The Role of Green Innovation Areas in Revitalizing German and Mexican Cities

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GIAGEM

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More information: www.uni-kl.de/giagem

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Contenido

1. Introduction. Green Innovation Areas

Karina Pallagst, José G. Vargas Hernández, Patricia Hammer

Greening and green spaces have gained significance in recent years both in growing cities and in shrinking cities, assigning greening the status of a tool with strategic urban development potential (Reimer et al., 2015). The term 'greening' is used as a strategic approach to nature and landscape protection and spatial planning to achieve a 'green infrastructure' as well as environmentally and socially acceptable practices to implement this strategy at the national, state, regional and local level in a spatial context. Greening at the state level is mainly focused on environmental objectives such as the protection of a wide landscape features. At the municipal level, the objectives of greening are characterized primarily by their creative and social orientation. As a result, a successful implementation at this planning level not only creates benefits for the urban society, it also fits in the overall green infrastructure network (Benedict & McMahon, 2006). At both levels, the sustainability aspect is of importance in order to develop, protect and maintain the environment.

Among others, greening involves the regeneration of former industrial sites for new parks, community gardens, restored habitats, flood-mitigating measures, water treatment plants, and municipal agricultural land, combined with the integration of existing green spaces (Schilling & Logan, 2008). Furthermore, greening can include the transformation and reorganization of road transport, the expansion of routes for pedestrians and cyclists, design measures to beautify the urban environment, promotion of urban gardens and farms, as well as the deliberate demolition of derelict buildings, which can be replaced through open spaces and sustainable planning policies (Adelaja, 2010).

Greening has the potential to generate benefits throughout all social, economic, and environmental areas. In fact, many of the heavily damaged and devastated areas of urban regions of shrinking cities have great potential for implementing greening measures. Accepting the fact that some areas cannot be considered for further development and instead should be transformed into a network of green spaces, hiking and walking paths, community gardens, and parks is a suitable requirement for the long-term need to deal with shrinkage. In addition, green infrastructure improves the quality of life of local residents, provides recreational opportunities, and increases the property values of neighbouring homes (Schilling, 2007). Furthermore, investment in green infrastructure can represent complex economic benefits for the city and thus boost the economic growth of the city and its region.

Previous research by one of the authors (Pallagst, 2010) investigated shrinking cities in the USA in order to gather in-depth knowledge about experiences with applying strategies to steer the development of shrinking cities with the example of Flint/Michigan. During the course of the research, greening turned out to be of special importance as a future development path for shrinking cities. Hence, Pallagst further investigated the case of Flint in 2014 with a specific focus on aspects of greening integrated into the new master plan of the city (Pallagst et al, 2017). The master plan developed by Flint displays a strong focus on greening embedded in a context of neighbourhood stabilization.

The reason for investigating Flint was—among other aspects—the suggestion of the new place type category 'Green Innovation Area' in the master plan. In 2010, the city of Flint received a Sustainable Communities Challenge grant from the U.S. Department of Housing and Urban Development (HUD) for developing a comprehensive master plan. The master plan was developed in a bottom-up, collaborative process involving numerous suggestions by citizens. The plan proposes several aims including citizen-based strategies by encouraging small businesses, developing community assets, and strengthening neighbourhoods. Based on existing vacancy rates, a set of designated place types was mapped out, laying out which areas of the city will remain as built up areas in the future (for residential and commercial uses), and which areas will be designated for right-sizing and tear-downs mainly of residential areas. The latter are declared as 'Green Innovation Areas' where former residential areas will be converted to urban agriculture. In particular, green infrastructure is supposed to strengthen Flint's position as an employment centre on neighbourhood level.

The example of Flint proves the vulnerability of cities with a mono structured economy. Like in other cities, the somewhat unexpected decline

of the leading industry placed city officials and the population in some kind of structural shock. Despite early efforts to maintain the city's economy by means of redevelopment with financial support by the federal government, these investments could not compensate the loss of jobs in car manufacturing. Today, planning for decline is the key, where right sizing and greening are essential for Flint's future development path. The change of legislation in favour of land banking offers a radical yet feasible approach for dealing with the large changes in the urban fabric. In addition, it becomes clear that the city is embracing its new and smaller footprint. With the ongoing process of rightsizing in the frame of implementing the new master plan, Flint is creating new types of open space within the city's boundaries. This new landscape might indeed be a place type that is part of a new economic approach towards greening, sustainability and quality of life.

What is striking in the case of Flint is that the attitude towards shrinkage seems to change: when looked at the types of strategies to cope with shrinkage, Flint is actively planning for a smaller and more sustainable type of urban development. This could potentially have turned into new perspectives for the cities, among them greening as a new vision and employment perspective.

One might ask, are there viable potentials for Green Innovation Areas in other countries such as Germany and Mexico? Following the National Research Strategy "BioEconomy 2030" of the German Federal Ministry of Education and Research, an interdisciplinary approach is considered necessary which ties in with aspects of societal change – involving different stakeholders in a knowledge exchange and by bundling individual research topics. In addition, approaches for regionally- and locally-adapted land management and decentralized approaches should be tested (German Federal Ministry of Education and Research, 2011; Bundesministerium für Ernährung und Landwirtschaft, 2013).

As defined by the European Commission, "Bio-Economy comprises those parts of the economy that use renewable biological resources from land and sea – such as crops, forests, fish, animals and micro-organisms – to produce food, materials and energy" (European Commission, 2017). In the following are presented good-practices from the food and energy sector, moreover socially driven examples are described. Finally, three reference cases highlight particularities, also abroad.

Major challenges lie within in a sustainable use of natural resources, and in supplying land for bioeconomic uses in a way, that minimizes land use conflicts (Bundesministerium für Ernährung und Landwirtschaft 2013). What would that imply for establishing bioeconomy in an urban realm?

Already in 2007, Jordan et al called for a more integrated and sustainable approach towards bioeconomic uses: "Financial and policy support should be given to the multi-stakeholder processes of learning, deliberation, negotiation, and experimentation that are needed to establish and evaluate research and demonstration projects" (Jordan et al 2007: 1571). In the same direction goes the discourse of a co-creation of society and biotechnology: First attempts in this respect suggest a quality based agricultural production based on regional/local food chains and a 'strategy of territoriality' based on sustainable land uses (Levidow 2008). The concept of a regional bioeconomy has since then taken shape with further research studies, such as where examples of urban gardening in the city of Berlin are showcased as best practices of bioeconomic uses (Erbstößer 2014). Nevertheless, a discourse on the potentials and strategies regarding bioeconomic uses in post-industrial cities is yet in its infancy – let alone a means of implementing bioeconomy as a land use type in urban planning and development processes and decision-making.

As part of a German-Mexican research collaboration, the project GIAGEM (Green innovation areas in Germany and Mexico) aims at enhancing the use of vacant inner city spaces as green innovation areas for bioeconomic uses and their potentials for implementation in German and Mexican cities. One of the first steps in the projects was to define what Green Innovation Areas could or should be. Thus, the authors came up with the following definition:

'Green Innovation Areas (GIAs) are a new kind of land use type with the purpose of revitalizing vacant or abandoned spaces. GIAs are locations for new innovative uses that are not yet specified, yet they are of experimental and innovative character. The range of uses can be attributed to the area of bioeconomy (among others). GIAs address a number of public, private and civil society actors. They aim in particular at connecting the communities' and the entrepreneurs' interests by means of long-range land use planning and sustainable land use allocations. In doing so they support two aspects: sustainable and land conscious settlement planning, and implementing bioeconomic (or other entrepreneurial) uses in urban revitalization processes.'

Applying green innovation areas as a revitalization tool for shrinking cities still needs to prove if it is suitable as a model for future development and revitalization in search of a new quality of life.

This book presents the results of a joint German-Mexican research project. As part of a German-Mexican research collaboration, GIAGEM aims at

- Research: enhancing the use of vacant inner city spaces as green innovation areas for bioeconomic uses and their potentials for implementation in German and Mexican cities.

- Networking: involving both partners in a strategic knowledge exchange on relevant ongoing projects within processes of green infrastructure, policymaking and decision making on bioeconomic land uses in a novel way, in the form of green innovation areas.

Research Questions

1] Which key knowledge transfer aspects regarding green innovation areas can be derived from ongoing projects (Germany, Mexico)?
2] What are the legal, administrative, economic, and societal conditions for green innovation areas and for developing areas for bioeconomic uses in Mexican and German cities?
3] In what way can existing approaches such as green innovation areas serve as prototypes for other cities (toolkit)?
4] Which areas for further research can be identified by the partners, setting the frame for coordinated projects?

In the presented research, both partners, Technische Universität Kaiserslautern and Universidad de Guadalajara, gained from each other's experience. Decision makers in cities and public administration in Mexican cities benefit from German experiences in formal land use processes and governance. Additionally, the German scientific partners deepenened their understanding of informal collaboration methods and forms of grassroots movements in Mexico in order to best facilitate future collaboration on technological and economic level.

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2. *Structural conditions of Germany and German case studies*

Sabrina Förch, Patricia Hammer

The Federal Republic of Germany counts 82.2 million inhabitants. In 2015, the life expectancy was for women 83.4 years and for men 78.4 years. Forecasts show that life expectancy constantly increased since 1960 and will further increase until 2060. In the year 2060, the forecasts predict for men of 84.8 years and for women of 88.8 years (Destatis - Statistisches Bundesamt, 2017 c).

In 2016, the GNI of Germany was of 3.197,31 billion Euros. In addition, one can see that since 2009 the GNI grew constantly, starting at 2.515,56 billion Euros. The GNI grew until 2013 on 2.893,93 billion Euros (Destatis – Statistisches Bundesamt 2017 d).

From the economic system, Germany is a so-called Social Market Economy (German: Soziale Marktwirtschaft). This is a socioeconomic model combining a free market capitalist economic system alongside social policies that establish both fair competition within the market and a welfare state. It is sometimes classified as a coordinated market economy (Economist, n.d.).

The following table shows the sectoral split for the German economy as of 2016.

Table 2.1. ***Sectoral Split of the German Economy***

2016	*Service Sector*	*Manufacturing trade (incl. construction)*	*Agriculture and forestry*
Germany	68,9 %	30,5 %	0,6 %

Destatia – Statistisches Bundesamt, n.d.

In the following paragraphs, those German regions are presented, where Best Practice examples of the GIAGEM project are located. Therefore, structural conditions of the region North Rhine-Westphalia with the cities Essen and Herne, the region Saarland with the city of Völklingen and finally the region Sachsen with the city of Leipzig are characterized.

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2.1. Ruhr Area: City of Essen

Karina Pallagst, Patricia Hammer

The Ruhr Area, located in the German State of North Rhine-Westphalia was already at an early stage one of the hardest hit regions of structural transformations in Germany. In order to the tremendous decline the area had to face, many innovative programs were launched to revive vacant land and create new employment possibilities.

These programs – e.g. 'Rebuilding the City East' and 'Rebuilding the City West' offered a structured and comparable methodology for the respective cities. For instance, in order to qualify for funding under these programs, the cities had to develop a comprehensive plan mapping out future goals for urban development for the entire city. Another key project which has drawn international attention was the IBA Emscher Park, carried out as a project of revitalization in the Ruhr Area in the 1990s (Höber and Ganser 1999). In the wake of the IBA, greening and green infrastructure were widely introduced as means to improve the quality of life in shrinking cities. Greening has gained significance in recent years both in growing cities and in shrinking cities, assigning greening the status of a tool with strategic urban development potential (Reimer et al. 2015).

The term 'greening' is used here as a strategic approach that aims to develop green infrastructure along with supporting environmentally and socially acceptable practices at the national, state, regional, and local levels. Many cities have employed successful greening strategies. At the forefront is the Emscher Park located in Germany's Ruhr Area, where a large-scale abandoned industrial space was turned into a landscape park for an International Building Exhibition. Greening in this respect is not a new planning

concept; however, steering urban development in line with green spaces and facilitating linkages with the surrounding landscape is gaining momentum (Fox-Kämpfer et al. 2015). Green spaces are thus not only related to the built environment, but of high relevance for the future development of cities as ecosystems and living spaces (Pallagst et al. 2017). Three examples will be featured in this volume:

a) Urban Gardening projects within the European Green Capital Year 2017, city of Essen
b) Energy Park Mont Cenis in the city of Herne.
c) Urban Forest in Leipzig.

2.1.1. Initial Situation

Population / Number of Citizens

The city of Essen is located in the state of North Rhine-Westphalia. It is part of the Ruhr Area, a metropolitan area of 5.7 million citizens. According to a survey of the Statistisches Bundesamt (Federal Statistical Office), the population of the City of Essen was 582.624 in 2015.

Table 2.2. ***Population of Germany, Ruhr Area, City of Essen (2015)***

Germany	*Ruhr Area*	*City of Essen*
82.2 million	5.7 million	582.624

Destatia - Statistisches Bundesamt, n.d.

Demographic and Socio-economic Change

The estimated population development for Germany as a whole until 2030 is relatively stable. On the contrary, for the Ruhr Area and the city of Essen the Statistisches Bundesamt Survey estimates a negative development. The populations will decrease by 5.3 % and 5.7 %, respectively.

Table 2.3. ***Estimated Population Development, Germany, Ruhr Area, City of Essen***

Germany	*Ruhr Area*	*City of Essen*
Relative population development 2012 to 2030 -1.1 %	Relative population development 2009 to 2030 -5,3 %	Relative population development 2012 to 2030 -5.7 %

Destatia - Statistisches Bundesamt, n.d.

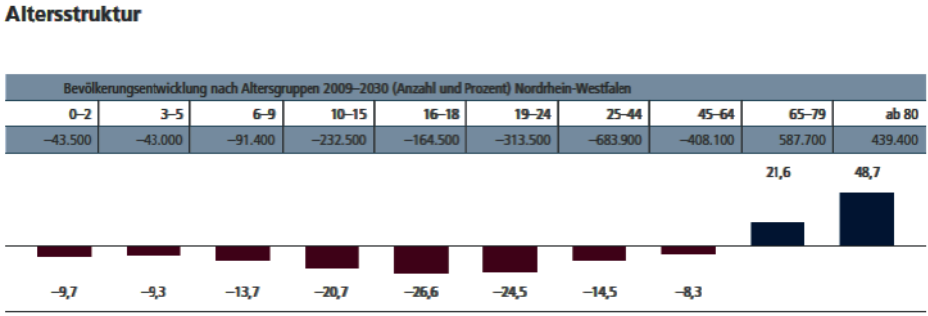
Federal State of North Rhine-Westphalia

The development of the age pattern of the Ruhr Area for the period from 2009 to 2030 estimates that the group of elderly people (age group above 65 years old) will increase. The younger age groups will decrease significantly (see table 2.3).

In North Rhine-Westphalia, the average life expectancy in 2012 was 77.4 years for men and 82.2 years for women. Moreover, a clear rise of the life expectancy is noticed since 1980 (Information und Technik Nordrhein-Westfalen, 2012).

The GNI of North Rhine-Westphalia was in 2015 of 650.408 billion Euros. Here, there is an increase of the numbers, too. In 2009, the GNI was only 539.582 billion Euros, until 2013, it increased to 611.490 billion Euros (Statistisches Amt Mecklenburg-Vorpommern, 2017).

Table 2.4. ***Development of Age Pattern North Rhine-Westphalia***



Wegweiser Kommune, n.d.

City of Essen

The age pattern development for the city of Essen reflects the general predicted development of the Ruhr Area: An increase in the number of elderly

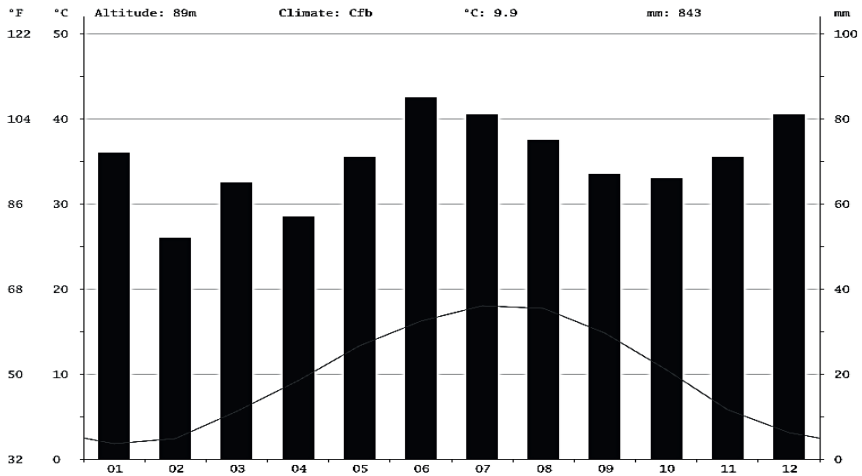
people of age 65 and older and a decrease in the number of young people (Wegweiser Kommune, n.d. b).

Table 2.5. *Development of Age Pattern City of Essen*

Natürliche Bevölkerungs-entwicklung (je 1.000)		Bevölkerungsentwicklung nach Altersgruppen 2009–2030 (%)											
2009	2030	0–2	3–5	6–9	10–15	16–18	19–24	25–44	45–64	65–79	ab 80	
–2,6	–4,4	–9,7	–9,3	–13,7	–20,7	–26,6	–24,5	–14,5	–8,3	21,6	48,7	Nordrhein-Westfalen
												Kreisfreie Städte
–1,9	–2,4	–12,8	–10,3	–11,5	–14,7	–17,5	–19,1	–13,6	–4,2	11,7	23,3	Bielefeld
–4,5	–5,6	–13,7	–12,7	–16,2	–20,3	–27,9	–26,6	–18,1	–16,2	16,5	29,1	Bochum
1,2	–0,6	0,2	3,0	3,8	2,1	–4,0	–13,1	–4,4	2,3	36,7	29,2	Bonn
–4,9	–6,0	–11,7	–9,5	–16,8	–23,9	–31,5	–28,9	–16,9	–12,2	29,0	47,0	Bottrop
–3,4	–3,8	–8,4	–5,5	–9,2	–15,2	–21,1	–21,4	–10,7	–9,1	13,5	33,5	Dortmund
–4,0	–3,7	–10,2	–7,6	–10,1	–16,9	–25,6	–22,9	–11,5	–8,5	9,3	26,2	Duisburg
–0,9	–0,5	2,6	9,8	12,6	9,3	–1,5	–10,8	–2,6	7,3	7,7	37,7	Düsseldorf
–4,6	–4,2	–4,7	–7,1	–1,8	–10,7	–21,4	–21,3	–8,5	–12,5	7,7	27,9	Essen
–4,9	–3,8	–12,7	–10,5	–13,1	–19,4	–27,2	–25,9	–14,8	–12,4	16,6	18,5	Gelsenkirchen
–4,7	–5,2	–14,9	–16,8	–23,4	–27,3	–34,3	–30,5	–18,6	–17,3	–0,4	23,9	Hagen
–2,7	–4,3	–13,5	–10,1	–17,1	–25,0	–28,2	–26,3	–17,1	–6,4	21,9	44,5	Hamm
–5,3	–6,3	–15,6	–14,5	–22,7	–26,5	–32,1	–30,8	–20,8	–14,9	17,7	26,4	Herne
0,5	0,0	–2,4	4,6	6,5	3,0	–4,0	–12,2	–5,2	3,9	13,1	45,0	Köln
–3,6	–4,9	–7,6	–8,3	–10,5	–16,5	–25,8	–24,1	–14,5	–9,2	17,1	42,1	Krefeld
–2,4	–3,7	–4,3	–4,0	–4,7	–9,7	–14,0	–15,1	–11,1	–2,3	5,3	49,2	Leverkusen
–3,2	–4,1	–8,3	–7,6	–10,9	–18,0	–24,9	–23,7	–12,2	–11,4	19,9	51,8	Mönchengladbach
–5,4	–6,2	–8,0	–4,0	–5,5	–11,7	–20,7	–20,7	–13,3	–11,5	5,6	31,1	Mülheim an der Ruhr
0,4	–1,6	–7,1	–1,7	–3,3	–7,5	–10,9	–17,3	–9,6	5,5	32,9	28,5	Münster
–5,1	–5,2	–7,9	–7,8	–9,7	–16,9	–26,7	–24,0	–12,7	–13,4	20,0	48,2	Oberhausen
–3,8	–5,1	–15,6	–18,1	–20,7	–27,4	–33,4	–31,6	–19,6	–18,7	–1,0	35,5	Remscheid
–3,5	–5,1	–6,3	–9,1	–11,4	–20,6	–25,7	–23,2	–15,2	–8,9	11,2	42,6	Solingen
–3,4	–4,0	–8,4	–10,5	–10,7	–15,6	–23,7	–23,6	–14,1	–13,6	6,4	33,5	Wuppertal

Wegweiser Kommune, n.d.

Figure 2.1. Climate Chart City of Essen



Clima-data.org, n.d.

Local Climate Essen

In Essen, the climate is moderately warm. There is significant rainfall throughout the year. Even the driest month still shows high rainfall. The classification of the climate according to Köppen and Geiger is Cfb. In Essen, the annual average temperature is 9.9°C. Throughout the year, there is an average of 843 mm of rainfall.

Soil Condition

As the Ruhr Area has been a major coal and steel production area in the past, depending of the exact location, the soil may be contaminated.

General Education Level of Citizens in Germany

The general level of education in Germany is high. Only 3.7% of people are without any school diploma and only 16.8% are without a completed vocational training. The German education system offers the unique possibility of accessing vocational training based on a secondary school diploma. Almost half of the population has completed such an apprenticeship or vocational training without higher education. The following table shows educational data for all of Germany. Regional differences may occur.

Table 2.6. ***Educational Attainment in Germany (2015; % of total population)***

Education	
In school education	3,6 %
Hauptschulabschluss (Secondary Education)	32,9 %
Realschulabschluss (Higher- Secondary Education)	22,7 %
Hochschulreife (A-Levels)	29,5 %
Without graduation/degree	3,7 %
Higher/Professional/Academic Education	
In education	9 %
Apprenticeship	48,5 %
Fachschul- and Hochschulabschluss (Bachelor, Master, Diplom)	23, 8 %
Doktor, PhD	1,1 %
Without academic or higher education	16,8 %

No data for the educational attainment at the level of the Ruhr Area and the city of Essen were available.

Destatia – Statistisches Bundesamt, n.d.

In terms of access to Universities, with a number of 22 Universities, the Ruhr Area offers the highest density of Universities in Europe. This includes Universities and Universities of applied sciences (Metropole Ruhr, 2018).

2.1.2. Economy

Structural & Basic Conditions

Number of Unemployed and Unfilled Job Vacancies

Germany (2016):	6,1 % unemployed[1]
Unfilled job vacancies:	655.490[2]
North Rhine-Westphalia (2017):	7,3 % unemployed[2]
City of Essen (2011):	12 % unemployed[3]
GNI (Gross National Income)	
Germany (2016):	3,197.31 billion Euro[4]
GDP (Gross Domestic Product)	
Germany (2016):	3,134.07 billion Euro
Per capita:	71.891 Euro[5]
North Rhine-Westphalia (2015):	669.676 million Euro[6]
City of Essen (2014):	78.370 Euro[7]
PPP (Purchasing Power Parity)	
Germany (2016):	532.034, 63 Million Euro
Per capita	6.485 Euro
North Rhine-Westphalia:	No Data available
City of Essen:	No Data available
HDI (Human Development Index)	
Germany (2016):	0,926 (4th in worldwide ranking)[8]

[1] Destatia – Statistisches Bundesamt, n.d. h
[2] Destatia – Statistisches Bundesamt, n.d. i
[3] Destatia – Statistisches Bundesamt, n.d. k
[4] Destatia – Statistisches Bundesa mt, n.d.l
[5] Destatia –Statist. Bundesamt n.d. m
[6] Destatia, Statistisches Bundesamt, n.d. n
[7] Essener Wirtschaftsförderungsgesellschaft mbH, 2017
[8] Länderdaten, n.d.

Subsidies

Different public subsidies are available through the EU, the Federal Government of Germany and its States for public projects. EU and State Funding

are available for revitalization of areas as well as for development measures through infrastructure projects (deficit support up to 70%).

Specific subsidies for the City of Essen are "Stadtumbau West" ("City Redevelopment Western States") or the possibility to draw funding from the European Interreg funding as well as German support programs for cities in bad financial shape (enables subsidy rates of 60- 90% free funding and with a 10-40 % own contribution as city). Moreover, a particularity in the German Budget is the "Länderfinanzausgleich" equalisation payments of public founds in which the richer states support the poor states financially. The corruption rate is low. The complete financial system of Germans states and cities is quite complicated and is not explained in detail here.

2.1.3. Infrastructure

The accessibility of the City of Essen by roads, railways, air and water is excellent. The City of Essen is considered one of the best-connected hubs in Europe. Around eleven million people can reach the City of Essen per car within an hour. Moreover, nine million people can reach the city by public transport within an hour (Essener Wirtschaftsförderungsgesellschaft mbH 2017, p1).

After this short overview of the main structural aspects of the city of Essen follows more details about the city of Herne which is located at only 25 km from Essen in the Ruhr Area.

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2.2. Ruhr Area: City of Herne

Sabrina Förch, Patricia Hammer

In the Ruhr Area, located 25 km apart from the city of Essen lies the city of Herne. The following paragraphs present an overview of the city of Herne, comprising a description of the initial situation, the economy and the infrastructure of this city.

2.2.1. Initial Situation

Population

In 2015, the number of inhabitants of the city of Herne was 160.135 inhabitants (78.550 men and 81.585 women). The number of German inhabitants was 135.813 people and 24.322 people had a migration background.

The city of Herne is composed of the urban districts Wanne, Eickel, Herne-center and Sodingen. In 2015, in the urban district Wanne lived 34.266 inhabitants, in Eickel lived 32.821 inhabitants and the urban district Herne-center had the highest amount with 58.259 inhabitants. The urban district Sodingen, in which the project Energy park Mont-Cenis was realized, had in 2015 the second highest amount of inhabitants with 34.789 (Stadt Herne 2017, p. 9).

The city of Herne is located in the Federal land of North Rhine-Westphalia that has from all the federal lands in Germany the highest number of inhabitants. In 2015, North Rhine-Westphalia had 17.87 million inhabitants from 82.18 million in Germany (Destatis – Statistisches Bundesamt 2017 a).

Table 2.7. *Comparison of the number of inhabitants*

Germany	*Federal state North Rhine-Westphalia*	*City of Herne*
82.18 Mio. inhabitants (as of 31.12.2015)	17.87 Mio. inhabitants (as of 31.12.2015)	160.135 inhabitants (as of 31.12.2015)

Destatis – Statistisches Bundesamt, 2017; Stadt Herne, 2017

Demographic and socio-economic change

From 2012 until 2013, the development of the population was generally stable In Germany, with only a minor decline of the population of 0.7%. However, the development is different in the respective federal states. In Bavaria, for instance, the population forecast predicts 3.5% growth, but in Sachsen-Anhalt, the forecast shows an enormous decline of the population with 13.6% (Bertelsmann Stiftung, 2015).

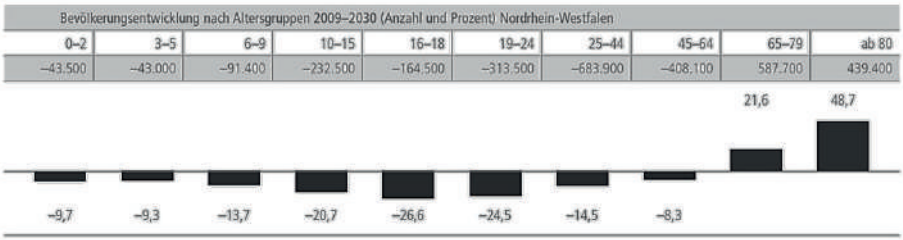
Table 2.8. *Forecast of the population 2012 until 2030*

Germany	*Federal State North Rhine-Westphalia*	*City of Herne*
Population forecast 2012 until 2030 -0,7 %	Population forecast 2012 until 2030 -5,3 %	Population forecast 2012 until 2030 -6,2 %

Bertelsmann Stiftung 2015, p. 4, Bertelsmann Stiftung and Wegweiser Kommune, 2011, p. 78, and Bertelsmann Stiftung, n.d., p. 4.

Compared to Germany, until 2030 the federal state of North Rhine-Westphalia will have a higher decline of the population. The forecast of the population predicts a decline of 5.3% that represents 953.400 people. In particular, the part of young people will clearly decline. The highest decline of -26.6 % will be schoolchildren of secondary school level II (16-18 years). Moreover, the figure below shows that the age group 19-24 years will have a decline of 20.7% until 2030. The highest rise of 48.7 % will account for elderly people of 80 years. Hence, in 2030 every second person will be older than 48.4 years (Bertelsmann Stiftung and Wegweiser Kommune, 2011).

Table 2.9. ***Population forecast in reference to age-groups 2009-2030 in North Rhine-Westphalia***



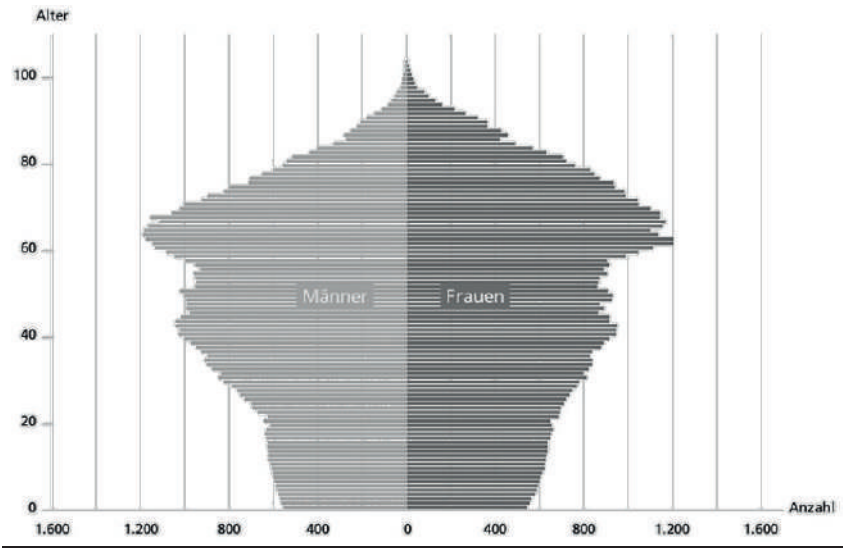
Bevölkerungsentwicklung nach Altersgruppen 2009–2030 (Anzahl und Prozent) Nordrhein-Westfalen									
0–2	3–5	6–9	10–15	16–18	19–24	25–44	45–64	65–79	ab 80
–43.500	–43.000	–91.400	–232.500	–164.500	–313.500	–683.900	–408.100	587.700	439.400
								21,6	48,7
–9,7	–9,3	–13,7	–20,7	–26,6	–24,5	–14,5	–8,3		

Bertelsmann Stiftung und Wegweiser Kommune 2011, p.78

The forecast of the city of Herne predicts a decline in population, too. From 2012-2030 the forecast expects a decline of 6.2%. In doing so, the balance is of -5.6 for 1.000 inhabitants (Bertelsmann Stiftung, n.d.).

In consequence, population development until 2030 shows a decline of -10.5%. The average age of the population of Herne will be around 47 years. Moreover, the share of 65-year-old people with 26.8% will be the main part (Bertelsmann Stiftung, n.d.).

Figure 2.2. Population Pyramid, Age Structure, City of Herne 2030



Bertelsmann Stiftung, n.d., p.11

Climate of Herne

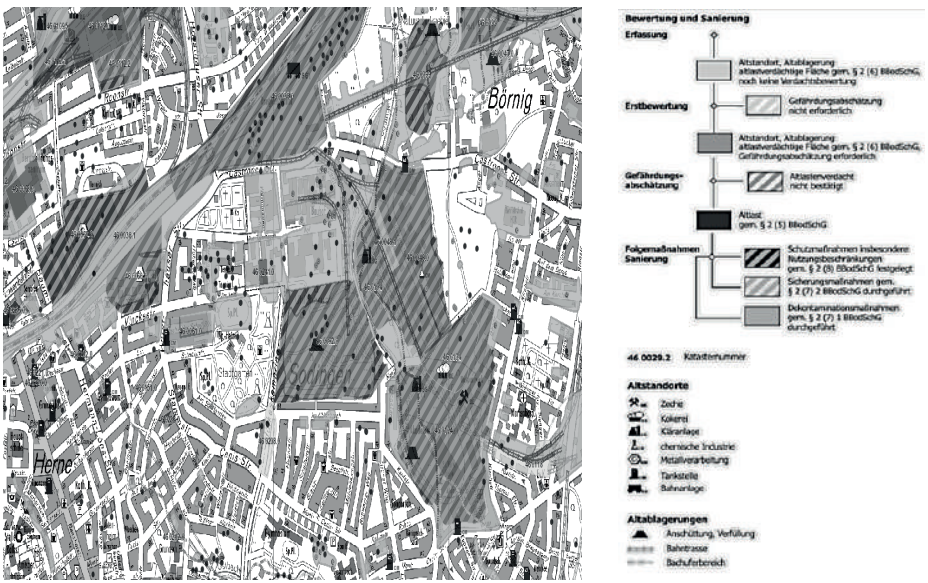
The predominant climate situation of the city of Herne is warm and moderate, in which the precipitation is shared over the year and even high in the driest months. The months with the highest precipitations are June, July and December. The lowest precipitation is in the month February with only 50 mm. The difference between June (highest precipitation) and February (lowest precipitation) is of 32 mm. The medium average amount of precipitation is of 820 mm/year.

The average yearly temperature of Herne is of 9.7° Celsius. The hottest month is July with an average temperature of 17.8° Celsius and the coolest month is in the year January with 1.7° Celsius. The classification of the climate is Cfb in reference to Köppen and Geiger (Climate-Data, n.d.).

Soil condition

In the city of Herne, several areas are in need of rehabilitation because of their contamination. This is caused mainly because of coal mining. In the period of industrialisation, eleven coalmines existed in Herne.

Figure 2.3. Extract of the soil contamination map in the area of the coalmine Mont-Cenis



Stadt Herne, n.d

The coalmine Mont-Cenis was one of eleven coalmines and can therefore today only be partly covered and used. The coal promotion left, as with all coalmines of this city, a huge contamination of the soil, in consequence only few areas could be rehabilitated.

In the frame of the project Energy Park Mont-Cenis, rehabilitation of the soil was undertaken. The coalmine Mont-Cenis had in the part of the coking plant a high soil contamination. There the contamination was encapsulated with a plastic sheet to avoid any propagation, as mentioned by Ulrike Martin in an interview on 2 November 2017.

Figure 3 shows that on the complete area of the former coal-mine, protection measures in reference to the German law (§2 Abs. 8 BBodschG) took place. Hence, the former area of the coking plant was not covered with buildings.

In the section of the residential area and the location of the Advanced Training Academy, the soil contamination could be cleared to allow for the construction.

Because of the former coalmines, the city is characterized by high soil contamination. However, a multitude of those areas could be rehabilitated and cleaned – in part to allow constructions.

Education

In 2012, the German education level is high, only 3.8 % of the schoolchildren do not have a school-leaving certificate. The main part of school leaving certificates is with 35.6 % attributed to the "Hauptschule" (German secondary modern school from year 5 to 9). In 2012, 27.3% of German schoolchildren received a High-school Degree.

Table 2.10. ***Comparison of the school leaving certificates in 2012***

	Germany	***City of Herne***
School leaving certificates	% in 2012	% in 2012
Hauptschulabschluss (certificate of secondary education)	35,6 %	4,8 %
Realschulabschluss (General certificate of secondary education)	22,1 %	13,3 %
Fachhochschul- oder Hochschulreife (General qualification for university entrance)	27,3 %	36,0 %
Without certificates	3,8 %	8,0 %

Destatis – Statistisches Bundesamt 2017 b, und Stadt Herne 2014, p. 116

However, 22.1% of the schoolchildren received a certificate from the "Realschule". In consequence, the main part of school leaving certificates are from the Hauptschule and the High school Degree in Germany (Destatis – Statistisches Bundesamt, 2017 b).

In the city of Herne the part of school children without certificate lies clearly above the German average with 8%. However, in 2012 the highest amount of schoolchildren (36%) in Herne received a high school degree. The certificate from the Realschule (13.3 %) and the certificate from the Hauptschule (4.8 %) follow this (Stadt Herne, 2014).

Table 2.11. ***Part of the higher school leaving certificates in Germany 2015***

Higher school leaving certificates	*Part in %*
Lehre/ duales Studium	48,5 %
Fachhochschul- oder Hochschulabschluss	11,1 %
Without professional school degree	16,8 %

Destatis – Statistisches Bundesamt 2017 b

Higher school level certificates represent in Germany whether a training in a dual system or a high school degree ("Fachhochschulabschluss" or "Hochschulabschluss" in German). Almost half (48.5 %) of the schoolchildren from the Realschule, Hauptschule with high school degree do a traineeship ("Lehre" in German) or dual studies. In 2015, 11.1 % of the schoolchildren obtained a high school degree. However, 16.8 % of the schoolchildren were without school leaving certificate.

Table 2.12. ***Attended schools in Herne in 2015/2016***

Attended schools in Herne	*Part in %*
Allgemeinbildende Schulen	35,5 %
Berufsbildende Schulen	57,3 %
Hochschulen und Akademien	6,0 %
No Data	0,7 %

Bundesagentur für Arbeit, 2017, p. 3.

Indeed, no direct comparison between the higher school level certificates in Germany and the city of Herne can be carried out. However, one can take a closer look at the part of school attendance in Herne. The statistic from the German Federal Employment Office underlines the fact that the highest

amount of certificates in Germany are training schools or dual studies is repeated in Herne. The most attended schools are those with professional focus with a part of 57.3 %. The Hochschulen and Academies have only a part of 6.0 % (Bundesagentur für Arbeit 2017, p.3).

The city of Herne also hosts the University of Applied Sciences for Public Administration (Fachhochschule für öffentliche Verwaltung) (Metropole Ruhr 2018).

2.2.2. Economy

In the economic part of this analysis, a description of basic conditions and structural situation follows.

Structural and Basic Conditions

In the first part, an analysis of the employees subject to a social insurance contribution will be displayed, but this in relation to commercial sectors. The sectors agriculture, forestry, manufacturing and trade, commerce, hotel and restaurant industry, traffic and other services will be distinguished. In 2015, 42.891 employees with social insurance contribution were counted. The main part with 22.412 employees was in the commercial sector „other services". This is followed by manufacturing with 10.470 employees with social insurance contribution. In the field trade, hotel and restaurant industry, traffic 9.983 employees were count in 2015. In 2015, the sectors of agriculture, forestry and fishery formed with 23 employees the smallest commercial sector (Information und Technik Nordrhein-Westfalen 2017 a, p.15).

Indeed, the number of employees in the different commercial sectors in North Rhine-Westphalia is higher, but the distribution among the different sectors is similar. In 2015, 6.407.112 people with social insurance contribution were counted. The biggest part hereof were 3.162.119 employees in the sector „other services. The manufacturing trade sector is, as in Herne, with 1.778.723 employees with social insurance contribution very high. In 2015, the agriculture, forestry and fishery sector counted only 32.020 employees in the federal state (Information und Technik Nordrhein-Westfalen 2017 b).

When looking at the different sectors in Herne, one can clearly see that machine construction, repairing and installation and the sectors health, logistic and chemistry are those with the highest employment and therefore the most important commercial sectors (Wirtschaftsförderungsgesellschaft Herne, 2017).

Table 2.13. ***Employees with social insurance contribution in the different sectors in Herne 2017***

Sectors	*Machine construction*	*Health*	*Logistic*	*Chemistry*
Employees with social insurance in 2017	2.700	9.100	8.200	800

Wirtschaftsförderungsgesellschaft Herne, 2017.

Moreover, the highest number of companies in the city of Herne are in the sectors machine construction, repairing, installation and equipment, production of chemical manufactures as production of data converting machines, electronic and optic production. The highest sales account for the production of chemical products and the manufacturing of motor vehicles and pieces (Information und Technik Nordrhein-Westfalen 2017 a).

Unemployment & numbers of qualified workers

In 2016, Herne counted 49.575 employees: 27.332 men and 22.243 women. Furthermore, 5.727 employees with migration background, 5.054 employees under 25 years and 8.955 employees of 55 years and older were counted.

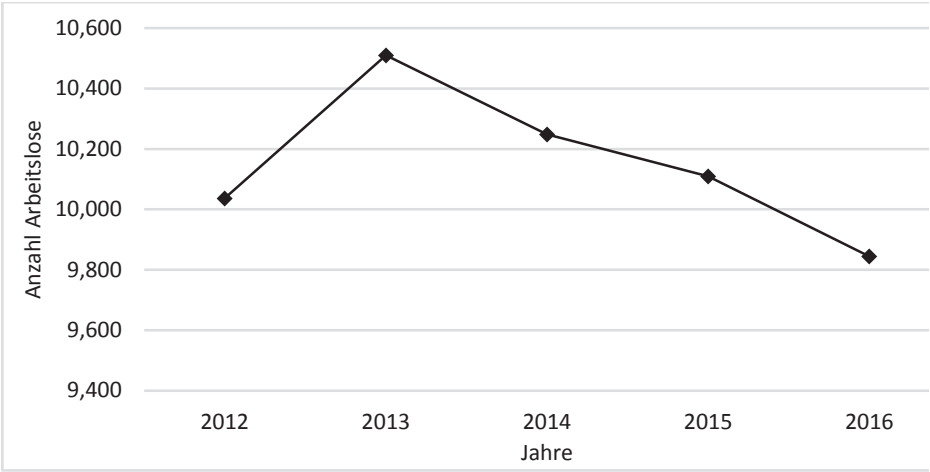
Altogether, in 2016 in Herne, 9.845 unemployed people were registered. Hereof were 5.596 men and 4.249 women. Moreover, 2.993 unemployed people with migration background, 933 unemployed under 25 years and 1.534 unemployment of 55 years and older (Bundesagentur für Arbeit, 2016).

In comparing unemployment figures from 2012 until 2016, one can clearly see that until 2013, the number of unemployed people constantly grew, but after this year, a positive development is noticed. Furthermore, the number of permanently unemployed persons is in decline since 2013.

In 2013 at 4.725 permanently unemployed persons was counted, in 2016 this number decreased to 3.927 persons. This represents a decline of approximatively 800 permanently unemployed persons (Bundesagentur für Arbeit, 2016).

This development is similar in North Rhine-Westphalia. In 2012, 733.276 persons were unemployed in North Rhine-Westphalia; this number grew in 2013 on 762.756 unemployed people. Since this date, a clear decline of the number of unemployed people is seen until 2016 in which there were 695.833 unemployed people. Therefore, from 2012- 2016 a decrease of approximatively 37.400 unemployed persons can be noticed in the state of North Rhine-Westphalia.

