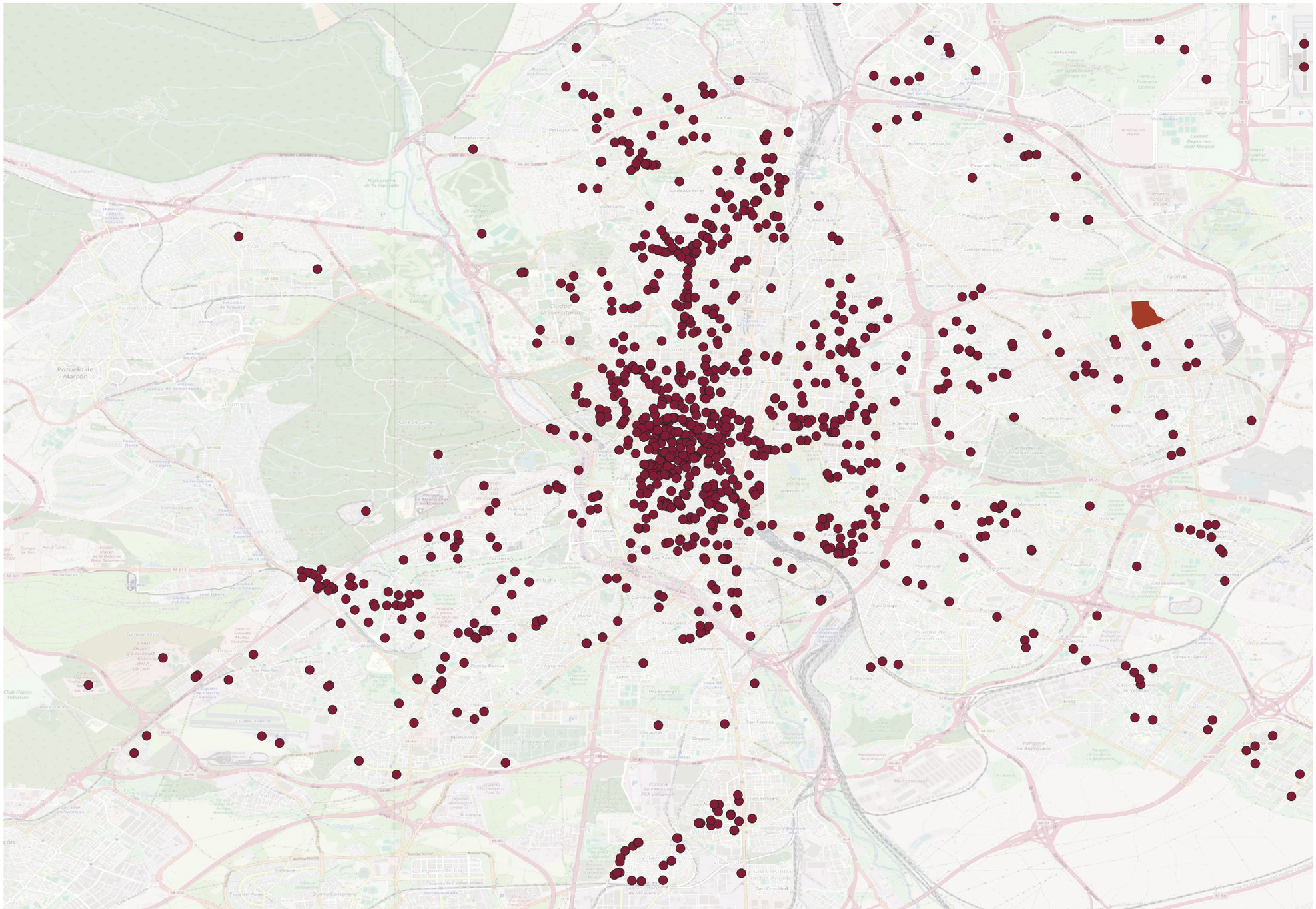
Note the selected design location is marked in dark red on right side of the map.



Food sourcing: Restaurants

Madrid counts a total of more than 4000 restaurants, ranging from small take out places to Michelin starred fine dining.

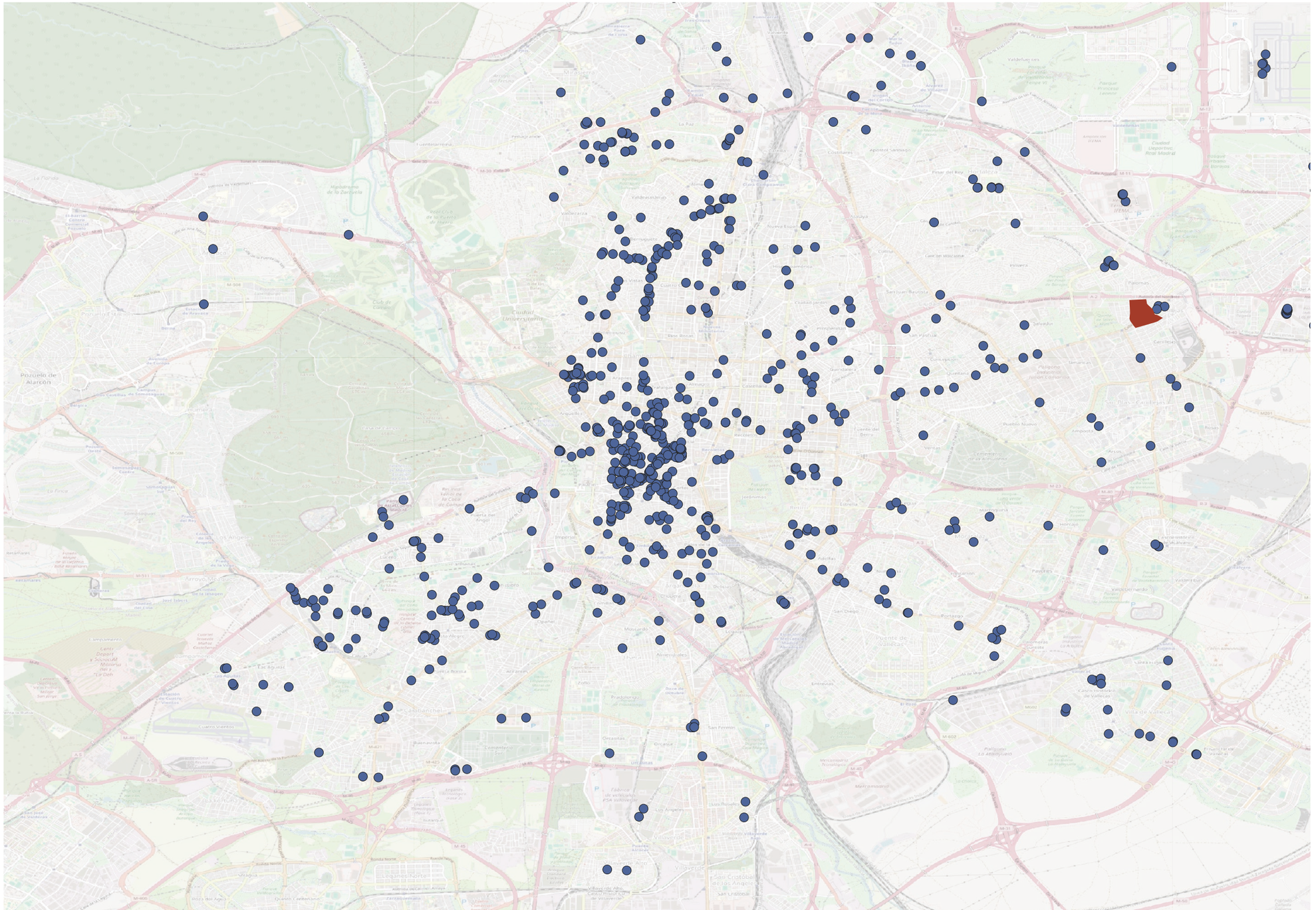
Note the selected design location is marked in dark red on right side of the map.



Food sourcing: Café

A total of 1065 café's serve breakfast, coffee and churros throughout the day.

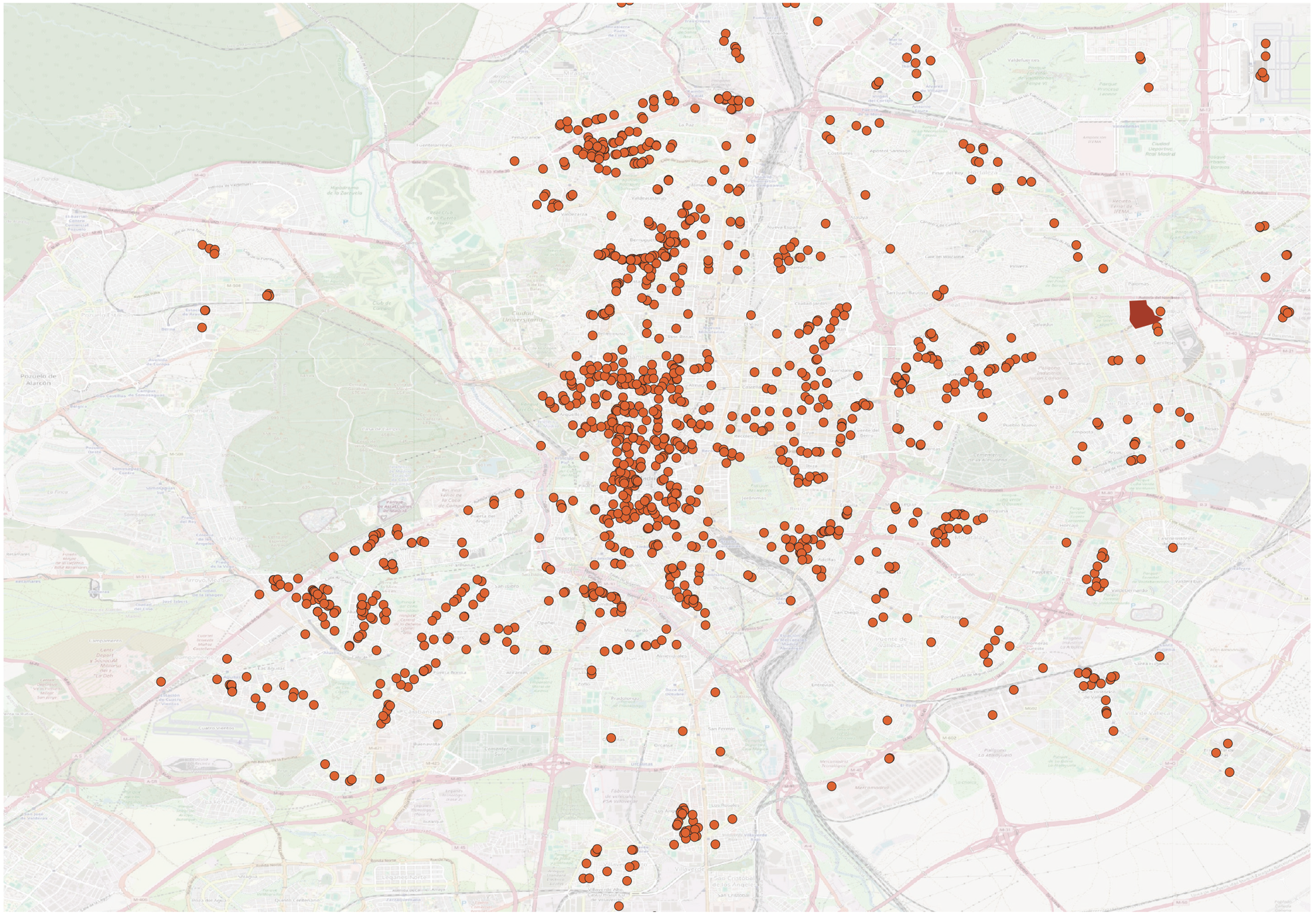
Note the selected design location is marked in dark red on right side of the map.



Food sourcing: Fast food

760 fast food restaurants are located in Madrid, most are owned by major chains such as Mcdonalds and Popeyes.