Figure 2.4. Comparison of the number of unemployed people in Herne from 2012-2016



Bundesagentur für Arbeit, 2016.

In view of the offer of extremely highly qualified workers, the amount of elderly employees in Herne is described in the following. One can notice here, that the number of employees in Herne between 65 and 75 years has doubled since 2003. In particular, in the midsize section the competition for highly qualified workers has been more difficult for years. This is similar all over Germany. Until 2030, the number of the working population will decrease about 1.4 million to 39.2 million. A decline of the employment will be noticed in particular in the processing trade, the commerce and the traffic as well as in the public services (Wirtschaftsförderungsgesellschaft Herne, 2017).

The shortage of skilled workers in Germany is mainly caused by demographic change based on the aging of the population and the low share of young people within the society. Under the point „demographic and socio-economic change „the shift of the age pattern until 2030 was predicted for Herne, therefore the city of will be affected by a shortage of skilled workers in the future.

GNI (Gross National Income)

The GNI describes the total of the gained income from all inhabitants of a region or a state.

Indeed, there is no GNI available for the city of Herne, but the total

amount of income and the accessible income per inhabitant is accessible. In 2014, the total income was 2.732 million Euro and the accessible income per inhabitant was 17.679 Euro (Wirtschaftsförderungsgesellschaft Herne, 2017).

PPP (Purchasing Power Parity)

The purchasing power parity displays the part of the purchasing power which is spent in retail, in consequence the available purchasing power for expenses. In 2017, the PPP of Germany was of 546.007,43 million Euros, in which the retail trade turnover was 484.307,43 million Euros. In 2017, the PPP in North Rhine-Westphalia was 118.696,70 million Euros. Moreover, North Rhine-Westphalia has a retail traide turnover of 106.035,86 million Euros (IHK – Industrie- und Handelskammer zu Köln, 2017).

Table 2.14. *Comparison of PPP in 2017 (million Euro)*

	Germany	***North Rhine-Westphalia***	***Herne (city)***
Purchasing power parity 2017	546.007,43	118.696,70	910,82

IHK – Industrie- und Handelskammer zu Köln, 2017 and Wirtschaftsförderungsgesellschaft Herne, 2017

In 2017, the city of Herne recorded a total purchasing power parity of 910.82 million Euros. This represents a purchasing power in retail of 5.819,0 Euros per inhabitant (Wirtschaftsförderungsgesellschaft Herne, 2017).

GDP (Gross Domestic Product)

GDP represents the economic power of an area. It is composed by gross value added, the non-deductible turnover tax and import charges. This displays a specific value. It includes all goods and services produced, also taking inflation into account (Stadtwerke Herne n.d. a).

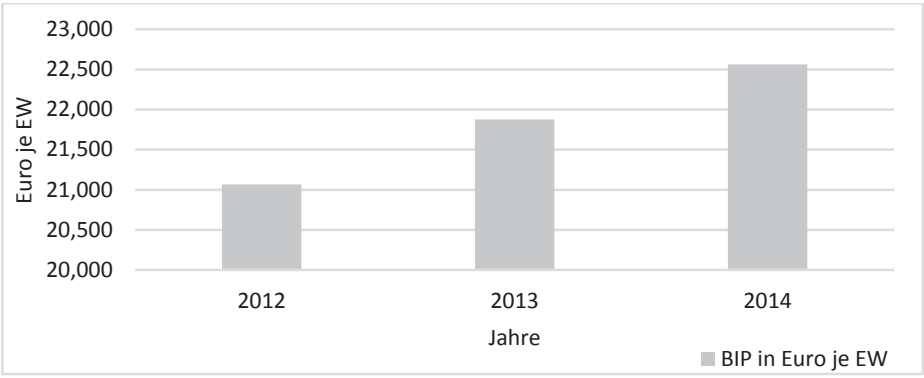
In 2016 in Germany, the GDP was 3.144,05 billion Euro. As for the GNI, the GDP increased constantly since 2009. In 2009, the GDP was of 2.460,28 billion Euro, which increased until 2013 on 2.826,24 billion Euro.

North Rhine-Westphalia had in 2014 a GDP of 631.568 million Euro. The German GDP grows constantly. In direct comparison to 2012, an increase of 35.246 million Euro is visible (Destatis - Statistisches Bundesamt 2017 e).

In 2014, the city of Herne had a GDP of 3.486 million Euro. This repre-

sents a GDP of 22.562 Euros per inhabitant. Indeed, Herne belongs to the structurally week cities of North Rhine-Westphalia. As compared to previous years, a clear increase of the GDP can be noticed. In 2012, the GDP was 21.066 Euros per inhabitant, the total GDP in this year was 3.455 million Euros (HaushaltsSteuerung, 2017).

Figure 2.5. Development of the GDP per inhabitant from 2012 to 2014



HaushaltsSteuerung, 2017.

Subsidies

In the field of urban planning and development different economic development programmes are available sponsored by the state or the EU.

In Herne the „urban redevelopment law", which was eacted in the year 1971 (Städtebauförderungsgesetz), is decisive for urban development. In the frame of urban redevelopment, urban districts or areas of a city are funded because of urban deficits or inequalities. The implementation of this measure is carried out in cooperation with the state, the region and the city and partly by the European Union. As part of urban redevelopment the following programmes were released: „urban districts with special need of rehabilitation" „Social City", „Urban restructuring West" and „Active city- and local center" (Stadt Herne, n.d. a).

Since the year 1971, approximately 20 rehabilitation zones were installed in Herne,. Until today (2018) a total amount of approx. 165 million Euro subsidies were necessary for these actions.

Concluded areas of the city of Herne were on one side the „Social City" area „Bickern/Unser Fritz" (promotion period 2002 until 2012) and on the other side the urban restructuring area „Wanne-Mitte", which was sponsored from 2006 until 2014. Current projects of the city are the urban restructuring

area Herne-center, which is since 2012/2013 in development stage and the "Social City" project in the area Wanne-Süd. The project Wanne-Süd is funded since 2016 (Stadt Herne n.d. a).

2.2.3. Infrastructure

In the area of infrastructure, the situation of the city of Herne is analyzed in a regional and supraregional context. In particular, the connection to roads, railways and inland water navigation will be discussed in more detail.

In the area of the road network, first the regional and supraregional connections are examined. In the middle of the urban area of Herne is the motorway junction Herne, which connects the federal motorways A42 (Kamp-Lintfort-Dortmund) and A43 (Münster-Wuppertal). The A42 motorway runs within the city of Herne from west to east. In the West, the A42 motorway leads to Gelsenkirchen and Oberhausen, passing Castrop-Rauxel in the East. From north to south, the A43 runs through the urban area. This leads north along Recklinghausen and south to Bochum-Nord. In addition, the city of Herne has a national highway connection. The B226 runs within the urban area from south to northwest.

Regarding the rail network, the stations „Wanne-Eick main station", „Herne main station" and „Herne-Börnig" can be found in Herne. The stations allow direct regional connections (S-Bahn, regional train and Eurobahn) to Dortmund, Duisburg or Essen, from which in turn supraregional connections (IC, ICE and IGV) can be reached. In addition, the main station in Herne is connected to the University of Bochum by the subway "U35 CampusLinie".

North of the city of Herne runs the Rhine-Herne Canal, which leads from the Rhine to the Dortmund-Ems Canal. The Rhine-Herne Canal branches off from the port of Duisburg and also serves as a connecting channel between the port and the West German canal system. The Duisburg-Ruhrot harbors are located approximately 40 kilometers from Herne and are among the largest inland ports in the world.

The port of Dortmund is located about 25 kilometers from Herne and thus represents another port in the immediate distance of the city. In addition, the port of Dortmund is connected to the entire European transport system and thus provides a major logistics location for the eastern Ruhr area. The port ist often referred to as the location of combined transport, as several tonnes of goods are transported by container per year (Büscher, 2017).

Figure 2.6. The Duisburg Habor

Stadt Herne, n.d. a

In addition, the rather small harbor „Wanne-West“ can be found within Herne in the district of Wanne. This port was mainly responsible for the former surrounding coal minds and the prevailing mining there. Today it still serves as a coal hub, but also as a hub for container and cargo center.

The city of Herne is therefore very well connected via the road and rail network as well as via ports. Due to its central location in North Rhine-Westphalia as well as in the entire Ruhr area, the city has great locational advantages. The good transport infrastructure makes Herne a delightful business location (Wirtschaftsförderungsgesellschaft Herne, n.d.).

After this characterization of the Ruhr Area a structural description of the region Saarland and the city Völklingen follows.

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2.3. Region Saarland: City of Völklingen

Jakob Schackmar, Patricia Hammer

This chapter introduces a structural description of the city Völklingen, located in the German state of Saarland.

2.3.1. Initial Situation

Population

The population of the City of Völklingen in 2015 is 39.129 inhabitants according to the Statistisches Bundesamt Survey. Völklingen is located in the Federal State of Saarland which comprises 995.597 citizens in 2015. In the Federal Republic of Germany reside 82,2 million people.

Table 2.15. ***Population of Germany, Federal State of Saarland, City of Völklingen***

Germany	*Federal State of Saarland*	*City of Völklingen*
82, 2 Mio. Residents (Stand 2015)	995.597 Residents (Stand 2015)	39.129 Residents (Stand 2015)

Destatia – Statistisches Bundesamt, n.d. a/b and Wegweiser Kommune, n.d. a.

Demographic and socio-economic change

The population estimatie for Germany for the year 2030 is relatively stable.

However, for the State of Saarland and the city of Völklingen, the situation is different: Their population is going to decrease by 11, 5 and 5, 5 % according to federal estimates.

Table 2.16. ***Demographic Development in Germany, Federal State of Saarland, City of Völklingen***

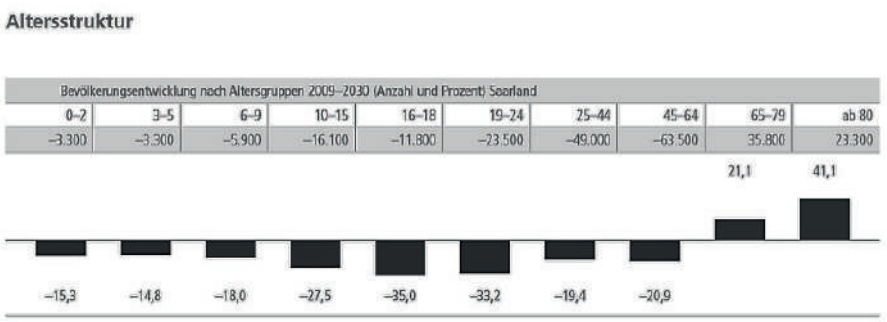
Germany	*Federal State of Saarland*	*City of Völklingen*
Relative population development 2012 to 2030 -1.1 %	Relative population development 2009 to 2030 -11,5 %	Relative population development 2012 to 2030 -5.5 %

Destatia – Statistisches Bundesamt, n.d. c and Wegweiser Kommune, n.d. b/c

Federal State of Saarland

The development of the age pattern of Saarland is going to experience a rise in numbers of elderly people (age groups above 65 years old) for the period from 2009 to 2030. The younger age groups will decrease in numbers.

Table 2.17. ***Age Structure of Federal State of Saarland***



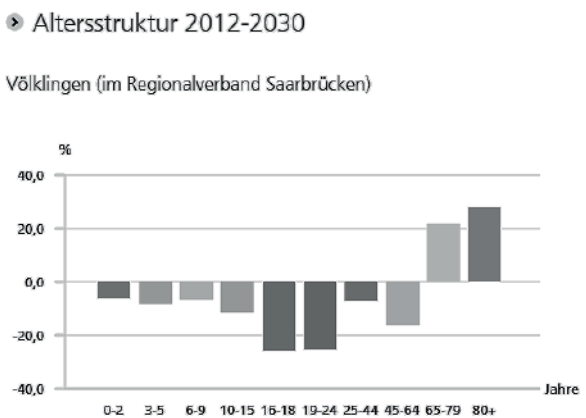
Wegweiser Kommune (n.d. b).

In terms of higher education, the State of Saarland hosts six Universities with the Universität des Saarlandes (UdS), main campus at Saarbrücken, being the largest. Moreover, UdS is part of a University network labelled the University of the Greater Region with six Universities from Germany, France, Belgium and Luxemburg partnering in a network.

City of Völklingen

For the city of Völklingen the age pattern is going to rise in numbers of elderly people (age groups above 65 years old) for the period from 2012 to 2030. Consequently, younger age groups will decrease in numbers.

Figure 2.7. Age Structure of City of Völklingen



Wegweiser Kommune, n.d. d.

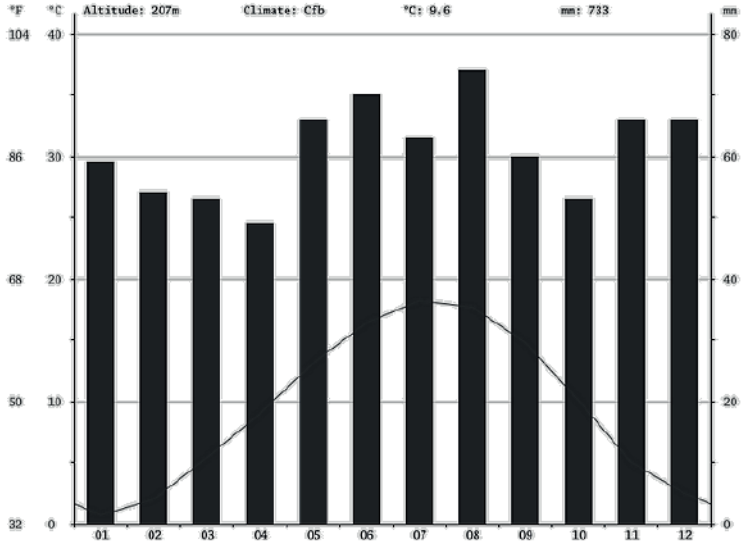
Local climate in the city of Völklingen

In Völklingen, the climate is moderately warm. There is significant rainfall throughout the year. Even the driest month still shows high rainfall. The classification of the climate according to Köppen and Geiger is Cfb. An annual average temperature of 9.6 ° C is reached in Völklingen. Throughout the year there is an average of 723 mm of rainfall.

Soil condition

As most of the city is embossed by the former industries of coal, steel and coking plants/ industries, the soil condition of the city is most likely contaminated. Especially on the locations of the former plants. The site of the case study Völklingen Fresh GmbH, which will be presented later, is considered to be one of them, but for this site, rehabilitation measures were taken.

Figure 2.8. Climate Chart for City of Völklingen



Climate-data.org, n.d.

Education level of unemployed citizens in Völklingen

The general level of education in the city of Völklingen is considered to be similar to the German standard, which is high.

The level of education (in July 2017) of unemployed people as a potential human resource is different though. More than half of the unemployed are without a completed school education. But almost a third has a completed apprenticeship training. Academics are the smallest group in numbers to not be employed.

Table 2.18. ***Educational Levels of Population of City of Völklingen***

Education level	*Schooling, In total*	*including*				
		No Hauptschulabschluss (Secondary Education)	*Completed school education*	*including*		
				Higher-Secondary Education	*Levels*	*No data*
In total	2.004	555	1.266	71	133	183
Without skills training	1.161	434	604	27	52	123
Apprenticeship	608	25	551	26	25	32
Academic education	63	-	63	16	47	-
No Specification	172	96	48	-	9	28

Bundesagentur für Arbeit, 2017

2.3.2. Economy

Table 2.19. ***Sectoral Split of Economy in Germany, Federal State of Saarland, City of Völklingen***

2016	*Service Sector*	*Manufacturing trade (incl. construction)*	*Agriculture and forestry*
Germany	68,9 %	30,5 %	0,6 %
State of Saarland	72%	27%	1%
City of Völklingen	57,22%	42,62%	0,13%

Destatia – Statistisches Bundesamt, n.d. e, Strukturwandel im Saarland, n.d. and Stadt Völklingen, 2016.

Life expectancy

By 2015, life expectancy in Germany is for men at 78, 4 years and for woman 83, 4 years. (Destatia – Statistisches Bundesamt, n.d. f). No data was found for the State of Saarland and the City of Völklingen as to specify the general German data.

Number of unemployed people and open positions
Germany (2016): 6, 1 % unemployed, open positions: 655.490
State of Saarland (2016): 7, 2 % unemployed, open positions: about 4.589
City of Völklingen (2016): 11, 1 % unemployed, open positions: no data available
(Sources: Destatia- Statistisches Bundesamt, n.d. g/h/i/j and Stadt Völklingen, 2016).

GNI Gross national income (Bruttonationaleinkommen)
Germany (2016): 3.197,31 billion Euros
State of Saarland (2015): no data available but GDP: 35.028 Million Euros
City of Völklingen (2016): no data available
(Sources: Destatia – Statistisches Bundesamt, n.d. k/l).

GDP (BIP)
Germany (2016): 3.134,07 billion Euros, per citizen: 71.891 Euros
State of Saarland (2015): 35.028 million Euros, per citizen: 67.323 Euros
City of Völklingen: no data available
(Sources: Destatia – Statistisches Bundesamt, n.d. m/n).

PPP purchasing power parity (Einzelhandelsrelevante Kaufkraft)
Germany (2016): 532.034, 63 Million Euros, per Citizen: 6.485 Euros
State of Saarland (2015): 6.162, 09 Million Euros, per Citizen: 6.197 Euros
City of Völklingen (2015): 218, 55 Million Euros, per Citizen: 5.597 Euros
(Sources: IHK Saarland, n.d. a/b/c).

Human development index
Germany (2016): 0,926 (4th in worldwide ranking)
(Länderdaten, n.d.).

Subsidies

Different public subsidies are available through the EU, the Federal Government of Germany and its States for public projects. EU & State Funding are available for revitalization of areas/ development measures through infrastructure projects (Deficit support up to 70%).

Specific subsidies for the City of Völklingen are “Stadtumbau West” (“City redevelopment West states”) or the possibility (being a border town) to draw funding from the EUs Border region Interreg funding as well as German support programs for cities in bad financial shape (enables subsidy rates of 60- 90% free funding and with a 10-40 % own contribution as city). Moreover, a particularity in the German Budget is the “Länderfinanzausgleich” a perequation with the public founds in which the rich regions support the poor regions financially. The corruption rate is low. The complete financial system of Germans Regions and Cities is quite complicated and is not explained in detail here.

2.3.3. Infrastructure

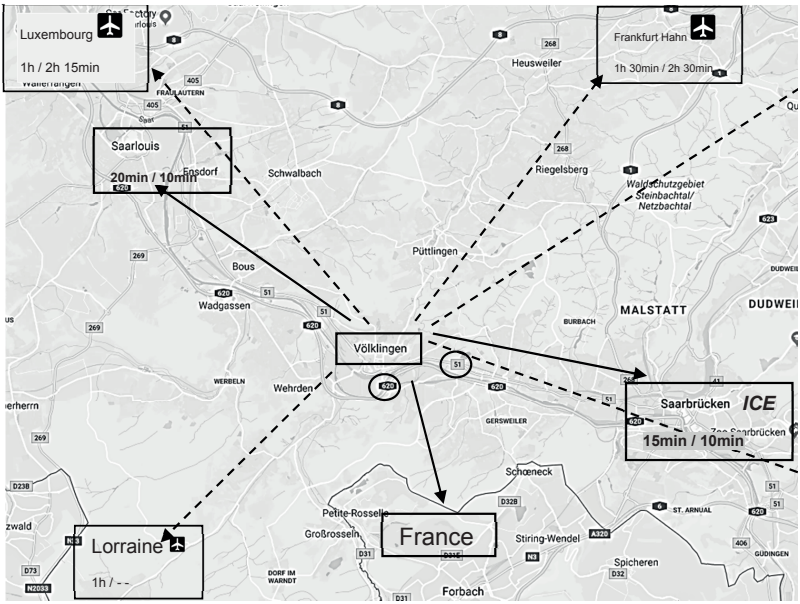
Völklingen is connected to the federal highway 620 (Saarlouis-Saarbrücken) and Bundesstraße 51 (Bremen-Saargemünd) in the overregional road network. Both roads run parallel to the river Saar in a north-south direction.

The Völklingen railway station is located on the Saarbrücken - Trier railway line and is run by Deutsche Bahn. There are trains of the generic Regional Express (RE) and Regionalbahn (RB) with connections to Saarbrücken, Trier, St. Ingbert, Koblenz, Kaiserslautern and Mannheim.

Today, city-wide public transport is guaranteed by buses, operated mainly by Völklingen-based transport companies. There are connections, for example, to the adjacent Warndt, to Lebach, Püttlingen and Bous. The formerly existing tramline at Völklingen was shut down in 1959 and replaced by overhead buses between the years 1950 and 1967. For years, however, the reconstruction of a rail-bound public transport system has been in discussion. This would allow the existing Saarbahn to travel through the inner city of Völklingen via the Deutsche Bahn railway line to Völklinger Hütte- a former steel mill now cultural landmark.

The city also ahs connection to the river Saar via a small port and the lock Völklingen.

Figure 2.9. Map of Völklingen, Connections via Highways, to Airports, Time to Destinations by Car and Train



In the following chapter, the last region to be described is the region Sachsen with the city of Leipzig.

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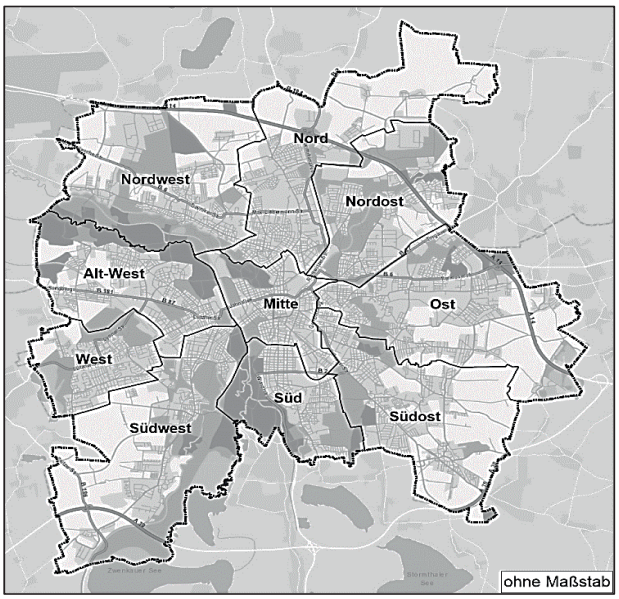
2.4. Region Sachsen: City Leipzig

Laura Maier, Karina Pallagst

Initial Situation

Leipzig is located in Central Germany in the northwest of the state of Saxony. It is subdivided into ten urban districts and 63 subdistricts.

Figure 2.10. Leipzig Subdivided into Urban Districts



Source: own image, source map: Stadt Leipzig, 2018a.

Figure 2.11. Leipzig's Location in Germany

Source: own image, source map: Google Maps, 2018.

The city of Leipzig is situated about 100 kilometers north of the German border to the Czech Republic and 160 kilometer west of the border to Poland. Just 30 kilometers to the northwest lies the city of Halle which can be reached by way of the A14 highway. The city of Zwickau is 70 kilometers to the south and is accessed via the B39 highway. Dresden is 100 kilometers to the southeast and reached via the A14 highway. The A9 highway leads to Berlin which is 150 kilometers to the north.

The area of the city is 29,781 hectares, it has a population of 571,088 and a density of 1.918 people/km² (Stadt Leipzig, 2018b). The state of Saxony has an area of 1,845,000 hectares and 4,081,783 inhabitants (Statistisches Landesamt des Freistaates Sachsen [SLFS], 2018a). This amount to a density of 221 people/km², which is less than one eighth of the density of the city of Leipzig.

Context

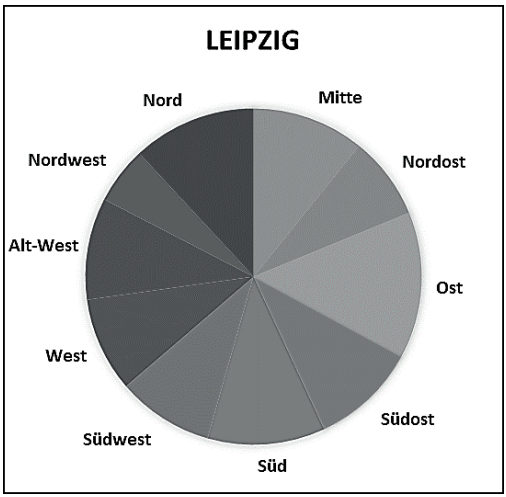
In order to set the context the following chapter describes population numbers, demographic and socio-economic changes, the climate, soil conditions and education.

Population

In 2016, Leipzig had 571,088 inhabitants among which are 280,292 men and 290,796 women. The percentage of foreign citizens in the city is 8.32% or a total of 47,523 people. In terms of population Leipzig is the tenth largest city in Germany (Stadt Leipzig, 2018c; Statista, 2018).

Leipzig is subdivided in ten urban districts, namely, Mitte, Nordost, Ost, Südost, Süd, Südwest, West, Alt-West, Nordwest and Nord. Figure 2.6 shows the population distribution of Leipzig.

Figure 2.12. Population Distribution in Leipzig



Source: own image, (according to Stadt Leipzig, 2018c).

Leipzig-Ost is the urban district with the highest population, the one with the lowest is Leipzig-Nordwest. The model area „Stadtgärtnerei-Holz“ is situated in urban district “Ost“, which in 2016 had a population of 81,998. In West lies the model area „Schönauer-Holz“. In 2016 the population there was 52,460. The model area “Gleis-Grün-Zug“ is located in the district of Südwest which in 2016 a population of 53,830. The population of other districts is between 31,812 in Leipzig-Nordwest and 68,791 in Leipzig-Nord (Stadt Leipzig, 2018d).

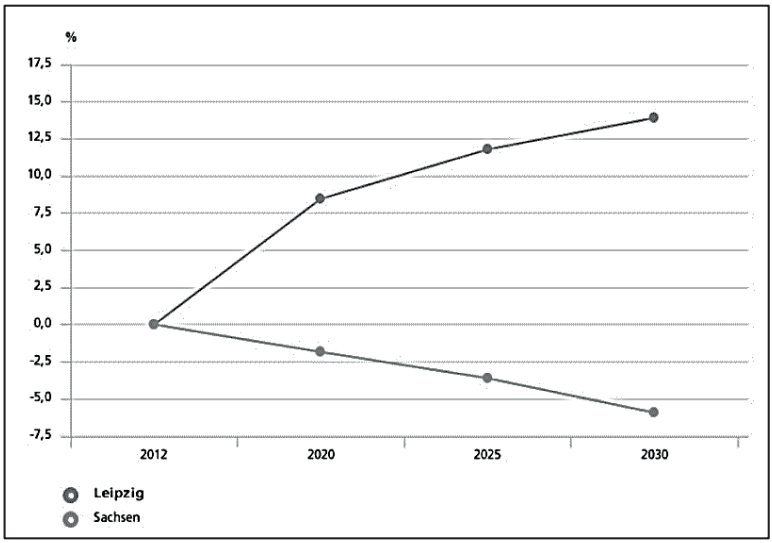
Leipzig lies in the state of Saxony that in 2016 had population of 4,081,783. It accounts therefore for a seventh of the overall population of Saxony (SLFS, 2018a).

Demographic and Socio-economic conditions

According to a 2015 study by the Bertelsmann foundation, Germany's population will shrink by a half million people until 2030 (Große Starmann, Klug, Arnsbeck & Loos, 2015). The data on the population's migration pattern over the last years support this development. From 2014 to 2015 net migration gains nearly doubled from 550.483 to 1.139.402. The following year, net migration gains fell to under half that number at 499.944 more people migration in than out (Statistisches Bundesamt, 2018a). The rate of natural increase, the subtraction of the death rate from the birth rate, increase from 2015 to 2016 as well. In 2016, it increased from -187.625 to -118.761 (Statistisches Bundesamt, 2018b).

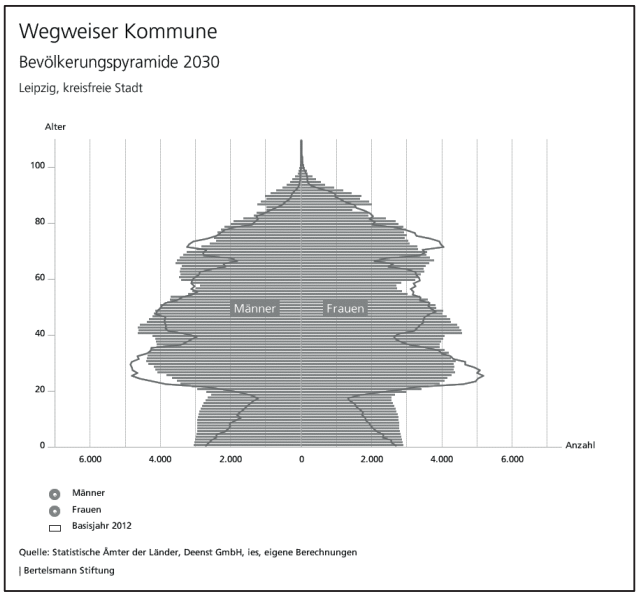
Similar demographic development occur in Leipzig and Saxony. By 2015, the net migration gains in Saxony increased to 47.096. In 2016, that number fell by about 70% to 13.242 (SLFS, 2018b). Leipzig also saw an increase in its net migration gains in 2015. While in that year the number was 15.428, it fell by a third to 10.020 in 2016 (Stadt Leipzig, 2018e). The rate of natural increase of Saxony decreased until 2015 and increased in 2016 to -15.383 (SLFS, 2018c). In Leipzig, the rate of natural increase has been increasing continually and in 2016 reached 895.

Figure 2.13. Projected Demographic Development in Leipzig and Saxony



Source: Bertelsmann Stiftung, o.J

Figure 2.14. Projected Population Pyramid



Source: Bertelsmann Stiftung, o.J.

As shown in figure 2.7, Leipzig's population is projected to increase despite Saxony's decreasing population. Accordingly to the data, Leipzig's population is set to increase by 12 %. Saxony is projected to experience a negative population trend. By 2030, the population is slated to have decrease by 5%.

Similarly, Leipzig is seeing an increase in its young population. The child dependency ratio, the share of the population that is aged 15 or younger in relation to the number aged 15 to 65 years, has increased to 20% in 2015. The age dependency ratio, the share of the population aged over 65 years in comparison to those aged 15 to 65, is slightly decreasing since 2013 and in 2015 was 31.6%. This is in spite of the fact that the share of the population aged over 65 is growing (Stadt Leipzig, 2018f).

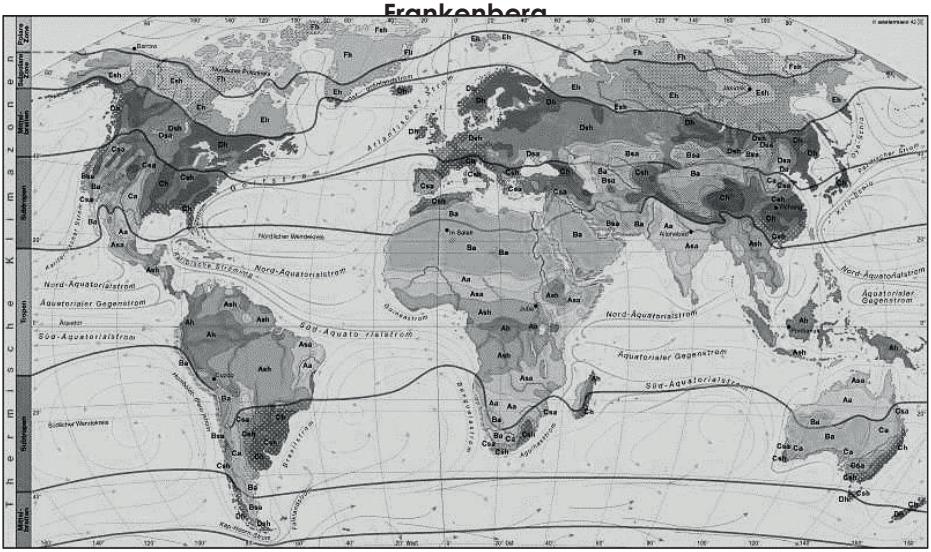
In comparison, Saxony and Germany overall are seeing their age dependency ratios increasing. Both have increasing child dependency ratios. As shown in image 5, until 2030, more young under the age of 20 and more people over the age of 60 are projected to live in Leipzig.

Leipzig is also experiencing an increase in the rate of foreigners in its population. In 2015, their share was 8.3%. The city is increasingly becoming more diverse (Stadt Leipzig, 2018c).

Climate

Figure 2.9 shows a map of the climate of the Earth according to A. Siegmund und P. Frankenberg. According to the map, Leipzig is in a zone of semi-humid, maritime climate of mid-latitude. This means, the annual average temperature is between 0 and 12 degrees Celsius. There are six to nine humid months per year and annual variations of monthly temperatures are between 10 and 20 degrees Celsius (Westermann Kartographie, 2008).

Figure 2.15. Climates of the Earth according to Siegmund/ Frankenberg



Source: Westermann Kartographie, 2008.

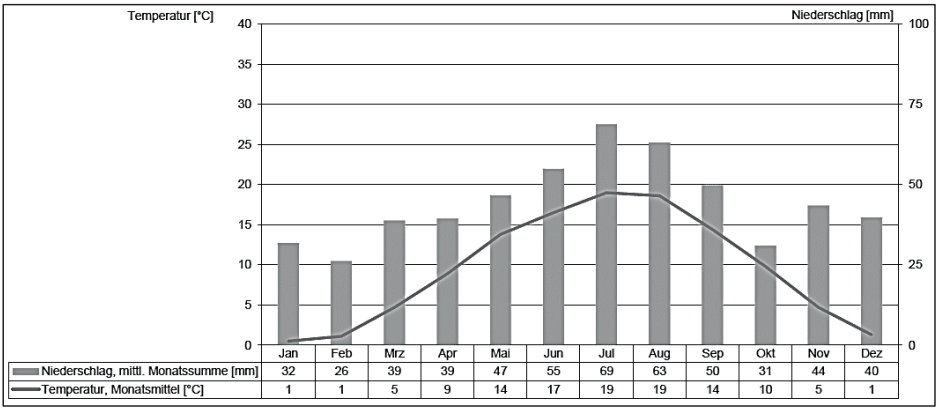
C. Troll's and K.H. Paffen's effective climate classification, shown in Image 6, takes into account temperatures, hydrologic balance and vegetation. According to this classification Leipzig is in a cool temperate zone. It has a sub-oceanic forest climate. Concretely, this means that winters are mild to moderately cold and summers are moderately warm to warm and long.

The maximal precipitation is in summer and autumn. The average temperature of the coldest month is between 2 to –3 degrees Celsius. The average yearly amplitude of the temperature is 16 to 25 Kelvin and vegetation duration is over 200 days. Most vegetation is of sub-oceanic mixed forests (Forkel, 2012; Westermann Kartographie, 2008).

Figure 2.16. Jahreszeitenklimate nach C. Troll und K.H. Paffen

Quelle: Westermann Kartographie, 2008

Figure 2.17. Climate Chart of the Leipzig Airport Station



	Jan	Feb	Mrz	Apr	Mai	Jun	Jul	Aug	Sep	Okt	Nov	Dez
Niederschlag, mittl. Monatssumme [mm]	32	26	39	39	47	55	69	63	50	31	44	40
Temperatur, Monatsmittel [°C]	1	1	5	9	14	17	19	19	14	10	5	1

Source: Deutscher Wetterdienst, o.J.

Figure 2.11 shows that in Leipzig the monthly average temperature in July and August is 19 degrees Celsius. The lowest monthly average temperature is 1 degree Celsius in December, January and February. The average yearly temperature is 9.4 degrees Celsius. The peak of monthly average precipita-

tion is 68mm in June. The lowest value is 26mm in February. The yearly average sum of precipitation in Leipzig is 533.7mm.

Land use

The following chart shows the distribution of area according to land-uses in Germany, Saxony and Leipzig.

Table 2.20. ***Distribution of Area according to land-uses in Germany, Saxony and Leipzig***

	Germany in 2016		***Saxony in 2016***		***Leipzig in 2017***	
	ha	***%***	***Ha***	***%***	***ha***	***%***
Overall area	35.757.963	100	1.844.999	100	29.781	100
Agricultural area	18.263.736	51,1	1.005.498	54,5	9.971	33,5
Housing	1.366.866	3,8	85.825	4,7	5.073	17,0
Industry and commercial area	606.103	1,7	34.119	1,8	2.901	9,7
Transportation infrastructure	1.802.890	5,0	80.900	4,4	3.611	12,1
Recreation	n.d.	-	n.d.	-	3.393	11,4
Forest	10.617.013	29,7	495.184	26,8	1.936	6,5
Water	821.898	2,3	43.307	2,3	1.172	3,9
Other areas	2.279.457	6,4	100.166	5,4	1.659	5,6

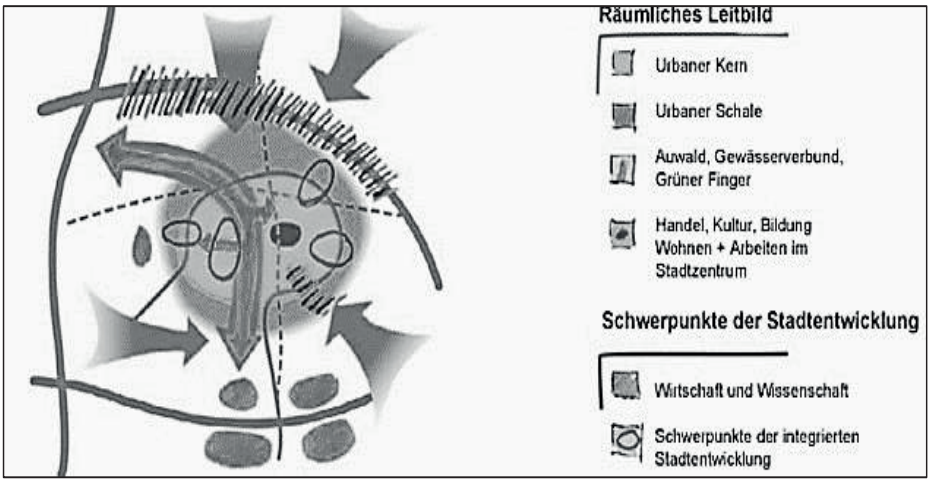
Source: own image (according to Statistisches Bundesamt, 2017 & Stadt Leipzig, 2018b).

The agricultural area in Germany makes up about half of the overall area. In Saxony, the share of agricultural area is slightly higher at 54.5%. In Leipzig, 33.5% of the area is used agriculturally. Housing account for 17%; industry and commercial uses cover 9.7% and transportation 12.1% which is much higher in comparison in Saxony and Germany. The area covered by forest in Germany is 29.7% and 26.8% in Saxony. Leipzig's area is 6.5% forest. Recreational areas account for 6.5% in Leipzig which cannot be compared with the numbers for Saxony and Germany as there is no data. Adding up forest, water and recreational areas, green and water areas account for 21.8%.

The land-use plan of the city of Leipzig in the annex shows forest areas in dark green. It is apparent, that forest areas are predominantly located on the fringes of the city. Furthermore, it shows a larger area of forest that is connected west of the inner city and forms a bent from north to south. This bent is made up of forests, parks, public gardens and nature parks such as the "Leipziger Ratsholz", the "Palmengarten", the "Leipziger Stadtforst" and the "Hänicher Holz". Also, some forest in Leipzig are nature reserves and house protected biotopes.

The spatial outline that is part of the land-use plan, shown in the image, indicates that the structure of the green space is crucial to Leipzig's overall structure. These green areas are situated all around the "urban core" with its larger "urban basin". The urban core is the city center. The urban basin is made up of the areas immediately surrounding the urban core. Marked by arrows, the image also shows the bent of green space that cuts through the city center.

Figure 2.18. Spatial Outline of the Land-Use Plan for Leipzig



Source: Stadt Leipzig, 2018g.

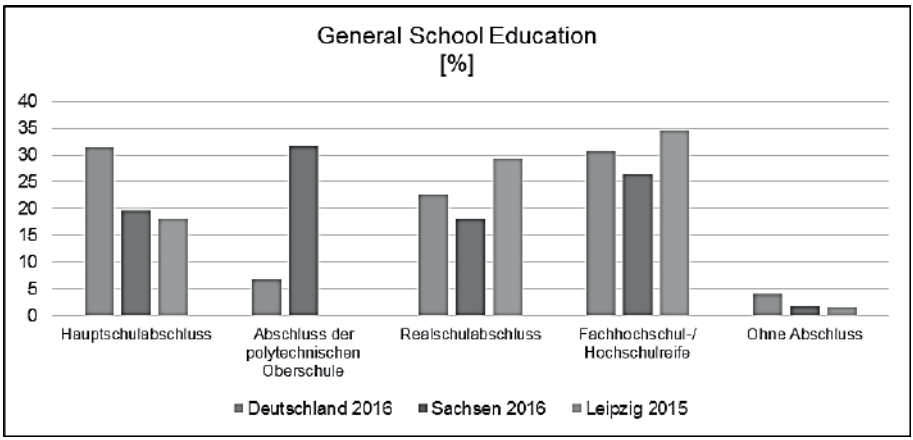
Education

GENERAL EDUCATION

General school education includes diplomas from Hauptschule (lower secondary school), poly-technical grade school (former school form in the GDR), Realschule (higher secondary school) and certificates granting entry into uni-

versities of applied science and universities in general. There is no statistical data for the poly-technical grade school in Leipzig, as those diplomas were not accounted for separately.

Figure 2.19. General School Education in Germany, Saxony and Leipzig in Comparison (in %)



Source: own image (according to Statistisches Bundesamt, 2018c; Stadt Leipzig, Amt für Statistik und Wahlen, 2017)

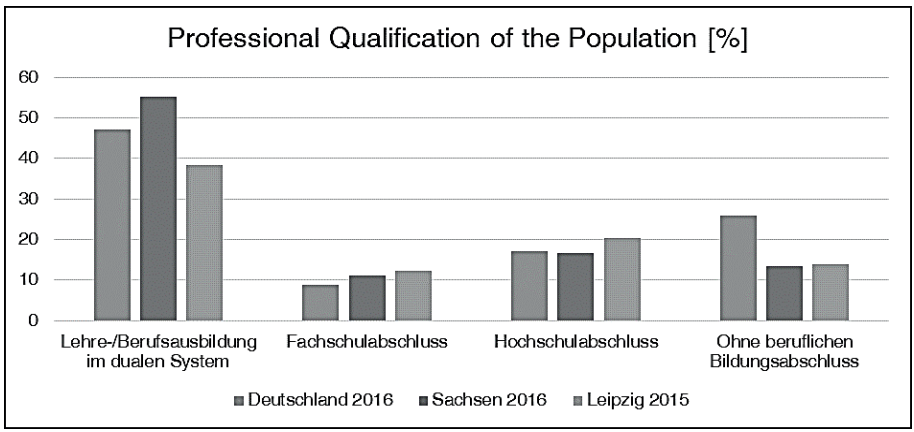
Figure 2.13 shows the general school education of the populations of Germany, Saxony and Leipzig. The national average in 2016 showed that 31.4% of the population had a Hauptschul diploma. In the state of Saxony and the city of Leipzig that share was markedly lower at 19.6% and 18%, respectively. As Saxony was part of the former GDR, the share of the population with a diploma from a poly-technical grade school is five times the national average. The share of alumni from a Realschule was 18% in Saxony, lower than the national average of 22.7% and the share in Leipzig at 29.6%. Saxony also has a lower number of people with certificates for entry into a university or university of applied science in comparison to the city of Leipzig and the national average. The number of people without any diploma of general education in Saxony and Leipzig is half that of the national average (2% v 4%).

Figure 2.14 shows the comparison of professional qualifications in Germany, Saxony and Leipzig. In comparison to the national average, the share of people with vocational education in the dual education system was 8% higher in Saxony. In Leipzig that share is a fifth lower at 38.3%. The national average of people with diploma from a two-year vocational programme (Fachschulabschluss) is 8.8%. For Saxony that number is slightly higher at

11.2% and for Leipzig it is 12.3%. The share of the population with a degree of higher education is similar for Germany overall and Saxony. In Leipzig that share is slightly higher at 20.4 %. Saxony and Leipzig are far below the national average when it comes to the percentage of people without professional qualifications. Nationally, that number is 26%, in Saxony it is 13.5% and in Leipzig 13.9% (Stadt Leipzig, Amt für Statistik und Wahlen, 2017; Statistisches Bundesamt, 2018c).

The city of Leipzig hosts seven public Universities with the University of Leipzig being the largest. In adition, there are three private colleges in the city (Stadt Leipzig 2018n).

Figure 2.20. Professional Qualification of the Population in Comparison in %



Source: own image (according to Stadt Leipzig, Amt für Statistik und Wahlen, 2017; Statistisches Bundesamt, 2018c).

Economy

In order to set the economic context for Leipzig, the following passages will illuminate several aspects. Such aspects are employment with statutory welfare, unemployment, average income, gross national product as well as available grants and funding.

Employment with Statutory Welfare

Table 2.27 shows the share of employees with statutory welfare in Germany, Saxony and Leipzig. In 2016 in Germany, 52.6% of the population were employed with statutory welfare. In comparison to 2014 and 2015, this is a slight

decrease of 0.1%. In contrast, the share in Saxony is 49.7% and in Leipzig 44.7%. Compared with 2015, Saxony saw a slight increase by 0.6% and Leipzig a small decrease of 0.1%.

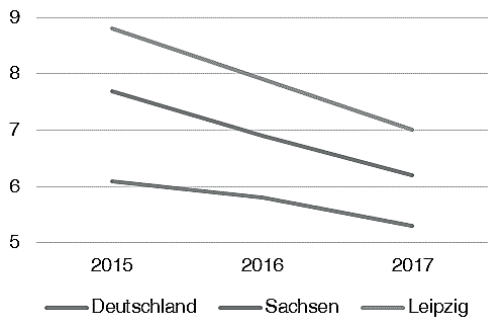
Table 2.21. ***Share of employees with statutory welfare in Germany, Saxony and Leipzig***

	2013	*2014*	*2015*	*2016*
Germany	53,2%	52,7% ↓	52,7% -	52,6% ↓
Saxony	49,7%	49,7% -	49,3% ↓	49,9% ↑
Leipzig	44,7%	45,3% ↑	45,2% ↓	45,1% ↓

Source: own image (according to Stadt Leipzig, 2018h; Statistisches Bundesamt, 2018d; SLFS, 2018d)

Unemployment

Figure 2.21. Unemployment Rate in Germany, Saxony and Leipzig



Source: own image (according to Statistisches Bundesamt, 2018e; Bundesagentur für Arbeit, o.J.; Stadt Leipzig, 2018i).

Figure 2.15 shows the development of the unemployment rate in Germany, Saxony and Leipzig from 2015 to 2017. Germany, Saxony and Leipzig all saw a decrease in the unemployment rate. In 2015, the national rate of unemployment of the civil labour force was 6.1%. In 2017, it fell to 5.3%. In Saxony, the unemployment rate in 2015 was 7.7%, 1.6% higher than in Germany. Until 2017, the rate in Saxony fell by 1.5%.

In 2015, the unemployment rate in Leipzig was 8.8%. As such, almost one out of ten of the civil labour force was unemployed. By 2017, there was a marked decrease to 7.0%. The rate is still higher than Saxony and Germany while constantly decreasing.

Net Household Income

The purchasing power of a population depends on their net household income. Net household income is the gross income of all persons in the household minus taxes and social insurance contributions.

The most recent data for net household income in Saxony is from 2013. Then, the net household income was 2.487 €. In comparison, in 2012 net household income in Germany was 3.069€ and 1.549€ in Leipzig in 2013. In 2016, the difference between the net household income in Germany and Leipzig subsisted with 3.314€ and 1.767€ respectively. In consequence, households in Leipzig are left with only about half the income the national average family has (Stadt Leipzig, 2018j; Statistisches Bundesamt, 2018f; SLFS., 2018e).

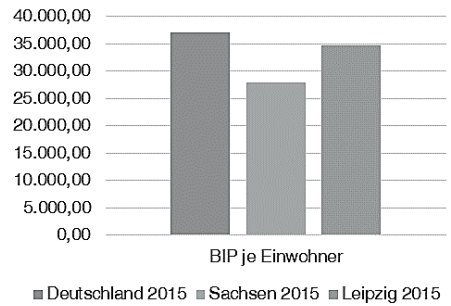
GNP

The gross national product, GNP, describes the value of all services and goods that are produced in one year within the borders of one national economy. It enables comparability concerning the wealth of a territory (Bundeszentrale für politische Bildung, o.J.).

The GNP of Leipzig was 19.138 million € in 2015, in Saxony it was 113.979 million € and 3,043.65 billion € in Germany. In order to compare these numbers it is usually presented in GNP per capita (Stadt Leipzig, 2018k; Statistisches Bundesamt, 2018g; SLFS, 2018f).

Image 13 underlines that the GNP per capita in Saxony is lower in Leipzig and Germany. The GNP per capita in Saxony is 34,640 €, a tenth lower than the GNP per capita in Germany at 37,038.32€.

Figure 2.22. GNP per capita in Germany, Saxony, Leipzig



Quelle: Eigene Darstellung (nach Statistisches Bundesamt, 2018g; SLFS, 2018f; Stadt Leipzig, 2018k)

Subsidies

In respect to urban renewal and urban redevelopment in Leipzig, there are several subsidy programmes by the EU, the federal government and the state in use as is shown in image 14. The various programmes and subsidies are being combined in order to be best used for the assisted area (Stadt Leipzig, 2018l).

The integrated urban development concept Leipzig 2020 defines five urban areas that are categorized as assisted areas and are recipients for subsidies. These assisted areas are:

– old town areas in Leipzig's East
– old town areas in Leipzig's West
– Leipzig-Grünau
– Georg-Schumann-Street
– Schönefeld

The categorization into assisted areas in combination with the allocation of subsidies form the base for the furthering of urban renewal and urban redevelopment (Stadt Leipzig, 2018m).

Table 2.22. *Various Subsidy Programmes in Leipzig*

EU	Bund	Bund & Länder	Bundesland	Stadt
EFRE – Europäischer Fonds für regionale Entwicklung (seit 2000)	Energetische Stadtsanierung (KfW-Programm 432) (seit 2015)	Städtebauliche Erneuerung (1991 - 2012)	Wohnungsbauförderung (Familienwohnen)	Städtisches Programm zur Wohnraumanpassung
	Soziale Stadt (seit 1999)	Zukunft Stadtgrün – Verbesserung des städtischen Grüns	Soziale Wohnraumförderung 2017 bis 2021 in Sachsen (2017 - 2021)	
	Städtebaulicher Denkmalschutz (seit Anfang der 1990er Jahre)	Programm Aktive Stadt- und Ortsteilzentren (bis 2015)		
		Stadtumbau Ost		

Source: own *image (according to Stadt Leipzig, 2018l)*.

Infrastructure

The regional and supra-regional connections to the city of Leipzig can be divided into street, rail, air and ship traffic.

The city is connected to the national highway system by the B2, B87 and B6 highways. This way the highways A14 in the north and east, the A36 in the

south and the A9 in the west can be reached. Leipzig is therefore connected regionally, supra-regionally and nationally.

Leipzig is connected to its surroundings by S-Bahn with various stations around the city. There are also regional connections by regional train and regional expresses. The main station in the center of the city is a railhead terminus from which national connections run as IC, ICE and EC trains.

Public transport is delivered to the city by tram, bus and night bus and is well established. Even outside the city center there are plenty bus and tram stations which usually are served regularly even on holidays and Sundays as well as at night.

Leipzig-Halle-Airport is situated northeast of the city. There are international connections to destinations in Europe as well as western Asia and the northern Africa. There are no long distance connections.

The airport sees 1.138.477 tons of goods trafficked by air which makes it the second biggest cargo airport in Germany (Flughafen Leipzig/Halle GmbH, o.J.). One characteristic of the airport are the three bridges of the runway that surpass the A14 highway.

Ship traffic plays a lesser role in Leipzig's traffic. The biggest river is the Weiße Elster which is a tributary to the Saale River and runs west of the city center. There are several tributaries and smaller rivers that run from the Weißer Elster mainly in the western part of Leipzig.

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3. Demographic and Economic Structural Conditions of Mexico

José G. Vargas-Hernández

3.1 INDICATORS OF MEXICO'S STRUCTURAL CONDITIONS

The republic of United Sates of Mexico counts with 129,163.276 million inhabitants in a territory surface of 1.964.380 km² with a moderate population density of 66 inhabitants per km² with data updated in 2017. The life expectancy of Mexico was in 2016 for women 78 and in almost 73 years for men. Since 1960 life expectancy has increased significantly and will continue to show variability for 2030. This forecast predicts a life expectancy of almost 77 in total, for women 79 and almost 75 for men (Consejo Nacional de Población 2010).

Table 3.1. *Socio-Demography*

Concept	*Year*	*Indicator*
Population (+)	2017	129,163,276
Density (+)	2017	66
Immigrants (+)	2017	1,224,169
Remittances received (M. $) [+]	2016	28,670.1
% Immigrants [+]	2017	0.95%
Remittances sent (M. $) [+]	2016	2,658.8
Emigrants [+]	2017	12,964,882
% Emigrants [+]	2017	10.04%

IDH [+]	2015	0,762
Ranking Paz Global [+]	2018	140º
Ranking of the Gender Gap [+]	2016	66th
Ranking [+]	2015	33rfd
Birth Rate [+]	2016	18.17 ‰
Fecund index. [+]	2016	2.8
Mortality rate [+]	2016	4.85%
Life expectancy [+]	2016	77.12
Gross marriage rate [+]	2011	4.90%
Number of Homicides [+]	2015	20,762
Homicides for 100,000 [+]	2015	16.35

Source: *Own compilation based on data from Expansión / Datos macro.com (2018).*

GNI per capita PPP in Mexico was reported at 17,160 in 2016, according to the World Bank collection of development indicators and has shown a constant increase during the last 10 years (World Bank, 2017).

Table 3.2. ***Economy of Mexico: National Accounts - Government***

Concept	*Year*	*Indicator*
GDP Trim Per Capita [+]	I Trim 2018	1,930 €
Annual GDP [+]	2017	€ 0M.
GDP Per Capita [+]	2017	€ 0
Quarterly GDP [+]	I Trim 2018	249.288M. €
Total debt (€ M.) [+]	2016	552,829
Debt (% GDP) [+]	2016	56.81%
t per capita [+]	Deb2016	€ 4,335
Deficit (M. €) [+]	2016	-26,950
Deficit (% GDP) [+]	2016	-2.77%
G. Public (M. €) [+]	2016	266,573.4
Education Expenditure (M. €) [+]	2014	52,556.7
Education Expense (% Gto Pub) [+]	2014	19.07%
Health Expenditure (€ M.) [+]	2017	28,438.6
G. Health (% G. Total Public) [+]	2014	11.58%
Defense expenditure (M. €) [+]	2017	0
Defense Spending (% Gto Pub) [+]	2016	2.66%

Public expenditure (% GDP) [+]	2016	27.39%
Public expenditure Per Capita [+]	2016	2.090 €
Expenditure Education Per Capita [+]	2014	€ 439
G. Public Health Per Capita [+]	2017	232 €
Defense expenditure per capita [+]	2017	0 €
Rating Moody's [+]	04/11/2018	A3
Rating S & P [+]	12/19/2013	BBB +
Rating Fitch [+]	03/16/2018	BBB +
Corruption Index [+]	2017	29
Ranking of Competitiveness [+]	2017	51º
Fragility Index [+]	2015	71.8
Ranking of Trans. [+]	11/01/2016	1º
Ranking of Innovation [+]	2017	58º

Source: Own compilation based on data from Expansión / Datos macro.com (2018).

Table 3.3. *Working market*

Unemployment rate [+]	June 2018	3.4%
Unemployment rate [+]	I Trim 2018	3.1%
Unemployed [+]	I Trim 2018	1,713,857 m.
SMI [+]	2017	€ 95.6
Average Salary [+]	2017	€ 5,542
Ranking [+]	2016	65º

Source: Own compilation based on data from Expansión / Datos macro.com (2018).

Table 3.4. *Markets – Quotes*

Euro / Mexican Pesos [+]	06/08/2018	21,4484
Dollar exchange rate [+]	03/08/2018	18,5725
10 years bonus [+]	07/08/2018	7.70%
Premium Risk [+]	07/08/2018	729
Stock (Var this Year %) [+]	06/08/2018	-0.07%

Source: Own compilation based on data from Expansión / Datos macro.com (2018).

Table 3.5. *Prices*

IPC General [+]	June 2018	4.6%
IPRI Year-on-year [+]	June 2018	7.0%

Source: Own compilation based on data from Expansión / Datos macro.com (2018).

Table 3.6. *Money market*

Interest rates [+]	06/21/2018	7.75%

Source: Own compilation based on data from Expansión / Datos macro.com (2018).

Table 3.7. *Business*

Doing Business [+]	2018	49th
IPI Inter-annual [+]	August 2017	-0.5%
Passenger vehicles Year [+]	June 2018	925,157
Vehicles Year / 1000 hab. [+]	June 2018	11.70
Annual production of vehicles [+]	2017	4,068,415
Vehicles / 1000 inhabitants [+]	2015	308.69

Source: Own compilation based on data from Expansión / Datos macro.com (2018).

Table 3.8. *Taxes*

General VAT [+]	01/01/2010	16.00%
Maximum type [+]	2017	35.0%

Source: Own compilation based on data from Expansión / Datos macro.com (2018).

Table 3.9. *Commerce*

Exports [+]	2017	362,480.5 M. €
Exports% GDP [+]	2017	35.52%
Imports [+]	2017	382,537.8 M. €
Imports% GDP [+]	2017	37.48%
Commercial balance [+]	2017	-20,057.3 M. €
Commercial balance% GDP [+]	2017	-1.97%

Source: Own compilation based on data from Expansión / Datos macro.com (2018).

3.1.1. Initial situation

Population /Number of Citizens

According to INEGI (Instituto Nacional de Información Geográfica y Estadística) Survey, the population of Mexico is of 129, 163, 276 inhabitants. The State of Jalisco Jalisco is a western state in Mexico fringing the Pacific Ocean with a population estimated of 8, 197, 483 (8 million 197 thousand 483) inhabitants as of July 1, 2018, according to the population projections of the National Population Council (CONAPO) (IIEG, 2018a).

The Metropolitan Area of Guadalajara (MAG) is integrated with the municipalities of San Pedro Tlaquepaque, Tonalá, Zapopan, Tlajomulco de Zúñiga, El Salto, Juanacatlán, Ixtlahuacán de los Membrillos and the aforementioned Guadalajara, which together share a constant conurbation. The National Institute of Statistics and Geography (INEGI) indicates that the MAG is the second most populated in the Mexican Republic and is only surpassed by the Metropolitan Area of the Valley of Mexico. The MAG is the second largest city in terms of population in the country in an area of 62,832 hectares

The Metropolitan Area of Guadalajara is located in the central part of the state of Jalisco and officially consists of eight municipalities, of which six are considered as central and two as external, which although considered within the Metropolitan Area are not part of its continuous urban sprawl, these being those of Juanacatlán and Ixtlahuacán de los Membrillos (Ramírez, 2013). In the last 45 years, the urban sprawl has multiplied 7.5 times, in contrast the population did 4.5. These demographic and spatial processes of accelerated and unequal expansion replicate the aggressive and voracious appropriation of soil and natural resources.

The National Institute of Statistics and Geography indicates that according to the Population and Housing Census 2010, the Metropolitan Area of Guadalajara had 4,434,878 inhabitants and it is estimated that in this year, 2018, it amounts to 5,002,466 at the date of August 7, distributed in the eight municipalities already indicated, that is to say, in an area of 2,734 km², this amount yields a population density of 1,622 inhabitants per km2, being Guadalajara the most populated municipality with about 1.5 million tapatíos. On the other hand, Juanacatlán stands as the one with the smallest population (INEGI, 2010).

Table 3.10. ***Breakdown of data from the Metropolitan Area of Guadalajara (INEGI 2010)***

Number of municipality	*Population*	*Surface (km²)*	*hab./km²*
1. Guadalajara	1,495,189	151.4	9,874.4
2. Zapopan	1,243,756	1,163.6	1,068.9
3. San Pedro Tlaquepaque	608,114	110.4	5,506.2
4. Tonalá	478,689	166.1	2,881.9
5. Tlajomulco de Zúñiga	416,626	714.0	583.5
6. El Salto	138,226	87.9	1,573.3
7. Ixtlahuacán de los Membrillos	41,060	202.4	202.9
8. Juanacatlán	13,218	138.3	95.6
Total AMG	4,434,878	2,734.1	1,622.1

Source: Ramírez (2013).

Table 3.11. ***Total Population and rate of growth (According to INEGI, 1990-2010)***

Data	*Year*				
	1990	*1995*	*2000*	*2005*	*2010*
Total Population of MAG	3,003,868	3,482,417	3,696,136	4,095,853	4,434,878
Annual rate of growth of MAG	2,7%	1,4%	1,8%	1,7%	1,7%

Source: Ramìrez (2013).

Table 3.12. ***Population of México, the state of Jalisco and the Metropolitan Area of Guadalajara***

México	*Jalisco State*	*Metropolitan Area of Guadalajara*
129, 163, 276 (2018)	8, 197, 483 (2018)	5,002,466 (2018)

Source: IIEG (2018a)

3.1.2. Demographic and socio-economic change

Population development of Mexico and the State of Jalisco

The population development of the State of Jalisco according to census results and latest official estimates.

Table 3.13. ***Population development of Mexico and the State of Jalisco***

Name	*Abbr.*	*Status*	*Capital*	*Area A-L (km²)*	*Population Census (C) 1990-03-12*	*Population Census (C) 1995-11-05*	*Population Census (C) 2000-02-14*	*Population Census (C) 2005-10-17*	*Population Census (Cf) 2010-05-31*	*Population Estimate (E) 2015-03-15*
Mexico	MEX	Fed Rep	Ciudad de México	1,959,248	81,249,645	91,120,433	97,483,412	103,263,388	112,336,538	119,530,753
Jalisco	JAL	FSt	Guadalajara	78,599	5,302,689	5,991,176	6,322,002	6,752,113	7,350,682	7,844,830

Source: City Population (2018) based on Instituto Nacional de Estadística Geografía e Informática, México (web).

Table 3.14. ***Estimation and projection of population 2018-2025 for the Mexican republic and The State of Jalisco***

	Indicator	*2018*	*2019*	*2020*	*2021*	*2022*	*2023*	*2024*	*2025*
Mexican Republic	Population at the middle of the year	124,737,789	125,929,439	127,091,642	128,230,519	129,351,846	130,451,691	131,529,468	132,584,053
State of Jalisco	Population at the middle of the year	8,197,483	8,281,714	8,363,277	8,443,137	8,522,198	8,599,902	8,676,234	8,751,124
Metropolitan Area of Guadalajara		4 963 574	5 016 215	5 066 976	5 116 439	5 165 151	5 212 774	5 259 285	5 304 628

Source: Own compilation based on data from CONAPO (2017). Estimates of the CONAPO are based on projections of the population of the municipalities of Mexico, 2010-2030.

The annual average growth rate of the population in the State of Jalisco during the 1990-2000 decade, it was 1.79%; while the 2000-2010 decade was 1.47% per year, the same than in the last five years. It should be noted that from 1960 to 1970 there was a growth rate population of 3.15% per year; however, since then there have been decreases in the pace of growth, which stopped happening until the last five years 2010-2015 (Gobierno de Jalisco, 2016).

The estimated population development for Mexico, the State of Jalisco and the Metropolitan Area until 2030 is relatively stable. In the coming decades, the population of Jalisco will complete the last phase of the transition demographically, moving rapidly towards a growing young population reduced and to an aged profile. Forecasts for 2030 suggest that the population could reach 7.79 million inhabitants; therefore, the state will continue to face in the next years the challenge of providing its inhabitants with employment, housing, clothing, food, education and health. The age pattern development of Jalisco for the period from 2009 to 2030 estimates that the group of elderly people (age group above 65 years old) will increase. The younger age groups will decrease significantly (Gobierno de Jalisco, 2016).

Table 3.15. ***Population of Jalisco and the Metropolitan Area of Guadalajara 1990-2015, and average annual growth rates***

	Average annual growth rates			
	1990-2000	***2000-2010***	***2010-2015***	***Absolute***
State of Jalisco	1.79	1.47	1.47	530 006
Metropolitan Area of Guadalajara	2.13	1.77	1.77	391 946

Source: Own compilation based on INEGI, Censos de Población 1990, 2000 y 2010; y la Encuesta Intercensal 2015.

The age pattern development for the Metropolitan Area of Guadalajara reflects the general predicted development of Jalisco: An increase in the number of elderly people of age 65 and older and a decrease in the number of young people.

Local climate of the State of Jalisco and Metropolitan Area of Guadalajara

There is a variety of climates in Mexico due to topographical diversity and latitude. The southern half of Mexican territory is included in the inter-tro-

pical Torrid Zone. In the north and center of the country the temperature differences between summer and winter are notable, while in the south they are small. Due to the latitude in the tropical south there are several climatic zones: the warm one from the sea level to 900m of altitude; the temperate from 900 to 1,800m. Above 2,800m are the stop and the perpetual snow.

Jalisco 68% of the surface of the state presents sub humid warm climate, along the coast and central area 18% is temperate sub humid in the high parts of the mountains, 14% dry and semi-dry in the north and northeast of the state. The climatological characteristics of the Metropolitan Area of Guadalajara corresponds to a semi-warm climate - transitional climates between warm and temperate - with an annual average temperature above 18ºC. It can be pointed out that the Metropolitan Area of Guadalajara has a stable climate during most of the year, and that may be observable in the change from dry season or from little rain to rainy season.

Soil condition of Jalisco and MAG

In the State of Jalisco the characteristics of the soil are haplic, cambisol eútrico, litosol, vertisol pelic and luvisol vertic, with great agricultural use, are also favorable for livestock use and a minimum part is for forest use. The main land uses in the state are: forest (31.1%), agriculture (26.6%), forest (24.5%), pasture (9.3%), scrub (9%) and other uses (22.2%) (Sosa Cedillo, 2006).

In the Metropolitan Area of Guadalajara, the sale of soil in lots without services and without property titles requires little investment and effort, and introduces cheap land into the market, which caused, informalities in the ownership of land and soil and the last four decades, a boom of irregular settlements. It coincided with a period of high demographic growth, little supply of land or formal housing, legal limitations for property of social soil, tolerance and complicity of authorities. Between 1960 and 2005, the existing urban land, based on 1960, multiplied by 7.5, while that the population multiplied by 4.5 in the same period, that is, a difference of 162%.

The illegal occupation of risk areas, agricultural (Valleys of Toluquilla and Tesistán), of zones with the sinking of soils (Tesistán), of the edge of the Oblate Ravine, of lands subject to landslides, floods, etc., generates situations of precariousness, insalubrity, fear and legal insecurity that does not prepare the ground for a balanced social development. There are many colonies in the Metropolitan Area of Guadalajara with mixture of land uses, which favors the proximity of urban activities among themselves. The mixture within the premises is less frequent due to the emigration of the

inhabitants of the historical centers, but there is at least close proximity between housing uses and commercial and services uses.

According to Information on Urban Land in Guadalajara 1970-2000, from the Atlas of Soil Production in the Metropolitan Area of Guadalajara, approximately 32% of the three and a half million inhabitants of the ZMG lived in irregularity in 2000, located in more than a thousand irregular settlements (Faust and Palomar, 2007) This irregularity began initially in Guadalajara, and then extended to Zapopan and Tlaquepaque and (Castillo et al., 1993).

General Education Level of Citizens in Mexico

For the pre-school and upper secondary levels in Mexico, the greatest increases in coverage are recorded, which, while not enough to reach the ideal goal (cover 100 percent in coverage), can be qualified as a significant advance. In upper secondary and higher education coverage is still insufficient despite the efforts and the great progress that has taken place in recent cycles. The advances on education in Mexico are presented in the following table:

Table 3.16. *Education: Coverage and net enrollment rate, 2015-2018 (in %)*

	Coverage			*Net Enrollment Rate*		
Educative Level	***2015-2016***	***2016-2017***	***2017-2018***	***2015-2016***	***2016-2017***	***2017-2018***
Basic Education	96.6	96.4	96.0	94.9	94.9	95.7
Preschool Education	72.5	74.5	75.7	72.3	74.3	75.5
Primary Education	106.0	105.4	105.1	98.7	98.4	98.4
Secondary Education	101.6	99.9	97.9	87.5	86.2	84.5
Higher Secondary Education	74.2	76.6	79.6	59.5	62.0	64.4
Higher Education	35.8	37.3	38.4	n.d.	n.d.	n.d.

Figures estimated by the SEP.

Source: Prepared by the Center for Public Finance Studies (Centro de Estudios de las Finanzas Públicas, 2018) of the H. Chamber of Deputies, with information from the Ministry of Public Education SEP.

The importance of education for people in Jalisco has been reflected in the public sector, as shown by the large public budget investment dedicated to this item. For example, in 2016 44.08% of the 2016 expenditure budget for the State of Jalisco is allocated to three key units in education in Jalisco: the Ministry of Education (28 833 million), the University of Guadalajara (10 410 million) and the Secretariat of Innovation, Science and Technology (633 million).

Table 3.17. ***Educational Levels in Jalisco***

Educational level	*Schools*	*Students*	*Teaching*	*groups*
Initial education	198	16,255	1,035	2,581
Pre-school education	5,300	322,396	14,805	14,841
Special education multiple attention centers (CAM)	155	11,007	1,099	1,158
Education for adults (Basic)	906	128,835	N.A.	1,797
Primary education	5,792	932,044	34,127	34,107
Secondary education	2,121	431,864	13,779	27,071
Professional technical	20	12,433	388	645
High School	1,127	320,694	10,336	17,764
Higher education	364	265,123	N.A.	26,715
Total by levels	15,983	2,440,651	75,569	126,679

Source: Secretaría de Educación Jalisco (2016). Secretaría de Educación Pública (2013).

Plan estatal de desarrollo Jalisco 2013-2033. Elaborated with data obtained from the statistical survey of the 911 format of each educational level in the schools of Jalisco, August 2012. Department of Statistics and Information Systems.

In the Metropolitan Area of Guadalajara (MAG), Jalisco's top educational offer is concentrated. The existence of a concentration of higher education services in the metropolitan area reduces the possibilities of higher education (public and private) for young people living outside the capital; Nowadays the University of Guadalajara works through a network of 18 university centers, seven of them thematic, located in the metropolitan area of Guadalajara, and one regional centers, which provide higher education to practically all the regions of the state.

The municipality of El Salto in the Metropolitan Area of Guadalajara has the highest percentage of failure in primary school, Guadalajara in secondary school and Tonalá in upper school. Of the metropolitan area, the one of

greater under achievement is Juanacatlán, whereas Guadalajara has the best percentage, with 89.9. INEGI also measured the number of inhabitants in primary and secondary education who can read and write. In the metropolitan area, Zapopan is the most backward.

3.1.3. Economy

Structural & Basic Conditions
The sectorial split for the Mexican economy as of 2016.

Table 3.18. ***Sectorial Split of the Mexican economy. GDP Percentages***

Primary sector 3.80%	Secondary sector 32.90%	Tertiary sector 59.20%

Source: INEGI (2016). Figures based on GDP, at constant prices.

The GDP of the primary sector (agriculture, livestock, fishing, forestry and forestry), contributes approximately 3.5% of the national GDP with annualized data and in 2014 registered a real growth of 3.2% above the global growth of the economy (2.1%). In 2014, Industrial Production (mining, manufacturing, construction, electricity and gas) had a contribution to GDP of around 33.5% of the total and recorded a growth of 1.9% in relation to 2013 in real terms, slightly below the economy's set (2.1%). By components, it stands out that Mining fell by 2.3% while the rest of the components recorded increases: Construction 1.9%, Generation and Distribution of electricity, water and gas supply 1.8% per year and Manufacturing 3.7%. The service sector as a whole (includes commerce, restaurants, hotels, transportation, communications, financial services and communal and personal services, among others) accounted for approximately 62.6% of global GDP in 2014 and grew by 2.2% during that same year, practically at the same level as the economy as a whole (2.1%). (Oficina Económica y Comercial de España en Mexico, 2016)

GDP for the second quarter 2018
INEGI presents the results of the Estimated Estimate of the Gross Domestic Product (GDP) Quarterly, which indicate that it decreased (-) 0.1% in real terms, in the April-June quarter of the current year with respect to the previous one with figures adjusted by Seasonality.

Table 3.19. ***Opportune estimation of the Gross Domestic Product during the second trimester of 2018. Seasonally adjusted figures by economic activities***

Concept	*Variation % real with respect to previous semester*	*Variation % real with respect to same trimester of 2017*
Total GDP	(-) 0. 1	1.6
Primary activities	(-) 0. 2.1	2.0
Secondary activites	(-) 0. 3	0.2
Tertiary activities	0.3	2.4

Source: La economia (2018)

In the State of Jalisco, the contributions of the main sectors of activity to the State GDP are:

Table 3.20. ***Contributions of the main sectors of activity to the State of Jalisco GDP***

Sector of economic activity	*Percentage of contribution to the GDP of the State of Jalisco (Year 2016)*
Primary activities	5.7%
Secondary activities	32%
Tertiary activities	62.4%
Total	100.1%

Note: The sum of the partials may not coincide with the total due to the rounding of the figures.

Source: INEGI (2016). System of National Accounts of Mexico. Participation by economic activity, in current values, 2016 (Preliminary figures).

In 2016, Jalisco ranked as the fourth entity with the highest contribution to the national GDP, participating with 6.82%, being the highest contribution percentage that our entity has to the national GDP in the last 14 years (2003-2016). It should be noted that during the current administration, the GDP of Jalisco has reached in the 4 years (2013-2016) record in terms of contribution to the national GDP, that is, the production of Jalisco has had historical levels in terms of its national perspective.

In terms of sectors, tertiary activities (commerce and services) recorded a growth of 6%, with the greatest annual growth registered in the Entity. For its part, the primary sector recorded a growth of 3.5%, while the secondary sector grew 2.2%

The metropolitan area of Guadalajara is one of the main tourist destinations in the country, and Puerto Vallarta stands out in the beach centers, which strengthens the services sector. This has allowed it to stand out in the international arena both in foreign trade and investments, which contributes to the development of the entity (IIEG, 2018a).

Number of Unemployed and Unfilled Job Vacancies

Table 3.21. ***Indicators of occupation and employment. Timely timed designs. During April 2018***

Main rates	*Percentage*	*Difference in point's percentage with respect to: The same month of last year*
Participation rate /1	59.7	0.5
Unemployment rate /2	3.4	(-) 0.1
Occupation rate /3	6.9	(-) 03
Labor informality rate /3	56.9	0.4
Occupation rate in the informal sector /3	27.5	1.4

Note: The differences in percentage points result from considering the indicators with all their decimals.

1] Economically Active Population as a percentage of the Population aged 15 and over.
2] Percentage with respect to the Economically Active Population.
3] Percentage with respect to the Employed Population. Source: INEGI (2018).

The Unemployment Rate (TD), which refers to the percentage of the population Economically Active (PEA) that did not work even one hour during the week of reference of the survey but expressed willingness to do so and did some activity for obtaining employment, it was 3.4% of the EAP at the national level, higher than the rate reported in the previous month. In its annual comparison, the TD was 3.4%, similar to the same month of 2017, with data adjusted for seasonality.

The Sub-Occupation Rate (referred to the percentage of the employed population that has the need and availability to offer more work time than

your current occupation demand) represented 6.9 percent. In its annual comparison, this figure was lower to the same month of 2017 that closed at 7.2 percent.

The Labor Informality Rate 1 (proportion of the employed population that is occupationally vulnerable due to the nature of the economic unit for which works, with those whose employment link or dependency is not recognized by their source of work) was 56.9% in the fourth month of 2018, percentage lower than reported in March, and higher by 0.4 points compared to April 2017.

Also, the Occupation Rate in the Informal Sector 1 (which refers to the proportion of the population employed in non-agricultural economic units operated without accounting records and that work from household resources or from the person who heads the activity without being constituted as a company), represented the 27.5% in April of the current year, higher than that observed in the previous month when it closed at 27.2 and registered an increase of 1.4 points compared to the same month of the year past.

In April 2018, 59.7% of the population aged 15 and over in the country was located as economically active (Participation Rate). This rate is higher than of the immediately previous month, also with seasonally adjusted figures (INEGI, 2018).

In the State of Jalisco, by the fourth quarter of 2017, the Economically Active Population (EAP) amounted to 3,757,723 people, which represented 61.7% of the population in age to work Of the total of the PEA, 97.1% is occupied and 2.9% is unemployed. Figures for the first quarter of 2018 of the National Occupation and Employment Survey (ENOE) show that the sectors of economic activity that concentrate the largest number of employed persons in the country are Commerce, Transformation, Agriculture and Personal Services (9, 8.5, 5.9 and 5.8 million respectively). These four sectors together account for 58.5% of the total employed population.

Employed persons (Millions of people). The Commerce sector with 17.9% of the total of employed people has the highest number of employed persons in the country, of which almost 55.8% of employed persons have schooling up to the secondary level and 41.1% have between 16 and 34 years of age. In contrast, the lowest number of employed persons is concentrated in the Extractive sector, with barely 0.8% of the total employed. Of all the sectors of economic activity, Tourism (21.8%), Transformation (18.8%), Commerce (17.5%) and Construction (17.3%) employ the highest percentage of young people between 16 and 24 years of age.

On the contrary, the sectors that occupy the lowest percentage of young people in this age range are Government, Education and Health and Extrac-

tive with 5.9%, 7.9% and 8.4% respectively. Likewise, the Agriculture sector is the one that occupies the highest proportion of people over 45 years of age, with almost half of the total employed workers in that sector (48%). In the Professional Services sector, workers over 35 years of age represent a little more than half of those employed (53.1%), and almost in the same proportion, those employed in the same sector have higher education (52.4%). %).

Unemployment rate for the State of Jalisco (Percentage of the PEA) for May 2018 is 2.5. For the month of May 2017 it was Jalisco 2.6. The [last available value reported on May 31, 2018 was 2.3. The Unemployment rate reflects the data recorded for the first quarter of 2018 IIEG (2018b).

GNI (Gross National Income)

Gross National Income (GNI) (US $) for Mexico with data from The World Bank: Data of Mexico was 12,666.17 million in 1960 and 1,123,689.02 million in 2017. (Banco Mundial 2018).

GDP (Gross Domestic Product)

The gross domestic product of Mexico in 2017 has grown by 2% compared to 2016. It is a 9 tenths lower than that of that year, when it was 2.9%. In 2017, the GDP figure was € 0m, which means that Mexico is the 193th economy in the ranking of the 196 countries from which Expansion / datos macro. com (2018b) has published GDP. The absolute value of GDP in Mexico fell 973.165M € compared to 2016. The GDP per capita of Mexico in 2017 was € 0, € 7,630 lower than in 2016, when it was € 7,630. To see the evolution of GDP per capita, it is interesting to look a few years ago and compare these data with those of 2007 when the GDP per capita in Mexico was 6,996.

Expansion / datos macro.com (2018b) ordered the countries based on their GDP per capita, where Mexico is ranked 193, so that its inhabitants are, according to this parameter, among the poorest of the 196 countries from which we publish this data.

The State of Jalisco contributes 7.1% to the national gross domestic product in 2016. The Gross Domestic Product (GDP) of Jalisco in 2016 represented 7.1% and occupied the place 4, with respect to the national total and compared to the previous year had a variation in constant values of 4.7%. The sector with the greatest contribution to the state GDP is commerce with 23.6%. According to the information of INEGI, in 2016 the Gross Domestic Product of Jalisco was 1,109,591 million pesos, reaching an annual growth of 4.7% in its production.

Regarding sectors, tertiary activities (trade and services) were those that registered the highest annual growth in the Entity, with 6.0% from 2015 to 2016, while primary activities (agriculture and livestock) in 3.5% and the secondary ones (industry and construction) grew by 2.2%. Both the primary and tertiary sectors recorded higher growth in 2016 than in 2015 when they grew 2.1% and 3.6% respectively. Jalisco continues as the number one entity in primary production in Mexico (agriculture, livestock, forestry, fishing and hunting), maintaining for this 2016 level of participation in the national total in this sector, with a contribution of 11.5% of the total production of the primary sector of the country.

Jalisco participated with 6.7% of the production of the secondary sector (Industry and construction) of the country, climbing to fifth place in national participation in this sector for 2015, and registering a new maximum of participation in the sector. In the tertiary sector (trade and services) our Entity has remained the fourth with the greatest contribution to the national total of the sector, registering in 2015 a participation of 6.55%, also reaching a new maximum of participation in the sector (IIEG Jalisco, 2017).

PPP (Purchasing Power Parity)

The Conversion factor for purchasing power parity (PPP), GDP for Mexico is of 9.3 (UML for every $ international) in 2017. Purchasing power parity conversion factor is the number of units of a country's currency required to buy the same amounts of goods and services in the domestic market as U.S. dollar would buy in the United States. This conversion factor is for GDP (Knoema, 2018).

HDI (Human Development Index)

Mexico has had an absolute mobility of positive opportunities that stands out in the international context. Between 1980 and 2013, the achievements in health, education and income recorded in the Human Development Index (HDI) were greater than the world average. By comparing the total life years of each generation in Mexico with the corresponding international minimums and maximums, the Health Index (is) can be constructed. This is one of the three elements of the Human Development Index (IDH). In Mexico, from 2000 to 2012, for almost all age groups, the IDH presents an absolute mobility of opportunities upward in the life cycle of people. The upward mobility and equalization of opportunities that arose between 2000 and 2006 for the whole population weakened in the subsequent six years (PNUD, 2016)

The most recent estimate of the Human Development Index (HDI) from certain factors associated with labor market conditions, the percentage of the employed population and other elements not yet determined shows that in the period from 2012 to 2014:

1] It is estimated that Mexico managed to increase its IDH by 1.03%. This would represent an average annual growth of 0.51% per year, slightly lower than that registered between 2010 and 2012, which was 0.53%.
2] The increase in average schooling, the number of people with work benefits, the people employed with access to health services and the decrease in child labor promoted human development in that period.
3] The trend towards greater human development was diminished by the reduction in the proportion of the employed population with respect to the national population. Decreased labor income per capita between 2012 and 2014.
4 The working conditions that are associated with human development did not change homogeneously. These improved in 24 states, especially in Baja California, Coahuila and Guanajuato. However, eight entities experienced a deterioration, especially Michoacán, Chiapas and Morelos (PNUD, 2016)

In the first quarter of 2015, the estimated rate of growth of the IDH increased markedly. However, the main challenges to promote human development in the long term, through the evolution of the labor market, are to raise the average income of the employed and encourage the participation of the employed population in quality jobs. (PNUD 2015). In this context, it is worth highlighting four mixed findings in the Human Development Index dimensions that are associated with the weakness of income equalizing mobility (Campos, Aguilar and Domínguez 2013).

First, the formal employment that provides access to health services was not expanded. This is a problem in terms of resources and financing, since contributions to systems such as IMSS tend to be reduced, while the burden for schemes such as Seguro Popular has increased. Second, the results from 2005 to 2015 show that the education reached by parents tends to determine more and more that of their children. From this it is inferred that the progress in education increasingly depends on the condition of origin and suggests that the existing inequalities in the education system and between the different local environments are not reduced to the desired speed. Third, only the poorest strata presented an absolute and positive movement of income. However, the crisis from 2008 to 2009 had an adverse effect on it.

In other words, although the equalizing trend is present, vulnerability to recurrent events persists, such as crises that come from abroad. Fourth, absolute mobility in occupational status throughout the life cycle in general is low, and is lower for women than for men (2.8% vs. 4.2%, respectively) (PNUD, 2016).

Jalisco stagnated at 13th place in the Human Development Index (HDI) at the national level, according to the most recent evaluation of the United Nations Development Program (UNDP) 2015. The reason why there was no progress is that the income of the inhabitants fell and he did not improve in health (Serrano Iniguez, 2015). Jalisco appears with an HDI of 0.751. The entity with the best index is the Federal District, with 0.830, followed by Nuevo León, with 0.790, and Sonora, with 0.779. The other states that surpass Jalisco are Baja California Sur, Coahuila, Colima, Queretaro, Baja California, Aguascalientes and Quintana Roo. The national index is 0.746, so Jalisco appears above it. It also exceeds that of Latin America, which is 0.739, and to the world, 0.700.

As for the rating, it appears in the states that have a "high" IDH, which is located between the values 0.745 to 0.760. The highest value is considered "very high", which is from 0.760 to 0.830. In previous evaluations, Jalisco had an HDI of 0.733 in 2008, which ranked fourteen nationwide, and 0.744 in 2010, year in which it managed to climb a position. Already in the area review, the best rating for Jalisco is in health, where it ranks 8th nationally, with 0.846. However, its mobility has been low, since in 2010 it was in the same position, with 0.842, the same value of two previous years, which kept it in place 10.