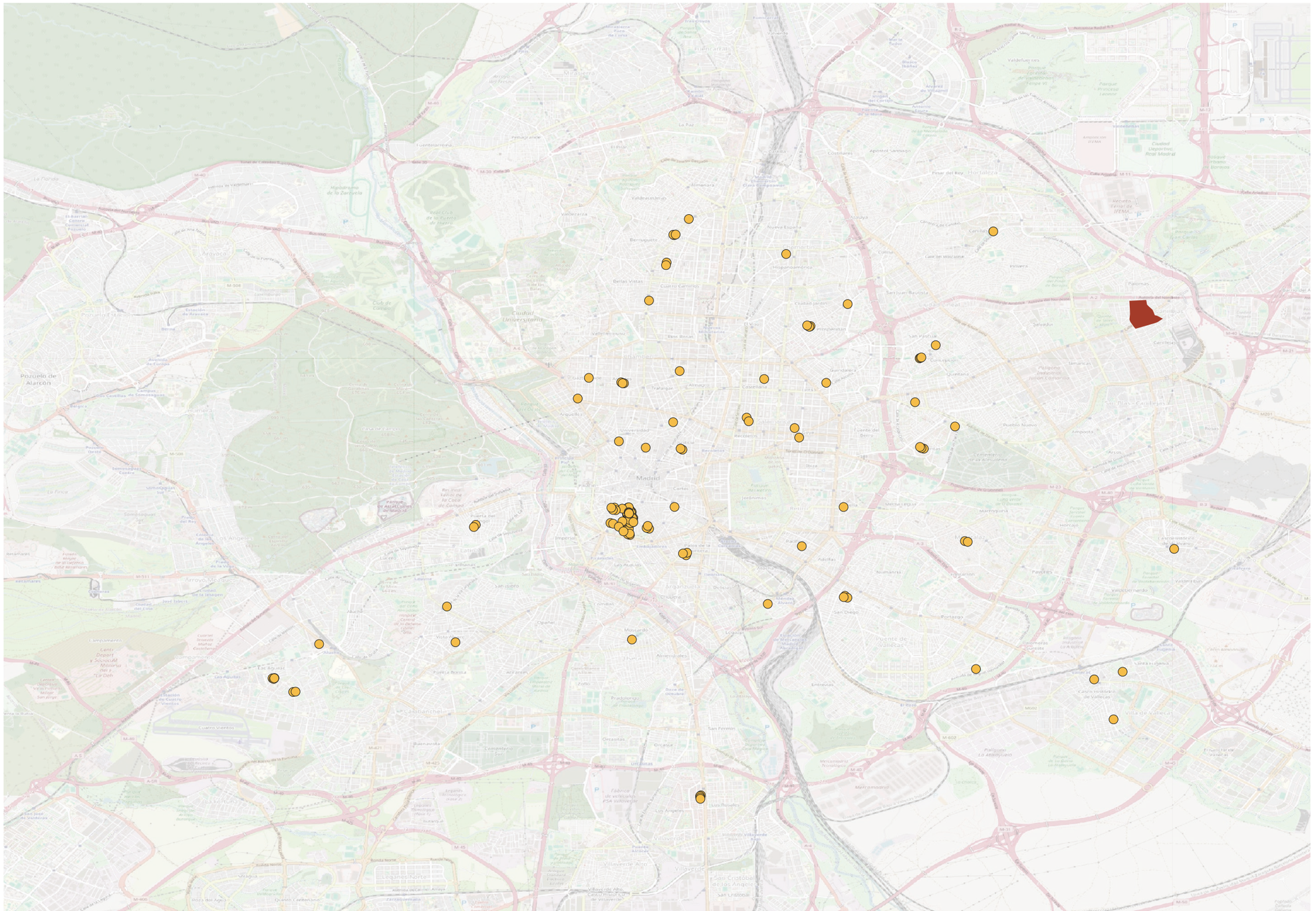
Note the selected design location is marked in dark red on right side of the map.



Food sourcing: Speciality shops

A total of 1249 specialty shops provide the citizens of Madrid everything ranging from fresh bread to artisanal spirits.

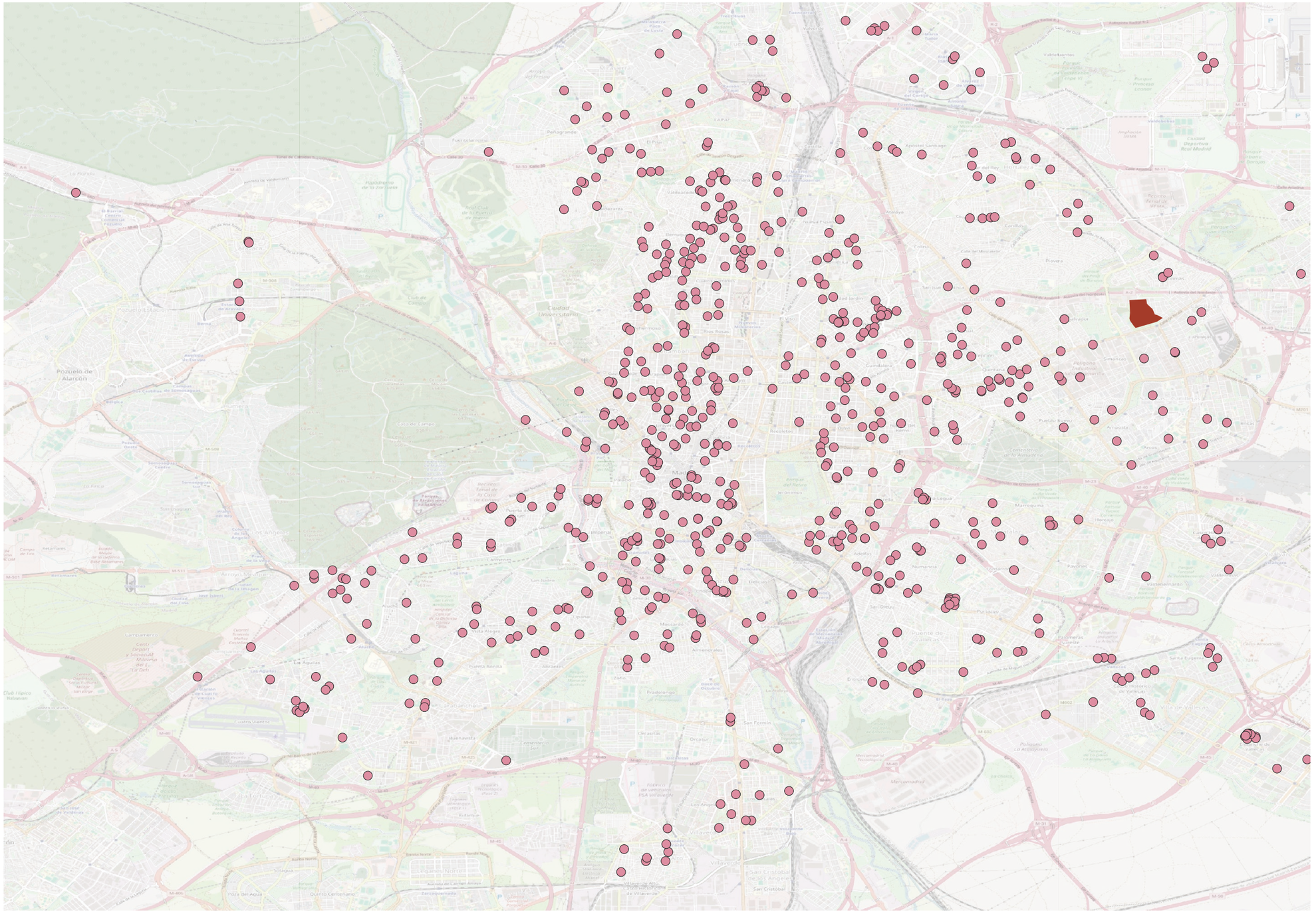
Note the selected design location is marked in dark red on right side of the map.



Food sourcing: Mercado's & market halls

Dozens of different mercado's and market halls throughout the city house a variety of shops. Some are aimed at artisanal gastronomic experiences while others are used by local residents for everyday groceries.

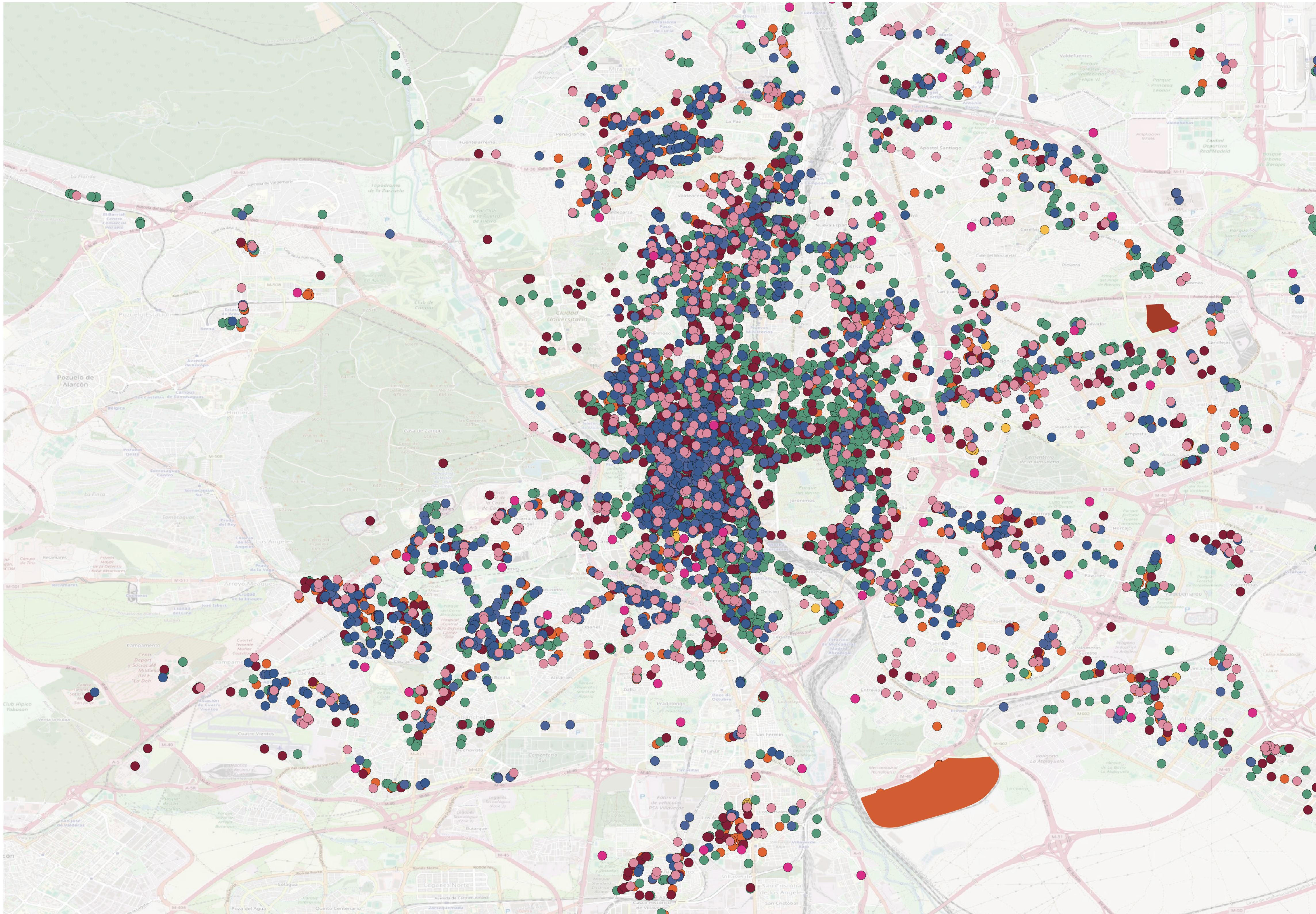
Note the selected design location is marked in dark red on right side of the map.



Food sourcing: Supermarkets

723 supermarkets provide the everyday groceries of the cities. These range from large corporate chains to small independent shops.

Note the selected design location is marked in dark red on right side of the map.



Food sourcing: all food sources overlapped

723 supermarkets provide the everyday groceries of the cities. These range from large corporate chains to small independent shops.

Note the selected design location is marked in dark red on right side of the map.