In contrast, in the income of its inhabitants, Jalisco fell. In 2008, it had a value of 0.781, being located in the twelve place; two years later, he had 0.789, in the tenth place. In 2012 it again fell to twelve, with 0.807. In education is where there has been improvement, because in 2008 Jalisco ranked 18, with 0.597; for 2010, it improved by reaching 0.619 and raising two seats. Finally, in 2012 it reached 0.622, so it is in the fourteenth place. The above represents that in the general rate of growth Jalisco is the number twelve state; in education the seventh; in health the number 18, and in income is from the entities of lower growth, placing itself in 22 (Serrano Iñiguez, 2015)

Subsidies

In Mexico, both the federal government and the governments of the states and municipalities grant basic subsidies of the different programs, funds and subsidies, which through the Secretariats and Dependencies of the Federal

Public Administration, allow the participation of the State Governments and the municipal ones, either as Executing Units or with actions that strengthen their institutional capacities.

The PROSPERA subisidios program includes resources for the attention of vulnerable groups; the adaptation and mitigation of the effects of climate change; the development of young people; the attention of children and adolescents; the prevention of crime, combating addictions, rescuing public spaces and promoting productive projects; the prevention, detection and punishment of administrative faults and acts of corruption, as well as for the control and control of public resources; road maintenance and maintenance; subsidies for state decentralized agencies, and the distribution of the hydraulic program: subsidies for federal entities.

Table 3.22. ***Subsidies grants by the Budget of expenditures of the federation for the fiscal year 2018***

Subsidies	*Budget allocated*
Subsidies for decentralized state agencies in public education	11,713,274
Subsidies for state decentralized agencies of the National Entrepreneurial Fund for Public Education	26,202,791,726
Subsidies for decentralized state agencies. National Entrepreneur Fund for Higher Education	56,377,156,518
Subsidies for State Decentralized Organizations National Entrepreneur Fund for Graduate Resources for the Care of Adolescent Girls and Boys in Education in Public Education	1,168,391,025
Subsidies for decentralized state agencies	26,202,791,726
Subsidies in matters of public security	5,000,000,000
Subsidies for decentralized state agencies in crime prevention	1,041,445,371
Subsidies to programs for young people	36,812,299
Subsidies to Electricity Rates	50,179,000,000
Subsidies for decentralized state agencies (UR 511)	58,437,807,172
Hydraulic program: Subsidies for federal entities (pesos Subtraction from: a) ISSSTE contributions; and, b) subsidies, transfers and fiscal support to the entities of direct control and productive enterprises of the State	688,112,918,481
U006 Subsidies for decentralized state agencies: General Coordination of Technological and Polytechnic Universities	300,000,000

Source: Cámara de Diputados (2018).

There are also subsidies for decentralized state agencies that the Federation grants, as well as for programs financed with concurrent funds, subsidies for strengthening public safety performance, subsidies for energy such as electric power, marine diesel and riverside gasoline, etc. The subsidy programs of the Administrative Branch 20 Social Development is allocated, in the states, under the terms of the applicable provisions, exclusively to the population in conditions of poverty, vulnerability, elderly, lagging and marginalization.

The amount of $ 750,000,000 is included for the constitution of the Border Fund, which is allocated to the granting of subsidies that help to reduce poverty, through a strategy of inclusion and social welfare, as well as to contribute to economic development through the granting of support to projects that promote the creation, consolidation and competitiveness of micro, small and medium enterprises, in the federative entities in whose territory are the international dividing lines of the north and south of the country. Below are some concepts of subsidies and the amount granted by the Budget of expenditures of the federation for the fiscal year 2018.

Infrastructure

Mexico has great challenges in terms of infrastructure. For more than ten years it was proposed that by 2030 our country will be among the best evaluated by the Infrastructure Competitiveness Index developed by the World Economic Forum, but the road is not easy. Mexico is the 13th largest economy in the world and has a very important lag in Infrastructure: the scarce investment in strategic economic sectors in recent years. The World Economic Forum Report (2013-2014) places the country in infrastructure and competitiveness in 66th and 55th place respectively.

According to the Monex Infrastructure Report, the country requires an annual investmentclose to 7% of GDP as the optimum level. Currently it is only 4.7%. As part of the strategy to achieve that goal, in accordance with the National Infrastructure Plan 2014-2018, the government seeks to detonate economic activity and guide the functionality of the existing construction through 743 projects with a total investment estimated at $ 7,750, 549.7 million of weights. The National Infrastructure Program 2014-2018 (PNI) projects an investment of $ 596.196 billion dollars (47% of current GDP). Of which 63% will come from the Public Sector, while 37% will be from the private sector (Grupo Financiero Monex 2018).

The investments in infrastructure programmed by the PNI are:

Table 3.23. ***Investments in infrastructure programmed by the PNI***

Sector	*Firm/specific project*	*Cost*
Energy	Pemex CFE	$253,809 million dollars $46,029 million dollars
Agrarian,	Territorial and Urban:	$143,133 million
3. Transportation -and Communications:		101,546 million dollars
4. Hydraulic:		$32,135 million
5. Tourism:		$13,941mdd
6. Health:		$5,600 million
	Guanajuato SMA: Tuxpan-Tampico: Tenango: Acapulco: Libramiento Villahermosa:	$3,300 million pesos (mdp) $8,000 mdp $3,200 million pesos $1,980 mdp $2,994 million pesos
Hydraulic projects:	Ac. Monterrey VI: ACC Toluca: Oaxaca ACC: Santa María Dam:	$15,437 mdp $2,900 mdp $4,500 mdp $6,377 mdp
Infrastructure	Social	5 hospitals for $39,028 million pesos
Energy projects	hydroelectric plants	4 for $36,250 mdp
Port projects	Port of Veracruz and two Terminals by	$42 thousand pesos
Train projects	Mexico - Querétaro: Mérida - Punta Venados Mexico - Toluca	$ 42 thousand mdp $ 42 thousand mdp $ 22 thousand mdp

Source: Grupo Financiero Monex (2018).

In total they are 743 strategic projects are considered by the PNI. According to the report, the tender of the work and the execution of each project will be the processes fundamentals that we must follow. The economic impact of the PNI is on the investment Annual program that could be 25% for each of the 4 years, that from 2015 the investment through the projects helped to increase GDP growth by approximately 1.50pp. The national economy grows at rates close to 3 % (Grupo Financiero Monex 2018).

The national infrastructure of Mexico has communications and transport systems, energy, telecommunications and real estate, but it can be said that it is established in practically all areas of economic activity, from the au-

tomotive sector to information technologies, passing through environment. By sectors, in 2016 infrastructure accounted for 61.3% of total Foreign Direct Investment (FDI), financial services 9.6%, transport 5.9%, mining 4.7% and generation and distribution energy, water and gas to final consumers 4.3%. In border infrastructures, the recent development of border connectivity infrastructures between Mexico and the US stands out, such as the Tijuana-San Diego airport pedestrian connection and the Matamoros-Brownsville railway bridge (Ministerio de Asuntos Exteriores y de Cooperación, 2018).

In general, the infrastructure for the State of Jalisco, with information from INEGI (2012) 2011 medical units: 1 210 public medical units with 15 384 doctors.214 private medical units with 1 000 doctors. The total number of schools at all educational levels was 15071.The entity has 1 583 establishments of different categories for hosting with 61 358 rooms. The length of the highway, according to type of road network. Year federal 2011.Troncal (main or primary) paved 2 472 kms. State feeders (roads) paved 4 020 kms, coated, 253 km, unpaved 7 km.; Rural roads paved 1240 kms and coated 5 692 kms. The total of state roads is 13 684 kms. Jalisco has 1 109 kilometers of railroad tracks. 2 international airports, one in the Metropolitan Area of Guadalajara and the other in Puerto Vallarta. The fixed telephone lines were of 1 730 799 * (preliminary) 1534 post offices throughout the State.104 telegraph offices. In mass media operate in State broadcasters 93 (46 modulated amplitude and frequency-modulated 47 as well as 33 television stations.

In the area of productive infrastructure, the state of Jalisco has 50 industrial and / or technological parks. The entity is located in 29th position in material and intellectual infrastructure of the 32 entities (Secretaria de Economia, 2018).

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3.2. State Jalisco, City Guadalajara, Zapopan

José G. Vargas-Hernández

Jalisco has 125 Municipalities, which are distributed in 12 regions to facilitate the management of the state; each region has a seat municipality designated by importance and strategic location of said municipality. Jalisco is the state with the longest tradition in Mexico; many of its cultural elements have become synonymous with Mexicanness. The State of Jalisco is one of the 32 States of the Mexican Republic and it is located in the western part of the country and has an extensive coastline in the Pacific Ocean. Its 80,137 km2 of territorial extension represent 4.1% of the surface of the national territory. It also has 341.93 km of coastline.

It is the fourth most populated federative entity in Mexico; and one of the most developed states in the country in terms of economic, commercial and cultural activities. Between 1950 and 2010, the Jalisco population grew considerably, as it went from 1 million to 7.35 million inhabitants. According to the results of the Intercensal Survey 2015, carried out by the INEGI (2015), it is estimated that as of March 15, 2015, the state of Jalisco had 7,880,000 inhabitants, 11 of whom 3,863,000 they are men and 4 017 000 are women.

In certain parts of the capital and of some municipalities, the standard of living is comparable to developed countries. However, as in the rest of Mexico, it is not representative of all the municipalities. In Jalisco, according to the Coneval (2015), from 2012 to 2014, multidimensional poverty decreased 270 800 people, which in relative terms represented a decrease of 8.9%. Despite this, in 2014, the problem of poverty continues to affect one in three people in the entity, since 35.4% of the population is in said condition; which in absolute terms means that 2 780 000 people live in poverty. In oth-

er words, these people do not have the income enough to satisfy their basic needs, they also have at least a social deficiency.

In this matter, the population in Jalisco presents a marked inequality. For example, in 2014 10% of the richest households in the state had income 22 times higher than 10% of the poorest households, according to data from the National Survey of Income and Expenses of the Households 2014 (ENIGH) of INEGI. In other words, while 10% of Jalisco households received a quarterly average income of $ 7,161, at the other end 10% of households received $ 157 175 of income in the same period. The income difference for both poles is approximately $ 150,000.

In the entity three of the municipalities that present the greatest progress in the Human Development Index (IDH) for women are: Zapopan, with 0.825; Guadalajara, 0.808, and Zapotlán el Grande, with 0.803; 384 PED Jalisco 2013-2033 Update 2016 The best condition for men is also found in those same three municipalities. The IDH shows that Zapopan, Guadalajara and Zapotlán el Grande are the municipalities with the largest education index (0.800, 0.750 and 0.741, respectively).

The expansion of basic education and the increase in the population of school age have had an impact on the increase in coverage, which reached 96.47% in basic education, 71.88% in higher education and 26.83% in higher education. On the other hand, postgraduate enrolment has grown steadily in the last five years (ANUIES, 2016), although it is still relatively low compared to enrolment in higher education (258 149). According to data from the ANUIES, in the 2010-2011 school year the graduate students were 17 143 and for the 2014-2015 school year these totalled 20 892.

Jalisco in 2011 had 208 companies in the productive sector that carried out extramural or intramural R & D projects in 2011, which represented 10.1% of the national total. These companies employed 1,742 people of them, 896 researchers and technicians and 534 technicians and equivalent personnel. For the year 2015, the number of researchers of the entity that are members of the National System of Researchers (SNI) were 1 191, which represents 5.11% of the national total. It should be noted that seven out of 10 of the members of the SNI are academics from the University of Guadalajara (UDG), specifically in 2016 in Jalisco they reached 1 283; and 72.2% of them belonged to the UDG. The IMSS, the Research and Technological Assistance Center of the State of Jalisco (CIATEJ), Tecnológico de Monterrey (TEC) and the Technological Institute of Higher Studies of the West (ITESO) follow him in a distant way.

According to the COEPO, in 2010, 66.5% of households in Jalisco did not have a computer. For the year 2014, this has been reduced up to 12.6%

according to the INEGI, since, by then, 53.9% of households do not have a computer. In addition, for the year 2010, 73.6% of those who had a computer did not have access to the internet. This has been reduced by 16% for 2014 (57.6% does not have this service).

The state of Jalisco has had important developments and achievements worth highlighting in terms of cultural infrastructure. Among them stands out the operation of libraries in all the municipalities of the entity and the existence of houses of culture in 122 municipalities. According to the census of sports facilities, made by the CODE Jalisco in March 2013, there is a total of 1,269 public spaces registered for physical and sports practice in the entity; which is clearly insufficient for a population of 7.9 million Jalisco (Gobierno del Estado de Jalisco, 2014).

In Jalisco, coverage in health services accesses has improved in the last ten years of the Jalisco population. In 2015 80.8% of the inhabitants in Jalisco were affiliated with some health service institution, which constitutes approximately 6 336 000 inhabitants. Of these, 52.3% receive attention from the IMSS, while 40.8% from the Seguro Popular. According to the COEPO (2010), in 2010 there was a lag or deficit in Jalisco of 451 192 homes due to overcrowding or precarious construction materials. In the last 25 years the growth rate of the inhabited private dwelling has been on average 2.8,

The State of Jalisco has an important participation in the national production. According to INEGI with preliminary information 2014, the Gross Domestic Product in Jalisco amounted to 849,795 million pesos at constant 2008 prices. The above means a contribution of 6.5% of the national total, for which Jalisco occupies the fourth position among the entities with greater value of production, only below México City (16.5%), State of Mexico (9.3%) and Nuevo León (7.3%). Jalisco contributes with 6.4% (57,888 million USD) of Mexico's GDP (INEGI 2014).

Jalisco stands out mainly for its primary production; it is the entity that contributes the most to the national GDP. By the magnitude and diversity of its primary activities, Jalisco owns the agricultural economy more important of the country, with a GDP of 46 291 million pesos (constant prices of 2008). In 2014, Jalisco contributed the highest percentage to the national agricultural and livestock sector, 10.9% (INEGI, 2015), almost three percentage points above the state of Michoacán, its closest competitor. Between the factors that have favoured the figures described above we can mention the Infrastructure (pathways established communication, productive infrastructure, tif traces, aquaculture production units, centre of added value, among others), as well as the diversity of climates (Gobierno del Estado de Jalisco, 2016).

For the year 2014, Jalisco had an area planted of 1 590 378.81 ha, of which 1 308 325.55 they corresponded to temporary area (just over 82%) and only 282 053.26 to irrigation (17.7%, very below the percentages of other entities such as Baja California, Baja California Sur, Sonora and Sinaloa), reaching a harvested area of 94.9% with respect to the total area sown. For the value of its agricultural production, in 2014 Jalisco occupied the second national position after of the state of Michoacán. The entity contributed 9.37% (representing 39 108 876 thousands of pesos) of the national agricultural value. The crops that provide the greatest income to state agricultural production are corn grain, agave, pastures, sugarcane, forage corn, and avocado. The value of the production of these crops represents 84.61% of the value of agricultural state production.

Jalisco is a leading state in livestock production in the country, during 2014 it was a national leader in the production of standing birds (11.5% of the national total) and channel (11.4%); live pig (18.9%) and carcass (19%); bovine milk (18.7%) and egg for dish (53.1%); second place in live and bovine cattle (both 11.2%), and third largest national producer in honey (11.67%) and wax in *greña* (11.1%). During 2014, Jalisco reached a production of 47,287,000 tons, of which 78% corresponds to aquaculture and the rest to capture. The participation of the State of Jalisco for the year 2014, in the total of the national production represented 3.4% occupying the eighth place in importance among the entities from the country. From 2007 to 2014, the value of fishing production went from 518 to 815 million pesos in the entity (CONAPESCA, 2015).

The forest industry of the state is incipient. Most of the production is sold at the foot of street still. For 2013, the value of the forestry production of the entity was 233,774,866 pesos, mainly contributed by timber production.

During the period 2003-2014 the sector secondary growth at an average annual rate of 2.52%, also higher than the 1.64 that was reached national level. As for the secondary activities, these represent almost the third part of the state economy, which place Jalisco with the sixth producing entity of the country. Secondary economic activity consists of four main sectors: Manufacturing industries; Building; Generation, transmission and distribution of electric power, water supply and of gas by pipelines to the final consumer and Mining. During 2014, the manufacturing sector stood out for generating the highest proportion of the value of the GDP with 167 550 million pesos at constant 2008 prices. Then, for order of relevance with respect to the value generated, is the Construction sector with 72 845 million, followed by the Generation, transmission and distribution of electric power sector, supply of water and gas pipelines to the final consumer that reached 16 706 million.

Finally, the sector of Mining generated 3.248 million pesos (INEGI, 2015) -all values at constant prices in 2008.

The manufacturing industry is the engine of the state economy. In 2014, it represented 64.4% of the total of the production of secondary economic activities in Jalisco and around 20% of GDP total of the entity. The growth of industrial GDP 2014 compared to 2013 was 3.4% in terms real, that is, above the annual percentage change registered at the national level that was of 2.16%. In addition to the above, it is worth noting that 20% of the population employed in Jalisco works in the manufacturing industry (Secretaría del Trabajo y Previsión Social, 2016). Within the manufacturing sector, the subsectors of the industry stand out for their contribution to GDP food beverage manufacturing industry, as well as the subsectors of the industries for the development of machinery, computer equipment, electronic accessories, electrical equipment, equipment of transport and elaboration of drinks (INEGI, 2015). Jalisco is a leader in the software industry, information and multimedia services.

On the other hand, tertiary activities presented an average rate of 3.27%, very similar to 3.23% of average annual growth of the tertiary sector that as a whole reached the country. The tertiary activities are those that mostly contribute to the state economy with almost two thirds parts of the total value of the Jalisco production, also standing out as the fourth entity that contributes to the national GDP in this sense (Gobierno del Estado de Jalisco, 2016). The tertiary activities have a preponderant weight in the Jalisco economy, generate the greatest contribution to the state GDP (63.92%), among which trade, services real estate and the transport sector.

Trade is undoubtedly one of the most relevant sectors, not only within the activities tertiary, but in general in the state economic activity. It generates almost a third of the GDP of said activities (32.1%) and about one fifth of 2014 state GDP (20.5%), in addition to employment to 21% the employed people, this due to the predominance and commercial tradition of Guadalajara that maintains it as the main distribution centre towards the west of the country. For 2014 the GDP of the trade sector was 174 159 million pesos (constant prices 2008). Real estate and rental services for movable and intangible assets generated a GDP of 116,711 million pesos (at 2008 prices), which places it as the second largest concept of greater scope within the tertiary activities. According to the ENOE, the services (Ll grouping of the concepts of Transports and communications; other services, and; Government and international organizations) to the third quarter of 2015 1,416,900 workers were registered in the entity, which represented an occupation of almost 42% of the total of those employed in Jalisco.

Currently, the tourism sector contributes 8.7% of state GDP, since, according to the ENOE (INEGI) of the fourth quarter of 2015, generates 284 705 direct jobs, receiving 24.8 million visitors. Its positioning with respect to the rest of the country's entities is emphasized by occupying the second place in national tourists hosted and the third in foreign tourism. Jalisco is the third entity in importance for its contribution to the national GDP for services related to the tourism sector, only below Mexico City and Quintana Roo, ranking above the national average.

Regarding terrestrial connectivity, Jalisco has a road and highway connectivity index of 0.4791, which means that it is within the range of a "medium" value. In terms of logistics, there are two international airports (Metropolitan Area of Guadalajara and Puerto Vallarta) and 33 aerodromes in the interior of the state. Airport activity reports an important growing trend with 76,519 arrivals during 2015. Jalisco is part of one of the most important rail routes in the country: The Manzanillo-El Salto-Irapuato-Aguascalientes-Monterrey-Frontera Norte route. For 2014, there is a record of 2,541,000 tons transported by rail.

Regarding telecommunications for the year 2013, a density of 95.6 subscriptions per 100 inhabitants was reached in the entity (the national average is 88.3). On the other hand, 51.8% of Jaliscians are Internet users and 55.3% of the population are computer users (INEGI, 2014). Mobile telephony has been increasing in the state, according to data from the Intercensal Survey 2015, Jalisco has 2 058 775 inhabited homes of which 85.49% have cell phones, and only 14.21% do not have this service.

Even though over 65% of Jalisco's economic activity comes from the tertiary sector (trade, transport, real estate and other services), Jalisco's agricultural sector leads Mexico's national production in several produces such as corn, milk, eggs and pork meat. According to the results of the third quarter of 2015 of the National Occupation and Employment Survey (ENOE), Jalisco continues as the third entity with the largest number of employed at national level. The percentage of participation at the national level of Jalisco is 7%, only below the State of Mexico and Mexico City that participate with 14 and 8%, respectively (INEGI, 2014).

The growth rate of the Jalisco GDP in the period from 2010 to 2014 was 3.6%, while the average annual rate of population growth rate from 2010 to 2015 was 1.47%. Therefore, its increase is almost half that of population growth in five years; however, despite the fact that it continues to grow, wages remain low.

Table 3.24. ***GDP by economic activity, Jalisco 2010-2014 (millions of pesos at constant 2008 prices)***

Economic activity	*2010*	*2011*	*2012*	*2013*	*2014*	*Percentage of State GDP 2014*
Primary activities	40209	38964	40 676	43994	46 291	5.45
Secondary activities	224700	238258	244635	249324	260350	30.64
Tertiary activities	472567	497001	521383	528669	543154	63.92
Total economic activity	737477	774223	806693	821987	849795	100

Source: INEGI (2015).

The economic participation rate is an indicator that measures the amount of AEP (Active economic persons) that participates in the working market. According to INEGI figures, the entity's rate was 3 578 041 people to the third quarter of 2015. In that tenor, Jalisco was surpassed only by the State of Mexico and the Mexico City. Together the three states, concentrate around 40% of Mexico's AEP. According to ENOE, the AEP in Jalisco represents 61.5% and is above the national average that is 60%. In the third quarter of 2014, the entity represented 62.4% and the third quarter of 2015. It has decreased by 0.9% (Gobierno del Estado de Jalisco, 2016).

In the period 2003-2014, the average annual growth of Jalisco exports has been of 11.5%. During 2014 the amount of exports of the entity reached an amount of 43,546 millions of dollars, that is, 2 948 million dollars more than in 2013. This represented a 7.26% increase. Regarding foreign direct investment for the third quarter of 2015 Jalisco recorded one 907.8 million dollars (USD) in this concept, so the State placed as the fourth entity with the highest IED. Only behind the states: Federal District with 3,914.7 million dollars, State of Mexico with 2,713.8 million dollars and Nuevo León with 2,318.5 million dollars. The 1,907.8 million dollars received by Jalisco represent 8.8% of the total of the registered IED in the country and is the highest figure registered since 1999 (Gobierno del Estado de Jalisco, 2016).

At the national level, Jalisco is recognized as an innovative state. In 2013, it ranked fourth in the Ranking National Science, Technology and Innovation, just below the Federal District, Nuevo León and Querétaro. The state is considered the innovation capital of our country, since it has an important number of high-tech companies, in addition to being the leading entity in the industry of software, information and multimedia services. In addition to the above, during the last few years promoted projects and large-scale events

in favour of innovative development such as the Center Mexico in Innovation and Design (mind), Digital Creative City and Campus Party. In Jalisco, there are 9.77 innovative companies for every 10 thousand economic units and 0.67 business incubators per 100 thousand members of the employed population (Foro Consultivo Científico y Tecnológico, 2014).

Jalisco represents 4% of the surface of the national territory, has a rich diversity of natural resources manifested clearly in its climatic, exosystemic, biological and geological diversity (Gobierno del Estado de Jalisco, 2010). The main land uses in the state are forest (31.1%), agriculture (23.6%), forest (24.5%), pasture (9.4%), scrub (9%), jungle (24.6%) and other uses (2.3%) (CONAFOR, 2012; Sosa Cedillo, 2006).

In general, this diversity allows the conjunction of a wide range of natural resources and sufficient ecosystem services to trigger development through a proper handling and care of ecosystems. The future of the state of Jalisco finds in the sustainable and sustainable management of its territory in proper use, conservation and protection of existing natural resources, especially of water. It is required to have in order the ecology of the territory, the orderly growth of its cities; in the construction of a mobility adequate in its metropolises and interregional connectivity and interstate (Gobierno del Estado de Jalisco, 2016).

Nationwide, Jalisco ranks third in urban solid waste generation, generating 33% of the country's total waste (Meléndez, 2013). There are 148 waste disposal sites, 48 are landfills of which only 85% are active; however, in operability, 140 are not fully compliant with environmental regulations and 140 are landfills with a strong impact environmental, historically been poorly operated.

The fourth part of the state territory is very sensitive to global warming with a total of GHG emissions per year of 42,001.22 Gg of Co_2 where 47% of this area is dedicated to predominantly agricultural activities, 4% to livestock activities and only 3% are human settlements. Climate disruption has various effects such as reduced rainfall and soil moisture or extreme temperatures increase and intensity of rainfall, crop failures, increased pollution, increased presence of natural disasters (such as hurricanes), among others (Fossil Energy International, 2002).

Because of the demographic growth and the excessive exploitation of natural resources, a severe environmental deterioration has been generated. Jalisco must join the trend of carrying out actions to combat environmental impact and reverse the effects of climate change.

Jalisco has particular characteristics that enable the production of energy with alternative sources, since it registers a high annual irradiation com-

pared to other states of the country: it receives around 169,475 twh a year, so this resource could be used throughout its territory. Jalisco has the potential to generate 5,347 twh / year through photovoltaic energy and up to 2,005 twh / year of solar thermal; for the hydraulic resource it has a potential of 1.21 twh / year; and for the wind resource is estimated a generation of 22 twh / year. Regarding the resource of biomass in subject of electricity generation, there is an exploitation of 1.4 PJ / year from bioethanol and for the generation of biogas is estimated at a generation of 14.4 PJ / year (IDOM, & ITESO, 2015).

Jalisco has positioned itself as a local leader by its initiatives such as the "Low Carbon State Program", the consumption of electricity from the recently inaugurated "Los Altos wind farm", the upcoming publication of the "State Climate Change Action Law", the cooperation with ICLEI-Local Governments for Sustainability and for the development of several municipal climate action plans, among other projects that will enable the state of Jalisco to play a significant role in the Mexican environmental policy and politics development. The sector in which this project develops is in the energy sector. Mexico's energy policy stresses expanding the natural gas market and reducing reliance on fuel oil; it is now Mexico's stated intention to change over to natural gas as its primary fuel for the future. The Secretary of Energy has initiated an Integral Fuel Policy, which seeks to significantly reduce the use of fuel oil within 10 years (Fossil Energy International, 2002).

The natural gas industry in Mexico is now the least regulated of Mexico's energy subsectors. Mexico's Energy Regulatory Commission (CRE) oversees the natural gas industry, and under the 1995 law, CRE is mandated to achieve a competitive, efficient, safe, and sustainable natural gas industry as part of Mexico's efforts at increasing use of natural gas for environmental, economic, and other reasons. CRE's powers include enforcement of regulations, inspections of facilities, issuance of permits, regulation of prices, and overall supervision of the industry (Energy Overview of Mexico, 2002).

Mexico has abundant reserves of petroleum and natural gas, yet strong economic growth is causing energy demand to outpace the country's ability to generate additional supply. A lack of infrastructure forces Mexico to flare significant amounts of natural gas while, until recently, inadequate investment in exploration and production has hampered production. The country is a net natural gas importer from the United States and will be through 2015, given that most of Mexico's natural gas production is in the south, where inadequate infrastructure hinders transport of the gas to northern growth centers (Energy Overview of Mexico, 2002).

The population concentration in the medium cities and metropolitan ar-

eas of the state has affected, among others, on the subject of mobility. In the last sixty years, Jalisco has seen a significant increase in its vehicle fleet. Public transport is the main means of transportation for the population, used by 57% of the population. In second place is the private car, with 26%. Only 13% of the population uses other means of transport (walking, cycling), 4% uses other means of transport (Jalisco Cómo Vamos, 2014). Despite the importance of public transport for the mobility of people, mainly in metropolitan areas, their quality and coverage are questionable.

The total cost as a result of insecurity and crime in homes in Jalisco represented an amount of 17 174 million pesos. Citizens consider that the main causes of insecurity are: corruption, inadequate laws, bad police, poor coordination between governments, impunity, the deficient judicial system and prisons that do not comply with the reinsert the individual, (Jalisco Como Vamos, 2012, page 234) The problems that have been detected in the municipalities of Jalisco are, among others, the attacks on institutions and attacks against elements of Public Security; the presence of organized crime and transit of armed groups; the increase in high-impact crimes; the lack of coordination intermunicipal and intelligence resources of the police to deal with crime organized, and the vulnerability of the municipal police to the actions of organized crime, (FGE, 2014).

Corruption in public security institutions is another element that contributes to a weak and vulnerable public security system. The poor performance of the criminal system in Jalisco is reflected in the high degree of impunity that is presented. Between January 2010 and December 2015, 65 637 complaints were filed with the Jalisco State Human Rights Commission (CEDHJ), with an annual average of 10,940. It is worth noting that the last year (2015) was the year in which the highest number of complaints, which reached 15 329. Of the total number of complaints presented in the last year, the majority corresponds to violation of environmental rights, violation of the right to integrity and personal safety, and the improper exercise of public function (Gobierno del Estado de Jalisco, 2016).

In counterpart, the legal guidelines issued by the CEDHJ in this same period were 59 732 (9 955 per year on average). The three authorities most frequently reported to the CEDHJ during 2015 were: Guadalajara City Council, with 1 856 complaints; the City Council of Tlaquepaque, with 1 049, and the Attorney General's Office of the State (Office of the Public Prosecutor), with 726 complaints. The recommendations of the CNDH and the CEDHJ to the state executive have been increasing compared to 2012, when a total of 24 recommendations were issued, while in 2015 there were 31 (Gobierno del Estado de Jalisco, 2016).

In Jalisco, democracy was strengthened during the last two decades with the creation of a competitive and free electoral system, which led to the political alternation in government. The democratic culture is a fundamental aspect that contributes to the democratic, social and political development of the state. An approach to this aspect is political inclusion, which refers to the degree to which the various groups and categories that make up the population of a society have access to government processes and decision making. In this area, the 2014 Democratic Development Index (idd-Mex) shows that Jalisco has achieved an average democratic development in recent years; however, in 2014 it reached the 10th place nationwide, climbing six positions over the previous year. Despite this progress, the results of the index indicate that Jalisco has one of the worst scores regarding the representation of women in the State Congress and their designation in positions in the Executive and Judicial branches.

The System measures Jalisco indicates that from 2010 to 2015 there was a considerable increase in control and monitoring committees formed or ratified, since they went from 5 803 to 7 652. The current legal framework that establishes the mandatory consultation and citizen participation in various The areas of governmental decision-making, particularly at the municipal level, make it possible to promote and strengthen its functioning dynamics in such a way as to help reinforce the citizen's right to participate in community development (Gobierno del Estado de Jalisco, 2016).

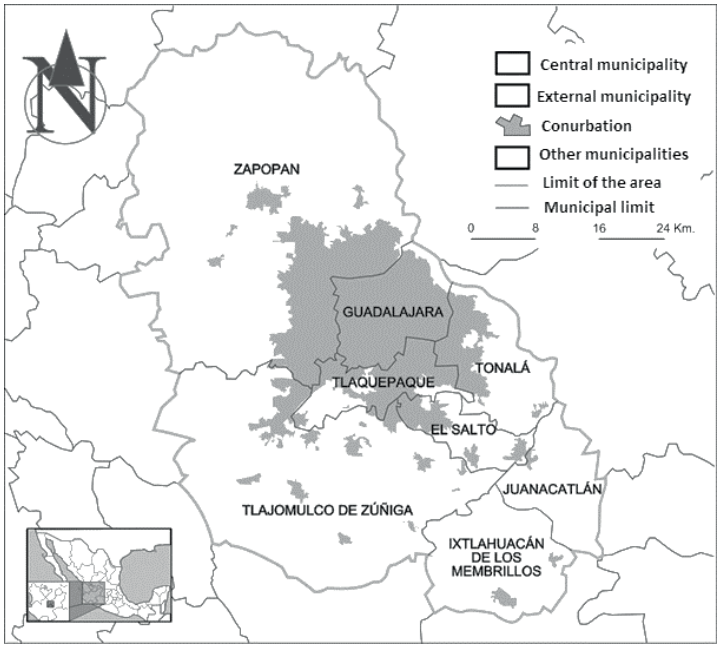
For a results-oriented public management in 2015, the CONEVAL awarded the state of Jalisco with the first place in the Systems index of Monitoring and Evaluation of Federative Entities for the programs "Unique Register of Beneficiaries of the Secretariat of Development and Social Integration (SEDIS) "; "Public Programs Monitoring System" and "Fondo Evalúa Jalisco Trust". In addition to this award, Jalisco was also recognized by the Inter-American Development Bank (IDB) and the Community of Professionals of Latin America and the Caribbean in Management for Development Results (COPLAC GPRD) as the best regional practice in management of results for the development in Latin America 2015 by the strategies of the System measures Jalisco and Evalúa Jalisco, which reflects the progress of the State in matters of public administration.

Metropolitan Area of Guadalajara (MAG)

The Metropolitan Area of Guadalajara (MAG) is integrated with the municipalities of San Pedro Tlaquepaque, Tonalá, Zapopan, Tlajomulco de Zúñiga, El Salto, Juanacatlán, Ixtlahuacán de los Membrillos and the aforementioned

Guadalajara, which together share a constant conurbation. The MAG is the second most populated in the Mexican Republic and is only surpassed by the Metropolitan Area of the Valley of Mexico (INEGI, 2010). The Metropolitan Area of Guadalajara is located in the central part of the state of Jalisco and officially consists of eight municipalities, of which six are considered as central and two as external, which although considered within the Metropolitan Area are not part of its continuous urban sprawl, these being those of Juanacatlán and Ixtlahuacán de los Membrillos (Ramírez 2013). See figure 3.1.

Figure 3.1. Metropolitan Area of Guadalajara



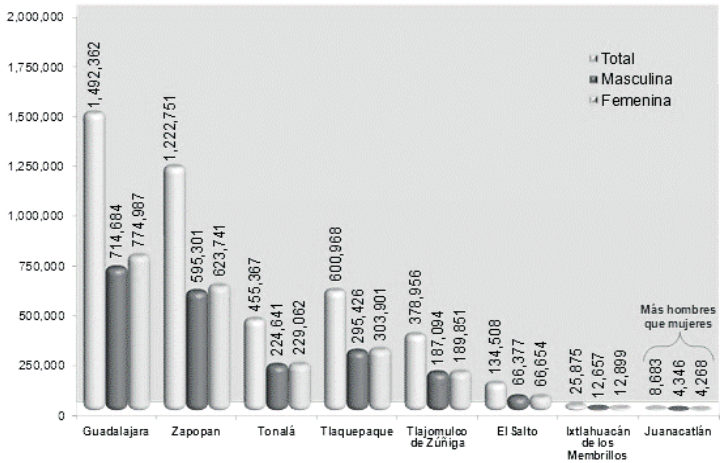
Source: Own elaboration with data of INEGI (2010).

The analysis highlights the persistence of the phenomenon of concentration population in the MAG that, with its nine municipalities and its 4 856 405 inhabitants, in 2015 represents 62.1% of the state population, 13 in 1990 represented 57.4% (considering these same nine municipalities). Thus, of the 530 thousand new inhabitants more than the state has compared to 2010, a total of 392 thousand joined the MAG, that is, 74% of the total. Of them, the largest amounts were in Tlajomulco, Zapopan, Tonalá and Tlaquepaque. But it should be noted that, if the measurement is made in relative terms, through

the annual average rate, the greatest increases occurred in Juanacatlán, El Salto, Tlajomulco and Ixtlahuacán de los Membrillos; which are the most peripheral municipalities of the MAG (Gobierno del Estado de Jalisco, 2016). The persistence of scattered MAG is a relevant problem of the city.

In 2010, 87% of the population in Jalisco was urban and the MAG represented 60% of the total population of Jalisco. The main urban area of the state, the MAG, has been adding municipalities to integrate, in 2015, a conurbation of nine: Guadalajara, Zapopan, Tlaquepaque, Tonalá, Tlajomulco de Zúñiga, El Salto, Ixtlahuacán de los Membrillos, Juanacatlán and Zapotlanejo. The Metropolitan Area of Guadalajara had 4,434,878 inhabitants in 2010 and it was estimated that in the year, 2013, it amounted to 4,641,511 distributed in the eight municipalities already indicated. That is to say, in an area of 2,734 km2, this amount yields a population density of 1,622 inhabitants per km2, being Guadalajara the most populated municipality with about 1.5 million *tapatíos* (INEGI, 2010). On the other hand, Juanacatlán stands as the one with the smallest population (Ramírez, 2013). See figure 2.

Figure 3.2. Total population and by gender of the Metropolitan Area of Guadalajara, 2011



Source: Elaborated with data from INEGI (2010).

Jalisco maintains population growth important, with persistence of population concentration in the MAG. This, along with the transition demographic in progress, will keep the window of opportunity of the so-called demographic bonus in effect, where a favorable relationship between the proportion of people in potentially older ages is maintained productive and the

ages of dependent people (children and older adults). This will be maintained by the next 15 years approximately (Hernández López, López Vega and Velarde Villalobos, 2013). In recent years, the presence of Central American migrants in Jalisco, especially in the MAG, has increased (fm4 Paso Libre, 2013). The migration of indigenous communities to the MAG that seeks to improve living conditions is high.

Zapopan registers the highest value of inequality with 0.465 in its coefficient and is in the fifth worst position in the entire state. On the other hand, the best metropolitan positions are occupied by the municipalities of El Salto with 0.355, Juanacatlán with 0.371 and Tlajomulco de Zúñiga with 0.395, all barely in the moderate levels of inequality. Regarding the total current income per average person and per municipality, in 2010 Coneval calculations indicate that the income in Zapopan, was the highest in the State of Jalisco, amounted to $ 4 681.

It should be noted that of the 10 most indebted municipalities in the country, two belong to the MAG in the State of Jalisco: Guadalajara, in second place; Zapopan, eighth, and Tonalá in tenth (IMCO, 2015).

The main economic activities in the Metropolitan Area of Guadalajara are the manufacturing industry, commerce, personal and maintenance services, as well as community and social services. The historical economic potential of Guadalajara, now strengthened with the municipalities of the conurbations, makes it consolidate as the second agglomeration of the country in terms of commercial exchange, one of the first in the volume of its industrial production.

The strategic location of the Metropolitan Area of Guadalajara, has led to the increase in recent years of the establishment of manufacturing companies with an electronic and cybernetic vocation. Circumstance that strengthens the productive structure of the Area, but that also becomes an important pole of attraction for young people from the interior of the state who day to day come to work in this place. It is important to note that 75% of Jalisco's industries are located in this area and this makes it the main center of economic activities in the state and even with interference in the west of the country (INEGI, 2010).

According to ProMéxico (2015), the MAG is considered the city with the greatest potential for attracting investments in Mexico. 9 700 000 m2, in eight corridors, make up the industrial market of mag. the export activities in Jalisco originate and are concentrated in five municipalities of the mag (El Salto, Zapopan, Tlajomulco de Zúñiga, Guadalajara and San Pedro Tlaquepaque). Regarding private tourism investment, which results from the total amount of investment in temporary lodging projects, recreational services,

foreign transportation and other tourism services, in the period 2008-2011 there was an acceleration driven mainly by the expectations generated by the celebration of the Pan Am Games in the MAG and five subsedes, with a significant slowdown in 2012 and presenting variable movements for the years 2014 and 2015 (5.24). According to the sectoral program, the MAG is the most visited in the state since it receives 47% of tourism, mainly for business reasons.

The regional equipment of the supply is within the urban fabric of the MAG which makes its accessibility and tends to create congestion both in its urban environment and in the accesses of the metropolis. The airport of Guadalajara is already sutured.

It is also noteworthy that the MAG has recently built and enabled infrastructure that has put the city on the map of international promoters and artists who see this city as an attractive market place. The MAG has public spaces for state and municipal arts and culture, as well as spaces promoted by private initiative and educational institutions. The Central region (MAG) has the largest number of universities and the largest offer of careers related to science and technology. In MAG there are 34 museums. The territorial distribution of the cultural infrastructure of Jalisco shows a concentration in the MAG: 28% of state museums are located.

To offer better safety conditions, mobility that requires physical activation of citizens, intensive work has been carried out in the conservation, maintenance and recovery of recreational public spaces such as the Solidaridad park and the Montenegro park. Work was also carried out in the construction of linear parks, as well as in the improvement of mobility in the MAG through the creation of zones 30 in the municipalities of Guadalajara and Zapopan, the expansion of the cycle path network and the start-up of the "Mi bici" program.

Some data of green space per capita and accessibility to open space (parks or squares), for the case of MAG, for example, based on the study Guadalajara Prosperous Metropolis, it is known that at present, the metropolis is not only deficit in green areas, but also in number of trees. Of the 9 m^2 / hab that the Organization World Health Organization (WHO) recommends, only 4.5 m^2 / inhab. It is important to highlight that intra-urban green areas allow to mitigate the damages caused by air pollution and noise, while avoiding erosion.

About the demand and supply of water in the MAG, until the 1980s the System Inter-municipal Water and Sewerage Services (SIAPA) managed endowments from 320 to 300 liters per inhabitant per day (l / inhab / day). The Lago de Chapala is the main source of drinking water supply of the MAG, since it

contributes 60% of the water that reaches the city. However, since 1991 it went into operation the Río Calderón system, Elías Gonzales Chávez dam and Calderón Aqueduct, the MAG has not incorporated an important source of supply. The supply has meant diminishing this allocation to levels of 240 260 l / inhab / day, associated with the demographic growth of the last 20 years, which means more than one million additional inhabitants compared to the present (Gobierno del Estado de Jalisco, 2016).

According to data obtained from the consultation with electronic urn made in the MAG, the urban mobility is considered as the second most important environmental problem, only behind water pollution (Gobierno del Estado de Jalisco, 2016). There are socio-environmental problems in the Lerma-Santiago Basin, loss of 552 ha in the Bosque la primavera (Spring Forest); shortage of water in the MAG; among others. According to the Sectoral Program for Water and Hydrological Reserves and with the information generated through the National Monitoring Network (RNM), the main Jalisco currents that show problems pollution, especially due to the presence of industrial zones and large urban areas, are: the Santiago River in the sections that adjoin the municipality of El Salto and integrated municipalities in the MAG, as well as in the section between the Las Juntas hydroelectric plant and the Derivadora Corona; El Río Verde in its portion near the Region Altos Norte, and again the stretch of the Santiago River bordering the tequila zone.