Sierra de Guadarrama

Carne
- Ganadería y Carnicería Sergio y Julio, Miraflores de la Sierra
- IPG (Municipios Área Guadarrama), Becerril (1) Cercedilla (2) Colmenar Viejo (5) Guadalix (1) Manzanares El Real (6) Matalpino (2) Miraflores (2) Moralzarzal (5) Soto del Real (2)
- Ganadera Alicia Tabernero, Santa María de la Alameda y Moralzarzal
- Granja Colmenar, Colmenar Viejo
- Ganadería Raúl Lema y Carnicería de Madrid, El Boalo-Matalpino-Cerceda
- Sabores Sierra de Madrid, Colmenar Viejo
- Cárnicas Lázaro, Manzanares El Real
- Cuerda Larga-Carnes de Miraflores, Bustarviejo y Miraflores
- Asoc. de Berrendo de Madrid, Cercedilla
- Asoc. de Criadores de Ganado Caprino de Raza de Guadarrama, Colmenar Viejo
- Asoc., de Criadores de Ganado Ovino de la Raza Colmenareña, Colmenar Viejo
- Lechal Colmenar, Colmenar Viejo
- Arroyo del Endrinal, Cercedilla
- Finca Hoyas de Santa Ana, Colmenar Viejo
- Ibéricos de Madrid JP Marabotto, Becerril de la Sierra/ Manzanares el Real

Cerveza
- Cervezas Gabarrera, Becerril de la Sierra
- Manuel Montero de Maltacaballar, Alpedrete
- Bienvenido Mister Marshall Beer, Guadalix de la Sierra, Navalafuente

Otros
- Ahumados y salazones Casa Santoña, Guadarrama
- Ahumados y salazones Fish Gourmet, Guadarrama
- Patatas fritas la Montaña, Collado Mediano

Lácteos y quesos
- Ecolaktis, Soto del Real
- Suerte Ampanera, Colmenar Viejo
- La Colmenareña, Colmenar Viejo
- Quesería Maliciosa, El Boalo-Matalpino-Cerceda
- Alimentos de Miraflores, Miraflores de la Sierra
- El Embrujo de la Sierra, Colmenar Viejo
- Quesos Peña Rubia, Guadalix de la Sierra

Miel
- Apícola Trallisería, Moralzarzal
- Miel Pablo de la Quintana, Soto del Real
- Amorymiel. Bustarviejo, Miraflores y Soto del Real
- Puramiel, Miraflores de la Sierra
- La Abeja Viajera, Soto del Real

Repostería
- La Buena Miga, Moralzarzal
- Pastelería Bernardos, Hoyo de Manzanares
- La Tahona de Moralzarzal, Moralzarzal
- Pastelería Cueto, Galapagar
- La Panata, Miraflores de la Sierra

Licores
- Gin Monti, Los Molinos

Alcarria

Aceite
- Aceites Torres, Torres de la Alameda
- Aceite de oliva y aceitunas de Campo Real
- Aceite de Oliva de Campo Real, S.L., Campo Real

Carne
- Vellilla, Arganda del Rey
- Liberto de Pedro, Ajalvir
- La Artesa, Alalpardo

Huerta
- Garbanzos de Daganzo Godín Fernández, Daganzo de Arriba
- Garbanzos Juan Félix, Daganzo de Arriba
- Huerta del Chorrillo, Paracuellos de Jarama
- Huerta Pepines, Valdetorres de Jarama
- Aroma Verde, Talamanca de Jarama
- La Huerta del Olmeda, Olmeda de las Fuentes

Licores
- Alambique de Santa Marta, Ajalvir
- Viking Bad hidromiel, Ajalvir

Lácteos y quesos
- Quesos Arcam, Campo Real
- Quesos Campo Real, Campo Real
- Lácteas del Jarama Albe, Fuente el Saz

Miel
- Miel de Mario, Villar del Olmo
- Miel Antonio Simón, Cobeña

Repostería
- Torta de Arganda, Arganda del Rey
- Pan de Pedrezuela, Pedrezuela
- Pan de Torres de la Alameda
- Obrador Joaquín González, Campo Real
- La Tahona, Talamanca de Jarama
- Mermeladas y Delicias Carmeltanas, Loeches

Chocolate
- Chocolates La Plata, Loeches

Vino
- Cooperativa Vinícola y Aceitera de Arganda, Arganda del Rey (DOP)

Sierra Oeste

Carne
- IPG Ganaderías (Municipios Sierra Oeste) Cenicientos (1) Santa María de la Alameda (10) Rozas de Puerto Real (10) Zarzalejo (1)
- Carne de la Finca, Colmenar del Arroyo
- Vaca Negra, Cenicientos
- Elsa Fernández - Plataforma nacional Ganaderas en red, Fresnedillas de la Oliva
- Kabriolas, Robledo de Chavela

Lácteos y quesos
- La Cabezuela, Fresnedillas de la Oliva
- Granja-Quesería Vega Alberche, Aldea del Fresno

Vino
- Nuestra Señora de la Soledad Sdad. Coop., El Álamo (DOP)
- A Pie de Tierra, Aldea del Fresno (DOP)
- 4 Monos Viticultores S.L., Cadalso de los Vidrios (DOP)
- Bodega Cooperativa Cristo del Humilladero, Cadalso de los Vidrios (DOP)
- Bodega Miguel Santiago, Cadalso de los Vidrios (DOP)
- Finca Aumesquet Garrido (Finca Mariscalas), Cadalso de los Vidrios (DOP)
- Comando G (la "G" de Garnacha, la "G" de Gredos y la "G" de granito), Cadalso de los Vidrios/ Las Rozas de Puerto Real (DOP)
- Bodegas Cardeña, Navas del Rey (DOP)
- Bodegas Marañones, Pelayos de la Presa (DOP)
- Bodega Virgen de la Poveda, Villa del Prado (DOP)
- Bodegas Nueva Valverde, Villa del Prado (DOP)
- Vinos Juliana, Villa del Prado (DOP)
- Bodega ecológica Luis Saavedra, Cenicientos (DOP)
- Bodega Ca di Mat, Pelayos de la Presa (DOP)
- Bodegas San Esteban Protomartir, vino y aceite, Cenicientos (DOP)
- De la Bodega, Valdemorillo. Vino de moscatel

Huerta
- Garbancera Madrileña, Quijorna, Brunete, Navalcarnero, Sevilla la Nueva, Villaviciosa de Odón, Boadilla del Monte, Villanueva de Perales, Villamantilla, Villamanta, Quijorna, Villanueva de la Cañada, Villanueva del Pardillo, Valdemorillo y Colmenar del Arroyo
- Huerta la Floresta, Quijorna
- Asoc.de horticultores de Villa del Prado
- Huerta de Madrid, Villa del Prado
- Huerta Clarita, Villa del Prado
- La Puerta Verde, Quijorna, Chapinería
- Ecotórtola (José Luis Leceta), San Martín de Valdeiglesias, Villa del Prado

Miel
- Miel de Gredos "JBJ Paraíso", Pelayos de la Presa

Repostería
- El Árbol del pan, Fresnedillas de la Oliva
- Panesthesia, Pelayos de la Presa
- Panaderías y pastelerías del municipio, Navas del Rey
- Panaderías y pastelerías del municipio, Valdemorillo
- Espiga de Oro, Robledo de Chavela
- La tahona de Jesús, Chapinería
- Panadería Miana, Santa María de la Alameda
- Pastelería Torrehermosa, Villanueva de la Cañada

Aceite
- Almazara Santiago Apóstol, Villa del Prado

Otros
- Caracoles Cadalso, Cadalso de los Vidrios
- Patatas Fritas Marisa, Villanueva del Pardillo
- Té Orgánico, Brunete

Vegas de Madrid

Aceite
- Cooperativa Santa Lucía, Carabaña
- Aceitera de Tielmes Sociedad Cooperativa Madrileña, Tielmes
- La Peraleña, Perales de Tajuña
- Cooperativa Virgen de la Oliva, Valdilecha
- Aceite Villa Óleum, Valdaracete
- Aceite ecológico Oleollano, Morata de Tajuña
- Aceitera de La Abuela, Titulcia
- Oleum Laguna de Bliss, Villaconejos

Vino
- Cooperativa San Isidro, Belmonte de Tajo (DOP)
- Andrés Morate, Belmonte de Tajo (DOP)
- Bodega Tagonius, Tielmes (DOP)
- Bodega Viña Bayona, Titulcia
- Coop. del Campo San Isidro, Valdilecha (DOP)
- Aceites y vino Pincelada, Morata de Tajuña
- Bodegas Licinia y Muss, Morata de Tajuña (DOP)
- Bodegas Pablo Morate, Valdelaguna (DOP)
- Bodegas González Arranz, Perales de Tajuña
- Vinos y aceites Laguna, Villaconejos (DOP)

Licores
- Vermut Zechini, Valdemoro

Huerta
- Ajos Cuenca, Morata de Tajuña
- La Huerta de Carabaña, Carabaña
- Asoc. Agricultores Vega de Ciempozuelos, Ciempozuelos
- La Madre Vieja, Ciempozuelos
- El Huerto de Huertas, Orusco de Tajuña
- Horticolas Bucero/La Vega de Perales, Perales de Tajuña
- Lahuertadelastraviesas, Perales de Tajuña
- Ángel Bucero, Perales de Tajuña
- La Huertilla del Tajo, Villamanrique de Tajo
- Verduras La Cometilla, Villamanrique de Tajo
- Melón de Villaconejos, Villaconejos
- Te Traigo la Huerta, Fuentidueña de Tajo
- Asoc. Conciencia Grows, San Martín de la Vega
- Huerta del Pingarrón, San Martín de la Vega
- El Huerteciito, San Martín de la Vega

Otros
- Huevos El Olivar de Bankiva, Perales de Tajuña
- Caracoles Vega Naturalis, Tielmes

Carne
- Campogrande, Ciempozuelos
- Embutidos Carnes Pacheco, Villaconejos

Lácteos y quesos
- Marqués de Mendicla, Ciempozuelos
- Quesería artesanal Gigorro, Valdelaguna
- Lácteos Don Pedro, Fuentidueña de Tajo
- Vega de San Martín, San Martín de la Vega

Repostería
- Dulces del Convento de la Encarnación, Trufas de chocolate, Valdemoro
- Pastelería de la Torre, Pastelería Real, Pastelería Paco Pan, Pastelería Conejo, Panificadora Morateña, Panadería la Dulcería, Palmeritas de Morata, Morata de Tajuña
- Panaderías del municipio, Brea de Tajo
- Horno tradicional Gallego, Fuentidueña de Tajo
- Panadería I. Moreno, Orusco de Tajuña
- Panadería Hermanos Cristóbal, Valdilecha
- Pastelería Pedro González, Valdilecha
- Panadería Pastelería Manuel Olmeda, Valdilecha
- Panadería Hnos. Terciado, Estremera
- Panadería Lidia, Tielmes
- Panadería Rodríguez del Pozo, Tielmes
- Herrero Dulces Artesanos, Perales de Tajuña
- Panadería pastelería Poldo, Perales de Tajuña
- Tahona de Belmonte, Belmonte de Tajo
- Pastelería Hnos Gutiérrez, Ciempozuelos
- La Tahona de Villaconejos, Villaconejos
- Tahona Jesús, Valdaracete

Cerveza
- Cerveza artesanal Yria., Valdemoro
- Cerveza La Verbena, Valdemoro

Miel
- Miel de Mario, Estremera, Arribite, Carabaña, Orusco y Villar del Olmo

Sierra Norte

Carne
- IPG Ganaderías (municipios Sierra Norte) carne de vacuno IPG
- "Del Ganadero a tu casa" Ganademad (Cooperativa de Ganaderos de Madrid)
- Cooperativa Los Apisquillos, Puebla de la Sierra
- Granja Prados Montes, Montejo de la Sierra

Otros
- El Ahumadero de Madarcos, Madarcos
- Ahumados Pastor, Bustarviejo

Cerveza
- Cerveza Bailandera, Bustarviejo

Repostería
- Panificadora Bustarviejo, Bustarviejo
- Obrador Mondalindo, Bustarviejo
- El Caminero, Cabanillas de la Sierra
- El Horno de Ángeles, Garganitilla del Lozoya
- Horno de Lozoya, Lozoya
- Jornadas Madarcos Ayer y Hoy, Madarcos
- Panadería Nani, Montejo de la Sierra
- La Pana, Navalafuente
- Artesanía de San Isidro, Torremocha de Jarama
- El Horno de Mariné, Torremocha de Jarama

Huerta
- La Troje, El Berrueco
- Semillas, plantel y frutales de variedades tradicionales
- Nuestras Huertas/ Huerta de Abril, Bustarviejo
- Abejas Hortelanas, Bustarviejo
- Peros de la Hiruela, La Hiruela
- El Puente del Molino, Lozoya
- Las Matosas, Montejo de la Sierra
- Eco Vergel, Redueña, La Cabrera
- Finca Casa de Oficios, Torremocha de Jarama
- Garbanzos de Torremocha de Jarama, Torremocha de Jarama
- CSA Vega del Jarama, Torremocha de Jarama
- Tómate la Huerta, Torremocha de Jarama
- Judiones de la Sierra Norte Verdea, Villavieja del Lozoya

Aceite
- Fanum Aceites Naturales de España S.L., Torremocha de Jarama

Vino
- Bodegas Viña Bardela, Venturada

Lácteos y quesos
- Queso de Santo Mamés, Navarredonda y San Mamés
- La Caperuza, Bustarviejo
- Quesería Jaramera, Torremocha de Jarama
- Quesería artesanal Los Cantares, Valdemanco

Miel
- EL Bardal de Braojos, Braojos
- Las abejas de Emilio, El Vellón
- Apícola Sierra Norte (Benjamín), Lozoyuela- Navas-Sieteiglesias
- El Jabardo Sat, Navarredonda/ Robledillo de la Jara
- Miel de la Puebla, Puebla de la Sierra
- Miel de la Sierra de Madrid, Redueña
- La Miel de May, Sierra Norte Valdemanco y Pinilla de Buitrago
- La Abeja Miel - Apiarte, Torremocha de Jarama

Madrid área metropolitana

Cerveza
- La Cibeles, Leganés / Alcorcón
- La Virgen, Las Rozas

Chocolate
- Chocolates Eureka, Pinto

Aceite
- Aceitunas Sánchez Montes, Humanes

Huerta
- Asociación de agricultores del Parque Agrario de Fuenlabrada, La Charquilla,Verdinaya – Legumbres Ecológicas, Fuenlabrada (CAEM)
- Kiva, Besana S. Coop.Ecodelbio SL, Ecosecha Madrid, La Huerta de Leo , Semillando Sotillo, El huerto de Usmán,Vega Fértil ,La Huerta de Riconatura, Ternera Vega Rivas, Rivas Vaciamadrid (CAEM)
- Finca Monjarama, San Sebastián de los Reyes (CAEM)

Lácteos y quesos
- Los Combos, Móstoles

Licores
- Vermut Zarro (Bodegas Sanviver), Fuenlabrada

Miel
- Madrid Miel / La Abeja Dorada, Leganés (CAEM)
- Colmena BeeWei, Villaviciosa de Odón (CAEM)

Otros
- Ahumados Nordfish, Rivas Vaciamadrid
- Conservas AYR, Getafe
- Supracafé, Móstoles (CAEM)

Repostería
- El Horno de Leña, Fuenlabrada (CAEM)
- Biopan, Rivas Vaciamadrid (CAEM)

Food sourcing: Labels & certification

The Autonomous community of Madrid tries to promote local production and processing throughout the region through the use of labels and certifications to indicate the products qualities.

Source:
Archivo de la Dirección General de Turismo de la Comunidad de Madrid, 2022

RESEARCH

LOCAL ACTORS & THEIR ROLES

The actors of the foodscape of Madrid are countless and range from big multinational brands and chains to the smallest artisanal bakery. The diagram on page 58 shows an overview of the major flows and their associated actors in Madrid. This chapter will discuss the role of every group of actors in the larger context and the influence they carry. A short summary description of every actor is provided in appendix C.

Environmental factors have a significant influence on food production, with climate, weather, flora & fauna, land and water being key actors. Without these food production would not be possible. Keeping them in a balanced and sustainable state is of the upmost importance, because if one of them falls out of balance so will the others, greatly disturbing food production and threatening food security. **Regulation and governmental policy** are the most direct way that governing bodies can exert influence on food production practices. Regulations are necessary to forcefully limit the negative impacts of food production such as pollution and water mismanagement upon crucial environmental actors. These regulation are often part of larger governmental policies that also include subsidies and other programs that promote sustainable practices to insure the long term viability of the industry and food security.

These regulations and policies are often supported by **research and development** done by public institutions like IMIDRA (Instituto Madrileño de Investigación y Desarrollo Rural, Agrario y Alimentari) and the Universidad Politéchnica supported by the Ministerio de Agricultura. They are at the forefront of impact studies, agronomic research and dissemination of knowledge. These are meant to inform and educate the wider public and drive for practices that are as efficient as possible, and limit the environmental and health impact of the industry.

Labour is a resource that is required to implement farming practices, encompassing a wide spectrum of roles each with different responsibilities. Ranging from owner and managers to specialists and unskilled migrant labourer. Although the industrialization of agriculture has transformed the industry over the last century not every task can by mechanised and there are cases that (skilled) manual labour is preferred even if this makes the process less efficient. How labour is implemented varies from farm to farm, dependent on the type of **agriculture** that is practiced and what qualities are prioritised. Field and permanent crops are often monocultural and more prone to mechanization while horticulture, livestock and managed wild require more extensive specialized expertise and labour-intensive techniques to ensure the final quality.

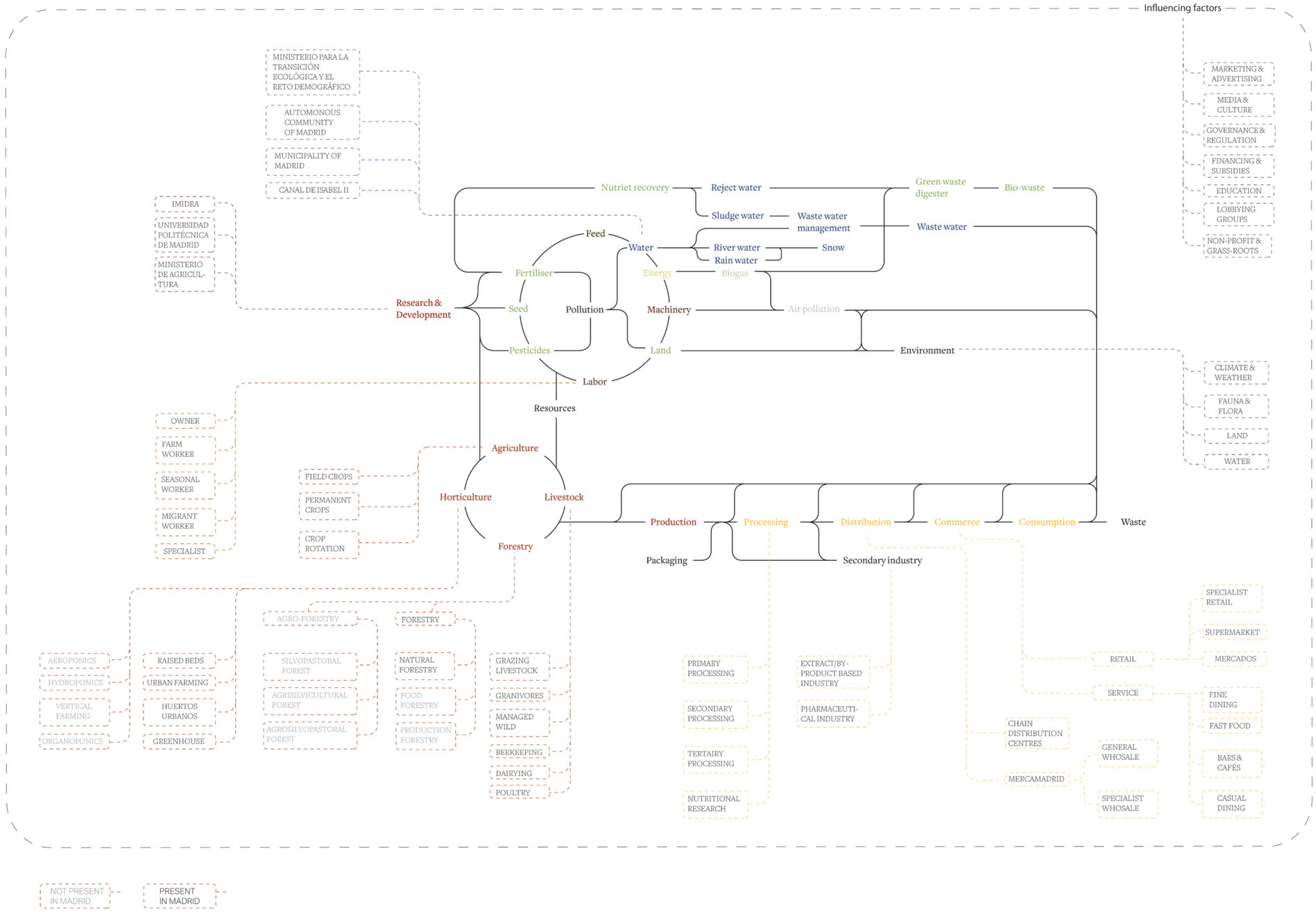
Most of the produced food will be processed before being consumed. During the primary **processing** stage raw agricultural products are processed into food commodities which can already be packaged, distributed and sold to consumers or be further processed through secondary processing into new products. These two stages span a spectrum from large-scale industrial operations to small-scale artisanal initiatives. Further processing during the tertiary processing stage involves the incorporation of additives to yield ‘processed food’ such as ready-to-eat meals. Lastly there is extra/by-product based processing which uses food extracts or by-products to create new products such as fertilizers, cosmetics or pharmaceutical products. The qualities of the food that is produced during the agricultural process is often determined by the qualities that are required for the final processed outcome. Unprocessed vegetables for example are often farmed with consistent colour and shape in mind, while this same type of vegetable can also be processed into sauce where consistent flavour and texture are qualities that are prioritized. The reverse can also be true with over production of raw agricultural products (or by products) leads to the invention of new processing techniques.

Distribution bridges the gap between producers and consumers. The way food is distributed is directly tied to the way it is produced and processed. Corporate chains make use of their own warehouses and distribution networks which consolidate products from multiple producers and processers to be supplied to their various stores. The large-standardized offerings of these stores require large order quantities that are of consistent quality. This makes food that is processed

through large-scale industrial operations the go to, as they are consistent in availability, price and quality. Food that is highly seasonal and/or produced/processed on small-artisanal scale will either be distributed through specialized companies operating out of Mercamadrid to various restaurants, mercado's and speciality shops or directly sold to consumer via markets or farm shops. The final sale of the product to the consumer makes up the **commerce**, during which food can either be treated as a commodity or a service depending on the way it is sourced by the consumer. For the different sources see the chapter: "Sourcing of food in Madrid".

These actors are influenced by a number of **influencing actors** such as marketing & advertising, media & culture, governance & regulations, financing & subsidies, education, lobbying groups and non-profits & grassroots initiatives. These shape consumer preferences, industry practices, and policy frameworks within the foodscape of Madrid.

All of the actors present within the foodscape of Madrid are interconnected and continuously influencing one another as demonstrated in this chapter. Influencing actors causing a change in consumer preferences will have a ripple effect upon commerce, distribution, processing, agriculture, labour and the environment, with the same being true in reverses. Understanding these relationships is essential for the creation of a sustainable foodscape because through careful changes in just a few actors it is possible to have a larger effect on the entire foodscape. The changes that will be required will be the subject of the next chapter where these will be uncovered through analysis of the current flows and systems of the foodscape.



Localized network of actors, flows and systems.

This diagram made by the author shows an organised version different actors, flows and sytems of the food-scape of Madrid.

RESEARCH

LOCAL FLOWS & SYSTEMS

As of 2024 38% of the world's land coverage and 70% of its fresh water supply is used for agricultural purposes, producing 23% of total global greenhouse emissions (FAO, 2023). These numbers are made up of a large collection of different flows and systems that are part of the foodscape. In the case of Madrid those flows and systems are represented in a systemized way in the diagram on page 58. Understanding the size of these flows and systems is a necessary step in deciding where possible changes will need to be made and will have the most impact in transforming the current foodscape to a sustainable one.

Resources

The resource flows required for food production are categorized in the diagram as the following:

- **Land**: is a vital resource in the production of food. In Spain 52% of the land is used for agriculture which is one of the highest in Europe (World Bank, 2023a). This percentage is even higher within the Autonomous community of Madrid, where 59.6% of the land is used for agricultural purposes. Of this land 23% is homogenous farmland dedicated to only a single crop leading to low biodiversity and requiring large amounts of irrigation and artificial fertilization to keep farmable (Gallardo & Martinez-Vega, 2016). Implementing different techniques such as crop rotation and agroforestry would increase both the biodiversity in the region surrounding the city and reduce the necessary artificial inputs.

- **Water**: is a vital resource in the production of food. Spain is undergoing a series of droughts, worsened by climate change, that is threatening food production. Currently 80% of all water used in Spain is used for agriculture (Ministerie van Landbouw, Natuur en Voedselkwaliteit, 2023). The Automonous community of Madrid has faced severe drought issues over the last five years and thus has increased its control over the amount of water used for agricultural purposes as well as offered subsidies and aid for the modernization of irrigation systems (Communidad Madrid, 2022a).

- **Pesticide**: is used in the control of pests. They can come in many different kinds such as herbicides (weed exterminators), insecticides (insect exterminators), nematicides (plant-parasitic nematodes exterminators), fungicides (parasitic fungi exterminators) and many more. Through the extermination of pests, plants are protected, and yields are thus increased. However, they also have a detrimental effect on biodiversity through the extermination of vital insects and animals, and the poisoning of the soil and water supply which in turn is making humans sick. In 2021 over 43% of fruits and vegetables sold in Spain contain traces of pesticides (AESAN, 2023).

- **Seeds**: are the starting point for almost all agricultural products. They can either come from a portion of the harvest that is set aside, from farming supply companies or bio engineering companies who genetically modify seeds to contain specific characteristics. IMIDRA has a research department for seed research and a vault that contains 600 unique species of seeds that are unique to the Madrid region that are not in widespread use anymore (IMIDRA, 2021).

- **Fertilisers**: are natural or synthetic materials that are applied to soil or plants to add additional nutrients. The transition to synthetic fertilizer made the current global foodscape possible through the industrialization of agriculture. Their use does have environmental consequences such as water and soil pollution and carbon emission during the manufacturing process. Spain is one of the biggest users of fertilizer in the European Union with around 1.0 million tonnes annually (EU total usage is around 11 million tonnes) (Eurostat, 2023). The Autonomous community of Madrid has already marked out areas that are vulnerable to contamination by nitrates released from fertilizer. As a response the government has set up a code of agricultural practices limiting the amount of fertilizer that is allowed to be used and only after an application has been approved (Communidad Madrid, 2022b)

- **Feed**: is food given to domestic animals, this can either be fodder (food specifically produced as feed) or forage (plants used for grazing). Feed is one of the main expenses when raising animals and large tracts of land are used to grow animal feed adding to deforestation. Food waste can be a good alternative to fodder such as spent grain from the brewing of beer or mash from cider making. Spain is currently the leading European producer of animal feed at 37.5 million tonnes. Transitioning to sustainable feed production would thus have a major impact (MAPA, 2023).