As much the MAG, as the rest of the average cities of the entity, they have followed an urban development model that generates an unsustainable mobility system. In MAG alone, the number of private cars registered in 1950 was 10,000, the equivalent to 45 inhabitants per car. By 1970 this figure had increased to 82,000 vehicles and for 2007, 1 426 027 units had been exceeded (Colectivo Ecologista Jalisco, 2013, page 12). As consequence has been registered during the last decades a greater density of cars by person, reflected with a shocking 7% annual growth rate sustained for more than twenty years (Gobierno del Estado de Jalisco, 2016).

In the MAG there is an overlap of public transport routes: a large number of them pass through the center of the city (up to 182 in only 600 hectares) causing low efficiency for the
excessive competition (Gobierno del Estado de Jalisco, 2011). To this must add the excessive number of stops and a disorderly growth of the system. On the other hand, except for unifying the capital letter for light rail, or lowercase for macrobus, the public transport maintains a poor administration of the service where the figure of man-truck (Consejo Estatal de Población, 2010).

The MAG has followed an urban development model that generates an unsustainable mobility system. Automotive vehicles of the AMG emit 1 450 000 tonnes of pollutants annually. the poor public transport service has caused the inhabitants acquire and make excessive use of private vehicles to travel. According to INEGI data, the vehicle fleet registered in the MAG went from 809 975 automobiles in 2000 to 1,868,269 in the year 2011, which represents a growth of 43.35% in the last eleven years. Also, in the year 2013, according to data from the Jalisco Atmospheric Monitoring System (follow), 96% of the emissions of atmospheric pollutants come mostly from private cars, which has a negative impact on air quality.

The accelerated growth of population centers, industrial activities, as well as vehicular park, have caused the increase of the concentration of pollutants in the atmosphere, which generates a problem of environmental health for the inhabitants, mainly in the MAG. The most polluting emissions come from a complex mix of sources from productive activities (industrial, commercial, services, livestock, etc.), the use of fuel in automotive vehicles, the use of certain chemical products used in cleaning, paints, and even that they come from natural processes, etc. (SEMADET, 2014). Mobile sources contribute mostly in volume to the generated emissions, consequence of the growth that the vehicle fleet has registered, particularly in the MAG.

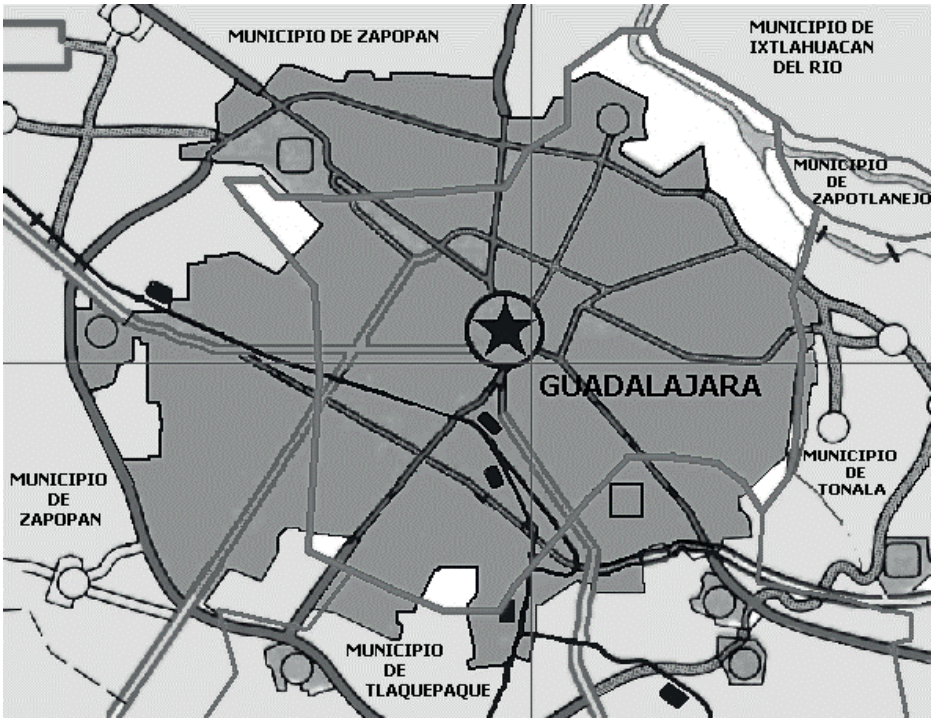
The MAG is one of the riskiest for its inhabitants, with approximately 1,200 risks, among which stand out: floods, subsidence displacements of earth and earthquakes; besides the coastal zone, which is usually affected by earthquakes, hurricanes and floods. These hydro meteorological phenomena pose risks to the health and heritage of the inhabitants, according to information from the Jalisco State Risk Atlas (Atlas de Riesgos del Estado de Jalisco 2009).

The growing urban sprawl requires new coordination challenges between the three levels of government that make possible the integral planning of the territory, the efficient management of public services and the full exercise of the rights of citizens, essential elements for governance and sustainable development of metropolitan areas. In this context, the identification of the number and size of the metropolitan area is of fundamental interest for decision-making, especially for the different sectors in charge of designing and implementing development policies with a territorial reference. It is important to point out that the Metropolitan Area of Guadalajara is not exempt from the contrasts that exist in the rest of the country and just as there are areas of full comfort, there are also others in which inequality and poverty prevail.

Guadalajara

Guadalajara is a city located in Mexico. It is the capital city of the Mexican state, Jalisco, and it is also the largest with a population of 1,495,189 recorded during the last census held in 2010 (INEGI, 2013). It is the 10th largest city in Latin America by its population and its name was given because of the existing soil in this city, with its translation from Spanish to English, "valley of stones." See figure 3.3.

Figure 3.3. Map of Guadalajara



In the 2010 census, the population showed more male residents with 52% of the population. The city has a literacy rate of almost 98% and the primary religion practiced is Roman Catholic, with 92.5%. Guadalajara has one of the largest economies in Mexico and has a major performance in commerce, services, and manufacturing industries. It has also been designated as one of the "Cities of the Future" because of its economic potential (World Population Review, 2018).

This city has not a constant population growth, but it is expected to be steady through upcoming decades (United Nations, 2018). In relation to the growth of the MAG, Guadalajara is losing population: in the first decade of the 21st century it did so at a rate of -0.93% year, and in the last five-year period it was 0.43%, which implies a reduction of 54% in the rate of population loss. From 1990 to date the population of the municipality of Guadalajara was reduced by 185 a thousand people (Gobierno del Estado de Jalisco, 2016). This in principle was because the urban sprawl covered almost the entire territory of the municipality. Additionally, it is associated with aspects such as the aging of its population, loss of habitability in central areas, and the model of horizontal and dispersed expansion of the MAG, among others.

Table 3.25. *Guadalajara Population Data (Urban Area)*

2018	5,068,000	1.53%	225,000
2015	4,843,000	1.74%	401,000
2010	4,442,000	1.78%	375,000
2005	4,067,000	1.78%	343,000
2000	3,724,000	2.10%	367,000

Source: United Nations (2018). World Urbanization Prospects - United Nations population estimates and projections of major Urban Agglomerations. ("World Urbanization Prospects – population Division – United Nations", 2018)

Guadalajara's 2018 population is now estimated at 5,068,000. In 1950, the population of Guadalajara was 403,000. Guadalajara has grown by 225,000 since 2015, which represents a 1.53% annual change (United Nations, 2018). However, over the last 10 years, Guadalajara has lost more than 200,000 inhabitants to suburban areas. The city center requires a repopulating strategy to achieve increased density. As people have moved away, the housing stock in the city center has also deteriorated. In some areas, many homes and buildings are either empty or in poor condition. Its climate is dry and mild except for the rainy season, which extends from July to mid-September.

Guadalajara maintains a predominant tradition in commerce as the main distribution center towards the west of the country. It is also one of the tourist centers of Mexico that register a greater number of occupied rooms.

In electronics, it has an Intel Guadalajara Design Center (GDC, for its acronym in English) in the city of Guadalajara, besides transnational companies in the industry of components, EMS, computing and office, among others (ProMéxico, 2015). the Software Center in Guadalajara, which brings together 35 companies and 700 IT professionals (Foro Consultivo Científico y Technological, 2014). Likewise, the Sectoral Program of Infrastructure and Public Works prepared in the year 2014, based on the Urban Development Plan Project of the Metropolitan Region of Guadalajara, notes that the lack of intermodal supply and distribution equipment properly connected to the regional and metropolitan corridors constitutes an important lack of the metropolitan region of Guadalajara, impacting competitiveness.

Guadalajara is also known for being a cultural and technological center (World Population Review, 2018). Recently, the Council for Metropolitan Development of Guadalajara, approved for the period 2016-2018, an investment of 3 100 million pesos, equivalent to 77%, of the Metropolitan Fund to be allocated to 36 green projects related to the following areas: non-motorized mobility and urban landscape, trunk corridors, dissuasive transfer modules.

The city needs a comprehensive vision to tackle inadequate public transportation services. The current public transport system encourages the used of automobiles, which has led to saturated insufficient road networks (WBCSD Urban, 2013). The perception of the city is mostly insecure and has problems with violence. This is the result of multiple and complex factors like poverty, low educational coverage, marginal social benefits, lack of employment and limited local opportunities. In addition, community facilities are inadequate and in poor condition (WBCSD Urban, 2013).

According to estimates of the National Institute of Ecology and Climate Change (INEEC, 2010), in the MAG produces 1.3 kilograms of solid waste per person per day, just below the averages of the cities of Mexico and Monterrey. Currently, the city disposes of most waste without recovering any of its inherent value, losing significant potential for value creation. In addition, there is no adequate infrastructure for waste segregation.

The municipality of Zapopan

The municipality of Zapopan belongs to the Central Region of the State of Jalisco and it is part of the Metropolitan Area of Guadalajara. Its population in 2015 according to the Intercensal Survey is 1 million 332 thousand 272 people; 48.8 percent men and 51.2 percent hundred women, the inhabitants of the municipality represented 27.2 percent of the regional total.

Table 3.26. ***Population of municipality of Zapopan in 2015, IIEG, 2016***

Total	*Percentage in the municipality*	*Men*	*Women*
1,332,272	100.00	649,671	682,601

Source: IIEG (2018). IIEG, Instituto de Información Estadística y Geográfica del Estado de Jalisco based on INEGI, censos y conteos nacionales, 2010-2015.

Comparing the estimated population in 2015 with the population in 2010 it can be perceived that the population increased 7.1 percent in five years. It is estimated that in 2020 this population will increase close to 1,414,972 habitants. Nowadays 689,327 million are men and 725,645 are women, representing 16.92 percent of the total population of Jalisco. In 2010 the municipality counted in total 234 localities. The municipal city of Zapopan is the most populated locality with 1,142,483 people, representing 91.9% of the population, followed by San Francisco Tesistán with 5.0% , "La Venta del Astillero" (Sale of the Shipyard) with 0.5%, "Fraccionamiento Campestre Las Palomas" with 0.4% percent and "Nextipac" with 0.3% percent of the municipal total (IIEG, 2018). Also, Zapopan has had a considerable increase of 67.9% in indigenous population from 2000 to 2010.

According to the Municipal Human Development Index in Mexico (IDH) in Jalisco, Zapopan is the municipality with greater human development in Jalisco, with an IDH of 0.816. His municipality of Zapopan registered the highest education levels in 2012 with 10.4 years as the average. Zapopan also has the lowest education gap (28.6%) and follows Guadalajara in concentration of the enrollment with 27.0% (Gobierno del Estado de Jalisco, 2016). Also, in 2015, life expectancy in Jalisco was of 75 years old; 73 for men and 78 for women (IIEG, 2018).

Most of the existing buildings have electricity, but only a few have access to piped water and drainage. The constructions are made with timber, concrete, bricks and adobe. The municipality offers public lighting services, markets, trails, parking lots, cemeteries, roads, public toilets, public security, traffic, parks, gardens and sports centers. Regarding basic services, 94.8% of the installed infrastructure has potable water, 96.9% of sewage and 98.9% of electric energy.

Most of the municipality of Zapopan (85.4%) has a semi-warm climate, half damp. The average annual temperature is 20.5 ° C, while the maximum and minimum average oscillates between 32.1 ° C and 8.4 ° C respectively. The climate of the municipality is temperate, semi-dry, with dry winters and dry springs. It is semi-warm with benign winter; it also has an average annual temperature of 23.5° C, and an average annual rainfall of 906.1 millimeters with rainfalls from June to October.

The lands of the municipality are mostly composed from rocks, basalt and tuff. The dominant soils have Eugic Regosol, Haplic Feozem and chromic Luvisol. The predominant soil is the Phaeozem (Feozem) with almost 50.6%, and it is presented in any type of land relief. It has a dark, soft, rich surface layer with organic matter and a lot of nutrients. Most of the land is only used for agricultural purposes. The municipality also has three characteristic forms of reliefs. In a higher percentage the injured zones are formed by a height of 1,500 to 2,000 meters, following the flat and semi-flat areas. The main elevations of the municipality are: "Las Colinas de La Col" (2,200 masl), "El Tepopote" (1950 masl), "La Mesa del Burro" (1,700 masl), "El Tule" (2,050 masl), "El Chapulin" (2,000 masl) high (1,990 masl), "El Colli" (1,950 masl), "El Chato" (1,800 masl), "El Masahuate" (2,100 masl), and the Lobera with (1,900 masl).

The natural wealth of the municipality is represented by 11,400 hectares of forest, where pine, encino, creton, jonote, madroño, oak, oyamel and tepame predominate. Its mineral resources are deposits of marble, kaolin, feldspar, agate, tezontle, gravel and sand (clay). The vegetation of the municipality is conformed mostly by pine and encino; both species are in the forests of the municipality: "El bosque de la primavera", "Bosque de Nixticuil" and "Bosque del Centinela". The current fauna of the place includes 106 species of animals such as white-tailed deer, puma, lynx, coyote, gray fox, badger, hare and raccoon, among others. Nearly 137 species of migratory and resident birds have been identified and can be observed hawks, eagles, herons, thrushes, quail, roadrunners, woodpeckers, etc.

Local crops include vegetables, fruits and seeds like corn, sorghum, zucchini, tomato, chickpea, avocado, mango and plum. Poultry, beef cattle, pig, sheep, goat meat and hives are also raised. A great industrial activity is developed. Companies like: Motorola and Coca-Cola, among others. According to (DENUE), the municipality of Zapopan by 2015 had 49,543 economic units and its sectors showed a predominance of economic service units, representing 47.3% of the total companies within the municipality (IIEG, 2018). The municipality has important shopping centers, named Plaza Patria, Plaza del Sol, Plaza Bonita, Plaza Universidad, Plaza Mexico (one part), Plaza Antares, La Gran Plaza, SAM'S, Price Club, Wall- Mart, Plaza San Isidro. Financial, professional, technical, administrative, communal, social, personal, tourist and maintenance are provided.

Gross Domestic Product in 2015 was 889,703 pesos at 2008 prices. The per capita gross domestic product was 146,746 pesos (INEGI, 2015). The participation of Zapopan in the Gross Domestic Product in 2000 was 10630.2 (adjusted million dollars), which represented 31.9%, placing it in the second

municipality in Jalisco, only after Guadalajara with 43.6%. Zapopan is also one with highest index of wealth and income in the GDP of the State of Jalisco. Its urban panorama is made up of modern buildings and luxurious shopping centers, residential housing and green areas, that show the highest level in the metropolitan area. For the year 2013 intermediate consumption was 108,762 million pesos (Gobierno de Zapopan, 2016).

The Economically Active Population (EAP) represents 45.20% of the total population, that constitute 562,233 habitants, of whom, (96.49%) are employed and the rest (3.51%) are unemployed. 6,293 inhabitants are employed in the primary sector of the economy (Agriculture, Livestock, Forestry, hunting and fishing), 141,375 inhabitants in the secondary sector (Mining, oil and gas extraction, manufacturing, electricity, water and construction) 388,48 work in the tertiary sector (Government, transportation, commerce and other services). And the remaining 6,781 inhabitants do not specify the sector to which their economic activity belongs (Gobierno de Zapopan, 2016). The number of insured workers also increased this year, where IMSS reported a total of 327,641 workers newly registered, representing in 55,025 more insured workers compared to the same month in 2012 (IIEG, 2018).

The municipality has air transportation, with a military base that receives airplanes DC-9 and the airport "La Cebadilla", which is a particular property able to receive airplanes. Near Zapopan is the International Airport of Guadalajara Miguel Hidalgo y Costilla for the public air service which is located 50 minutes from the municipal center. The land transportation to the municipality of Zapopan is done through the Mexico-Nogales, Guadalajara-Saltillo and Guadalajara-Barra de Navidad roads. It has a network of dirty and paved roads that communicate to localities.

Because of its importance, the highway that connects with the north of the State of Jalisco with the State of Zacatecas stands out. Rail transportation is carried out through the Guadalajara-Nogales line of the "Ferrocarril Del Pacífico" system, only for cargo movement. Through the municipality passes the train called "Tequila Turístico" that goes from Guadalajara to the population of Tequila. See figure 3.4.

The terrestrial foreign transportation is done in direct buses for passengers concentrated in the terminals located in Zapopan, and other places such as Tlaquepaque and Tonalá in the Metropolitan Area of Guadalajara. Urban and rural transportation is done in rental vehicles, private vehicles and buses. It also has a bus terminal which is next to the roundabout Emiliano Zapata, on the road to Tesistán. The nearest ports are Puerto Vallarta and Manzanillo both located on the Pacific Ocean.

Figure 3.4. Zapopan´s connection of roads, airport and railways

Source: Own elaboration.

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4. Bio-Economy and best-practice examples of Green Innovation Areas

In the following parts, best practice examples from the food and energy sector will be presented. Moreover, socially driven examples are described. Finally, three reference cases highlight specific aspects of goverenance or, respectively, from other countries.

FOOD SECTOR

One important part of the bioeconomy sector is food production. While many people would consider urban plant-based farming the first consideration in this segment, the examples displayed here stem from animal based production. Both are of interest as they are located inexisting urban areas respectively on former old industrial sites. The fist example, FRESH, a German example, shows that a potentially good and innovative idea might need a large amount of know-how and governance in order to be successful. The second one, Totem, a rabbit farm in Mexico, has a strong anchorpoint in a social movement of empowering citizens in their own nutritional improvements.

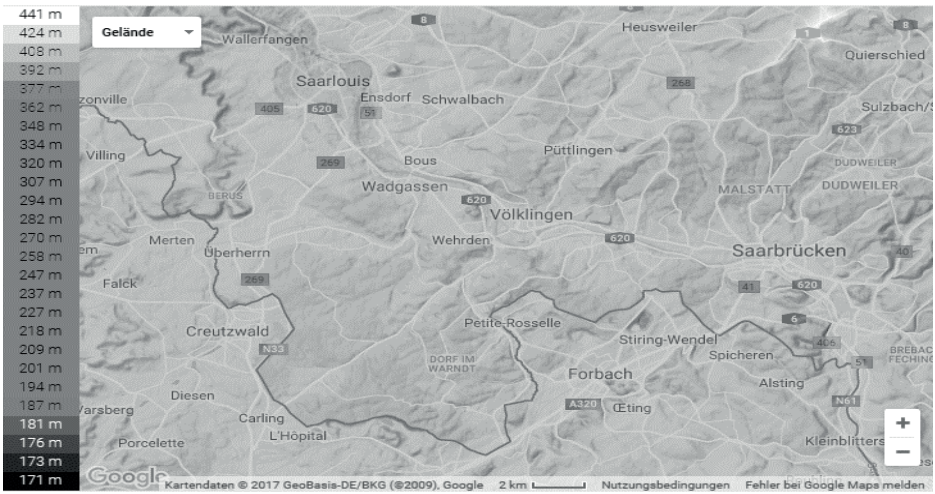
4.1. Fresh GmbH in Völklingen: Aquaculture

Jakob Schackmar, Patricia Hammer

Geographical Classification

Völklingen is located on the banks of the River Saar only a few kilometres from the state capital Saarbrucken. The districts of the city to the left of the Saar are part of the Warndt region and border France. The city of Völklingen is part of the regional district of Saarbrucken. Völklingen is excellently accessible by road, rail, air and water.

Figure 4.1. Topography of City Völklingen



Source. Topographische Karte Völklingen, n.d.

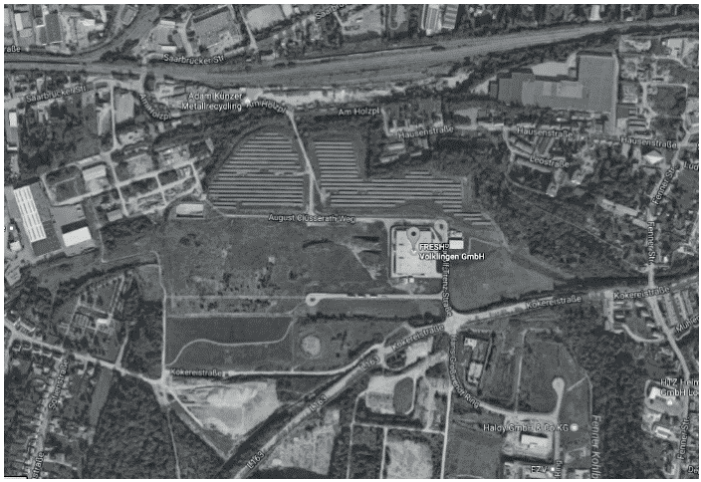
Topographical Classification

The city of Völklingen is characterized by the River Saar running through the city from the south to the north. The city is located mainly in the Saar valley and is bordered by hills. The lowest topographic point is the Saar itself at 182m N.N., the highest elevation reaches at 383m.

Urban and Overall Spatial Classification

FRESH Völklingen GmbH is located in the south-east of the city of Völklingen. The company, urban and residential areas are visible on the following maps:

Figure 4.2. Zoom in of the company FRESH in the city of Völklingen



Source: Googelmaps Fresh, n.d.

Fresh GmbH, Site Qualification

In an interview from March 2nd 2017, Peter Zeller, CEO of Fresh GmbH, explains that Fresh GmbH is the first of its kind, unique and with no comparable standards available. Almost 100 % of its electricity consumption is generated by solar-, wind- and hydropower. The aquaculture includes four large fish water pools and uses the resources in closed-looped biological purification carefully. The total area of the company Fresh comprises is around 10.000 m². The production area covers around 6.400 m². The Fresh Völklingen system is designed for an annual production of 500-700 tons of fish. The aquaculture company is located on the site of a former coking plant

in the city of Völklingen and runs on 100% renewable energy. The central location in Europe allows for short transport routes to customers. The site fulfils the standard requirements for developed industrial areas: electricity, drinking water supply, waste water connection, traffic connection and proximity to a conurbation.

Fresh can expand 30% on this site, even the construction of a second plant with 1000t capacity on an adjacent site would be possible. Some expansion projects are already in a planning stage.

This plant is uniquely designed and thus cost around 25 Mio. Euros (including start-up costs of around 3 Mio. Euros). A second plant with a production volume of 1000 tons of fish annually would cost about 15-18 Mio. Euros (excl. start-up costs, see before). An amortization is expected to be reached after about 8-12 years. The Earnings Before Interest and Tax (EBIT) of this current plant is reached in 2018, so Peter Zeller.

Production Cycle of Fish:

The different produced fishes need before selling the following days to reach the adequate size: *a)* Gilthead / Sea Bass > 380 - 400 days to 400 - 600 gr. *b)* Kingfish > 350 - 420 days for caliber 3kg - 5kg.

Planning status & zoning

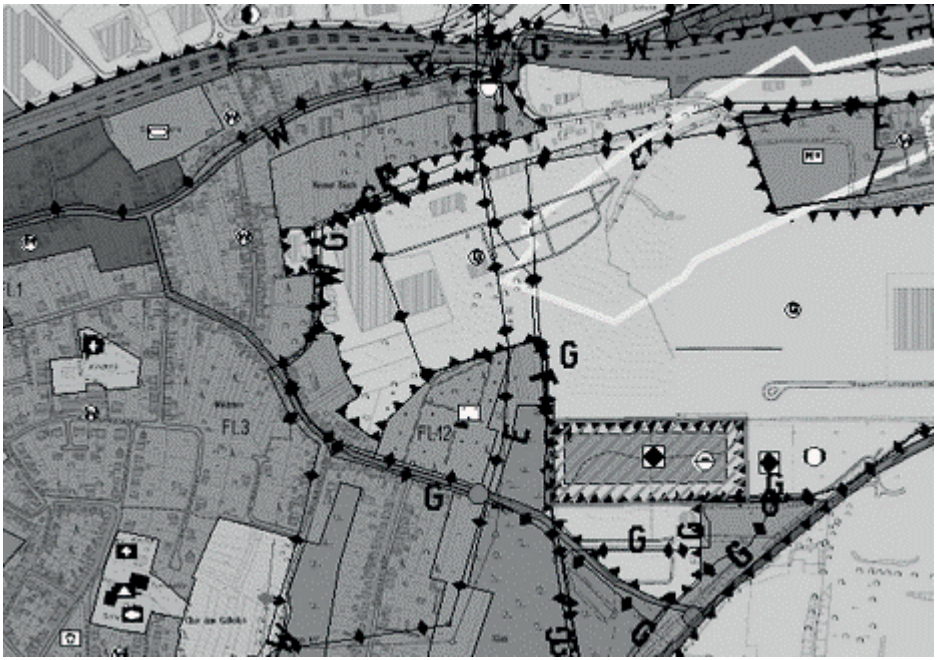
The following map shows the zoning as layd out in the city's land-use plan, more exactly the business park/ industrial park commercial area (Gewerbegebiet) of the Fresh GmbH (Flächennutzungsplan, 2012).

Connection by Road, Rail, Air and Water

Völklingen is very well connected: The federal highway 620 (Saarlouis-Saarbrücken) and the Bundesstraße 51 (Bremen-Saargemünd) connect the city to the regional road network. Both federal roads run parallel to the river Saar in the north-south direction. Public transport is operated by buses, mainly by Völklingen transport companies. There are connections, for example, to the adjacent Warndt, to Lebach, Püttlingen and Bous. The former tramway in Völklingen was shut down in 1959 and replaced by a bus system in Völklingen between 1950 and 1967. For years, however, the reconstruction of a rail-bound public transport system has been planned, according to which the Saarbahn is to travel through the inner city via the Deutsche Bahn railway line to the Völklinger Hütte.

Access road to the FRESH Völklingen site is Kokereistreet which is a state street (L 163) and thus a regional connection road.

Figure 4.3. Zoning map of the company Fresh



Source: Flächennutzungsplan, 2012.

Accessibility of Markets & Customers

Through sufficient connection via rail, road and ports, markets are well accessible. The State of Saarland forms a market of approx. 1 Mio. inhabitants. In addition, the border region of France, Region Grand Est, counts 5,56 Mio inhabitants (Wikipedia, 2015), the State of Luxemburg has 604.000 inhabitants in 2018 (Statista, 2018) and the German State of Rhineland- Palatinate counts approx. 4,05 Mio inhabitants. The Metropolitan Rhine-Neckar Region which connects to the State of Baden Württemberg is also close.

The location of the FRESH Völklingen company has a strategic access to the markets of Germany, Swiss, Luxemburg and Italy. Cooperations are being extended to further markets.

Restrictions of the Area

The zoning area of the Fresh Völklingen is a "Gewerbegebiet" (commercial area). In Germany, this is regulated in § 8 of the Baunutzungsverordnung (Building regulations law of zoning). According to this regulation, commercial enterprises of all kinds, warehouses, storage facilities, public enterprises, commercial, office and administrative buildings, petrol stations and sports facilities are allowed land uses in commercial areas. Usually, residential areas are prohibited in this zone.

The boundaries of a commercial area are defined by an urban development plan. Restrictions on the nature of the trade are limited by the fact that particularly disturbing enterprises are only allowed if they are in accordance with noise emission regulations of the commercial area. These orientation values are 65 dB per day and 55 dB at night. Thus, a commercial area differs from an industrial area in which higher noise levels are allowed. Similar regulations also include exhaust of fumes and other harmful emissions (BauNVO, 2016).

Emissions

The Fresh Völklingen Company does not cause emissions such as: *a)* Noise (indoor production of fish). *b)* Exhaust of harmful fumes (Use of electricity through solar panels on roof and power grid connection, no combustion of fossil resources)

Thus production at Fresh Völklingen does not contribute to air pollution. Except for the related shipping traffic to and from the production plant.

Existing Buildings

The pictures (fig. 4.4) show the development of the site from a former coking plant to the aquaculture company Fresh. Pre-existing buildings have been demolished.

Conversion or Demolition

For building the company FRESH, no pre-existing buildings were reused. All formerly existing structured were demolished . There are no other buildings/ uses on the site.

Figure 4.4. Development of Project Site

Source, Date.

Soil Contamination

The pre-existing contamination of the 37, 5 hectare site was due to 40 years of coking plant works. It was cleared by Gewerbeansiedlung Völklingen GmbH (GAV), a company owned by the City Works of Völklingen Holding GmbH. The coking plant stopped operating in 1999 and was demolished shortly after. The contamination of soil and subsequently water ways running through the property were cleaned up until the GAV bought the land in 2007/2008. The site was buildable by 2008 and this process took almost 8 years (Stadtwerke Völklingen GmbH, 2007).

Jochen Dahm, the Ex-Mayor and Managing Director of GAV highlights that the aim of the clean-up operation was the protection of the environment with the greatest ecological benefit. At the same time, the costs had to be economically viable. This goal has been achieved (Stadtwerke Völklingen GmbH, 2007).

Restrictions for Further Development

The site has been cleared from all contamination. Therefore, considering the soil, there are no restrictions on the use of this property. The restric-

tions on further usage are determined by the regulations of the development plan.

This plan states that a commercial or industrial park may be build. Restrictions are on emissions (cf. section emissions).

The Fresh Völklingen GmbH is not restricted due to its indoor production facilities and the absence of mayor emissions such as noise or combustion residue.

Costs for the Rehabilitation of the Soil

The goal has been achieved to keep costs economically viable. Unfortunately, no depiction of costs could be found. Even though it was a project with financial support from the EU within the framework of the program INTERREG III A (Stadtwerke Völklingen GmbH, 2007).

Real Estate Prices and Land Value

Approximatively land value in reference to the official website of the German Ministry are 18€/m² at the Fresh Völklingen commercial zone site (Ministerium für Umwelt und Verbraucherschutz Saarland, 2014).

State of Saarland: The purchases recorded between 2010 and 2015 (undeveloped land) ranged from € 5.0 / m² up to € 216 / m². There are multiple reasons for that: location, connection to roads and markets, size- possible extension etc. In reference to an Interview with Christian Schreiner from the Regionalverband Saarbrücken, the country-wide average over the years was approx. 36.5 € / m² and the median was at 28.3 € / m².

SWOT "Aquaculture - Völklingen"

This section offers insight into the strengths and weaknesses of the project FRESH.

Based on the analyzes, some conclusions can be drawn here: This factory fulfills the initial objectives of the Stadtwerke Völklingen. It produces fish as a new resource and created new jobs. This innovative way of producing works well and is continuously improved. Since the sale of the fish factory from the public services to a private investor, it is operated more efficiently. Moreover, this pilot project has the potential, based on low site qualifications to be built anywhere in the world. However, the development history of bad management is still present as significant errors happened in the beginning.

Table 4.1. ***SWOT-Analyse Aquaculture Völklingen, Draft:own representation 2018***

Strengths	*Weaknesses*
Ecological, local production of Fish, short distances = low CO2 balance as import goods **Reuse of industrial land** on a former coking plant area **Good connection** to regional markets and within Europe = Accessibility to markets **Innovative engineering**, worldwide first saltwater-Aquaculture onshore Constant **further development of the system**, high innovativeness of the company Fresh Private economy **runs the factory profitable** (EBIT Begin 2018) **Site qualifications** of the factory relatively **low**, can be built nearly everywhere Supply with **100% renewable energy** Fish farm has **space for expansion** Employment **hardly threatened by industrial automation** Fundamental part of the growing **urban farming- market** **Represents the future for food security**, because the worldwide demand of fish and overfishing increase	**In the starting phase no professional management**// g**overnance** /project development Weak capacities of the public sector**/ less flexible and business oriented than a private investor** **Construction delay** because of the design of a prototype **Lack of knowledge** during the planning and construction period **Stadtwerke Völklingen** were almost **insolvent** (approx. 20 - 22 Mio. € deficit) **High initial investment** of approx. 15-18 Mio. € for building another factory **High rate of academics** on staff, thus few jobs for local work force **Only 20 new jobs created** Small company, comparatively **few jobs** **Bad Image** due to mismanagement at the development stage **Highly specialised product**, no bulk good therefore high price
Chances	***Risks and Challenges***
City and Region active by promoting economic development **Skilled workers available** (through further education of potential job seekers) **Worldwide interest** for research and economic development & request for planning and construction of this system **Growing interest** for sustainable & top quality food on a g**lobal scale**	**Dependent on globalization**, offshoring possible in the future with a more profitable factory **No more financial support expected from the city** **Site not located in a metropolitan area** = smaller local market

Strengths of this factory are - among others - the creation of jobs on an industrial conversion site. This factory shows a better relation of jobs per m² than the former coking plant. For this reason, this conversion project can be regarded as a success. By transitioning from a city-owned to a privately operated business, the company runs more efficientsla and profitable. Thus the future of the company and the related jobs is secure. The first profits are expected at the beginning of 2018 (EBIT).

This saltwater aquaculture factory can be seen as an important instrument against the overfishing of the seas and the offshore aquaculture; it contributes to the growing demand of fish by protecting the environment, so Peter Zeller in 2017. Besides, the local and ecological fish production and the low CO^2 consumption are of importance. Imported fish usually has to be transported over long distances; this can be avoided due to the local production.

Based on the closed aquaculture system and the minimal consumption of resources, as the daily water loss of only 1%, this factory can be built almost anywhere. The company Fresh Völklingen has committed itself to constant innovation. Another topic for the future, which this factory investigates, is urban farming and a 100% supply with renewable energies. In order to be able to expand in the future, the company reserved properties in the neighborhood.

Main part of the weaknesses of this fish factory is the development- and construction history. Here, management errors occurred and the consequences of the construction of a factory of this size were underestimated. On the one hand, staff which did not have the experience and knowledge for creating a factory of this kind was in charge for management, and on the other hand, important financial miscalculations were undertaken. Moreover, the question occurs if a public service administration as the German “Stadtwerke” which primary duty is infrastructure supply should be in charge for this kind of project. This municipal energy supplier almost went bankrupt with this project because of enduring mismanagement. After the sale of the factory Stadtwerke had a huge amount of debts, approx. 20 - 22 mio. €.

The jobs created by FRESH are mainly occupied with academics. In the production, there are also jobs that are taken by former employees of the coking plant. Mmost of the employees of the factory hold a university degree. Therefore, it is not easy for the local population to get a job there. Moreover, in total only 20 new jobs were created. In relation to the large investment, this is a clear weakness.

The construction of a similar factory would include high initial investments of around 15 to 18 mMio. €. This would be with a capacity of 1000t fish per year, hence 300t more efficient than the prototype with a construction phase of 2-3 years. An amortization would occur after a period of 8-12 years.

A chance for the aquaculture lays in the favorable conditions of the spirit of the time for sustainable development and a use of technologies of the a bioeconomic sector. The international interest for bioeconomy in general, and urban farming in particular, will not decrease anytime soon, and there are vast demands to build this kind of factory in other countries. The sale of the patent or a broader development of aquaculture would both add value in the city of Völklingen. Thus the image of the project and of the city would be improved. Moreover, the impacts on the job market and the increase of the trade tax income of the city would be fuelled.

The employment situation is coined by two components, on the one side the high unemployment rate of 11, 1% and on the other side the lack of skilled workers, which deviates from the comparably low level of education . Based on the education level of the 2300 people seeking a job, one can say that more than the half of them do not have the necessary qualifications to enter the job market as they don't have the basic German educational certificates (for ex. the „Hauptschulabschluss"). The other part of the unemployed people could be employed after a job-related training, which could also be at the fish farm.

The area of the former coking plant is only to a small extent occupied by buildings. A further extension of the fish farm is possible as adjacent areas are already reserved for that. A possible future expansion could be done just in the neighborhood of the fish farm.

Another chance lies in the outreach to the city, which could make use of the economic development with the fish farm in its development strategy. Although, the city cannot provide any financial sponsorship due to its debts, it does supports a good economic atmosphere with guidance and counseling, underlines Peter Zeller in 2017.

One risk for the fish farm is a financial risk, which is hard to calculate. For instance, municipal taxes might increase based on the city's debts (per capita debt of 2500 euros, tendency increasing). Because of the demographic development of the city and the region the question arises how long enough skilled workers will be available for the economy.

The building ground of the fish farm demonstrates the challenges of a redevelopment project (long lasting rehabilitation of contaminated sites). Völklingen has several abandoned industrial areas wich could be converted into commercial real estate, but most of these areas are contaminated. This means that the costs and time required for site development and the preparation of the ground are not predictable.

Furthermore, the bad reputation of the fish farm due to bad governance of the development phase is one of the reason whys the fish produced here

is not sold in the region. Entering the local market is a challenge for the fish farm said Peter Zeller in 2017.

Finally, the attitude of the municipality and the business development corporation to be active and to support this project clearly shows an active role of the municipality when it comes to handling structural change.

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4.2. TOTEM Rabbit farm in Mexico

Lucia de Lourdes López Hernández, Jose G. Vargas-Hernandez, María Alejandra López de Lara González y Jesús Rodrigo Hernández Robledo

Totem. Organic Rabbit Farm, it's a project that focuses on working especially in marginalized colonies. Following we will define those zones located within the municipality of Zapopan that are classified as such.

Given this, equity is closely linked to the territory and can be analyzed from the distribution of opportunities and access to public services in the different colonies and neighborhoods of the municipality. Based on the Margination Index of 2010, given by COEPO, 15% of the colonies were identified as having a higher index of marginalization and a 15% lower index. (COEPO, 2012. *Desarrollo Humano.)*

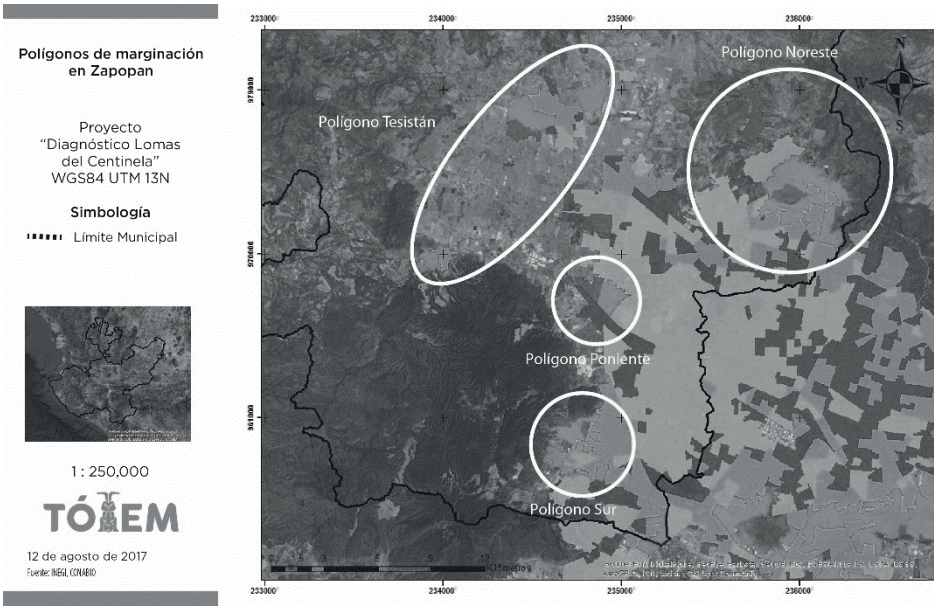
The following map shows the territory of Zapopan, with 4 main polygons where the colonies are concentrated with the highest index of marginalization: Polygon Northeast, polygon Tesistán, polygon west and polygon south. Totem is currently working in two colonies: "Lomas Del Centinela" and "El Rehilete".

Location / Size; Geographical Classification; Topographical Classification

Taking into account that "El Rehilete" colony does not have enough data to collect the information presented in some points described below.

Lomas del Centinela and El Rehilete are vulnerable colonies that are located to the northeast and west respectively of the municipality of Zapopan. Both colonies are in the limit of the periphery of the city being delimited by protected green areas like the Sentinel Forest in the case of Lomas and the Forest of the Spring in the case of El Rehilete.

Figure 4.5. Marginalized polygons, Zapopan, Jalisco



Source: INEGI, Conabio, 2017.

Both colonies were formed mostly from the migration of families who came from the countryside. That makes them irregular communities, the years of antiquity vary from 20 to 10 years according to the comments of the neighbors. Due to increasing of rural migration, the phenomenon of irregular settlement began to be fostered. These "irregular" subdivisions are located on the periphery of the city on generally communal lands invading, in some cases, the conurbated municipalities. By this mechanism, clandestine profiteers and promoters took advantage of the land by proffering them, at relatively low prices, to people outside the shared land (Latin America Housing Network, s.f).

Urban and Spatial Location

The characteristics, basic data of the "Lomas del Centinela" and "El Rehilete" colonies are shown below. Taking into account that this last colony does not have enough data to collect the information presented in some points described below.

Basic Data

Residents and Urban Integration

In this area the houses are built by the people that live there. They lack a firm floor and are mostly made of bricks. The houses consist of just one single room only with a division for the bathroom and it can be seen that the people in the colonies often have little or no education and have little socio-economic status, so, they struggle to find a job in order to provide money and sources for themselves. Also there is no efficient public health system so the inhabitants are in lack of access to pharmacies, private doctors or, in the worst case, are relient on self-medication.

Planning Status and Zoning

As stated by the partial urban development plans presented by the Zapopan Municipal Government, the following are specifically mentioned for the ZPN-02 "Arroyo Hondo" districts referring to "Lomas Del Centinela" and the ZPN-07 district "El Colli" referring to "El Rehilete". (Gobierno de Zapopan, 2016).

Partial Plan District ZPN-02 for: "Lomas del Centinela"

- *Polygons of potential development:* North zone of "Lomas Del Centinela" on the edge of the Forest.
- *Housing:* Conformed by a garden and multi-family horizontal construction.
- *Urban structure:* Located at the South conformed by regularized buildings and three neighborhood centers. This is property of the state and it's near "Bosque Del Centinela".
- *Current land use:* Located in "The Six Corners" used for commercial land, services, and agriculture.
- *Urban equipment:* There is only one church with institutional facilities in the neighborhood and one school with equipment at the north.

Partial Plan ZPN-07 for "El Rehilete"

- *Polygons of potential development:* Improvement (a popular place for informal trade in Arenales Tapatios).
- *Housing:* There are no registrations in the partial plan. Only small family houses are allowed.
- *Urban structure:* "El Rehilete" is an urban sub-center.
- *Current land use:* mostly housing, government warehouses and some minor selling activity.
- *Urban equipment:* There's only an elementary school and some churches.

Connection

This colony has only two routes that reach the downtown area which are called "The Six Corners", limiting access for people who live in the northeastern part of "Lomas". Both colonies are characterized by a lack of public services such as running water or waste water disposal. That is why some of the locals installed their own piping system obtaining water directly from the well. Waste water disposal is also a problem that affects both colonies because It is really common to see water from septic tanks or domestic wastewater running through the streets.

Both colonies, being part of the Metropolitan Area of Guadalajara, are close to public transportation routes. "Lomas Del Centinela" has difficulties and is more limited in its access in comparison to "El Rehilete". Both still have dirty roads and stone pavement.

Figure 4.6. Sewage channels and housing conditions in "El Rehilete" Zapopan, Jalisco

Source: Totem, 2018.

Area / Environment

Nowadays, there are no environmental regulations. As waste management is inefficient, many people opt for burning their waste creating more air pollution.

Due to the high altitude of Zapopan, water resources are not sufficient neither in quality nor quantity to satisfy the current and future demand. The overexploitation of aquifers and the presence of heavy metals such as arsenic, produced naturally or by pollution, requires taking other measures for improving the management of existing sources of clean water and taking care of the main problems of waste and pollution control.

Urbanization issues in Zapopan come with changes in land use. As areas have been assigned for residential purposes, the construction of big malls, buildings that offer specialized medical services and industrial parks. Formerly, these areas were vast land designated to the cultivation of maize and even wooded areas that were considered ecological reserves. Over the last decades, the changing economic structure of Zapopan has manifested itself in a transformation towards urban activities such as: housing, commerce, industry, services, etc.

Bioeconomic Approach of Totem

Totem is a social enterprise operating within the bio economical field of food, designed to fulfill the needs of the basic pyramid of needs through the implementation of a business model with a social impact. It is an innovative project that combines the direct participation of the community to support sustainability.

Dedicated to raise and produce rabbits, this farm will help the population having access to organic and quality animal protein at a low cost for people who live in vulnerable communities. It contributes to food security, improves the biological utilization of food consumption, its scope and distribution.

Figure 4.7. Logo of Totem Organic Rabbit Farm

Source: Totem, 2018.

Totem also wants to be a learning space for integration and cohesion for the community. This, will be practiced on the farm with the goal of bringing together people through workshops, environmental education, artisanal cooking, rabbit and horticultural therapy as well as hiring people who need it, providing them with a well-paid job and fair working days.

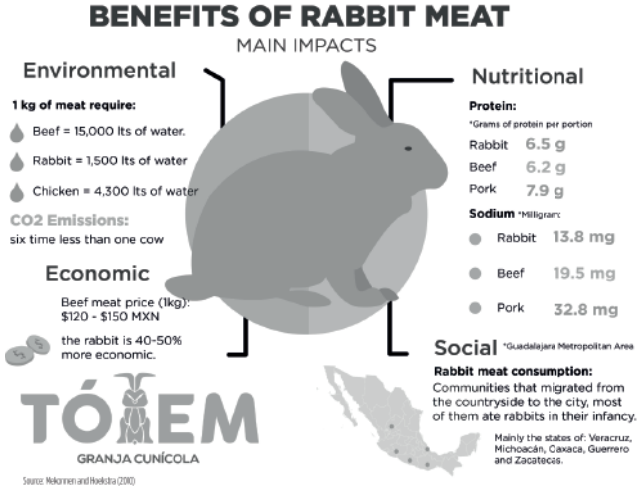
The production will be by a sustainable and organic scheme, with the implementation of various eco-technologies such as dry baths, solar oven, rainwater harvesting, bio-construction techniques and the production of food through orchards, gardens and a living pharmacy. This will be accomplished by closed cycles, resulting in a decrease of operating costs.

The main beneficiaries of Totem will be the families that are living in irregular settlements of Zapopan with high levels of vulnerability and marginalization. One of these settlements main characteristic is the lack of public services as they were established in unregulated or irregular spaces.

Most of the inhabitants of these settlements are migrants from the countryside, so the high prices of animal proteins on the market limit their access to this source, resulting in malnutrition problems and health issues.

Totem estimates that the price of rabbit meat per kilo will be between 40% and 50% cheaper than beef meat, and even with less sodium than pork or chicken, using a smaller amount of water for its production (15,000 L/kg of beef compared to 1,500 L/kg of rabbit meat).

Figure 4.8. Benefits of producing Rabbit meat



Source: Totem, 2018.

Totem is a social enterprise that seeks to reduce food inequality by way of implementing bio economics. Below, Totem's goals and objectives are summarized within the concept mission and vision of Totem.

The mission of this project is to offer food of excellence with high nutritional value, supporting the economy and local consumption through a sustainable process and its vision is to reduce food inequality through quality food production farms, ensuring availability and accessibility.

To achieve these goals and objectives, communities with similar parameters of marginalization were identified, alliances with institutional organizations and civic organizations working in the area created.

Figure 4.9. Sale of meat at El Rehilete and Lomas Del Centinela, Zapopan, Jalisco

Source: Totem, 2018.

In May 2016, the project participated in a Social Entrepreneurship Laboratory for six months. In this laboratory, Totem did some fieldwork in the "El Rehilete" colony. Totem observed different problems which had to be validated with the community in order to design a solution proposal.

Once the need was identified, Totem's project was enrolled in the "Challenge Impact Ideas of Socialab Mexico". The project won and was able to start its activities in February of 2017 with an incubation stage which lasted another six months.

Totem is working with other governmental organizations as well as other groups and non-profit associations on the following points:

Validation: Work with community, theoretical/practical workshops (good eating and nutrition pyramid, preparation of Mexican dishes with rabbit meat and closing of the session with feedback from neighboring participants).

Figure 4.10. Community fairs at Lomas del Centinela, Zapopan,

Source: Totem, 2018.

At the same time as the product was validated (meat tasting, sale channel, and the formal presentation of the product), the community was introduced with the sustainable scheme of the farm, the elements that will integrate it and the eco technologies used in the construction, i.e. "super adobe", dry toilets, and rainwater capture.

The aim was to show the population and people who visit the farm that it is possible to have a sustainable and decent home with the implementation and use of local and sustainable resources.

Also, the families will have access to vegetable gardens and a living pharmacy. They seek to recover some traditions that used to be passed from generation to generation and to acknowledge the importance of caring for one's own lands.

By emphasizing the origin and production process of their food, Totem can achieve that people consume healthier foods. By educating about nutrition, people are persuaded to reduce processed foods in their daily diet.

On the other hand, the correct use of medicinal plants as a preventive method for treating diseases of people and rabbits will also be taught. This project also aims to reduce violence through emotions management by practicing horticulture in the orchards.

The production of the farm will be based on ecological criteria and animal welfare, taking care of the way in which animal protein is produced; with this, Totem seeks to make visible the profitability of a sustainable company and begin to change certain paradigms in the market.

The conditions for the animal habitat are being planned considering certain characteristics. To achieve animal welfare, Totem will follow each of the housing elements and characteristics.

- The rabbits should be mostly ipaced in shaded areas, because they do not withstand the heat.
- Removing soil moisture by placing sawdust on daily basis.
- Allow free circulation of both light and air.
- Free light and air, but providing complete protection against rain.
- Drinking troughs
- Rabbits should have fresh and clean water daily.
- Cleaning and hygiene (The habitat should be cleaned and disinfected daily).

Rabbits need certain nutrients in their daily diet to grow, reproduce, and produce milk and therefore a big amount of meat, so the food must include fats, vitamins, proteins, and carbohydrates. The food given to the rabbits must be organic and only up to 30% can be out of a formula.

This matrix was elaborated with the different phases that are in the life cycle of the rabbits, referring to their stage of growth and their function in the reproductive cycle.

Table 4.2. ***Matrix with the stages of the rabbit***

Rabbit phase	*Fodder and vegetables (grams)*	*Water*	*Mixture of grains per day (grams)*
Baby rabbit from day 30 to 65	100-150	1/2 cup	50
Adult from day 60 to 150.	100-110	1 cup	50
Female and male / Dry or rest	100	1 cup	50
Female pregnant without breeding	150-200	1 cup ½	200-300
Female non-pregnant lactating	150	1 cup ½	200-300
Lactating and pregnant female	200	8 cup	200-300

Source: Martínez Castillo, Miguel Ángel (2004). Cunicultura.

Finding food that is free of agrochemicals is very difficult, that's why Totem is creating a bank of native seeds and is performing bromatological analysis. With this, the quality and quantity of nutrients from each seed can be ascertained thereby enabling Totem to measure the yield and the productive efficiency. Also, with research and experiments made in the area of multi-nutritional blocks, the necessary fiber and protein for the rabbits could be provided.

As a social company, the project seeks provide a new generation of jobs that offer training and employment to the people of the community that are being discriminated against, to people with motor or visual disability, to the elderly, etc.

To have a broader picture of the productive project in a specific con-

Figure 4.11 Experimental crops made of forage and maiz criollo (national corn)

Source: Totem, 2018.

text, it is important to consider groups of people that are being affected by the decisions and activities of the business. (Freeman and Reed, 1993).

The next table below shows the impact generated by Totem.

Table 4.3. ***Impact generated by Totem with the different actors involved. (Totem graphic)***

Actor	*Form of Impact*
Customers	Access to animal protein, decrease in food inequality.
Shareholders	Generation of social impact, with economic remuneration.
Society	Changing paradigms of well-being and quality of life through the implementation of eco-technologies.
Government	Inter-sectoral action for the reduction of food inequality through private investment.
Suppliers	Fair and dignified treatment in the acquisition of goods, prioritizing the care of the environment.
Employees	Fair labor days, gender equity and well-paid salary.
Environment	Creation of closed cycles with principles of circular economy, to reduce, prevent and eradicate negative externalities.
Owners	Corruption-free, transparent society.

The clarity in the policies and mechanisms, guarantee a good internal operation of the organization, the members and the population involved.

The following table shows the elements that are been taken into consideration for the organizational mechanisms inside the equipment.

Table 4.4. ***Organizational mechanisms in the team***

Clarity of functions	**Each of the partners will have their role and function within the rabbit farm, these will be** assigned or taught once every six months to learn what each one does and value it.
Monthly Activity Plan	In each first week of the month realistic goals and assignment of activities to be fulfilled will be set recognizing the priorities.
Evaluation of Activities	Exposure of results, feelings, thoughts and learning experiences, with the aim of using difficulties as opportunities to grow.
Methodologies	Systematization of Experiences, 2. Popular Education Techniques, 3. Smart Tool and 4. Self-evaluation, Self-regulation.

Source: Totem graphic.

The organization proposes the following mechanisms for the incorporation of the subjects for the institutional work.

Table 4.5. ***Internal organization***

Query for decision-making	The decision making is done by consensus respecting everyone's opinions and feelings.
Institutional Culture	There are two legal representatives for external associations, but it does not mean that the voice of other colleagues is not valued.
Ethical Principles of the organization	The project is meant to be a model for replication in other farms, not a mass production company, its goal is not to promote exploitation and industrialization, it also promotes fair and participative working days. It recognize the dignity of the people and respects their freedom and privacy. This project does not discriminate against any person and it does not use the name or resources of TÓTEM for any personal benefit.

Source: Totem graphic.

The indicators for the development and monitoring generated from the interaction with Totem are shown down below.

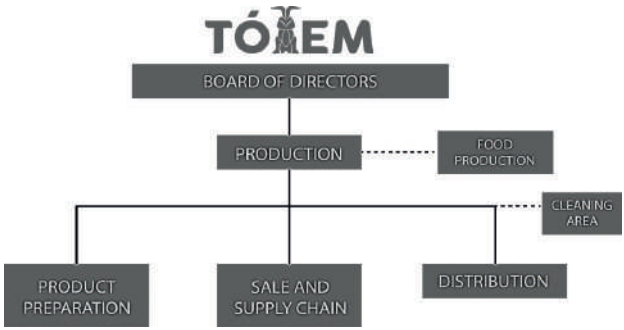
Table 4.6. ***Population benefited***

Changes in people's lives	**Totem strengthens the people** it works with, respecting their decisions, feelings and thoughts.
Methodologies	Lean Startup Method: Goal Circle, Design Thinking, Empathy Map and Value Map
Quantitative Indicators	Indicators of nutritional status: Lower rates of malnutrition in the colony, decrease of diseases and the improvement of cognitive development Indicator of social cohesion: Neighborhood participation Economic indicator: Accessibility of animal protein Environmental Indicator: Decrease of garbage in homes and home gardens
Qualitative	Environmental Indicator: Decrease of garbage, reuse of materials and objects and greener streets. Composters: A photographic collection developed every 6 months. Systemic indicator: Decrease in stress levels through rabbit breeding Perception of neighborhood trust.

Source: Totem graphic.

The people required for the implementation of this projects are shown in the organization chart below.

Figure 4.12. Totem organization chart



Source: Totem graphic.

The company has external financing, mainly seed capital, that the members received from the program "Ideas de Impacto" which was managed at the national level by Socialab Mexico, the Secretary of Innovation, Science and Technology of the State of Jalisco and the bank Citibanamex. Those resources came from two sources: The $80,000 MXN prize for seed capital that Totem received from Citibanamex after the project was selected winner, and another $80,000 MXN, that were collected by a crowd funding campaign on Donadora, resulting in a total amount of $160,000 MXN. Those resources are intended for the project's validation and creation.

Totem will start with selling rabbit meat to the communities that the project has been working with. The unit of measurement for production will be one rabbit, where this channel is between 1,000 and 1,200 grams in weight ready for sale and with a starting price of $65 to $70 MXN.

In a second stage, the rabbit meat will be sold to a high market segment, under two defined impact models: products with proportionally escalated costs (product costs vary depending on the market); and the "one by one" model (our high segment consumers could sponsor the product for the benefit of people and communities in need).

With the income generated by the sales, Totem will be looking forward to subsidizing the cost of the rabbit meat for the communities and achieve a price of $50 MXN a kilogram of meat.

Totem will be located on the outskirts of the ZMG, inside or near the colonies with which we work. Nowadays, the land is being managed along with Strategic Projects of Zapopan in the colony Lomas Del Centinela. The reason for this location is that when boosting consumption and local trade it is essential to be located near the colony, making alliances with local merchants and offering the direct product on the farm.

The main beneficiaries of this project will be: women, housewives and part-time employees from around 45 years old, who live in irregular settlements located in the municipality of Zapopan, Jalisco; mostly lacking basic services in their homes, such as light, drinking water, drainage, among others. Most are families who migrated from the countryside to the city in search of a better chance of life. They buy meat at least once a week. When they cannot buy meat they opt for giblets and junk food. They are interested in the well-being of their children, and eat as healthy as possible.

With the consumption of the rabbit meat of Totem, our beneficiary will be able to: Increase the amount of food, reduce spending from 30% to 40%, get animal protein with higher nutritional value and at a lower cost.

In the development stage of this project, research of rabbits and documentation in the bio-economy field are made, market tests and prototypes for the inclusion of rabbit meat in the food pyramid in order to help improve the quality of peoples' life are made.

Having a totally validated market and all the knowledge to start the production, only the final management of the space will be left. That space where the Totem Farm will be located is being selected from six presented options.

As for the public perception, the members of this project began to detect the problem of low consumption of animal protein due to the insufficient income that families receive monthly. As a solution, it proposes consuming rabbit meat at low cost in contrast to other animal proteins, this is why a matrix of evaluation was made to make it cleared and emphasize the value and impact that this project has in people's lives.

Table 4.7. ***Final evaluation***

Strengths	Totem has a multidisciplinary team, which increases our conflict resolution capabilities that can be generated at the time of the company's operation
Opportunities	It also explores new markets that have not been exploited.
Weakness	The incorrect management of hygiene and safety can cause disease to rabbits.
Threats	The main threat is that other producers could lower the price, but wouldn't comply with bio-economics and the sustainable processes. Temperatures have been increasing which can lead to stress in rabbits and some disease.

Source: Totem graphic.

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4.3. Energy sector. Energy Park Mont-Cenis in the city of Herne

Sabrina Förch, Karina Pallagst

The energy sector is strongly tied with the intention of bioeconomy in supporting energy transitions from bewing fossil-based to more sustainable energy systems. The green innovation area characterized in this section displays an energy park created on the site of a former mining plant at Mont Cenis in Herne/Germany. This example is not only energy efficient in its architecture, but also in its energy consumption.

At first, the city of Herne was analyzed (see chapter 2.2), in the next step the focus will be on the project "Energy Park Mont-Cenis" which is located in the city of Herne. First of all, the location and the size of the project area will be analyzed. Subsequently the spatial connection regards traffic connections (roads, harbors, rails) will be determined and analyzed. Furthermore, the project area will be examined regarding the environment, the existing situation and existing contaminated sites and soil contamination. In the field of the environment restrictions in the form of existing legal provisions as well as emissions and particulate pollution are considered. In terms of the object of investigation of the contaminated sites, the initial situation of the soil contamination is determined and then the costs of the remediation are stated.

To get a first overview of the area and its location in the spatial context, a geographic and topographic, as well as the urban and overall spatial classification of the project area will be made. Afterwards the urban integration of the project will be further explained and the basic data and plan regulations will be examined.

Geographical Classification

The city of Herne is located in the middle of the Ruhr area of North Rhine-Westphalia and has an area of 51, 41 km². In the north Herne borders on Herten and Recklinghausen, in the east on Castrop-Rauxel, in the south on Bochum and in the west on Gelsenkirchen. Dortmund and Essen are the next two big cities. Both cities are about 20 kilometers from Herne.

Herne is also divided into the districts of Eickel, Herne-Mitte, Sodingen and Wanne. The project "Energy Park Mont-Cenis" was realized in the municipality of Sodingen, on the former colliery Mont-Cenis.

Figure 4.13. Location of the project area in Herne (without scale)

Geoportal Stadt Herne, n.d., Design: Own representation, Kaiserslautern 2017.

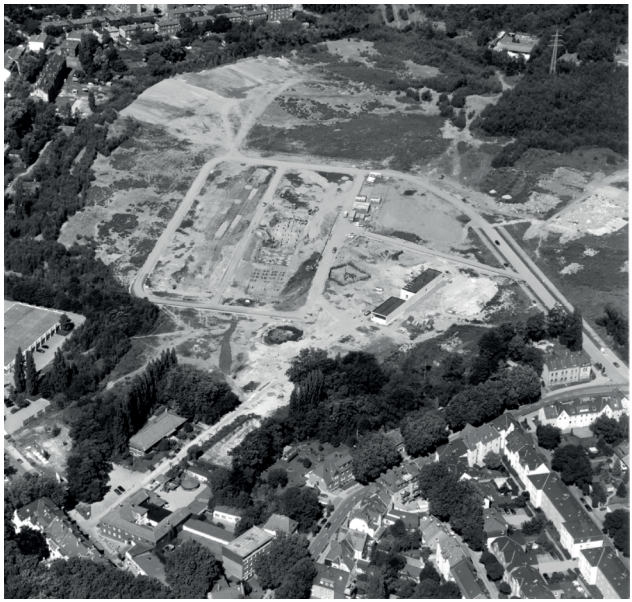
The former mine was named after the French Alpine Tunnel Mont-Cenis and was created in 1871 through the participation of French capital (Jourda and Hegger 2001). The project area is characterized above all by its central location in the Ruhr area, but at the same time also in the whole of North Rhine-Westphalia. In addition, the city of Herne and thus also the project area are located in the area of action of the International Building Exhibition of the IBA Emscher Park (Jourda and Hegger 2001).

Topographic Classification

The topography of the project area was largely determined by the former mine. However, after decommissioning the mine in 1978 and the subsequent demolition of the facilities, one can speak of a predominantly even topography. This was mainly due to the leveling of the surface and the backfilling of the shafts in 1980 (Ruhrgebiet Industriekultur, 2017).

The current topography is mainly characterized by the newly formed advanced training academy with a roof-integrated solar power plant and a park, cogeneration power plant for drained firedamp flow and the high-performance battery storage facility (Jourda and Hegger 2001). In addition, during the development of the energy park, a housing estate with approximately 250 households was built on the former colliery and in the striking distance of the advances training academy.

Figure 4.14. An aerial view of the development of the former coal mine in 1997



Entwicklungsgesellschaft Mont-Cenis 1999 (CD).

Urban and Overall Spatial Classification

The „Energy park Mont-Cenis" is centrally located in the district of Sodingen in the city of Herne. The energy park with the training academy, the cogeneration power plant for drained firedamp flow and the high-performance battery storage facility is connected via the Mont Cenis Square as well as via the Mont-Cenis road.

The training academy represents the core of the facility and finds its place in a glass climate envelope, which at the same time represents a solar power plant, since photovoltaic modules are integrated in both the glass roof and the south-west facade.

The academy was also built in an elliptical shape of the park grounds. Within the building of the academy are the district administration of the city of Herne, hotel facilities for the participants of the academy, a citizen hall, a casino, a gym for the participants of the academy as well as the training academy and its administration itself (Jourda and Hegger 2001).

The cogeneration power plant is located only a few meters to the east of the Academy. Here, mine gas is released from the former coal shafts and processed into three cogeneration units. At the same time this heat and electricity is generated, which in turn is fed into the public grid. The academy as well as the newly developed housing estate and a nearby hospital are supplied with the heat generated there.

The battery storage system has the task to provide the solar power even when no sun is shining. Thus, the power through the system is released only when needed.

Figure 4.15. Aerial view of the city district Herne-Sodingen (without scale)

Geoportal Ruhr, 2011-2017.

Regarding the urban integration, it should be noted above all that a new city center in Herne-Sodingen has been created through the reuse of the former coal mine.

As part of the revitalization of the mine, the Mont Cenis Square was realized as a new urban space, which connects the entire facility of the energy park with the district of Sodingen. The Mont Cenis Square is connected to the energy park by a large staircase. In addition, a new shopping center and a passageway with additional retail space have been created on the square.

The large staircase is also framed by two further buildings, which were built in the course of the new construction. Here, predominantly new residential units and service facilities, offices and practices, which are mainly located on the ground floor, were realized.

Figure 4.16. The staircase with adjacent buildings from the perspective of the academy

Own picture, Herne 2017.

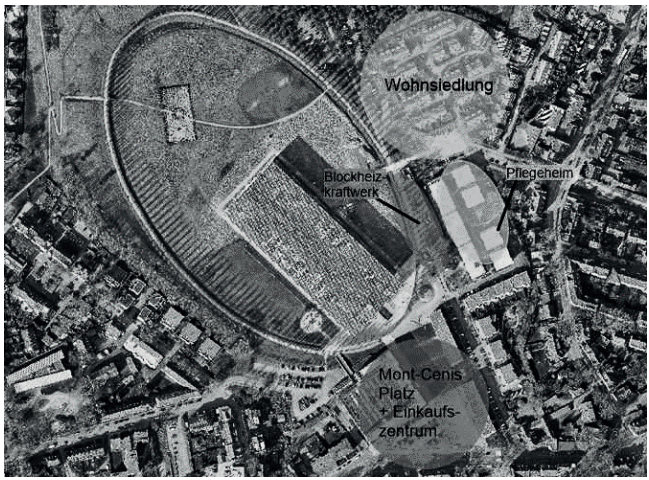
The glass training academy was also arranged in a large tree ellipse of poplars and thus embedded in the landscape and the adjoining forest. At the same time, the large ellipse represents an avenue (Joseph-Pierre-Monin-Weg) of one kilometer, which is used by walkers, hikers, athletes or cyclists (Jourda and Hegger 2001).

The park was additionally provided by a stone field and by blue points of light with artistic effects. The stone field was designed by the landscape artist Hermann Prigann and the blue points of light that lead around the avenue were designed by Mischa Kuball under the name "Oval Light" (Ruhrgebiet Industriekultur, 2017).

In addition to the development of the energy park, a housing estate with approximately 250 residential units, a day care center and a nursing home were planned and built adjacent to each other. The goal at that time consisted mainly in improving the quality of life of the residents. Within the new residential area, different forms of housing can be distinguished from lower-level

houses to terraced houses. However, urban residential forms are also represented within the housing estate (Jourda und Hegger 2001).

Figure 4.17. The academy with the adjoining new building (without scale)

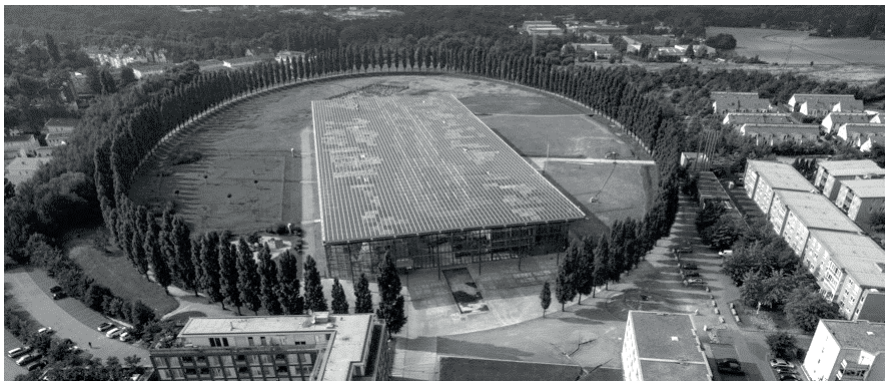


Geoportal Stadt Herne, n.d., Design: Own representation, Kaiserslautern 2017

Basic Data

The Energy Park Mont-Cenis is composed of both the microclimate shed, which is the training academy of the state of North Rhine-Westphalia, and the cogeneration power plant and the battery storage facility.

Figure 4.18. The training academy Mont-Cenis



Stadt Herne, n.d.a.

The glass enclosure of the advanced training academy covers an area of 20,000 square meters and, with 3,200 integrated photovoltaic modules, is one of the world's largest roof-integrated solar power plants.

The photovoltaic modules supply both the entire building complex of the academy as well as the 250 newly created households of the housing estate. In addition, the photovoltaic modules produce environmentally friendly electricity and optimally distribute the light and shade of the building. The roof-integrated solar power plant generates around 600,000 kilowatt hours of electricity per year with a 1-megawatt peak output (Stadtwerke Herne, n.d.).

Within the building of the microclimate enclosure are a civic hall, a gym, the district administration of the city of Herne, a casino, as well as the academy and its administration. In addition, the building has a greenhouse atmosphere through pools and planters and at the same time creates a Mediterranean climate (Jourda and Hegger 2001).

The microclimate enclosure and the use of solar energy is saving approximately 18% of CO_2 emissions on a comparably air-conditioned building (Jourda and Hegger 2001).

The cogeneration power plant uses the mine gas which has been released into the atmosphere since the decommissioning of the mine.

Figure 4.19. The academy from the inside

Own picture, Herne 2017.

Every year, about 1 million cubic meters of mine gas, containing 60% methane, are released through the former mine shafts. The mine gas is used to

generate electricity and heat by means of three cogeneration units. The use and further processing of the mine gas prevents the outflow of methane and thus simultaneously contributes to climate protection (Jourda and Hegger 2001).

The block-type thermal power station generates around 9,000 MWh of electricity and 12,000 MWh of heat annually. The electricity is fed into the public grid and the heat is used by the Academy, the adjacent housing estate and a hospital.

The battery storage system is also part of the energy park. This has a capacity of 1.2 megawatts, an energy content of 1.2 MWh and also consists of 816 single batteries. The task of the battery storage system is to store the energy generated and, if necessary, for example, when the sun is not shining, release the energy (Stadtwerke Herne, n.d.).

Above all, the project stands for a symbol of structural change, as the former colliery was converted into a site for sustainable energy generation, further education and through the avenue at the same time for recreational activities, and was rebuilt. As a result, not only the city of Herne but also the entire Ruhr area was given an impulse. The "Energy Park Mont-Cenis" also makes a contribution to climate protection and has created an engine for forward-looking urban development for Herne (Jourda and Hegger 2001).

The energy park continues to provide indirect positive effects in the city. The municipalities' Herne latest project "Energy self-sustaining urban area", which is to be realized in the city in 2018, represents an innovative energy concept. Here, the newly emerging houses are to produce the required energy (electricity, heat and hot water) almost completely themselves. Ulrike Martin, the person in charge of the management of the building added in an interview done the 2nd of November 2017 that this should also be done by roof-integrated photovoltaic systems and a battery storage system.

The total cost of the entire "Energy park Mont Cenis" project, covering an area of 32,000 square meters, was around 57.21 million euros in 2002. The cost of building the academy amounted to 15.70 million euros. The district town hall with the citizen's hall and library amounted to 4.91 million euros, the climate envelope including the facilities cost 14.42 million euros and the cost of the solar system amounted to 7.82 million euros.

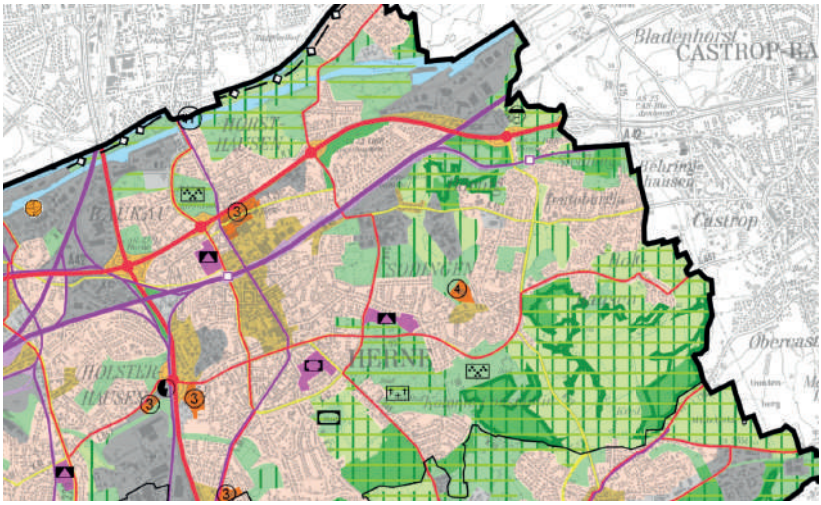
The total amount of the project consists of 42.85 million euros for building construction and 11.68 million euros for project development, renovation and urban development. However, the real estate sale of the housing estate generated proceeds of approximately € 8.18 million.

Ulrike Martin underlines in her interview on the 2nd of November 2017 that the constructed area of the project was 12,096 square meters and the undeveloped area was 15,527 square meters

Status of Maps

The Regional Land Use Plan of the Planungsgemeinschaft Urban Region Ruhr is relevant for the cities of Bochum, Essen, Gelsenkirchen, Mülheim an der Ruhr, Oberhausen and Herne. The area of the academy is specified as a special area or as a special area for universities, education and research. The Mont Cenis Square and adjacent shopping center are shown in the Regional Land Use Plan as mixed construction areas. The newly developed housing estate has been designated as housing area, thus as a general settlement area (ASB) (Städteregion Ruhr 2030, 2017).

Figure 4.20. A section of the Regional Land Use Plan (without scale)



Städteregion Ruhr 2030, 2017.

The development plan for the area of the project area specifies a traffic area of special purpose for the stairwell and the Mont Cenis Square. Mostly, however, "public green space" was determined according to §9 Abs. 1 BauGB. The area of the cogeneration power plant was also specified as a special purpose (development plan Mont-Cenis, Annex).

Connection

In this section, above all, the local and remote connection of the energy park and the training academy are examined. In particular, the connection and the distance of the next motorway junction, bus and train stops as well as the pedestrian distance will be discussed.

In addition, the location of the project area with regard to the accessibility of markets and customers is highlighted.

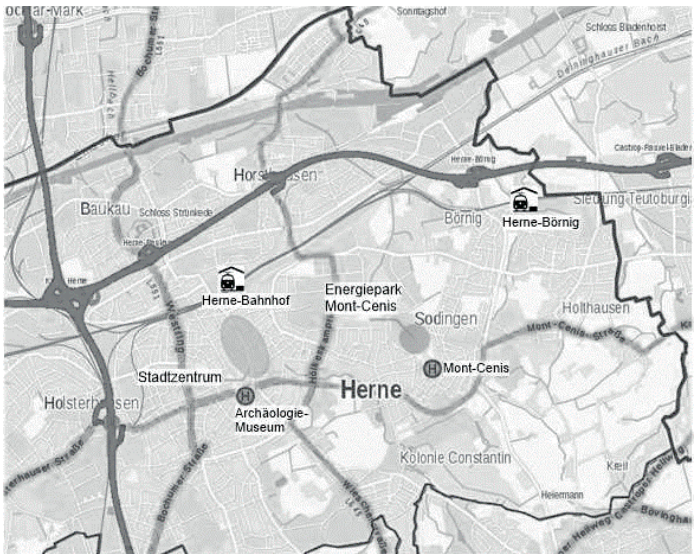
Connection by Road, Rail, Air and Water

The Energy Park Mont-Cenis and the Advanced Training Academy are perfectly connected by public transport.

The main road to the Academy is the Mont-Cenis street which connects the two districts Holthausen and Sodingen and moreover the Mont-Cenis-Place is integrated and connected by this road. The next Highway connection is the Highway A42 which is reachable within 7 minutes from the Academy. The federal highway B226 lies 15 minutes from the Academy.

The closest train stations are the train station "Herne-Börnig" and the train station „Herne Bahnhof". The Energy Park and the Academy are 7 minutes away by car and 27 minutes away by foot from the train station "Herne-Börning". The distance from the train station „Herne Bahnhof" to the Energy Park and the Academy is of 12 minutes by car, 40 minutes by foot and with the bus 311 every 10 minutes reachable in 20 minutes.

Figure 4.21. Overview of the most important train stops (without scale)



Geoportal Ruhr, 2011-2017, Draft: own representation, Kaiserslautern 2017.

Another possibility is the train station „Bochum Bahnhof" from which by the metro-line one can reach the Academy and the Energy park.

Every 10 minutes the metro-line reaches the closest station „Archäologisches Museum“, moreover the bus 311 stops at this station.

The city center of Herne is about 30 minutes away by foot and 10 minutes away by car. Moreover, the bus 324 reaches the city center, too.

Accessibility of Markets and Customers

Through, the perfect connection of the Ruhr area by streets, rails and ports the city of Herne located at its center possesses a good accessibility to clients and markets. North Rhine- Westphalia constitutes a market of approx. 17,8 millions inhabitants, in which the Ruhr area forms a part of 5,1 millions inhabitants. The city of Herne has a part of approx.. 160.000 inhabitants of this market.

The Energy Park supplies with energy the municipal energy supplier, hence the hospital, private residentials and the Academy benefit of this. The Academy proposes yearly for 23.000 participants from North Rhine-Westphalia seminars and training in different sectors. Ulrike Martin underlines in her interview done the 2nd. November 2017 that the seminars are mainly, in the field of human resources development, communication and cooperation, law, administrative management, press and public relations and methologitical skills.

In the next paragraphs, the legal regulations and restrictions of the project area will be dislayed, followed by an examination of the urban invovement from an environmentally relevant perspective and an analyse of the existing emissions.

Restrictions of the Area

Based on the regional zoning plan (German Federal Building Code) this area of the Energy Park (Advanced Training Academy, Solar power plant, Combined heat and power plant and storage facilities) represents in the German Federal Building Code a „Sondergebiet“ in German (§§2 to 11 BauNVO) a special area for renewable energy production. The new build housing area is in reference to the German Federal Building Code §4 BauNVO a residential area and the area of the residential care home for the elderly and the area of Mont-Cenis-Place is in reference to §6 BauNVO a area with mixed zoning (“Mischgebiet” in German).

The zoning plan Mont-Cenis (“Bebauungsplan” in German) gives regulations and restrictions in the field of noise prevention. In reference to §9 Abs.1 Nr.24 “Baugesetzbuch” the Federal Building Code noise reduction measures are fixed on the combined heat and power plant. Respective to the installation there are requirements for the walls, the used air outlets or the entrance

doors. As the area is of mixed zoning, compensating measures were taken in terms of plantings and removing pavement.

Figure 4.22. The cogeneration power plant of the Energy Park

Own picture, Herne 2017.

Urban Integration

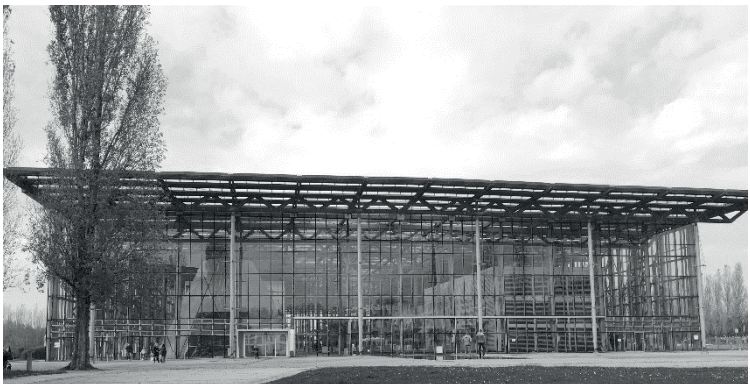
The Energy Park is in particular through the Mont-Cenis-Place well integrated in the City of Herne. The Energy Park connects to large green areas and the alley to the adjacent forest. The newly created residential area in the east is very well integrated in this area, such are the residential care home for the elderly, the kindergarten and the new buildings which frame the Mont-Cenis-Place.

The Mont-Cenis-Place, the new Shopping center as well as the service facilities, offices and doctor's office shape the new urban center in Herne-Sodingen. It was a „rebirth" for the city and for the Ruhr Area a future trend to a new energy policy. This project marks a symbol of the structural change because the city center which was lost by the closing of the coal-mine could be structured newly (Jourda und Hegger 2001).

Moreover, the Advanced Training Academy is very well integrated in the urban situation as festivals and events take place in the hall of the Academy.

The Joseph-Pierre-Monin-Way, along the alley, which goes one kilometer around the Academy is also daily used by the participants of seminars from the Academy, hikers or athletes in reference to an interview with Ulrike Martin's on the 2.11.2017.

Figure 4.23. The Advanced Training Academy view form the Mont-Cenis-Place



Own picture, Herne 2017.

Emissions

The Energy Park „Mont-Cenis" emitted neither noise nor air pollution as dust or odorous substances. On the contrary, the electric power of the co-generation plant of 1,5 Megawatt and with the resulting electricity and heat production, helps to avoid a yearly emission of 60.000 tons CO2. Moreover, by making use of the firedamp the discharge of methane is prevented.

In the project area, noise is caused only by the main roads as the Mont-Cenis-Street or the Sodinger-Street.

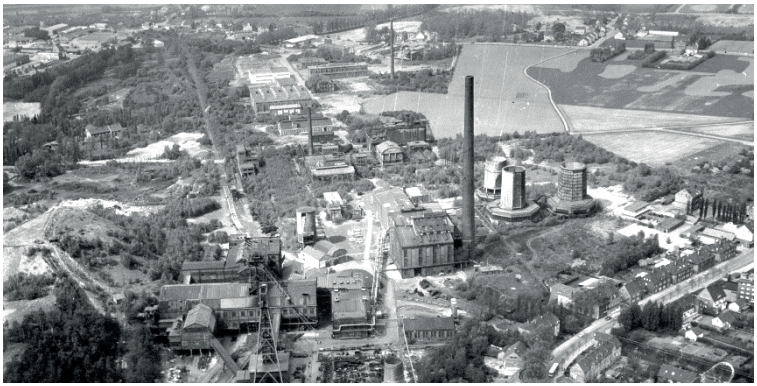
In the next part of the analysis the status quo will be described. In particular, the historic development of the existing buildings.

Existing Buildings

The coal-mine Mont-Cenis was more than 100 years the motor of the city of Herne and the urban district Sodingen. In 1978 the coal-mine closed and herewith the land became vacant as this area was cleared. In the following 10 years this fallow land was not in use. With an agreement between the city and the State in 1989 it was decided that an Energy Park with an Advanced Training Academy from North Rhine-Westphalia would be established in this location. In 1994 the regional development agency Mont-Cenis was created (Stadt Herne, n.d. b).

In 1995, this Agency bought this cleared area (of approx. 25 hectars) from the montane real estate company and started the redevelopment in the same year. Hence, the existing area was already cleared and the Agency „only" had to care about the soil rehabilitation.

Figure 4.24. The former Coal-mine Mont-Cenis



Entwicklungsgesellschaft Mont-Cenis 1999 (CD)

Figure 4.25. The Coal-mine Mont Cenis just before the construction of the Training Academy in 1997

Conversion or Demolition

All existing old buildings were demolished with the closing of the coal-mine and in consequence no one of the former buildings could be re-used.

Contamination

The following section describes the soil contamination and the restritions for further use for the new buildings and their costs.

Soil Contamination
After the closing of the coal-mine and the demolition of the existing buildings the area was abandoned for several years. This was caused by soil contamination from the former coking plant as well as a benzol and ammoniac factory. In 1989, after the agreement between the city and the Sate the restoration of this area set in from 1990 onward (Stadt Herne, n.d. b).

Here it became obvious that the area with the highest contamination was the location of the former coking plant. The rest of the area had only few contaminations. Rehabilitation measures were taken as change of the soil and shifting said Ulrike Martin in an interview on the 2.11.2017.

Restrictions for Further Development
Ulrike Martin underlines in an interview on the 2.11.2017 that after the discovery of existing soil contamination in the area of the former coking plant the polluted soil was encapsulateed with a plastic sheet to avoid any propagation. However, despite of this encapsulation this area could not be used for new constructions. In the front section of the coking plant the existing contamination was successfully removed, therfore the Advanced Training Academy was located in this part. The contamination of the residential area was cleaned up, too.

Costs for the Rehabilitation of the Soil
The total costs for the cleaning of the soil, for the project development and for urban construction were in 2002 of 11,68 millions Euros in reference to Ulrike Martin in an interview on the 2.11.2017. Moreover, this project was co-financed by the European Fund of Regional Development (EFRE).

Real Estate Prices and Standard Ground Value
As designated by the German federal building code, the area of the Energy Park is a „Sondernutzungsfläche“ (a area for special use) and in consequence no estimation of the standard ground value is feasible. In the part of the bordering residential area is a standard ground value of 220 €/m² (Boris Nordrhein-Westfalen, 2017).