- **Energy**: is used throughout the production of food. This can take the form of the fuel used in farming equipment or the energy used in the brewery process. The way this energy is produced via unsustainable methods is adding to climate change. The Spanish food and drink industry was responsible for 9.6% of the energy consumed in Spain in 2014 (Monforti-Ferrario & Pedo Pascua, 2015).

- **Machinery**: is used during the farming process to mechanize tasks that would traditionally be done by hand. These activities include ploughing, sowing, reaping etc. Farmers often heavily invest in machinery as it increases the amount of work they can do manifold. Although electrical machinery is available, the majority of them still runs of diesel or gasoline adding to the carbon emissions of the agricultural sector.

- **Labour**: in the food industry is responsible for the employment of 440.000 people, making up for 2% of the employed population with an additional 4% working in the agricultural industry (World bank, 2023b). The agricultural labour force heavily skews towards older people, with 59.4% being made up of people between 40-64 years. This percentage is even higher when it comes to independent owner-operators (Eurostat, 2016). In the coming decennia the majority of the labour force will retire making increased number of migrant workers and mechanization necessary. This will also mean that value knowledge and traditions will be lost.

The expenditure of these resources adds up in the production of agricultural products. These are then processed, packaged, distributed, and consumed. The size of these flows is as follows:

- **Production & processing**: of agricultural products accounted for 2.41% of the Spanish GDP in 2023. The fruit and vegetable sector being the most important with cereals, olive oil and food plants following closely behind. 50% of production is exported internationally with 92% going to the European Union. Although value of production has risen over the years, the volume of production has been steadily declining with a decline of 13.6% being almost 2.5 times as strong as the next country. Much of this decline is due to the continuous drought that Spain has been facing over the last few years which especially hit wheatfields and olive grove hard. The industry will have to adapt to face this challenge and maintain its competitive position on the market and ensure food security. (La Moncloa, 2023).

- **Distribution**: of food is a major factor in the emissions caused by the food industry. Every kilometre that a food item travels from its producer to the consumer adds to the emission, also called a 'food mile'. In Spain over 19% of the emissions caused by the food industry are due to transportation. On a global scale these food miles cause a combined emission of 3.0 gigatonnes of CO_2 (Ministerio de Agricultura, 2023). The added kilometres also mean added time between harvest/production and consumption making artificial preservation techniques necessary leading to a loss of flavour (Steel, 2013). Localization of food production would do much to counteract these phenomena. This is illustrated through the example of a tomato on page 66.

- **Consumption**: of food averages around 1.4000 Kg yearly per capita in Spain for a yearly total of 65.8 billion kilograms. The diet of the average Spaniard has majorly changed over the centuries, as demonstrated in the 'Foodscapes of the past' chapter. Since 2010 the average daily intake for a Spanish citizen is as follows: milk and derivatives (379 g), fruit (310 g), vegetables and greens (302 g), cereals and derivatives (214 g), meat and meat products (179 g), fish (100 g), oil and fat (48 g), precooked food (34 g), eggs (32 g), and legumes and pulses (11.9 g). The amount of meat and dairy have steadily increased over the last centuries, with the amount of meat even exceeding the recommended daily intake while traditional staples such as cereals, vegetables, fruit, legumes, and pulses have declined and are below the recommended intake (Varela-Moreiras et al, 2010). Reversing this contemporary consumption pattern even partially would reduce the amount of greenhouse emissions that are released during the farming process and lead to a healthier diet.

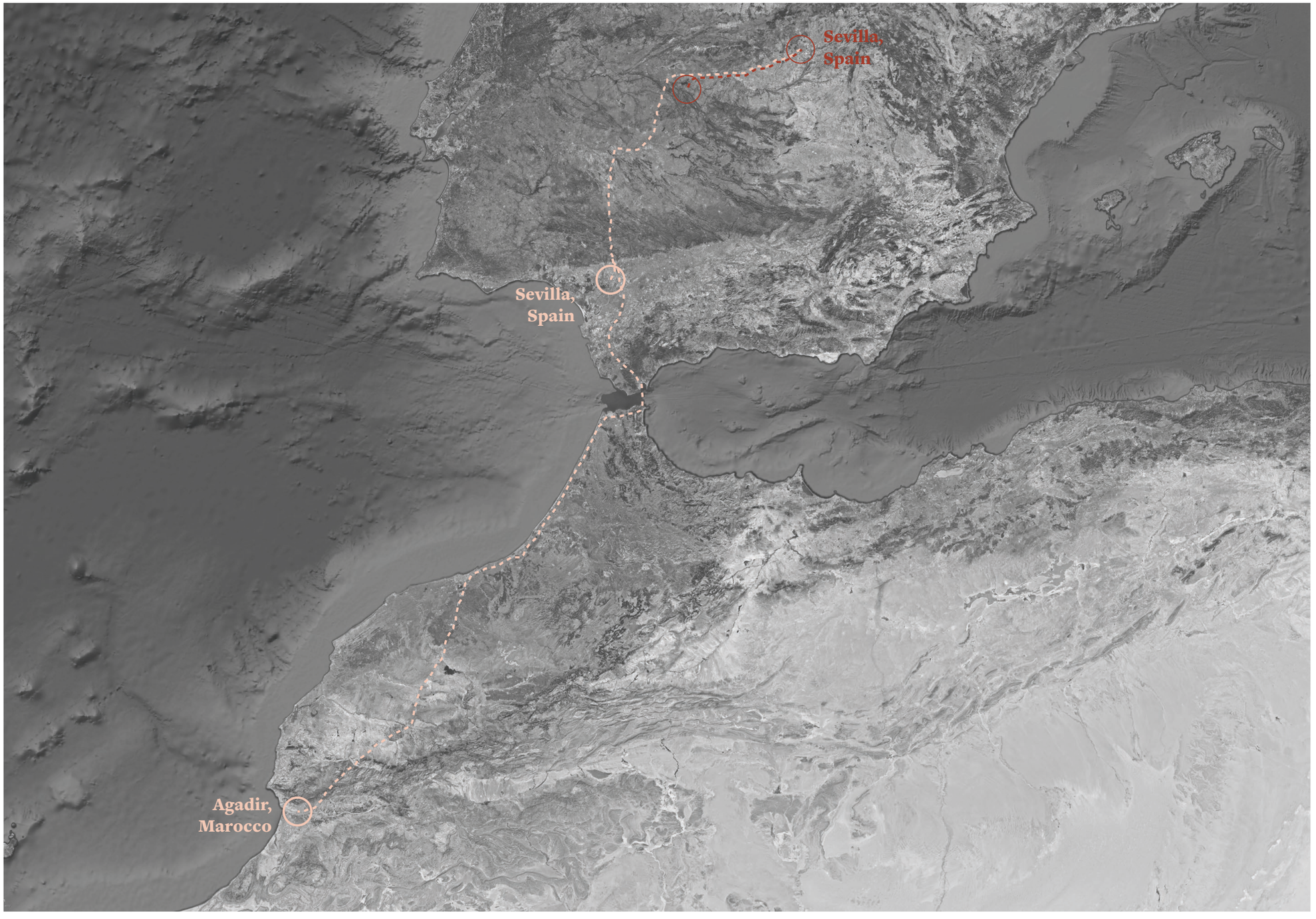
- **Waste**: and especially food waste is a major issue in Spain with Spaniards throwing away 1,201 million kg/l of food and drink in 2022. According to European Counsel reports around 10% of European food production is discarded every year (Ministerio de Agricultura, 2023). The Spanish government has attempted to mit-

igate this issue in recent years by passing new legislation to limit waste such as requiring discounts on food that is about to expire and making donations of non-used items to foodbanks mandatory (Ministerie van Landbouw, Natuur en Voedselkwaliteit, 2022).

- **Waste reuse:** is currently being implemented within the Autonomous Community of Madrid through the transformation of food waste into compost and biogas. The city of Madrid has introduced specific containers for its citizens to deposit bio-waste into and the city departments such as the park services have their own collection infrastructure. This waste is then transported to either the biomethanisation complex or the composting plants. Yearly Madrid produces around 250.000 MWh of energy through the use of biogas produced at the complex accounting for 2.5% of the total yearly consumption. The composting plants produce fertilizer which is either sold or used in the city's parks and nurseries (Acierta con la Orgánica, 2023). The wastewater of Madrid is processed by the facilities of the Canal de Isabel II company. Sludge is produced during the purification process of urban wastewater, which is used as a fertilizer for agricultural production surrounding the city. The water that is reclaimed is used to water the municipal greenery and clean the streets through an underground piping network with the remainder being flushed into the Manzanares river (Communidad Madrid, 2023c).

The analysis of the above discusses systems and flows sketch a clear picture of a foodscape where production has a significant environmental footprint through the use of vast tracks of land, freshwater resources, pesticides, fertilizers, and non-sustainable energy. This is compounded by complex distribution networks that import and export food on a global scale, adding more greenhouse emissions over every kilometre travelled between producer and consumer. The shift in contemporary consumption patterns to ones that are more environmentally impactful and wasteful are partially to blame for this along with the industrial globalization of food production.

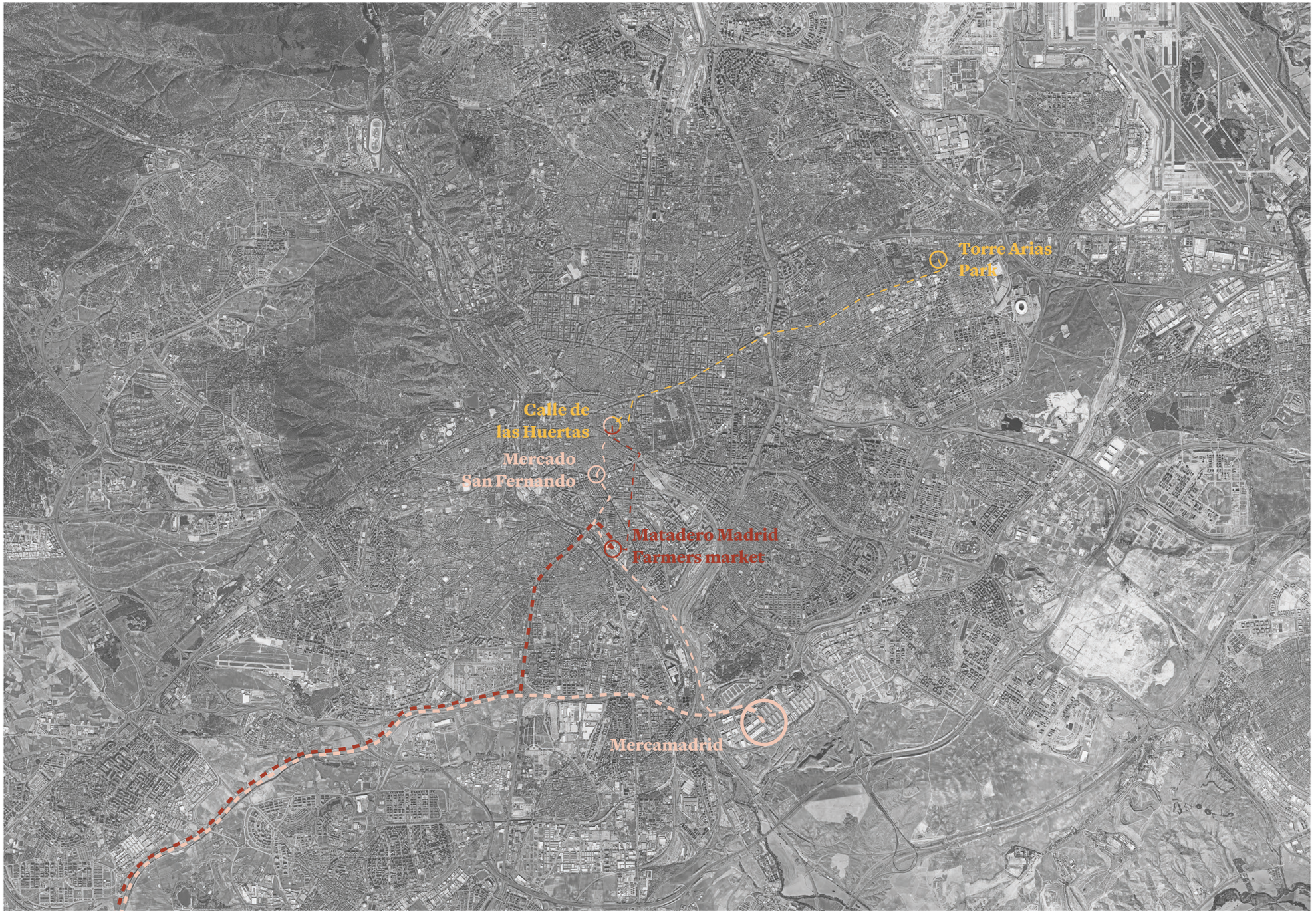
Change will need to be implemented to counteract these negative trends. Not only on the level of agricultural production itself where efficient water management and land use, pest management, and organic practices take centre stage, but every step of the way from production to consumption. Food needs to be as locally produced and processed as possible to reduce foodmiles, consumption patterns need to change, and waste needs to be eliminated. These large-scale changes can however only be achieved through a shift in values that prioritise sustainable food practices. This must be done in cooperation with the actors discussed in the previous chapter. Together with them it is possible to educate and implement practices that counteract and replace the ones causing the negative systems and flows discussed in this chapter. What these sustainable 'best practices' entail will be the subject of the next chapter.