Evaluation
The project „Energy park Mont-Cenis“, which was created in line with the Advanced Training Academy (“Fortbildungsakademie” in German) from the land North Rhine-Westphalia is very well integrated in the urban conditions as well in the city of Herne as within the entire Ruhr area. Especially the use on a former coal mine of renewable energy sources fosters a sustainable urban development. Furthermore, the image of a small and a structurally

weak city has enhanced through the creation of the new community center at Herne-Sodingen.

Another positive effect is the connection of the Energy park with a new housing area. Through the revenues crated by the real estate sales, parts of the project costs were covered.

The new trends regarding the second mine gas drilling or the energy storage batteries show moreover that the interest exists to improve constantly and increase the sustainability, the climate protection and efficiency of this area. These opens new possibilities of energy production for the future.

However, at the end of the 1990s the knowledge for the developing the climate envelope and the use of the coal mine gas as energy supply was low. Therefore today defects and technical problems appear (close the rooflight etc.). The development of a pilot project is linked to a lack of knowledge that often causes additional costs. Yet, only bagatelles had to be renewed or replaced, so Ulrike Martin in an interview on the 2nd November 2017.

Altogether, this project is very positive and therefore a good example for other vacancies on old industrial sites. This pilot project is characterized by the initiative „create something new", because at this time the use of renewable energies was a new and unknown field. Overall it is a best practice example of bioeconomic uses on vacant inner-urban sites.

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4.4. Socially driven examples. Urban Gardening Projects in the city of Essen

Carsten Miller, Patricia Hammer

The socially driven examples expand the classical bioeconomic sector towards the day-to-day lives and benefits for the inhabitants of a city, they crate benefits for civil society and cater to the needs of residents. These examples are attached to the food, energy sector, but their main focus is not an economic onbe, but it is genuinely social. For this reason, the project team and editors of this volume decided to frame several examples under the header 'socially driven examples'. The best practice cases presented here are the urban gardening projects in the german city of Essen, the Parque Agroecologico de Zapópan/Mexico, and the urban forest, Leipzig/Germany. All these examples are green, innovative, and to a high extent socially driven.

The city of Essen is located in the heart of the Ruhr Area with approx. 590.000 inhabitants that represent 12% of the total amount of inhabitants of the Ruhr Area. This city of about 210 km² has nine districts with 50 quarters, with an overall density of 2.800 inhabitants per km². The city of Essen is the second largest city of the Ruhr Area, the fourth largest city in North Rhine-Westphalia and the ninth largest in Germany. Behind the mega-cities London and Paris, the Ruhr Area is the third largest metropolitan area in Europe. Several corporations, services and trading companies are located in Essen (Essener Wirtschaftsförderungsgesellschaft mbH 2017, p 1.). In consequence, seven of the 100 top-selling German companies have their headquarters in Essen, for example: E.ON SE, RWE AG, ThyssenKrupp AG, ALDI Nord, HOCHTIEF AG, Schenker AG und Evonik Industries AG (Essener Wirtschaftsförderungsgesellschaft mbH 2017, p 3). Moreover, Essen is a university city and a trade fair town. The city of Essen is an excellently

connected hub and within the city the public services (underground, buses, trains) serve the entire city. Moreover, bike trails, pedestrian ways and pedestrian areas complete the city. In Germany, the urban development is based on different regulations such as the urban code ("BauGB" in German), the landscape code ("BNatschG" in German), emission code ("BImSchV" in German) and other specialised codes. There are European and national regulations and controls as well of the emissions of cars as for corporations regarding fine particulars in the air. Since the 60s, the air quality of the Ruhr Area improved immensely as the Ruhr Area underwent an economic transition as a former coal and steel production area.

In 2010, Essen won the European Capital of Culture award and in 2017, it held the title of European Green Capital. The title European Green Capital is awarded yearly for European cities that enact high environmental standards and proof willingness to follow a sustainable way of city development. Within the network of the prized cities, the European Commission is enabling the exchange of knowledge and good practice (City Essen, 2017).

Figure 4.26. Topographical Map of Essen

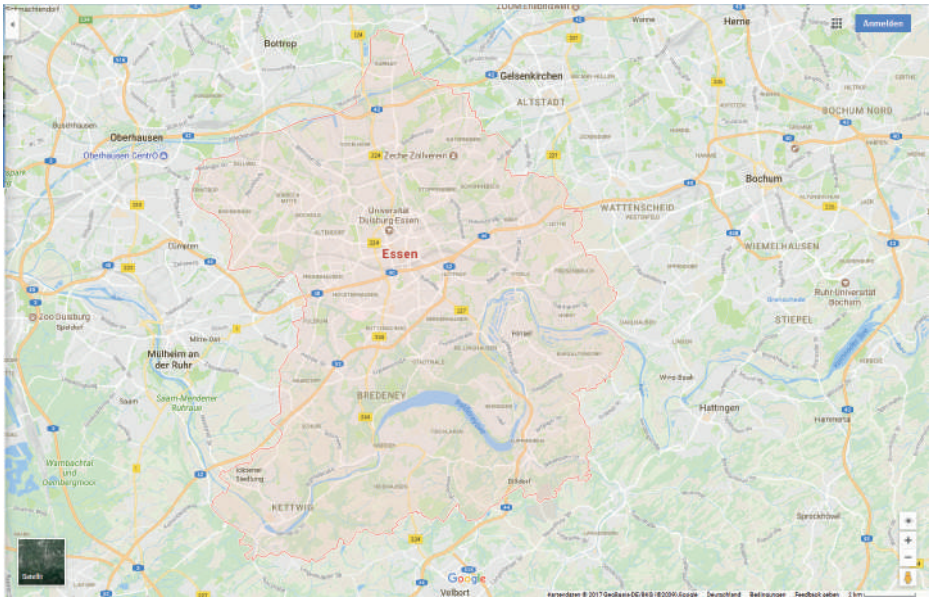
Google Maps, n.d.

First, the following maps show the topographical, urban and spatial location of Essen:

In 2013, the first urban gardening project arose, called "Siepengarten" located in the valley of Siepental in the quarter Bergenhausen. Within the European Green Capital Year 2017 as announced in the project application

of the City Essen the total amount of 20 urban gardening projects were supposed to be realized.

Figure 4.27. Satellite Image of Essen



Google Maps, n.d.

The urban garden "Siepengarten" was created by cooperation of the BUND (Bund für Natur- und Artenschutz) group Essen, the Volkshochschule and the Transition Town-Initiative Essen (Stadt Essen 2016, p. 2). Shortly afterward, three other urban gardening projects arose in Essen based on a marketing event of the city of Essen. An advantage is that there is no need to create an association to open an urban garden; this would be more time consuming as urban gardening is a free time activity. In consequence, a common agreement on the rights and duties of the city and the urban garden has been established and implemented. The joint work of the honorary Office Essen (Ehrenamt Agentur Essen), the Ruhrverband (a non-profit water management company based on public law) and the city Essen, made it possible said Wiebke Jünger in a personal telephone interview on May 5th 2017. There is for instance a kind of care contract that amended yearly between Grün and Gruga (administrative section of the city Essen in charge of green areas) and the urban gardeners, which states that gardening without pesticides nor turf is mandatory. Moreover, gardening is only allowed with ecological products

and local plants (Süselbeck, 2012). The gardeners, which work voluntary, are covered by a liability insurance from the state North Rhine-Westphalia. Currently the city of Essen has 12 urban gardens, but alone in the year 2016 seven new urban gardens arose. Through public finance from the City, the total amount of 20 urban gardens is targeted in the European Green Capital Year 2017 (WDR, n.d.).

The following map shows the location of 12 urban gardening projects in Essen; at the end of 2017, 20 urban gardening projects shall be realized.

Figure 4.28. Overview of Project Locations

Transition Town, n.d.

The reasons and the goals of the urban gardens vary. The urban garden "Allmende Bonnekamphöhe", for istance, shows what can be labelled as 'solidarity agriculture'. There is shared gardening on a former small garden lot called Experiment Kleingarten. The urban garden Siepental comprises fruit and vegetable beds, which borders on a green area in the quarter Bergerhausen. Based on the soil contamination of the area in Lorengarten only gardening in elevated beds is possible. Besides, in the urban gardens Etlinggarten and Diergardstraße creating a good neighbourhood is the main interest of the activities. The urban garden "Planckgarten. is located close to an existing refugee accommodation where a multicultural group gardens. Students utilize the urban garden "Reckhammerweg" close to the University. Finally, the urban gardens "Haumanngarten and "Zum Wolbeckshof" have other reasons and users groups.

For reaching the goal of 20 urban gardens in Essen, the city Essen promotes potential areas for urban gardening with the text "here an urban garden can arise" on the following sign:

Figure 4.29. Promotion for the Project by the City of Essen

Transition Town Essen, n.d.

These signs are located in Essen at the following emplacements to promote further urban gardens. On the following map are potential areas for urban gardening in Essen:

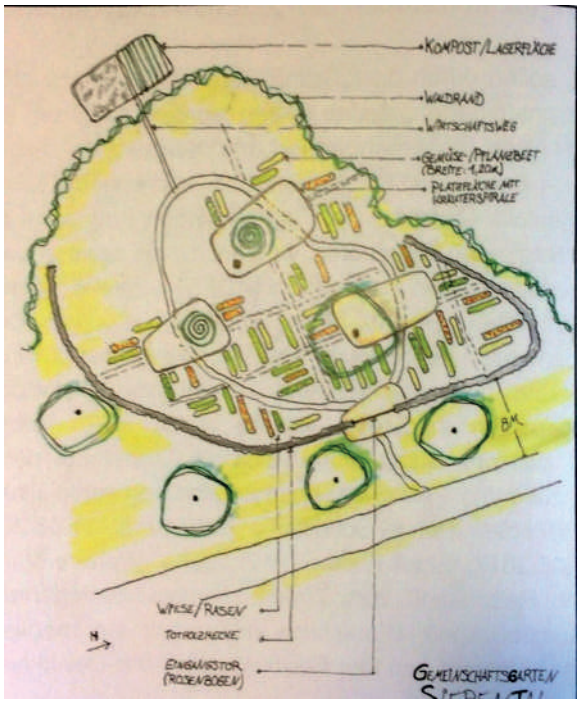
Figure 4.30. Map of Potential Sites for Urban Gardening Projects in Essen

Transition Town Essen, n.d.

Mainly the urban garden projects are located on former playgrounds, parks or green areas that are properties of the city Essen. The city supports the urban gardens by offering free humus and in doing a sample of the soil (Süselbeck, 2012). Depending on the state of the soil, the urban garden is on the ground or in specially designed elevated beds.

The urban garden Siepental is located on a former grassland. Having been planted for four years, it has several beds for vegetables and perennials. Different berry bushes frame this urban garden. Besides the growing of fruits and vegetables, the biodiversity is an important factor. Therefore, numerous bee friendly plants grow there. Moreover, an insect hotel and two tit-nesting boxes are on this urban garden. Finally, the urban garden Siepental give a comprehensive experience of the nature though gardening or by a visit. The following view shows the urban garden Siepental:

Figure 4.31. Plan of Urban Gardening Project at Siepental



Gemeinschaftsgärten Essen, n.d.

The urban garden Siepental was the first urban garden in Essen. Founded in 2013, it served as the blueprint for others that followed afterwards.

Founding the first urban garden, its initiators had to do a lot of convincing to get the idea realized. With the support of city administrators, a legal framework facilitates the creation of further urban gardens. There is not only the cooperation with the city that is important, but also with the Diakonie, a social welfare association of Germany's Protestant churches. The Diakonie organizes activities for long-term jobless people and weekly a group of jobless people comes for gardening three hours, said Petra Fiedler who is active in this project. Moreover, each first Wednesday of the month a so-called health-garden take place in which a traditional healer presents a medicinal plant. Everyone can participate and it is free of charge. Moreover, between these health-garden sessions a thematic orientated exchange occurs between the participants. While the European Green Capital Year a workshops for building elevated beds, takes place in the urban garden Siepental. These elevated beds of wood shall help elderly and handicap people to garden. Moreover, on tree days the garden is place and part of a bike trail "to seed, to harvest, to eat". Awareness raising through gardening. Although, games as a kind of "garden memory" take place to promote gardening (Stadt Essen, 2017).

Cooperative gardening started only in 2015 at Allmende Bonnekamphöhe, but gardening activities at this site first started as early as 2011. Since its conception, the project, run by the Bonnekamp foundation, has implemented a sustainable urban development strategy. On three hectares belonging to the foundation, urban farming is undertaken in an exemplary and yet yield bringing fashion (Transition Town, n.d. 1). The site features three sections. Zone 1 serves for organic farming of vegetables by way of hydroponic watering. In zone 2, the producing of berries and other fruit as well as raising animals take place. In contrast, zone 3 is reserved for local wild plants as well as an orchard and an area of pasture. This is to ensure that important habitats for birds, small animals and amphibians are protected. Participants can choose whether they would rather work an individual bed or a communal area or participate in the running of the general operations. The produce from Bonnekamphöhe can be purchased by giving donations to the charity.

Support for the project by the city is described as difficult. Due to conflicting ideas as to the use – the city wants to use the site for development of housing – the former initiative changed its status and became a foundation. This way, the city lost any claim to the area it had.

Due to the aforementioned conflict over the use of the area, the Bonnekamp foundation lost access to government funds (Jünger, Wiebke. Telephone interview, 05.05.2017). Despite this conflict, Allmende Bonnekamphöhe got included in the Green Capital programme. During the run of the "sow, harvest, eat"-days programme Allmende Bonnekamphöhe offered a so-ca-

lled secret garden. For the project, an area of 100 to 150 m² was converted into a recreational area. Hidden behind blackberry hedges, helpers created a close-to-nature space of calm and relaxation (Stadt Essen 2017j). Moreover, on four dates during that year, the foundation offered "Afternoons of Culinary Delight". On these dates, participants will harvest together and under the instructions of professional chefs cook their meals (Bonnekamp-Stiftung 2017).

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4.5. Parque Agroécologico Zapopan (Metropolitan Area of Guadalajara)

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The Zapopan Agroecological Park is located in "Cerrada Santa Laura" within Santa Margaritas colony in the municipality of Zapopan, State of Jalisco. The located zones is defined within the chapter municipality of Zapopan.

The Agroecological Park has a community garden where the citizens can grow and harvest organic food, a classroom, built with natural materials, a module of dry ecological baths, a nursery area for plant production, a compost area for fertilizer processing and recycling nutrients, an edible forest, a rainwater harvesting and distribution system and an ecological market area.

The surface it's occupied by the project which has 1.8 hectares, a neighborhood with about 40 thousand inhabitants, near the Pedagogical Water Forest in the area of the Colomos III Foresr. Both park are connected as part of a network of agroecological parks in the Guadalajara Metropolitan Area.

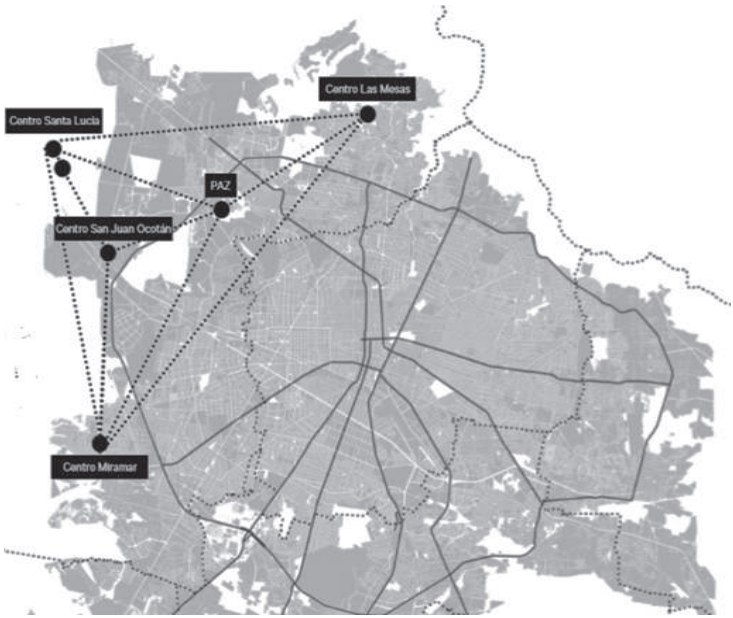
What used to be a rubble and rubbish dump, is now the first Agroecological Park in Zapopan, thanks to the work of the neighbors, the Teocintle Collective and also with government support. It was inaugurated on March 27, 2015 by the Mayor Héctor Robles Peiro.

The "Pedagogical Forest of Water" has local and national connection to roads, ports, railways and walking accessibility to markets & customers.

The municipality of Zapopan has important shopping centers, named Plaza Patria, Plaza del Sol, Plaza Bonita, Plaza Universidad, Plaza Mexico, La Gran Plaza, SAM'S, Price Club, Wall- Mart, and Plaza San Isidro. Regarding supply, in terms of popular consumption services, this need is covered by 2,571 grocery stores selling food and beverages, 485 butchers and 459 establishments selling prepared foods). In Zapopan there are 15 municipal mar-

kets and 77 established markets, which makes this municipality a center of supply of localities and surrounding municipalities. The Market of the Sea stands out for its variety and quality of its products.

Figure 4.32. Network of agroecological parks in the Guadalajara Metropolitan Area



Medina, 2017.

The Municipal Urban Development Program of Zapopan aims to establish urban and environmental policies based on the determinations of the current programs and plans of the State Planning System, adequate and adjusted to the local needs and considering the established by the applicable environmental instruments in the municipal territory. The nature and characteristics of the Zapopan's ecosystem, within the environmental regionalization of the state is characterized by the environmental impact of new human settlements, agricultural, industrial, and commercial and service works or activities. The presence of more than half of the total population of the State in the Metropolitan Area of Guadalajara, being the municipalities of Guadalajara and Zapopan that shelter the greater part of this, generates a series of environmental and mobility problems.

Air pollution in Zapopan is one of the main pollutants generated in the metropolitan area, this is due to agricultural activities (burning), unpaved

roads, diesel vehicles in circulation, combustion emissions in industry, forest fires, and suspension of dust from construction activities including the transport of material and those extractive activities as is the case with material banks, among others.

The fraction particles smaller than 10 microns is the one that is most concentrated in the metropolitan area. The highest contribution in tons of pollutants corresponds to mobile sources, accounting for 96% of the emissions generated. Particles suspended in the atmosphere (PM10) are now considered to be the best indicator of air quality. They are constituted by nitrates and sulfates or by organic carbon - due to their conformation which may be of natural origin or also by photochemical reaction (Reyes, Castellanos y Gutierrez, 2009).

Another aspect that is involved in the problem of pollution in the ZMG is the winds and their effects on the concentration and dispersion in the atmosphere of ozone and suspended particles, generally, at higher wind speeds, greater dilution of pollutants. The annual wind regime in the region is divided into two defined periods: One from November to June in which the West winds prevail, and from June to October in which the East winds prevail. (Cohen, 1979).

Ozone, which is due to the reaction of hydrocarbons in the atmosphere, is another pollutant that has exceeded 100 μg / m3. As the easterly winds contribute to the ozone concentrations in the west of the ZMG, mainly due to the frequency of calm periods, and the western winds carry the ozone towards the center. The slightly moderate winds of the southwest and southeast of The ZMG transport this pollution to the north. For the spring period, there is a decrease in the air quality index, since it registers 97 IMECA ozone points as the maximum level. Towards the north and south of Zapopan the season of the year that concentrates higher levels of pollution by particles of ozone is the winter. (Reyes, Castellanos y Curiel, 2009).

In the case of nitrogen dioxide (NO2), whose main source is combustion in industries and vehicles, it turns out to be the other pollutant present in the atmosphere of the municipality of Zapopan. It is observed that 13.0% of NO2 measurements exceed 40 μg / m3 which is the annual average recommended by WHO. Sulfur dioxide (SO2) - a product of the combustion of coal, diesel, fuel oil and gasoline with sulfur, in addition to sulfur-rich metallic veins, industrial processes and volcanic eruptions - has been located within the limits established by both the Mexican standard of 340 μg / m3 and the WHO standard of 40 μg / m3.

This place was all constructed with natural materials. It counts with a main building, a classroom, an office, a small room that has domestic tech-

nologies, dry bath module and a community garden fenced with 47 beds of cultivation (10m2 each) plotted by Tierra Cruda but excavated in the rubble by Collective Teocintle Agroecological and volunteers; Bamboo structure for composting and nursery of nurseries. It also has a winery that was built by Farid Morales in collaboration with DIF Zapopan, Collective Teocintle Agroecological and other volunteers, while the bamboo structures where given and placed by Fernando Partida of BambuXal also with the help of collective.

Due to the altitude and the hydrographic network of the region, it is considered that there are no sufficient water resources in quality and quantity to satisfy the current and future demand. The overexploitation of the aquifers and the presence of heavy metals such as arsenic, requires among other measures, improving the management of existing sources of fresh water and addressing the problems of waste and pollution control.

Knowing this, it can be said that it is due to the change of land uses, with the growth of the urban spot, both in residential areas and in areas of industrial use, where the pollutants have been present significantly affecting the environment.

Figure 4.33. Logo and Agroecological Park activities

Medina, 2017.

The Zapopan Agroecological Park is in the bio-economy field of agroecology food, health and energy. It is an innovative public space that combines the direct participation of the community of a urban farm project that practices that support of the sustainability culture (such as the recollection of organic waste for the production of compost) as well as training workshops on different agroecological themes to generate a unique space in the city open to all citizens.

Within the programs of the Public Space Authority of the municipality, Zapopan focused on the needs of the community, to generate job opportunities and entrepreneurship in the agroecological Park.

The kids connect with the eco technicians, which can give them the opportunity to improve their own housing, generate construction projects and self-construction (Martínez, 2016). The Zapopan Agroecological Park, is a space open to all the public where, through workshops, practice and coexistence, there is a collective learning on issues related to agroecology, self-sufficiency, environmental knowledge and social awareness (Traffic ZMG, 2016). This center of inclusion is a space that generate and promote opportunities for the local people. (Martínez, 2016).

Figure 4.34. The Orchards and the main building in the Agroecological park

Medina, 2017

Citizens are also able to have access to areas such as: An educational center built with natural materials, a boardroom/ library, a classroom, and a urban garden that is an important part of the project so the people can relate. The park have a nursery for the reproduction of plants, a compound area to produce fertilizers, a main square, the first West Edible Forest, ecological baths, a rainwater collection and distribution system to make the park self-sustainable. In addition, several ecological workshops, cultural and sports activities are being held within the areas (Gobierno de Zapopan, 2015).

In this space it has been found that it had a fertile ground to grow: radish, chard, cabbage, lettuce, parsley, parsley, corn, beans, arugula, basil, chayote, broccoli, chili, potato, chives, sunflower, etc., are some of the more than eighty species of edible consumption, medicinal plants, etc. In the orchard you can find crops of various vegetables such as chard, lettuce, lavender, squash,

squash, arugula, onion, cilantro, parsley, pineapple, bean, celery, cabbage, chayote, tomato, green tomato and African cucumber, among others (Rocha, 2016).

The main goal of this project is to continue fostering social cohesion and work for a better health through orchards and urban agriculture. Zapopan Government has a agroecological network of parks in strategic areas of the municipality. An agroecological park is the perfect project for public space, an environmental sustainability component where people of the community can produce their own food (El Informador, 2017).

Figure 4.35. Civic innovation and ecological innovation cycle

Medina, 2017.

The Zapopan Agroecological Park it's a space that became a meeting and a development space for the community in an urban environment which is committed to sustainability and to organize events such as the "Teocintle" fest, which is celebrated to raise awareness about the existence of the capacity of the human beings to generate his own resources, this, to allow them to subsist (food, utensils) and to connect the community, land, work and practice their traditions. The events celebrated and organized in the park, offer different activities such as: workshops of urban gardens, rally, craft market, food area, barter, dance, music, conversation and networking, outdoor cinema, among others (Trafico ZMG, 2016).

César Medina in collaboration with the Municipal Government of Zapopan and the University Center of Biological and Agricultural Sciences (CUCBA) of Universidad de Guadalajara keep working in this and other projects (Gobierno de Zapopan, 2016).

As the matter of time spend starting with "Tierra Crudas" work, began with the drafting of the project to manage the funds in the month of June

2013. Many people have collaborated in the construction of this park, specifically "Tierra Cruda". The municipal government of Zapopan was in charge of the design and the general master plan of the park, construction of the classroom-office complex, the module of dry baths and the perimeter fence of the orchard. The local authorities also were in charge of design and build the social aspect of the park, which means it generate the social-neighborhood appropriation for the project and train them in agro ecological sowing. From this social process, the Collective Agro ecological Teocintle (CAT) was emerged. (Gobierno de Zapopan, 2015).

Figure 4.36. Sketch and disposition of the Agroecological Park, Gobierno de Zapopan, 2015

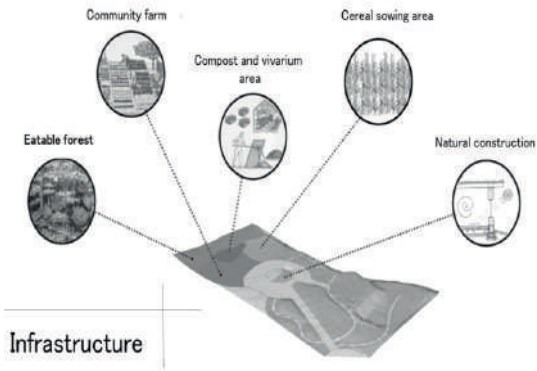


Figure 4.37. PAZ construction process

Tráfico ZMG, 2016.

The people who work and participate in the park always produce their own compost, build beds, seek to improve and make innovations in environ-

mental terms, seek the common good, and make decisions (El Informador, 2017). The community garden is designed in a circular form for a better use. Currently there are 47 beds of cultivation available for anyone with knowledge in bio intensive crops and meets the requirements of the collective

In the social matter it can be said that the park was appropriated through its community gardening where 32 families are working organized by the Collective Teocintle Agroecological. In addition, this space offers several workshops to the neighbors of the park as the rest of the inhabitants of the Metropolitan Area of Guadalajara.

Figure 4.38. People working in the orchards

El Informador, 2017.

The municipality of Zapopan highly promotes this project with collaboration of other civil organizations and universities, in order to promote self-consumption and environmental education. With the collaboration of the Collective Teocintle Agroecological, Farid Morales, who became the coordinator of the park employed by DIF in Zapopan, officials of the institution, with help of Carlos Bauche and Fernando Partida BambuXal, as well as the consultants for the general design of the park, the orchard and the edible forest by Máshumus and also the Cooperative "Las Cañadas" (Gobierno de Zapopan, 2015). The Teocintle Collective helps those who come and teach them how to grow their own food, which makes citizens feel productive and healthier.

Local Authorities from the municipality of Zapopan want to empower them, increase capacities with projects and workshops that are specialized in urban agriculture and has knowledge in seed production and compost. All this focused on community organization. The municipality is in charge of

coordinating and managing the workshops and activities of the collective and community. Once a month, the local authority of the municipal government and the city Council, organize a tour to different orchards, including this park that is open to the community and is a public space meaning that anyone can be part of it.

Is important to say that the proper authority of this public space is responsible for the Park, which includes the orchard and the edible forest. It is managed by the collective Teocintle and is a project belonging to this local spaces authorities from the municipal administration of Zapopan, Jalisco. This is also impelled through the Direction of Public Spaces. Teocintle Agro ecological Collective is an organization that works in the management of the orchard of the park. The chief of the Public Spaces in Zapopan among César Lepe Medina, coordinator of this project and manager of the Special projects of public spaces office in the city, are now in charge of this park.

The collective is divided into commissions involved in gardening activities. New people can decide if they want to be members. Currently, there are about 40 families from the community, represented by one person, that are part of the park.

Speaking of the financial part, the Zapopan Agroecological Park had an investment of approximately 5 million pesos and has an important impact in 110 direct beneficiaries, in addition to the communities surrounding the park and people interested in participating in this project (Gobierno de Zapopan, 2015).

The budget of the park has an income that comes from several sources of financing and contributions.

Table 4.8. ***Financing, Own compilation with data from César Lepe Medina, coordinator of the project and public servant of the Office of Special Projects of Public Space of the City***

Zapopan Strategic Projects (PEZ) / Metropolitan Fund approximate figure, for a fund for the forest district of 10 million pesos out of which are allocated to Zapopan city of all	$ 3, 000, 000.00.
The National Program for the Prevention of Crime (PRONAPRED) contributes with	1, 100, 000.00
DIF Zapopan- Donations Area with	950, 000.00
and Program Temporary Employment PET / SEMADET with	120, 000.00

The Agroecological Park is located in a farm with almost two hectares in the Metropolitan area of Guadalajara (ZMG) that has the highest rate of

violence and criminality. This space used to be a ravine and that was filled with rubble. The first intervention took place with the construction of a board and with the installation of urban furniture and public lighting by the Special Projects of Zapopan Office. (Gobierno de Zapopan, 2015).

This sustainable project also includes the creation of classrooms made from bamboo, a waste separation and recycling system of plastic, paper, glass, metal, organic waste and PET. The park has a central classroom that was built with materials such as wood and straw. This building is contemplating its use to be a meeting point, a conference place and a market display, this, to give an opportunity to those who collaborate in the management of the ecological garden, giving them this space to offer their products. The park has a dry bath system that is used to reuse the generated waste as a compost and it also counts rainwater raining dam with capacity of 750-thousand-liter rainwater harvesting board and 20-thousand-liter storage tank that will provide water to the orchard and forest during the dry season which was also constructed by Agroecological Zapopan Park.

Figure 4.39. Products from the orchards and events in the park

Medina, 2017.

As a result, the Local Authority of the Public Space of Zapopan, through the Zapopan Agroecological Park, offers a space for community building and collaborative work, where one of its priorities is the orchard where 25 to 35 kilos of food are produced and harvested weekly. (Gobierno de Zapopan, 2016). The production has several types of vegetables, fruits, medicinal plants and ornament plants. There are more than 50 species as pumpkin, beet, sesame, strawberry, lettuce, Swiss chard, bean that are gown in this park. Other products are elaborated with this harvests such natural slurries or milks made from seeds such as almond or canary seed. The Solar dehydra-

tors was created to dehydrate foods such as tomatoes, traditional footwear based on pre-Hispanic roots and even the compilation of biocosmetics made with plants such as lavender and lemon.

The public perception is positive, nowadays, there are a lot of people who finds comfort and relief in this orchards, they like being part of something, connecting with people who feels the same way and are working hard to stay productive, to have a decent income and to live a better and healthier life. The environmental education also has a very important impact in the activities and people working in this park to make a sustainable lifestyle.

This park marks a milestone in the regeneration of public spaces with a project of social and environmental relevance. It is important to mention that the park was a wasteland and a place of total disuse. A total of 1.8 hectares, on Santa Laura Street, in the colony Santa Margarita (colony with more than 33 thousand inhabitants), now live in peace. This place has now recovered from being abandoned, and today is the reflection of hard work and creativity of citizens and authorities that are a model for this public space with pedagogical purposes and for the constant neighborhood participation. (Gobierno de Zapopan, 2015).

The following SWOT matrix provides an overview of strengths, weaknesses, opportunities and risks of the PAZ. These were mainly compiled through on-site interviews, collected impressions and the evaluation of a previous analysis. The strengths, weaknesses, opportunities and risks are identified, categorized and evaluated with the aid of a SWOT analysis. The SWOT analysis then contributes to identifying measures and recommendations for the PAZ and the city administration. The SWOT analysis is therefore an important basis to support decisions and for making the right use of potential, limiting risks and developing strategies from it. It can also be used to determine which aspects do not require improvement.

By using the PAZ as a community garden, the land area is protected from development, so that this open landscape is used for groundwater recharge, which is of particular importance due to the constant scarcity of water. In addition, the PAZ as a green area contributes to air filtration and oxygen formation and consequently to a better mesoclimate in the district. The idea of sustainability can be found in all elements of the PAZ: The fruit and vegetables are grown without genetically modified seeds but with organic farming methods and they also produce their own compost and use it as fertilizer. Chickens and rabbits are kept too, which serve as a food source. The main house and the kitchen were built using traditional building methods and natural materials and the water supply is provided by a separate rainwater collection basin. The knowledge about these sustainable methods is imparted

in workshops and various events and is thus intended to contribute to raising awareness. This awareness raising is also promoted by the fact that the school in the neighborhood regularly uses the park for biology lessons, whereby the knowledge about sustainability issues, food security and bioeconomics is to be passed on to the next generation.

Table 4.9. *SWOT*

Strengths	***Weaknesses***
meeting place raising awareness educational issue bioengineering/bioarchitecture bioeconomics/sustainability own water supply own compost revenue at festivals decisions by the community keeping area free of construction initial funding from the government no genetically modified seeds keeping of small animals cooperations with universities/companies/ schools critical selection of sponsors hours of operation donations from sustainable companies improving the urban climate independence/self-financing workshops/events	dependence on city administration and politics community is not a legally secure organization products are mainly for own use small community marketing public transport accessibility self-financing
Opportunities	***Risks***
meeting place raising of awareness educational issue citizen participation César as a link between the city administration and community sales of products keeping of small animals marketing	former waste disposal site no legally secured organization critical selection of sponsors limited water supply government owns land independence/self-financing

Further strengths are the economic aspects of the PAZ: The initial funding of the government has facilitated the beginnings of the park, but today it finances itself. This has become possible through the organization of festivals

and the sale of various products. Support from sponsors or companies will only be accepted if they fit into the sustainable image of the PAZ, whereby the PAZ community points out its independence and self-government. It is precisely this self-governing community that is the greatest strength of PAZ. The social component plays a special role, as the PAZ serves to strengthen and expand the community, to support citizen participation and to give citizens a voice to the city administration. The PAZ shall be used as a meeting place in the neighborhood and exists also to reduce the crime rate. Since the PAZ is surrounded by a fence, that is locked overnight, the protection of the area is also guaranteed.

Weaknesses

The biggest weakness of the PAZ is the dependence of the community on the city administration and politics. Due to the fact that the property still belongs to the city, the PAZ could be closed or the land could be used for something else at any time. It is possible that the park is going to be sold to construction investors for example because of its good location and the settlement pressure.

Due to the desired financial independence from the city administration, financing problems arise, so that not all planned projects can be implemented. The critical selection of cooperation partners and sponsors makes it even more difficult to raise money. But nevertheless this aspect can be mentioned in terms of both strengths and weaknesses because it preserves the good image of the park.

The volatile management in the past has led to a significant loss of members, so that the community currently does not have enough members to be heard by the city administration and to be able to make serious demands. Furthermore, the PAZ community is not a legally secure organization. In addition, the location of the park and its poor accessibility by public transport make it difficult to attract new members and visitors. Additionally, the marketing can be expanded, as only social media channels are used at the moment. As only a few members of the PAZ currently grow fruit and vegetables, these products are also mainly intended for their own use and not for sale.

Opportunities

Some aspects of the PAZ offer opportunities and potential for expansion or improvement. This is for example, as already mentioned in the strengths, the educational aspect through several cooperations. Through various workshops or lessons for students, many different topics can be taught and thus contribute to raising awareness. Here is the chance to reach even more children, young people and adults.

The grassroots democratic orientation of the PAZ is a great opportunity to involve local citizens in community projects, to give them a role and perspective and to show that a strong community can work together with the city administration. César Lepe is the main contributor to the success of the project, as he is responsible for the link and coordination between the PAZ and the city administration. So, the PAZ can serve as an example for other projects and show how such collaborative projects can work. Moreover, this type of meeting place in the neighborhood is intended to reduce the crime rate.

The keeping of chickens and rabbits can be extended and optimized and offers the chance to become a further source of income if the animals are sold. Moreover, their preparation can be taught in workshops. Similarly, overproduced fruit and vegetables can be sold on a market and thus be another source of income.

The greatest opportunity is marketing. Since advertising is currently only done via a Facebook page, there is still some potential for improvement in order to attract more visitors to the PAZ and win new members for the community.

Risks

Due to the past of the PAZ as a site for waste disposal, it cannot be assumed that the soil is not contaminated, and the agricultural products are free of pollutants. Furthermore, the cultivation of fruit and vegetables and thus also the number of members of the PAZ is limited by the existing water capacities. The desired independence from the government as well as the critical choice of sponsors lead to financing bottlenecks because there are not enough financial resources available for all projects which are considered. Additional to that, there is the dependence on the city administration, as mentioned in the weaknesses, as it is the owner of the property, so at any time there is a risk to lose the area to another use. Due to the fact that the community has no legally secure form of organization, there is the risk that the community is not being noticed or heard in public and by the city administration. Therefore it is difficult for the community to enforce its issues.

Aspects without requirement to improve

In addition to the aspects requiring action, aspects without need for action can also be derived from the SWOT analysis. The following is a summary of the aspects that are already satisfactory and do not require improvement.

A major positive aspect of the PAZ is its sustainable and environmentally conscious orientation. Organic farming has a particularly positive effect on the environment and preserves and conserves natural resources. Soil protec-

tion, water protection and species conservation are only some of the advantages. The own compost helps to achieve a nutrient cycle that is as closed as possible and to improve soil fertility. Furthermore, the absence of synthetic chemical pesticides and genetically modified seeds contributes to the production of high-quality and low-pollutant food. This sustainability concept is also being pursued in the bioconstruction of the main building, the dry baths and the new kitchen. By using natural raw materials, sustainable architectural concepts can be realized that not only have positive physical and biological properties, but at the same time knowledge about these traditional building methods can be maintained and passed on.

The organization of various workshops and festivals attracts people to the PAZ and draws their attention to the activities of the community. This not only conveys knowledge, but also strengthens the community and makes the PAZ a social event location. As a result, this supports the idea of the PAZ to create a meeting place for everyone. The grassroots democratic character of the community is also an elementary component of this idea and should be preserved.

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4.6. Urban forest in Leipzig

Laura Maier, Karina Pallagst

Leipzig was a model city for implementing urba forests on vacated areas, conducted in a project by the German Acency for Nature Conservation (Bundesmant für Naturschutz).

Figure 4.40 Delimitation of the area

source: own presentation based on map Stadt Leipzig, 2018a.

Stadtgärtnerei Holz

One of the three selected urban forests in the frame of the aforementioned project, in Leipzig is the model area „Stadtgärtnerei-Holz", a former nursery area.

Location/ size

For a better understanding of the location follow a description of the geographical and topographical situation, the urban context as some general information of the area.

Figure 4.41. Main way through „Stadtgärtnerei-Holz"

source: own picture, Leipzig 07.2018.

Geographical situation

The model area „Stadtgärtnerei-Holz" has a size of around 3,8 hectares and is located in the east area of Leipzig

close to the urban district southeast (Irene Burkhardt Landschaftsarchitekten [L&IBL], n.d.a; Stadt Leipzig / Stadtplanungsamt). Moreover, this area lies in the urban district Anger-Crottendorf, in the east part of Leipzig. It is close to the urban districts Volkmarsdorf in the north, Sellerhausen-Stünz north-east, Mölkau in the east, Stötteritz in the south-east, Reudnitz-Thonberg in south-west as Neustadt-Neuschönefeld in the west. The City-center is about three km west.

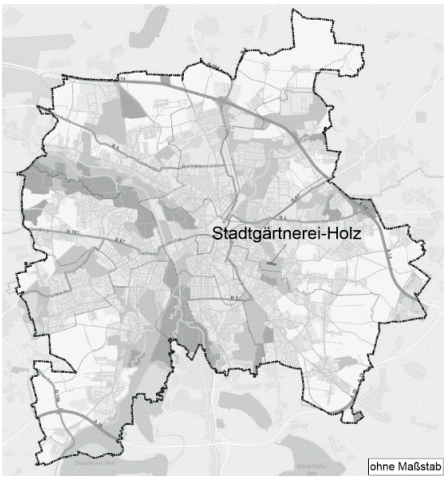
The urban district east is with 4.073 hectares the second biggest district in Leipzig. Around 37,9% of the total area is in agricultural use. Around 41,1% of the area are residential-, industrial-, and traffic-areas. Around 12,1% of the total area are recreation areas and partly under seal. Only 8,9% of the urban district are not under seal (Stadt Leipzig, 2018n).

Anger-Crottendorf belongs with 190 hectares to the three smallest urban districts in Leipzig-east. From the total area 52 hectares are residential use, 9 hectares are industrial use and 34 hectares are traffic areas. Hence, around 50% of the total area are sealed. Around one third of the area Anger-Crottendorf is a recreation area. In consequence 19% of the area is not sealed (Stadt Leipzig, 2018o).

Topographical situation

The area is located 120 - 125 meters high above zero. The entire city of Leipzig has only small altitude differences of maximum 20 meters. The east part of Leipzig is lightly higher with 125 meters above zero than the west part with 110 meters above zero. The urban forest has no heights nor hollows (Staatsbetrieb Geobasisinformation und Vermessung Sachsen [GeoSN], n.d.).

Figure 4.42. Location of the urban forest "Stadtgärtnerei-Holz" in Leipzig



source: own presentation based on map: Stadt Leipzig, 2018a

Urban and spatial situation

The urban forest in the quarter Leipzig East is located south-west of the urban district. This district is with 83.632 inhabitants in 2017 the densest urban district in Leipzig, about 14,5% are foreigners. This is after Leipzig Center the second highest rate of the entire city. The average age in Leipzig East in

2017 is 41,8 years which represent in comparison to the other districts a good average. The rate of unemployed people is with 4,7% under the average of the city Leipzig (Stadt Leipzig, 2018n).

The urban district of the urban forest is with 11.781 inhabitants one of the four districts in the urban district east with a population above 10.000 inhabitants. The part of foreigners is with 10,7% low. Moreover, the rate of unemployed people is with 4,4% under the level of the area and the city Leipzig (Stadt Leipzig, 2018o).

Leipzig East has several green areas. Several multi-story dwelling and one family dwelling with garden are located on the east border of the city of Leipzig. Moreover, one can find in this area several garden plots. In the north, west and the south of the „Stadtgärtnerei-Holz" different garden plots are located. In the broader area one can find other garden plots. In the east lies a big forest of 8 hectares. In the south-west lies a cemetery of 14 hectares with many trees. More in the south are other forest areas and garden plots.