Spatial flow of a tomato

The image on the left shows the spatial flow of two tomato's that will be consumed in Madrid, Spain. Tomato A is a standard tomato and will come either from a greenhouse in Agadir, Marocco or Sevilla, Spain and will travel unripe but refrigerated by highway to Madrid (displayed in pink). Tomato B is an heirloom tomato produced for flavour by a small biological farm to the east of Madrid where the terroir is optimal for this and is transported while ripe by highway to Madrid (displayed in red).

The impact of the transportation on carbon emissions will be 231 grams of CO_2 per kg for tomato A from Agadir, Marocco and 113 grams of CO_2 per kg from Sevilla, Spain. While that of the tomato B is 70 grams CO_2 per kg.



Spatial flow of a tomato

Zoomed into the City of Madrid Tomato A is first transported to Mercamadrid and from there distributed to the Mercado San Fernando. Here it is bought and walked back to a house on Calle de las Huertas in the city centre.

Tomato B is transported to Matadero Madrid where there is a farmers' market. The farmer that produced the tomato sells the tomato directly and informs the buyer how to best prepare the tomato. From here the tomato is biked back to a hose on Calle de las Huertas.

Lastly tomato C is introduced in this example. This tomato is grown and processed at the Torre Arias Park (the site selected earlier for the design). The tomato is directly picked from the vein as part of a larger horticulture park. From there the tomato is brought back by metro to a house on Calle de las Huertas. The transport of the consumer will emit around 16 grams of CO_2 in total.

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BEST PRACTICES

The negative consequences of the current flows and systems of the foodscape were highlighted in the previous chapter. It was made clear that large-scale changes need to be achieved through a shift in values that prioritise sustainable practices. Such practices consist of a wide array of actions that take place during the production, processing, distribution, and consumption of food. There is a non-exhaustive list of these, and they will shift depending on the person writing about them. The following practices and their meaning/characteristic are an amalgamation according to the selection of the author sourced from Viljoen (2012) and Phillips (2013). This selection has been made with the consideration that these practices can be implemented within a single architectural intervention in the city of Madrid. This intervention would function as a pilot project and public institution which aims to educate and let people participate thus seeking to change their values to ones that prioritise a sustainable foodscape.

1. **Crop rotation**: rotating crops helps break pest and disease cycles and also adds nutrients to the soil, increasing its fertility. This makes artificial fertilization less of a necessity, limiting soil and water pollution.

2. **Cover cropping**: planting cover crops during winter helps prevent soil erosion, supresses weeds and adds nutrient to the soil.

3. **Conservation tillage**: limiting minimalizes erosion and helps retain soil structure and water retention.

4. **Integrated pest management**: using a mixture of biological, cultural, mechanical, and chemical pest control measures to fight pests and minimalize pest resistance and pollution.

5. **Water management:** effective irrigation techniques such as drip irrigation conserve water and limit soil erosion and nutrient runoff. The use of harvested and recovered rainwater are also possible measures.

6. **Soil management**: testing the soil for pollution and nutrient levels helps determine the required amount of nutrients more precisely, decreasing the need for unnecessary fertilization.

7. **Agroforestry:** integrating trees and shrubs adds biodiversity, ecosystem resilience, and contributes to carbon sequestration.

8. **Livestock and pasture management**: rotating livestock over pastures improves soil health, reduces erosion and enhances the well-being of the animals. Limiting the amount of artificial and manual work that needs to be done on the land.

9. **Organic practices**: making use of natural fertilisers such as manure and compost, crop rotation, and avoiding synthetic pesticides helps with environmental health and diversity, and produces food that is less artificially modified.

10. **Diversification**: diversity in crops helps reduce risks of nutrient depletion and pests as well as increasing biodiversity, sustainability and adding to a diverse diet.

11. **Community engagement and education**: engaging with the local community and educating them about farming practices helps build awareness about food production and environmental well-being. Adding to a long-term shift in value towards sustainable practices.

12. **Renewable energy**: the use of renewable energy lowers greenhouse emissions that take place during food production.

13. **No-waste:** considering nothing as waste optimises the use of resources of the project and eliminates the negative output. When the project uses more waste than it produces it can also take in waste, becoming a net positive.

14. **Localised processing & production**: processing and producing as everything on the local level reduces the impact distribution and promotes local expertise and economics.

15. **Learning and adaption**: continuous learning about new techniques, species, and technologies allows for adaption to changing conditions such as social and climate change.

This collection contains just some of the best practices that are part of the multifaceted approach required for the transition to a sustainable foodscape. Although these are not all of the practices that can be implemented, they are those that should be implemented in an architectural intervention that means to reintroduce the values that the citizens of Madrid have historically held about their food and which would support a sustainable foodscape and thus form the catalyst of a wider positive change in the foodscape of the city.

CONCLUSION

At the start of this paper, the main research question: “How could architecture play a central role in the creation of a sustainable foodscape in Madrid? “ was posed. Through the use of multiple research questions, it was possible to uncover the current foodscape of Madrid, its impact, the changes required to make it sustainable and what role architecture can play in it. This started with the historic and cultural context which has evolved over the last millennia, being moulded by the unique circumstances of Spain’s history and geography to form the current foodscape. This evolution shows that the way we value and handle food is deeply shaped by our cultural and social values.

This current system is, however, deeply unbalanced and values such as price, year-round availability, and quality assurance have displaced those of animal welfare, fair trade, and environmental well-being. A shift caused by the industrialization of food production in an attempt to banish food insecurity. The consequences of this has been the creation of a foodscape where the relationship between producer-consumer has been replaced by that of producer-processer-consumer. This is made clear by the fact that the majority of the food available in Madrid is sourced through either large corporate chains or the inaccessible conglomerate of Mercamadrid, which make use of distribution networks with international reach to supply the many supermarkets, mercado’s, speciality shops and restaurants within the city. Thus putting distance between the consumer and producer, causing consumers to not know the origin of the food they consume and producers to not know who consumers what they produce. The consequences of these trends can be seen in the impact that all the systems and flows of the foodscape have on both the environment as well as the health of those that consume the food produced by it.

TTo change this system is no easy task. It requires the establishment of the relationship between producer-consumer and a change of values so that practices will change leading to a more sustainable foodscape. These practices should be implemented along every step from production to consumption to change the negative effects of the current flows and systems within the foodscape. This should be done in cooperation with the multitude of different actors as to reinforce their effects throughout the entire foodscape.

The foodscapes of past and present already contain examples of how these changes can manifest themselves within Madrid. Historic examples include the rural private estates of the nobility, the urban horticulture fields on the city’s edge and the kitchen gardens within it. These can of course not be reintroduced in completely the same way, their relation to the city and the variety of their produce are however qualities for which to strive. This is also true for the central role that food played in the social gatherings and fostering a sense of community. When it comes to contemporary examples, the initiatives of the Huertos de Madrid and the market days already provide some opportunities for consumers to meet food producers and production. Although these opportunities are infrequent and small-scaled they are a model on which to expand, and their continuous success demonstrates the already existing interest of Madrilenians surround their food.

The role architecture can play in the creation of sustainable foodscapes is through the spatial implementation of an expansion of this already present interest, the showcasing of sustainable practices and the reestablishment of the historic relationship between the city and the source of its food. The architecture created from this will aim to educate Madrilenians while also letting them participate and socialize. This will allow consumers the opportunity to directly engage in the production itself and the food that it creates while also fostering a community surround it. Through experiencing this small sustainable foodscape values fitting such a foodscape will be reestablished thus partially returning to a historic past where food played a major role in the daily lives of Madrilenians while also causing a ripple effect that will have a positive impact on the future of the entire city of Madrid.

BIBLIOGRAPHY

Acierta con la Orgánica. (2023). Organic waste. Madrid City Council. Retrieved 17-03-2024 from https://aciertaconlaorganica.es/en/organic-waste/
AESAN. (2023). Memoria Anual AESAN 2021. https://www.aesan.gob.es/AECOSAN/docs/documentos/publicaciones/memoria_anual/MEMORIA_AESAN_2021.pdf

Archivo de la Dirección General de Turismo de la Comunidad de Madrid. (2022). Turismo y productos de proximidad en la Comunidad de Madrid. Retrieved 17-04-2024 from https://turismomadrid.es/attachments/article/18022/MAPA%20KM%200%20CAM_200223_WEB.pdf

Campbell, J. (2017). At the First Table: Food and Social identity in Early Modern Spain. University of Nebraska Press.

CAEM. (2021). Control Authority for organic agricultural production. Retrieved 09-03-2024 from https://caem.es/caem/

Cámara Agraria. (2023). Market Day. Retrieved 09-03-2024 from https://camaraagraria.org/que-hacemos/#funciones

Canal de Isabel II. (2022). Sustainability report 2022. https://www.canaldeisabelsegunda.es/documents/portlet_file_entry/20143/Informe+Canal+ENG.pdf/ae179659-d18b-93c3-0718-f0b49a48f8e4

Communidad Madrid. (2020). Ecological production. Retrieved 09-12-2023 from https://www.comunidad.madrid/servicios/medio-rural/produccion-ecologica

Communidad Madrid. (2022a). Control de la Calidad y de los usos de las aguas subterráneas. Retrieved 09-04-2024 from https://www.comunidad.madrid/servicios/urbanismo-medio-ambiente/control-calidad-usos-aguas-subterraneas?language=es

Communidad Madrid. (2022b). Contaminación producida por los nitratos procedentes de fuentes agrarias. Retrieved 09-04-2024 from https://www.comunidad.madrid/servicios/urbanismo-medio-ambiente/contaminacion-producida-nitratos-procedentes-fuentes-agrarias

Communidad Madrid. (2023a). Quality food brands from Madrid. Retrieved 09-03-2024 from https://www.comunidad.madrid/servicios/medio-rural/marcas-calidad-alimentos-madrid

Communidad Madrid. (2023b). M Certified Products. Retrieved 09-03-2024 from https://www.comunidad.madrid/m-producto-certificado

Communidad Madrid. (2023c). Water supply and sanitation. Retrieved 17-03-2024 from https://www.comunidad.madrid/servicios/urbanismo-medio-ambiente/abastecimiento-saneamiento-aguas

Departamento de Educación Ambiental. (2023). Retrieved on 2023/11/25 from: https://diario.madrid.es/huertos/programa-municipal-de-huertos-urbanos-comunitarios/

Eriksen, S. (2013). Defining Local Food: Three Domains of Proximity. Acta Agriculturae Scandinavica, 63, 18. https://doi.org/09064710.2013.789123

Eurostat. (2016). Archive: Farmers in the EU – statistics. Retrieved 09-04-2023 from https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Archive:Farmers_in_the_EU_-_statistics

Eurostat. (2023). Consumption of inorganic fertilizers. https://doi.org/10.2908/aei_fm_usefert

FAO, I., UNICEF, WFP & WHO. (2023). The State of Food Security and Nutrition in the World 2023

Gallardo, M., & Martinez-Vega, J. (2016). Three decades of land-use changes in the region of Madrid and how they relate to territorial planning. European Planning Studies, 24. https://doi.org/10.1080/09654313.2016.1139059

Harmash, O. (2023). Russia pounds Ukraine's grain, UN warns of hunger from price rises. Reuters. https://www.reuters.com/world/europe/russia-hits-ukraines-grain-fourth-day-practises-seizing-ships-black-sea-2023-07-21/

Holland, M., & La Salle, J. M. d. (2010). Agricultural urbanism : handbook for building sustainable food and agriculture systems in 21st century cities. Green Frigate Books.

Imbert, D. (Ed) (2015). Food and the City: Histories of Culture and Cultivation.

IMIDRA. (2021). Memoria Divulgativa 2020/2021. https://www.comunidad.madrid/sites/default/files/doc/investigacion_y_ciencia/imidra_2020-2021_-_memoria_divulgativa.pdf

Kirwan J., E. a. (2004). Macro-level Analysis of Food supply Chain Dynamics and Diversity in Europe. SUS-CHAIN report no. 10, Issue.

La Moncloa. (2023). Agricultura. https://www.lamoncloa.gob.es/espana/eh18-19/agricultura/Paginas/index.aspx

Luis, L., Tardío, J. (2005). Productos vegetales utilizados en Madrid entre los siglos XIV y XIX. Archivo Iberoamericano de Historia de la Medicina y Antropología Médica, 47(2), 25-44.

Lake, A. A., Burgoine, T., Greenhalgh, F., Stamp, E., & Tyrrell, R. (2010). The foodscape: classification and field validation of secondary data sources. Health & place, 16(4), 666-673. https://doi.org/10.1016/j.healthplace.2010.02.004

Lang, T. H., M. (2015). Food Wars: the Global Battle for Mouths, Minds and Markets. Routledge.

Lim, C. J. (204). Food City. Routledge.

Lohrberg, F., Christenn, K., Timpe, A., & Sancar, A. a. (2023). Urban agricultural heritage. Birkhäuser, part of Walter de Gruyter.

MAPA. (2023, 16-10-2023). España alcanza los 37,5 millones de toneladas de pienso y se mantiene como líder europeo en producción de compuestos en 2022 https://www.mapa.gob.es/es/prensa/ultimas-noticias/espa%C3%B1a-alcanza-los-375-millones-de-toneladas-de-pienso-y-se-mantiene-como-l%C3%ADder-europeo-en-producci%C3%B3n-de-compuestos-en-2022/tcm:30-661690

McMaster, D. (2019). Silo: The Zero Waste Blueprint. Ivy Press.

Medina, F. X. (2005). Food Culture in Spain. Greenwood press.

Mercado Matadero. (2023). El mayor mercado de proximidad, Mercado de Matadero abre sus puertas. Retrieved 11-03-2024 from https://mercado-dematadero.com/el-mayor-mercado-de-proximidad-mercado-de-matadero-abre-sus-puertas/

Mercamadrid. (2022). Mercamadrid 2022 Annual Report. https://www.mercamadrid.es/memoria-actividades-2022/

Ministerie van Landbouw, Natuur en Voedselkwaliteit (2022, 06-07-2022). Spain approves the draft law against food waste. https://www.agroberichtenbuitenland.nl/actueel/nieuws/2022/07/06/spain-approves-the-draft-law-against-food-waste

Ministerie van Landbouw, Natuur en Voedselkwaliteit. (2023, 18-08-2023). Spain: “ We spend more water than we can afford” https://www.agroberichtenbuitenland.nl/actueel/nieuws/2023/08/18/spain--we-spend-more-water-than-we-can-afford#:~:text=According%20to%20the%20article%2C%20agriculture,country%20has%20around%20935%2C000%20farmers.

Ministerio de Agricultura. (2023). Informe del desperdicio alimentario en España 2022. https://www.mapa.gob.es/es/prensa/22desperdicio_alimentario_2022_tcm30-655555.pdf

Monforti-Ferrario, F. & Pedo Pascua, I. (2015). Energy use in the EU food sector: state of play and opportunities for improvement.

Morán, N., Simón Rojo, M. (2019). Hidden Urban Agricultural Heritage at the Manzanares River: Toward an Agroecological Wedge in the Southeast of Madrid City.

Morgan, K., Marsden, T., & Murdoch, J. (2008). Worlds of food: place, power, and provenance in the food chain (Ser. Oxford geographical and environmental studies series). OUP Oxford.

Pérez S., d. l. Á., M. (2014). The Early Modern Food Revolution: A Perspective from the Iberian Atlantic. In B. Aram, Yun-Casalilla, B. (Ed.), Global Goods and the Spanish Empire, 1492-1824: Circulation, Resistance and Diversity. Palgrave Macmillan.

Philips, A. (2013). Designing urban agriculture : a complete guide to the planning, design, construction, maintenance and management of edible landscapes. John Wiley & Sons.

Reckinger, R., Kapgen, D., Korjonen, M.H, Pax, A., Margue, S., ‘Food System Discovery – Actors and activities in Luxembourg’, Sustainable Food Practices, University of Luxembourg, 2022 (IG2-v.B).

Sevilla, M. (2019). A History of Food in Spain. Reaktion Books Ltd.

Sobal, J., & Wansink, B. (2007). Kitchenscapes, Tablescapes, Platescapes, and Foodscapes: Influences of Microscale Built Environments on Food Intake. Environment and Behavior, 39(1), 124-142. https://doi.org/10.1177/0013916506295574

Steel, C. (2013). Hungry city: how food shapes our lives. Vintage Books.
UNEP, FAO and UNDP. 2023. Rethinking Our Food Systems: A Guide for Multi-Stakeholder Collaboration. Nairobi, Rome and New York

Van der Sande, B. (Ed) (2012). Food and the City: A Future for the Metropolis. NAi Publishers.

Varela-Moreiras, G., Ávila, J., Cuadrado, C. et al. Evaluation of food consumption and dietary patterns in Spain by the Food Consumption Survey: updated information. Eur J Clin Nutr 64 (Suppl 3), S37–S43 (2010). https://doi.org/10.1038/ejcn.2010.208

Verhoeven, S. (2018). Flourishing foodscapes: Design for City-Region Food Systems.

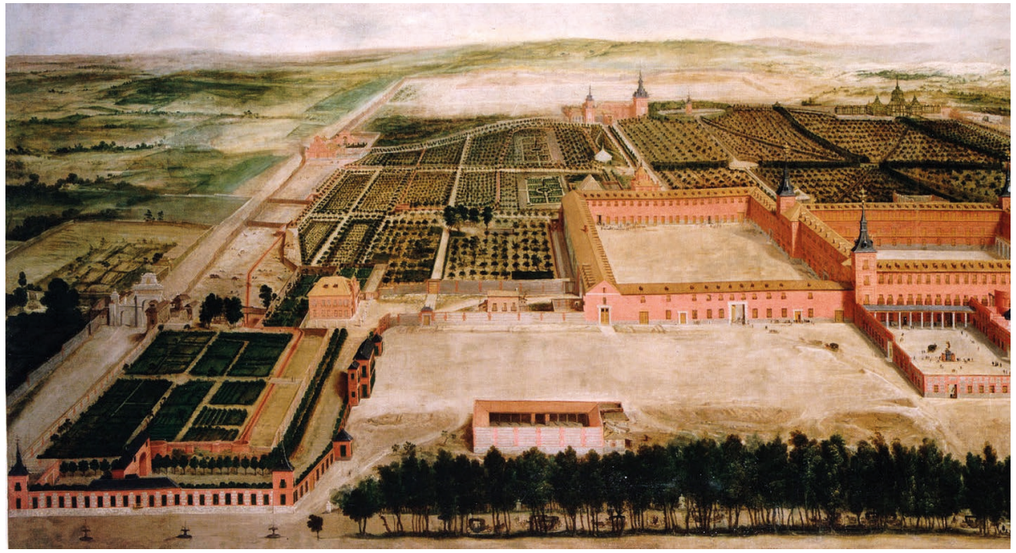
Verzone, C. (2021). Food urbanism : typologies, case studies, strategies. Birkhauser. https://doi.org/10.1515/9783035615678

World Bank. (2023a). Agricultural land (% of land area). https://data.worldbank.org/indicator/AG.LND.AGRI.ZS?locations=ES&name_desc=false
World bank. (2023b). Employment in agriculture (% of total employment). https://data.worldbank.org/indicator/SL.AGR.EMPL.ZS?locations=ES

APPENDIX A

IMAGES OF THE FOODSCAPE OF THE PAST

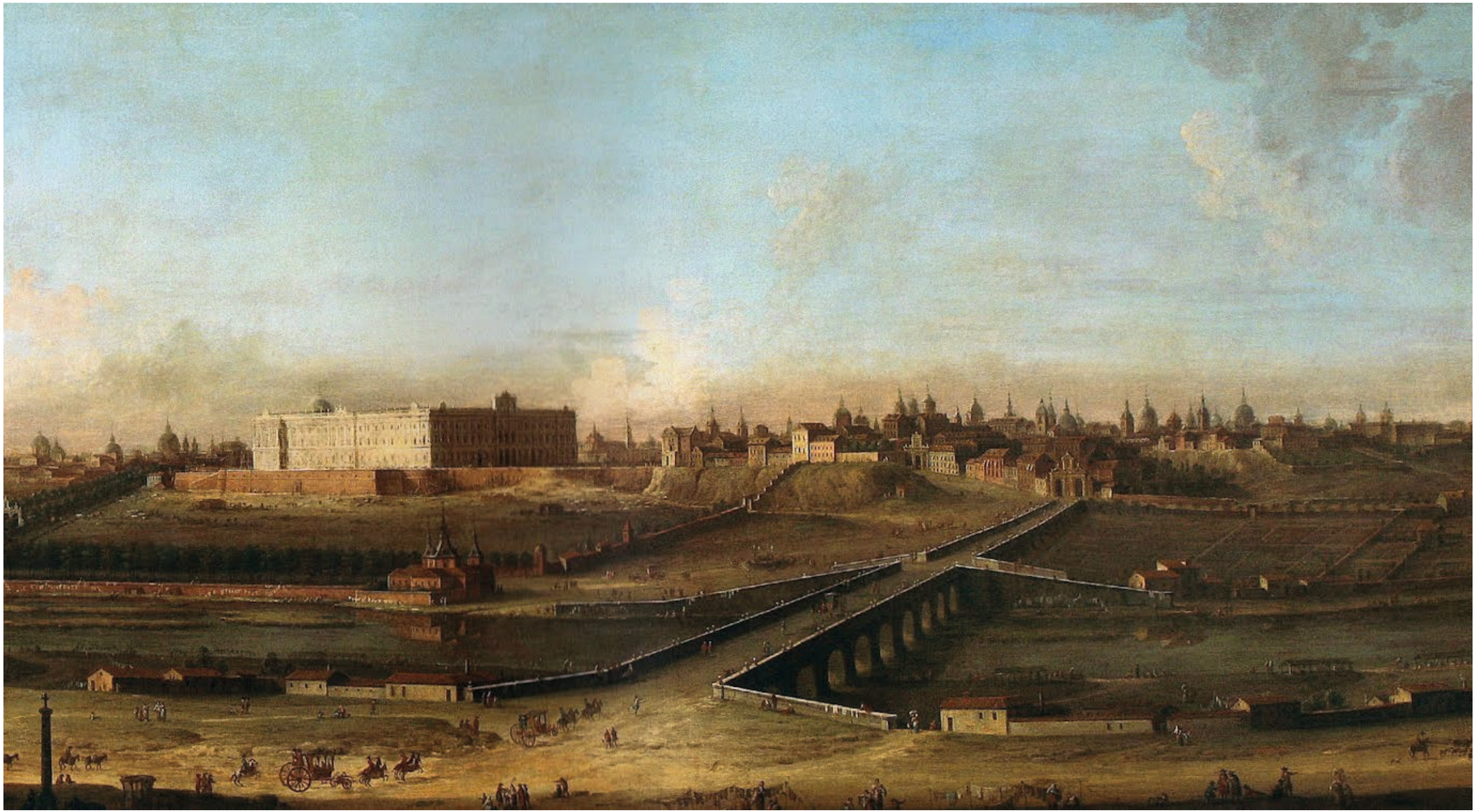
All images retrieved from Archivos de la Communidad de Madrid



The Buen Retiro Palace in 1635
Note the horticulture on the left

View of the Real Alcázar and the Segovia bridge
Orchards are on the left side of the bridge

View of the Real Alcázar and the Segovia bridge
the urban horticulture gardens are on the right of the bridge

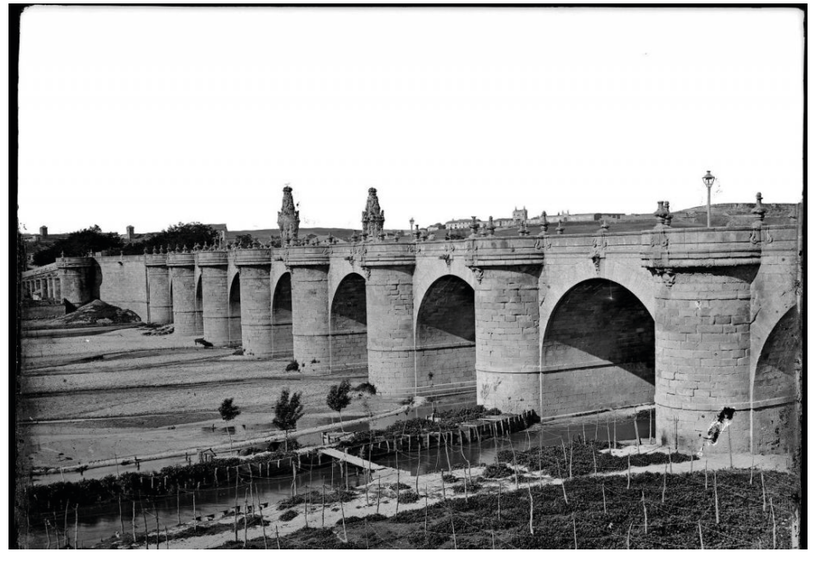


View of the Real Alcázar and the Segovia bridge

the urban horticulture gardens are on the right of the bridge
and the orchard rows on the left

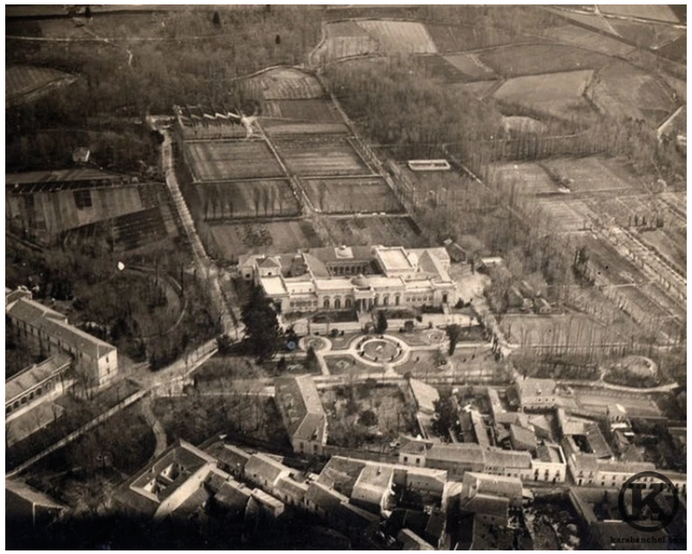
Views of the west bank of the Manzanares River around 1900
with the royal palace in the background and horticulture gardens in the foreground

The Segovia Bridge with the royal palace in the background
and horticulture fields in the foregrond around 1900



Toledo bridge in 1930
with horticulture gardens on its banks

Toledo bridge around 1960
with horticulture gardens on its banks



The Finca de Vista Alegre estate around 1930
horticulture fields are positioned around the palace

A few of the west bank of the Manzanares River
with horticulture fields in the foreground

The Manzanares river around 1960
with horticulture fields in El Calderon

APPENDIX B

LABELS & CERTIFICATIONS

To identify food with certain characteristics such as organically produced or locally sourced, the city of Madrid uses a variety of labels to communicate these characteristics to the consumers. The first label is to identify that the food is 'ecological,' 'biological,' or 'organic'. The meaning of these words and the use of associated labels need to follow regulations established by the European Union, which is also responsible for the control of the processes and ingredients in the production of the food. Besides this logo, it is also required to indicate the place where the raw ingredients that make up the product come from: 'EU Agriculture,' 'Non-EU Agriculture,' or 'Spain Agriculture' (Comunidad Madrid, 2020).

Organic agriculture and livestock products that have been manufactured, processed, or packaged in the region of Madrid require a separate label, indicating that they have been certified by the CAEM (Committee for Organic Agriculture of the Community of Madrid) (Comunidad Madrid, 2020). According to the CAEM, the majority of the 12,000 hectares and 547 operators dedicated to organic farming in the Community of Madrid are dedicated to olive groves, cereals, vineyards, and pastures. Besides certifying the products, they also provide resources for producers to transition to organic production (CAEM, 2021).

Besides labels certifying the organic production of food, the Community of Madrid also has a variety of labels to denote certain protected products produced within the region (Comunidad Madrid, 2023a)

The EU's organic label is meant to indicate that the product is produced following regulations established by the European Union.

Since 1990, Madrid uses the Vinos de Madrid label to denote the origin of wine produced within the community, accounting for more than half of the 16,000 hectares of vineyards within the region.

The Protected Geographical Indication Meat from the Sierra de Guadarrama is a label guaranteeing the quality of three meat products from the region's cattle: Guadarrama Veal, Yearling, and Cebón. The animals used in these products must come from specific breeds and are fattened using cereals.

Protected Geographical Indication Carne de Ávila denotes the meat from the Avileña-Negra-Ibérica cattle breed, which are farmed over large areas of forest and pastures in the communities of Andalusia, Aragón, Castilla-La Mancha, Castilla y León, Extremadura, La Rioja, and Madrid.

Quality Designation Campo Real Olives designates olives belonging to the Manzanilla de Campo Real and Manzanilla Cacereña varieties, known for their dressing with natural ingredients such as thyme, fennel, oregano, and garlic. Of the olives produced in the community, 75% belong to the label.

Chinchón Geographical Indication is used to guarantee the origin of an aniseed spirit drink in the town of Chinchón. Although the label was founded in 1991, the original distillery was founded in 1911 as a cooperative by 300 harvesters, and the production of the drink itself goes back even earlier.

Products that are produced and processed in Madrid in the Community of Madrid but are not protected by the above labels can still receive a label denoting their origin: 'M Product Certificado'. M Certified Products need to be locally produced, safe products with differentiated quality (Comunidad Madrid, 2023b).

Protected Designation of Origin Madrid Oil indicates Extra Virgin olive Oil produced, processed, and packaged in the southeast of the Community of Madrid, amounting to 23,600 hectares of olive oil groves. These olives belong to the majority Cornicabra, Castellana, and Manzanilla Cacerña varieties, with a minor share coming from the local Carrasqueña, Gordal, Asperilla, and Redondilla varieties.

APPENDIX C

DESCRIPTION OF ACTORS

The following appendix gives a short description of all actors depicted in the diagram on page 58 and discussed at large in the 'Localized actors and their roles'.

Environment (Reckinger et al, 2022)

- **Climate & weather:** climate includes the seasonal temperatures, rainfall, and wind patterns, while weather concerns the temporary conditions of these factors. Both of these are crucial influences on the production of food and determine what kind of food can be produced within a region. The production of food can be heavily influenced by climate change and also be a major influencer of it.

- **Flora & fauna:** contain a wide variety of organisms including but not limited to plants, animals, and fungi. Without the complex system that is made up by these organisms, food production could not exist, while at the same time also having a major impact through the use of fertiliser and pesticides.

- **Land:** is used to categorise the geological and geomorphological landscape features including relief, elevation, slope, social composition etc. Agriculture requires the nutrients from healthy soil to be able to produce food. However, agriculture is also tied to the soil degradation through the overuse of fertiliser and pesticides.

- **Water:** is of vital importance in the production of food. Over 70% of fresh water is used in food production through the use of irrigation. The quality of this resource can, however, negatively be impacted by the pollution coming from the use of pesticides and fertilisers.

Water

- **Ministerio Para La Transición Reto Demográfico:** the Ministry of Environment is responsible for environmental policy on a national level including that of pollution prevention, climate change, and water use, major topics that impact the ability of food production.

- **Autonomous Community of Madrid:** the provincial government of Madrid has various programs to support local farmers to diversify and adapt to climate change such as subsidies for more sustainable irrigation systems.

- **Municipality of Madrid:** the municipality runs various programs to ensure the quality of the food available to their citizens and to promote local production within the municipality.

- **Canal de Isabel II:** is the only company that manages the water supplies of Madrid and wholly owned by the Autonomous Community of Madrid. The company is not only responsible for the drinking water supply but also the water used for irrigation of farmland, industrial use, and the infrastructure surrounding it such as the canals, wastewater plants, reservoirs etc (Canal de Isabel II, 2022),

Research & development

- IMIDRA: Madrid Institute for Rural, Agrarian and Food Research Development is a department of the Community of Madrid responsible for R&D and other activities surrounding agriculture and their associated sectors. They carry out research into unique species, farming techniques, and more with the aim to support the farmers within the Community of Madrid (IMIDRA, 2021).

- Universidad Politéchnica de Madrid: The Politechnical University of Madrid has its own faculty for R&D surrounding agriculture; they work in close collaboration with IMIDRA and make use of their facilities.

- Ministerio de Agricultura: The Ministry of Agriculture steers national policy of the Spanish agricultural sector with a specific focus on keeping the sector competitive on the global market and the efficient production of food under changing conditions within Spain.

Labour

- The process of farming is labour-intensive; even though much of the work such as ploughing and reaping has been mechanised, many parts are still done by hand such as the picking of fruit and the raising of livestock. Within the division of labour, there are a variety of roles such as the owner of the farm who is responsible for all activities. This can either be an independent owner who carries out most of the work themselves with possible help of farm labourers or a large corporation that owns vast tracks of land managed through a corporate bureaucracy. Working under the owner are the farm labourers; these can be farm workers that are permanent employees, seasonal workers that are contracted during certain seasons and otherwise have other jobs or migrant workers that move from farm to farm providing unskilled labour. Besides these, there are the specialists that have extensive expertise in specific processes, crops, or livestock species. These are more common when dealing with products that are fetching high prices and thus must have specific qualities such as wine or meat (Holland & La Salle, 2010).

Agriculture (Reckinger et al, 2022)

- Field crops: include cereals (wheat, barley, rye, oat, grain, and spelt), protein crops (peas, beans, and lentils), and oilseeds (rapeseed, sunflower). These are produced on extensive outdoor fields that are often irrigated.

- Permanent crops: are categorized as trees and shrubs which occupy the same plot for several years (usually five years or more). These are mainly fruit and nut trees, bushes, vineyards, and olive groves.

- Horticulture: is the farming of vegetables and flowers. Horticulture can take place on either outdoor fields or within greenhouses depending on the available land, resources, and required qualities. The growing of vegetables can be approached in many ways such as biointensive, permaculture, agroecological, and more. Every one of these methods will have its pros and cons and will impress different qualities on the final product such as size, flavour, colour, degree of homogeneity, environmental impact, and more.

- Grazing livestock: are categorized as farms that produce animals such as bovine, sheep, and goats for the production of milk and/or meat. The distinguishing factor is that the animals can be fed via the grazing of grass.

- Granivores: include animals such as pigs, poultry, and rabbits. Unlike grazing livestock, they cannot process grass into protein. However, they are omnivores and thus can be fed leftovers from other agricultural processes.

- Managed wild: includes fish, honey, and wild animals such as deer and boar. Although they can be bred for consumption, they are not domesticated like livestock and require specific management techniques based on the environmental and cultural conditions of their surroundings.

Processing (Reckinger et al, 2022)

- Primary processing: is the processing from raw agricultural products into food commodities. These commodities can either be packaged, distributed, and sold to consumers or sold to secondary processors (this can be food processors or the gastronomic industry). Examples of processes that belong to this category are milk production, milling of cereals, crushing of seeds or fruits into oils or juice, slaughtering and butchering of animals, and wine and beer production.

- Secondary processing: is the processing of basic ingredients produced by primary processing to new products. Examples of processes that belong to this category are baking, production of dairy-based products such as cheese or yogurt, the fabrication of sauce, etc. The scale of these processes can vary from large industrial factories to small artisanal home kitchens.

- Tertiary processing: is the production of what is called 'processed food'. These foods include premade ready-to-eat and heat-to-serve items that often include additives either derived from natural food or synthesized from other organic compounds to add flavour, colour, and shelf life.

- Extract/by-product based industry: makes use of food extracts or by-products in the creation of a new product. Examples of extract include those found in cosmetics or synthesized for use in the pharmaceutical industry while by-products are often processed into fertilizer.

- Pharmaceutical industry: uses extracts and compounds synthesized from agricultural products in the creation of medicine.

Distribution

- Chain distribution centres: are part of a large corporate chain. These chains are responsible for their own distribution network for which they own their own distribution centres. Products are transported from different producers and processors to these centres from where the products are combined and distributed to the stores owned by the chain (Reckinger et al, 2022).

- Mercamadrid: is the main wholesale market of Madrid and its surrounding region. The majority of the food that is distributed to restaurants and independent shops comes from Mercamadrid. The market does not function as a single entity and is instead made up of 800 companies specialized in different products (Mercamadrid, 2022).

Commerce

- Commerce is the final step before consumption of food. There are various actors from whom food can be bought. In the case of Madrid these are discussed in the chapter 'sourcing of food in Madrid'.

Influencing factors (Reckinger et al, 2022)

- Marketing & advertising: in the foodscape includes a wide range of activities such as advertisement in the media, consumer research, sample promotions etc. Through this, brands try to influence the products that consumers purchase and consume.

- Media & culture: include the spread of content through the use of various media such as broadcasting, publishing etc. This dissemination of information influences the perception and opinions of people and has a hand in the shaping of culture.

- Governance & regulation: include all organisations that oversee the creation and implementation of the law. These are public authorities, government departments, supranational organisations such as the EU and WHO.

- Financing & subsidies: are critical actors in the foodscape and are responsible for financing food production in exchange for a part of the profits. These can include groups such as trusts, investors, capital markets, the stock market and IMF. However, they can also have a negative impact as they require constant growth as to be satisfied.

- Education: encapsulate a wide variety of activities including education about nutrition, cooking and farming practices. These programs are often organised by governmental bodies and NGOs.

- Lobbying groups: try to advocate for their cause, and to influence policy of governing bodies and the general public in their favour. The lobbying groups that are part of the food industry often have large amounts of influence over the standards to should represent what is healthy and sustainable.

- Non-profit & grassroots: are organisations that try to achieve a common goal without a focus on profit. These can include better education about a healthy diet or the reduction of waste. Such organisations often work hand in hand with governing bodies to achieve common policy goals.