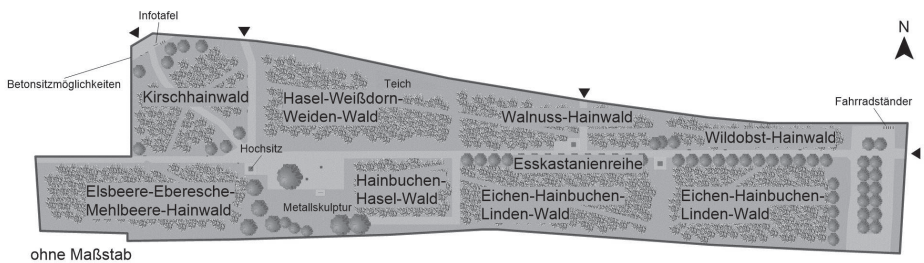
History

From 1877 until 1911 the urban forest area „Stadtgärtnerei-Holz" was a market garden of the Hanisch family. From 1911 until 2005 it was a city market garden. After the end of it use in 2005, this area was 4 years a fellow land. The buildings and former green houses stayed on this area. In 2009, those buildings were demolished and the area cleared. In 2010 started the rearrangement and the forestation (L&IBL, n.d.a).

Map of the project "Stadtgärtnerei Holz"

The following map shows the planning of the urban forest „Stadtgärtnerei-Holz".

Figure 4.43. Planning of the area "Stadtgärtnerei-Holz"



Source: own presentation based on L&IBL, n.d.a

A main road with on one side chestnut trees cross in east/west direction the area. Four entries make the area accessible. Moreover, trails are planned in the entire area, but were not yet layed out during the visit of the site.

Regarding the forestation different thematic sections are planned as described in the following table.

Table 4.10. ***Different kinds of forests in the urban forest „Stadtgärtnerei-Holz"***

Forest	*Image of the forest*	*Types (selection)*
Checker trees-Sorb-beam tree-forest	multilayered, light → small trees with big trees, open, bright, park	Sorb *(Sorbus aucuparia)* Checker trees *(Sorbus torminalis)* Cornel cherry *(Cornus mas)* Beam tree *(Sorbus aria)*
Cherry-forest	high, multilayered, light → close to nature, transparent, view	Purple-leaf plum *(Prunus cerasifera 'nigra')* Cherry plum *(Prunus cerasifera)* Bird cherry *(Prunus padus)* Sweet cherry *(Prunus avium)*
Hazel-White-thorn-range-forest	Few existence of small trees → species-rich, dense, low	Sorb *(Sorbus aucuparia)* Hazel *(Corylus avellana)* Cornel cherry *(Cornus mas)* Whitethorn *(Crataegus)*
Common horn-beam-Hazel-forest	multilayered, light → graduated in height, light existence with view, traditional habit	Common hornbeam *(Carpinus betulus)* Pear *(Pyrus communis)* Hazel *(Corylus avellana)* Whitethorn *(Crateagus)*
Walnut forest	multilayered, light → graduated in height, open, light, clear tree top, park	Sorb *(Sorbus aucuparia)* Chestnut *(Castanea sativa)* Walnut *(Juglans regia)* Littleleaf linden *(Tilia cordata)*
Oak-Horn-beams-Linden tree- forest	high, single-layer, dense	Hornbeam *(Carpinus betulus)* Blackthorn *(Prunus spinosa)* Oak *(Quercus robur)* Littleleaf linden *(Tilia cordata)*
Wild fruit forest	Clear section of wild fruit wood → meadow orchard, crops und wood	apricot *(Prunus armeniaca)* pear *(Pyrus)* mirabelle *(Prunus domestica subs. syriaca)* quince *(Cydonia oblonga)*

Source: own representation based on L&IBL, n.d.a.

The reforestation was done in 2010 with mainly 30-50 cm high forest plants that stay five years enclosed to protect the area. Nowadays, a kind of forest is visible in the different sections. However, there is a biological rearrangement of the different species.

Three raised blinds were distributed in the area in order to offer the possibility of an overlook. These raised blinds don't exist anymore because vandalism destroyed them and they had to be removed. At one entrance an information blackboard is arranged to inform visitors about meaning and purpose of the model area and its plants and arrangement. This blackboard is hardly readable because of graffiti and stickers.

On the main square in the west part of the area former cement plant tub from the city market garden shall serve as seats. But today they don't exist anymore. Moreover, a metal sculpture with open windows decorates this place, sadly it is also covered with graffiti.

A former cistern of the market garden was preserved as decorative part in shape of an artificial pond. But this pond is not accessible because no trails nor beaten paths offer access to it.

On the west end of the main way some bee-hives were installed.

Originally this area was almost 40% sealed. For the demolition and the transformation measures a big part of the buildings and the sealing were removed. Only the trails and the square are sealed. Also some precious tree groups stayed, therefore today the age of the plants is completely mixed (L&IBL, n.d.a).

Connection

In the south is the "Zweinaundorfer" street that connects in west direction to the city center and in east direction to the districts "Mölkau" and "Zweinaundorf". In east direction the „Pommern" street connects to a residential area in the south. Along the "Pommern" street free parking is possible on one side.

In west direction of this area is the suburban train stop "Leipzig Anger-Crottendorf". From there the main train station Leipzig is about 15 minutes away by suburban train.

South-west is the bus stop „Leipzig Ostfriedhof" and south-east is the bus stop „Pommern" street that are regularly daily reached by several bus lines. Hence, the main train station is accessible within 15 minutes with the bus lines 72, 73, as from 02:00 until 04:22 with the night bus N7 (LVV, n.d.).

In the north as in the east is a pedestrian way along the area. The broad main way of the model area invites to cross it by bike.

Surroundings

On the south border is the association of small gardens „Anger-Crottendorf“ as well as the east-cementery. In west direction is the association of small gardens „Immerglück“ as well as the suburban train stop „Leipzig Anger-Crottendorf“. In the north are other areas of associations of small gardens, the center of distribution of the municipal works service as well as a residential area with single family houses and multi-story dwelling. In the east borders a forest. Finally, on can find in the broader area mainly single family houses and multi-story dwelling partly with garden.

Existing building stock

There are no buildings on the model area. In 2009, during the demolition all buildings were removed.

Soil contamination

The area is not mentioned in the register of contaminated sites of the region Sachsen.

In the section of the model area the standard ground value is of 10 Euros per m². This value is in direct comparison to other vacant and green areas partly more than 3 times higher. In comparison to general residential building area this value is low because in this area the value is of 140-250 euros per m² (Stadt Leipzig, 2018a).

Figure 4.44. Entrance north-west with information blackboard

Source: own picture, Leipzig 07.2018.

Evaluation

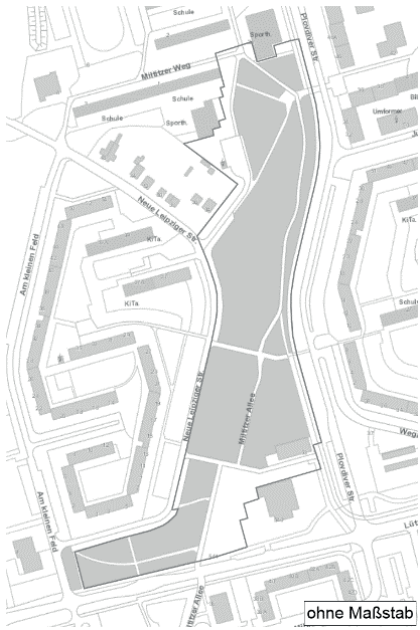
The model area „Stadtgärtnerei-Holz“ is the first of the three done areas in Leipzig. In 2010, it was publically opened. It fits perfectly in the green area

of Leipzig's urban district „Anger-Crottenforf". The area is enclosed by a fence or a wall. Four accesses only in the north and east connect the area. The entrance in north-west direction, see image 5 is not inviting. The information blackboard is not readable because of graffiti, also the seat and the wall behind suffer vandalism, so that the quality of the stay doesn't seem high.

The main square in the west section, see image 6, doesn't hava a high quality of place, too. The raised hide was removed because of high damage. The seats from former plant tubs of the city market garden are missed. The metal sculpture is also painted with graffiti. The wanted "forest view" through the window of the sculpture is not perceivable. The raised hide were also removed because of vandalism. The different forest sections are in different development stadiums. While some sections have small trees and bushes other parts have already a forest. Especially the many fruit trees are used by the visitors of the model area. In the west part are some bee-hives. In the east section close to the entrance two lines of fruit trees were plant with a sealed way around. This section has not a forest style and the planned pathways aren't there. The partly dense vegetation makes a way through the forest difficult. The pond that is central in the north is not reachable trough pathways. From the sealed paths only a little amount of trash is visible, but on the sideways is more garbage visible. The trails on the model area are not illuminated by night which creates spaces of fear and insecurity by nightfall.

Summarising, the area appears as a park, but also as a forest as in image 7. Different fruit trees offer the possibility to access fresh fruits without having to own a garden. Because of vandalism at several parts the forest has less sojourn quality.

Figure 4.45. Delimitation of the aera



Source: own representation based on map: Stadt Leipzig, 2018a

Urban forest „Schönauer-Holz"

Another model area for the main project of the "Urban Forests" project in Leipzig is the "Schönauer-Holz" area. This is examined in more detail below.

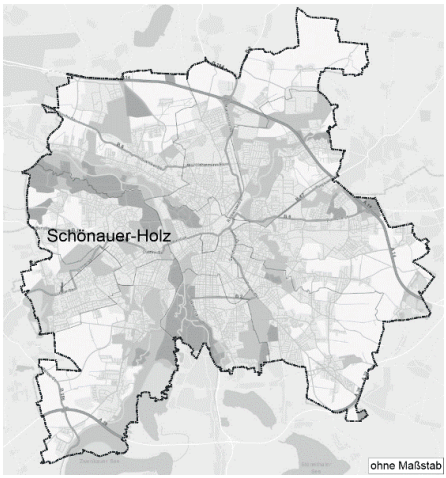
Figure 4.46. Insight of the model area

Source: own recording, Leipzig 07.2018

Location/Size

When classifying the location and size of the "Schönauer-Holz" model area, the geographical and topographical location, the urban and overall spatial classification, the key data as well as the planning statements and the current status are also illuminated.

Figure 4.47. Location of the „Schönauer-Holz" model area in Leipzig



Source: own respresentation based on map: Stadt Leipzig, 2018a.

Geographic location

The "Schönauer-Holz" model area is located in the middle of the western district in the southwest of the Grünau Nord district. It has an area of about

5.5 hectares (L&IBL, n.d.b). The district is located in the west of Leipzig. The district Schönau borders to the east, the district Grünau-Siedlung to the southeast, the district Lausen-Grünau to the southwest and the district Militz to the west and north.

With an area of 1,470 hectares, the City District West is the second smallest district in Leipzig. About 47.48% of the area is sealed by residential, industrial, commercial and traffic areas. In addition there are 215 hectares of recreational areas, some of which are also sealed, which corresponds to about 14.63%. About 37.89% of the total area remains completely unsealed (Stadt Leipzig, 2018p).

The district Grünau-Nord has a total area of 95 hectares. This makes it the smallest district in Leipzig-West. Of the total area, 51 hectares are residential, 27 hectares traffic and 3 hectares industrial and commercial, which corresponds to 85.26%. 11 hectares, so 11.58% of the total area, are allocated to recreational areas. This leaves about 3.16% completely unsealed (Stadt Leipzig. 2018q).

The model area is located about eight kilometres to the west of Leipzig city center.

Topographical location

The model area is 118 to 120 meters above normal zero. The southern part is slightly higher, the southwestern part slightly lower. Overall, however, the difference in height is negligible and neither elevations nor depressions are discernible (GeoSN, n.d.).

Urban and spatial situation

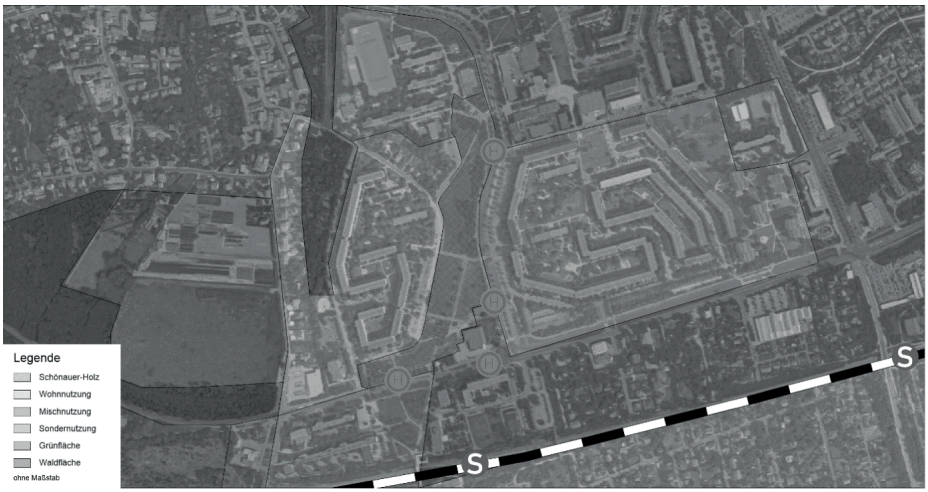
With a population of 53,070 in 2017, Leipzig-West is the third smallest district in Leipzig. The share of the foreign population is about 10.9% and is thus the third largest in comparison to the other city districts. With 2,670 unemployed, they account for about 5% of the total population in the district. The unemployment rate is thus below the 7.8% recorded for the city as a whole (Stadt Leipzig, 2018p).

Grünau-Nord has 8,591 inhabitants in 2017, making it one of the three most populous districts in the western urban district. The proportion of foreigners (14%) is higher than in the district as a whole and the proportion of foreigners in Leipzig (9.5%). The unemployment rate in Grünau-Nord is about 6% with 518 unemployed, slightly higher than in the entire western district of the city (Stadt Leipzig. 2018q).

Image 11 shows the urban classification of the model area. In the area around the “Schönauer-Holz” there are not only greenery along roads and

paths but also a few other green areas. Further north there is a wooded area and an agricultural green area. Further west, there is also an agricultural area and green areas. To the west and east of the model area, residential use dominates in multi-story row buildings. To the north and further afield of the area there are several schools including associated sports areas. Retail and trade can be found in the south and northeast. In general, residential use in predominantly multi-story row buildings and partly single-family houses in point development dominates in the wider environment of the model area.

Figure 4.48. Urbanistic classification of the "Schönauer-Holz" model area



Source: own representation based on map: Google Maps, 2018.

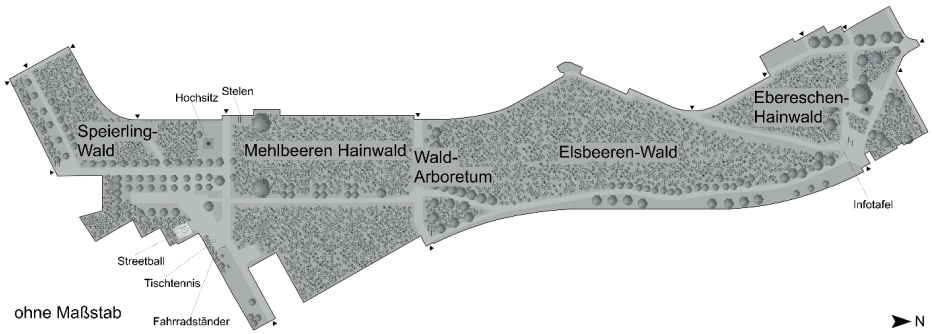
Basic Information

The "Schönauer-Holz" area was opened for public use on 26 July 2013. It is located on the site of the former eleven-storey prefabricated housing complex "Eiger Nordwand", which was completely demolished in 2007. After demolition, the area lay fallow for six years until 2013 (L&IBL, n.d.b). Residential complex 7, within which the model area is located, has been a redevelopment area and thus an assisted area for urban renewal in Grünau since 2003 (Stadt Leipzig, 2018r). In the integrated urban district development concept Leipzig-Grünau 2030 (STEK), the urban forest was included as a recreational area, but it still takes several years to achieve a noticeable effect (Stadt Leipzig, n.d).

Plan statements/status

The following illustration shows the planning of the "Schönauer-Holz" model area.

Figure 4.49. Planung der Modellfläche „Schönauer-Holz"



Source: own representation, modified according to L&IBL, n.d.b

The existing network of paths, consisting of a main path in a north-south direction, which initially runs in the center of the southern part and then shifts northwards to the eastern edge, as well as four paths running in a west-easterly direction, is to be included and renewed. In addition, there are other smaller routes planned. All paths as well as some trails in the northern area are available.

In the southern third, a court situation with table tennis, streetball, an information board and seating facilities was created. This course, with its seating, sports and play facilities, was implemented. The information board is no longer available as it was destroyed by vandalism. To the west of the square, the planning envisages a high seat that has been erected and is intact.

At the northern end, a square situation with a high seat, seats, an information board and steles as art objects is also planned. The place with the furniture and the high seat is available. The information board was also dismantled here.

In addition to several rows of trees, which mainly consist of horse chestnuts (*Aesculus hippocastanum*), and a forest arboretum, the planting of various trees or tree species as a kind of collection, in the middle of the model area, four different forest quarters are to be created, which are afforested with plants 50 to 80 centimeters high. The common denominator is the 60 percent share of Sorbus species. Together with the accompanying tree species, these should form rather light forest structures. In the northern area there are some stand woody plants, among them birch (*Betula species*), pine (*Pinus species*), tree hazelnuts (*Corylus colurna*) and privet (*Ligustrum spe-*

cies), which are to be preserved. Planned are a sorb forest, a Cranberry grove forest, a checkers tree forest as well as a rowan grove forest, whose forest picture as well as tree and shrub species are listed in the following table.

Table 4.11. ***Various forest quarters of the "Schönauer-Holz" model area***

Forest	*Forest picture*	*Tree species (selection)*	*Shrub (selection)*
Sorb forest	Medium high, dense → small-area, compact stocks for shielding	sorb *(Sorbus domestica)* common hornbeam *(Carpinus betulus)* common oak *(Quercus robur)*	ambarbaris *(Berberis vulgaris)* blood-twig dogwood *(Cornus sanguinea)* hazelnut *(Corylus avellana)* sloe *(Prunus spinosa))*
Beam tree-forest	Two-layer, sparse → transparent, light, park-like	Beam tree *(Sorbus aria)* Durmast oak *(Quercus petraea)* harewood *(Acer pseudoplatanus)*	Wild berries *(p.e. Rubus ideaus)* ambarbaris *(Berberis vulgaris)* hazelnut *(Corylus avellana)* sloe *(Prunus spinosa)*
checkers tree forest	Medium high, one-layer, dense → extensive, dark	checkers tree *(Sorbus torminalis)* field maple *(Acer campestre)* Durmast oak *(Quercus petraea)*	Wild berries *(p.e. Rubus ideaus)* Red elder *(Sambucus racemosa)* viburnum *(Vibrunum-Arten)*

Forest	*Forest picture*	*Tree species (selection)*	*Shrub (selection)*
Rowan-forest	Multivlevel, sparse → small-area, natural, versatile	rowan *(Sorbus aucuparia‚edulis')* blood-twig dogwood *(Cornus sanguinea)* Sweet cherry *(Prunus avium)* Littleleaf linden *(Tilia cordata)*	Wild berries *(p.e. Rubus ideaus)* ambarbaris *(Berberis vulgaris)* hazelnut *(Corylus avellana)* sloe *(Prunus spinosa)*
Arboretum forest	open edge of the forest with tree trunk steles → groups of trees, large shrubs	Beam tree *(Sorbus aria)* rowan *(Sorbus aucuparia ‚edulis')* checkers tree *(Sorbus torminalis* Sorb *(Sorbus domestica)* common oak *(Quercus robur))*	

Source: own representation (by L&IBL, o.J.b)

The afforestation along the way and the various forest structures are largely recognizable. The south-eastern part is only covered with low shrubs (L&IBL, n.d.b).

Connection

To the west is the "Neue Leipziger" street and to the east "Plovdiver" street in a north-south direction. Both flow in the south into the "Lützner" street and the B87, which also runs along the model area. On the one hand, this leads eastwards towards the city center and also serves as a supra-regional connection to the west and north.

To the east there are two tram stops, the stop "Plovdiver Straße" in the south and "Jupiterstraße" in the north. Both stops are regularly served by Tram 15 on weekdays, weekends and public holidays. The main station can be reached by tram in approx. 30 minutes. South of the model area at "Lützner" street is the bus stop "Am kleinen Feld" in the west and the bus stop "Plovdiver Straße" in the east. Both bus stops are regularly served by bus lines 62, 65, 65E and 66 on workdays and Saturdays and sometimes also on Sundays and public holidays. In the north-east there is the bus stop "Jupiterstraße", from where the bus line 66 runs hourly from Monday to Saturday from 8 a.m. to 9 a.m. until 6 p.m. (LVV, n.d.).

From the suburban train station "Leipzig, Militzer Allee", which is about 200 meters to the south, the main train station can be reached by suburban train in about 25 minutes.

The area is also easily accessible on foot or by bicycle, as it is surrounded by footpaths and cycle paths.

Surrounding

In the south, a school center including a sports area borders the model area. Among them are the 94th secondary school in Leipzig, the special school for promoting learning in Grünau and the Max Klinger School. Tram tracks and a main road run to the east along the area. In the south, the "Netto" discounter and a driving school border the area. There is also a main road here. In the west, various residential streets, residential and mixed use with retail trade as well as day nurseries and other social facilities border the area. The residential use, which borders on the model area Schönauer-Holz or lies in its surroundings, is characterised by multi-story row buildings.

Existing building stock

The former prefabricated housing complex was completely demolished.

In the southeast is a building which houses a physiotherapeutic practice

and is otherwise vacant. Although it protrudes into the model surface without any spatial boundaries, it does not belong to it.

In the south there is a small pavilion of a driving school. This building also projects into the model area, but does not belong to it and is spatially delimited by a fence.

Contaminated sites

The area is not listed in the Saxony Register of Contaminated Sites. In some places, however, there is a high degree of soil compaction.

The standard ground value of the area and its surroundings is 270 euros per square meter. The areas a little further away have lower standard ground values. In the area southeast of the model area, for example, this is 170 euros per square meter. (Stadt Leipzig, 2018a).

Evaluation

On the 26th july 2013 the model area „Schönauer-Holz" was finished and publically opened. This is the second area of the urban forest project in Leipzig. The urban forest lies in an area surrounded by office buildings and commercial buildings and provides a kind of green center for this districts. The urban forest is accessible through several entries from each side. There are four entries that seem to be a main entrance because of metal steles as well as arranged trunks from the forest „Leipziger Auwald". In the north the trunks were removed due to an illegal felling. On the south entrance, see image 13, close to the pavilion from the driving school, one can find two park benches. Due to the closeness to the street and the dense situation on the square there is no high sojourn quality.

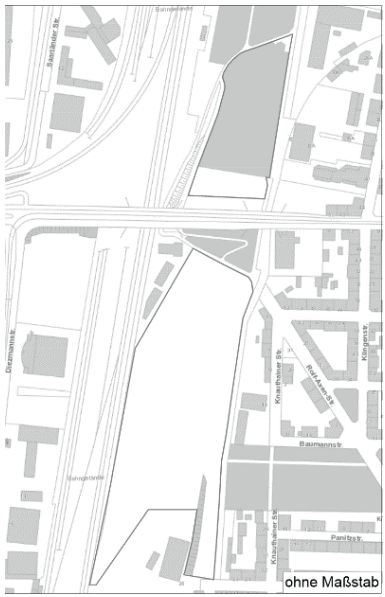
Figure 4.50. Square with seats based on concrete slab

Source: own picture, Leipzig 07.2018

Direction north on the east side there is a big square, see image 14. There is a streetball-place, several ping-pong tables as well as seats based of concrete slab. The square is designed openly and only light row of trees border it. The sojourn quality is here at a high level because the square is limited and without spaces of fear nor insecurity. The information blackboard close to the ping-pong table and located in the north section had to be removed because of vandalism. The small square in the north offer a high seat as seats based on concrete, but unfortunately painted with graffiti. The square is rubbish-strewn and hasn't a high sojourn quality. The north part creates a nice forest feeling because of existing trees. Some trails offer the possibility to discover new areas besides the usual ways. In northwest direction there weren't existing trees and therefore the vegetation needs more time. This section seems more as a high grassland with small trees. In the south section there are only isolated existing trees. The most are along the ways which generates a kind of avenue. Behind it is a reforestation area that needs to develop. Because of this the south section seems more a park as you can notice in image 15. In the southeast section, in the north of the physiotherapy practice many planting don't exist anymore. There are grasses and low bushes. A reason for this is the dense soil which is poor in nutrients. The rain causes on this soil waterlogging and otherwise occurs aridity. These extreme conditions regarding the location couldn't be overcome by the forest planting. Considering that there is no planned replacement planting the area will develop based on succession. Partly, the ways are illuminated by lamps. But those are only scattered visible and partly strongly damaged, too. In consequence by nightfall some place become spaces of fear or insecurity. Particularly, the north area is rubbish-strewm. The reason for this is the lack of trash cans.

The model area „Schönauer-Holz" has the potential to become an urban forest available for different user groups. The trees need on some parts time to develop and to become an urban forest.

Figure 4.51. Delimitation of the area



Source: own picture, Leipzig 07.2018

Urban forest „Gleis-Grün-Zug“

The third model area from the project „urban forest“ in Leipzig is the area „Gleis-Grün-Zug“. The description and evaluation of this area follows.

Figure 4.52. View of the model-area

Source: own representation based on map: Stadt Leipzig, 2018a.

Location/ size

When classifying the location and size of the model area, the geographical and topographical location, the urban and overall spatial classification, the key data as well as the planning statements and the current status are also considered.

Geographical situation

The model-area „Gleis-Grün-Zug“ has approximately 5 hectares and lies in the urban district southwest (L&IBL, n.d.c). The area is divided by the „Antonien“ bridge in two sections. The north section lies in the urban district “Plagwitz“ and the south section lies in the urban district „Kleinzschocher”. About 4,5 km in northeast direction lies the city center of Leipzig.

The urban district „Alt-West“ boders the model area in the west. The urban district “Plagwitz” boders on the west side “Neulindenau”, on the north side “Lindenau” and in east direction “Schleußig”. The urban district „Kleinzschocher“ borders on southeast the district Connewitz“, on the south the district „Großzschocher“ and in west direction „Grünau-Siedlung”, “Grünau-Mitte” as “Grünau-Ost”.

The urban district „Südwest“ is with 4.656 hectares the largest district in Leipzig. Thereof 508 hectares are residential areas, 316 hectares are industrial and commercial areas and 361 hectares are traffic areas. This means

that about ¼ of this urban district is under seal. Moreover, 404 hectares are recreation area and herewith under seal, too. The part of agricultural area is in comparison to other urban districts high with about 43,9%. Besides the agricultural area remains about 22% unsealed area (Stadt Leipzig, 2018s).

"Plagwitz" has a total area of 173 hectares and is herewith the smallest urban district in southwest. More than 90% of the urban district are residential, industrial and commercial area as well as traffic area. Finally with 2 hectares recreation area remain only 9% unsealed area in this district. (Stadt Leipzig, 2018t).

The third smallest urban district is with 304 hectares „Kleinzschocher" after comes „Schleußig" and „Plagwitz" in southwest. Approximately 39,1% of the area is under seal with residential, industrial and commercial buildings and traffic areas. Recreation areas play a big role in this urban district with about 35,9%. A quarter of this area is unsealed (Stadt Leipzig, 2018u).

Topographical situation

The model area „Gleis-Grün-Zug" lies at about 117 meters above zero. The area has in the north no raisings nor lowerings. The south section lowers in the center a bit. In the north of the "Antonien"-bridge coming from west to the area a sealed platform connects to the bridge. In the south a sealed platform overcomes the height difference, too (GeoSN, o.J.).

Urban and spatial situation

In 2017, the urban district „southwest" has 54.727 inhabitants and is herewith one of the four urban districts with the lowest number of inhabitants. There live 3.606 foreigners that represent a part of about 6,6%. The rate of unemployment is with 3% far below the city level (Stadt Leipzig, 2018s).

"Plagwitz" is with 15.798 inhabitants the densest district in the municipal district „Südwest". Approximately 9% is foreign population. This part is a bit higher than in the municipal district. The unemployement rate in Plagwitz is with 558 jobless people about 3,5% and herewith only few over the level of Leipzig-Südwest (Stadt Leipzig, 2018t).

In 2017 „Kleinzschocher" had a population of 10.054 and was herewith the third biggest urban district in the municipal district „Leipzig-Südwest". The rate of foreigner is with about 8,6% above the rate of the municipal district. With 4,7% lies the rate of unemployment above the rate of „Leipzig-Südwest", nevertheless it is below the rate of unemployment of the city Leipzig (Stadt Leipzig, 2018u).

Around the model-area many different uses are located, see in image 19. The southeast is mainly characterized by residential use more particularly

four level high built-up areas. Whereas direction north appear mixed use with retail trade and restaurants as well as big commercial areas with companies. Green areas appear only as roadside greenery.

In west direction lies big industrial and commercial areas. But, there are a big cemetery as well as many small allotment garden areas whereby in this section green areas exist. In the west section the model area is limited by train tracks.

The south part under the model area is characterized mainly by small allotment garden areas as well as one family houses with garden. As opposed to this the north section is characterized by less green areas and a mixed use. Hence, there are mainly mixed use and commercial and industrial use.

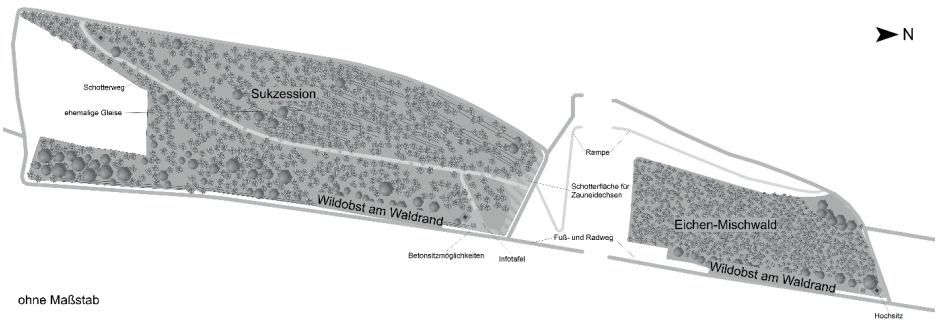
Basic information

From 1879 until 1990, thus 111 years, the freight depot „Gaschwitzer Eisenbahn“ operated in the section of model area „Gleis-Grün-Zug“. In 1990, after its shutdown the area stayed fellow 17 years. In 2007, the tracks were mostly removed. In 2011, could thus start the reforestation with the urban forest that went on in 2017 (L&IBL, n.d.c).

Planning/Status

The following image shows the planning of the model area.

Figure 4.53. Planning of the model-area “Gleis-Grün-Zug”



Source: own representation based on L&IBL, n.d.c

A joint pedestrian and bike way is planned around the entire area. This way exists largely and is in a good state. The way on the south end of the area wasn’t realized yet.

The south section shall develop itself on a natural way through succession from fellow land to forest area. In this section some tracks stayed. On

the east forest border shall be planed wild fruits. Thereof there is few to see because wild blackberries completely taken in this section. On the north border close to the platform to the „Antonien"-bridge is planned a brash area for sand lizards.

In the northern area, reforestation of a mixed oak forest is planned. Since this did not take place until 2017, the trees are still quite young and additionally characterized by high defoliation. Here, wild fruit is also to be planted on the eastern edge of the forest. Individual trees are recognizable.

Three high seats distributed over the area should give the visitor the opportunity to get an overview of the forest areas. In two places, at the very north and at the northeastern tip of the southern area, there is a high seat, an information board and concreted seating. Everything is intact.

The composition of the tree species varies on the forest areas that develop through succession or afforestation. While reforestation sets a direction, succession is gradually developing the species best suited to the special site conditions with stony and dry soil. The following tree species can be found on the entire model area:

Oak *(Quercus robur)*	Elm *(Ulmus minor)*	Common beech *(Fagus sylvatica)*
Turkey oak *(Quercus cerris)*	Littleleaf linden *(Tilia cordata)*	Field maple *(Acer campestre)*
Champion oak *(Quercus rubra)*	Common hornbea *(Carpinus betulus)*	Norway maple *(Acer platanoides)*
Ash *(Fraxinus excelsior)*		

The wild fruit plantations along the edge of the forest should include the following species:

Crab apple *(Malus sylvestris)*	Elder *(Sambucus nigra)*	Chestnut *(Castanea sativa)*
Sweet cherry *(Prunus avium)*	Rowan Sorb *(Sorbus aucuparia)*	Walnut *(Juglans regia)*
Common medlar *(Mespilus germanica)*		Hazel *(Corylus avellana)*

It remains to be seen which of these species will prevail. Also it can come by seed entry to a mixing and/or it can come further tree species in addition (L&IBL, n.d.c).

Connection
The area is cut through the bridge of Antonienstraße, from where it can be reached via a barrier-free footpath and cycle path. A footpath and cycle path also runs along the area, connecting it to the surrounding area. The nearest tram and bus stops are about 300 meters west and east of the area. Tram lines 1, 1E and 2 as well as the Nightliner N17 stop at "Diezmannstraße" and Antonien-/Gießerstraße" regularly on working days, weekends and public holidays. The main station can be reached in about 20 minutes (LVV, n.d.).

A wide and well developed footpath and cycle path runs in the east, north and northwest part of the model area. The model area is accessible from the Antonienbridge via a ramp to the north and south.

Surrounding
The model area is the southern part of the project area "Bürgerbahnhof Plagwitz". In the north there is a building playground, the "HildeGarten" community garden and the "Heiter bis Wolkig" café. In the west, the area is separated from commercial building land by railway tracks. In the south there is also an area for commercial use. In the east there is residential and mixed use. Among other things, a net and an Aldi are resident here.

Existing building stock
Southwest of the Antonienbridge there is a building which is currently empty but is being renovated. Although the building is not spatially separated from the model area, it does not belong to it.

Soil contamination
The area is not listed in the Saxony Register of Contaminated Sites.

Due to its former use as a freight station, the soil is highly compacted.

For the area of the model area no ground reference value is to be determined. The standard ground values of the adjoining areas differ greatly from one another. The areas east of the area, with less distance to the city, show values between 50 and 380 euros per square meter. The standard ground values for the areas west of the area are 3 to 40 euros per square meter. (Stadt Leipzig, 2018a).

Evaluation
The "Gleis-Grün-Zug" model area was the last of the three areas to be completed in 2017 and opened to the public. It is the southern part of the "Plagwitz Civic Station" project. In the north, the building playground, a fruit orchard and the "HildeGarten", a community garden, adjoin the model area.

These areas have a very alternative effect, which fits the concept of an urban forest. The model area is divided into two parts by the Antonienbridge. The northern area shown in Image 47 was afforested as an oak mixed forest in 2017 and is still fenced in, as the cultural care, which is scheduled here for three years, is still being carried out. Therefore, this area still needs some time until it can be perceived as an urban forest. A small square in the north with a high seat, information board and concreted seating offers a great quality of stay. A straight, asphalted ramp along the western edge of the forest provides a barrier-free connection between the higher Antonienbridge and the urban forest or the other areas of the Plagwitz public railway station.

Figure 4.54. A high seat of the model area

Source: own picture, Leipzig 07.2018

The southern area shown in Image 48 is to develop through natural succession. Some tracks were left in the area. The underground is characterised by gravel, which makes it almost impossible for people with walking disabilities or people with walking restrictions to walk on the surface. The vegetation in this area is currently dominated by tall shrubs and grasses. Some areas, such as the eastern wild fruit strip at the edge of the forest, are hardly accessible due to heavy blackberry growth. At the southern end there is a high seat. One such is shown in Image 49. This gives an overview of the entire southern area. There is also a high seat at the northern end, south of the Antonienbridge. Next to the lookout tower there is a small square with information board and concreted seating, the quality of which is good. To the west of the square is a gravel area, most of which is free of vegetation and serves as a compensation area for lizards. The Antonienbridge and the southern part of the urban forest are also barrier-free connected by an asphalted ramp. In its current stage of succession, the southern area looks more like a cultivated

fallow area and still needs a few more years before it can be recognised as an urban forest area. Although there is no dustbin on the entire model area, it is hardly garbage. Also vandalism through destruction or graffiti is hardly to be recognized. Due to the fact that the trees and shrubs are not yet very high, the entire area offers hardly any shade. This is a problem, especially in the summer months. The area is surrounded by paved paths, mainly used by pedestrians and cyclists. The footpath and cycle path in the west along the southern area is not asphalted. Its surface forms loose split. The planned route south of the model area is not yet available, as the right of way is currently missing. However, it is still to be created.

The "Track-Green-Train" model area also has the potential to establish itself as a well-used urban forest area.

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5. Reference cases for implementing and/ or steering Green Innovation Areas

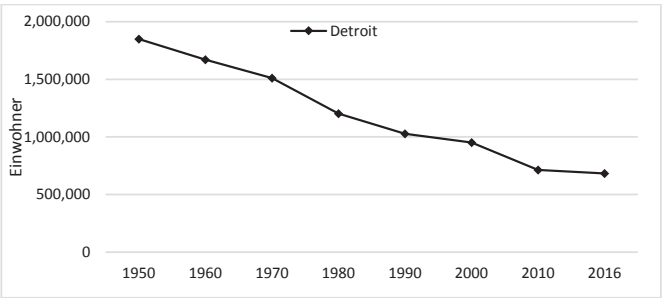
The reference cases presented here show how and in what way other countries utilize green innovation areas in their practice, respectively, which other areas might have the potential to become green innovation areas in the future. The first example, Urban farming in Detroit displays this concept from a city which can bee seen as most affected by post industrial and urban transitions in the world, Detroit, located in the Rust Belt. Here, many urban farming projects were initatedover the years. The second reference case comes from Switzerland. This example demonstrates how important the factor goverance is in steering land use and urban development. The second reference case coes fromt eh Mexican city of Guadalajara. It shows the development of an urban forsést whichcould in the future be used for wood production thus in a bioeconomic way.

5.1. USA: Urban Farming in Detroit

Libeshan Sivayogan, Karina Pallagst

Within 50 years, the city of Detroit lost approximately one million inhabitants. The lost population moved mainly to the suburbs. Hence, as the population of the suburbs grew, the city proper suffered severe losses and continues to do so (Oswalt 2004, p.14). Image no. 1 shows the shrinking process of the population from 1950 to 2016. For the year 2016, the US Census Office counted 683.443 inhabitants in Detroit. In 2010, the same number was 713.777, within the past six years the population declined by some 30 thousand inhabitants. In 1950, the population was 1.8 million, but since then the city experienced a constant decline that is of unprecedented significance. Within 50 years the city of Detroit shrank by nearly 900.000 inhabitants. No other American city saw a comparable decline.

Figure 5.1. Development of the population (1950 – 2016), Entwurf: Eigene Darstellung, TU Kaiserslautern 2018



Source: U.S. Census Bureau, 1950 -2000, and 2010, and 2016

The loss of population mentioned above lead to the fact that Detroit displays numerous vacant areas. These areas have the potential to be reuses and an improved. To this end, urban farms can play a key role as they offer not only fresh food, but also employment and an improvement of these vacant inner-city areas with attractive greenery.

Location / Size

Geographical Classification

The area of the urban farm is located in the North End district. To the south it borders the Milwaukee Junction district and to the west the three districts of New Center, Virginia Park and Boston Edison. Arden Park is located between the northern and southern part of North End (see image no. 2). The cities of Highland Park and Hamtramck respectively are located to the north and the west of North End. North End is situated in Detroit, about 7.7 km from Downtown.

East of North End runs the I-75 an Interstate highway connecting the north and the south for a quick connection to other cities. On the western side is Woodward Avenue, a highway called M-1. This highway is famous in the USA (Shepherd, 2018). To the south lies E Grand Blvd. Image no. 2 shows that North End is perfectly connected.

North End has two green areas/parks: The Bennet Playground in the south and in the north Bradby Park. In addition, North End counts two urban farms: The Oakland Avenue Urban Farm in the north and the Michigan Urban Farming Initiative in the south. The farms are approximately 2 km apart from each other. This article is about the Michigan Urban Farming Initiative (MUFI).

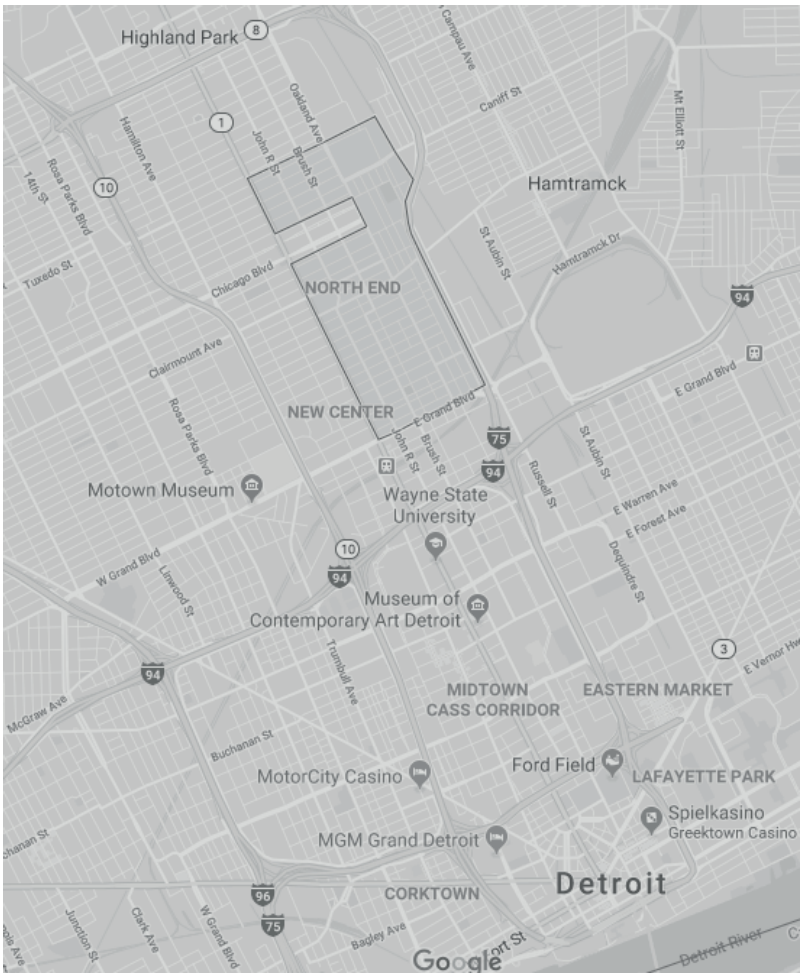
Topographical Classification

The area of MUFI is at an altitude of 629 ft or 192 m (Elevation map, 2018 a). The average altitude of the city is 600 ft or 182 m, so MUFI is a little above the average altitude (Elevation map, 2018 a). The plot on which the project sits in relatively level so that the topography is not of much concern (Elevation map, 2018 b).

Urban and Spatial Location

The location of MUFI is characterized by vacant and unused areas. MUFI uses these vacant areas and creates urban agriculture here. MUFI is located at 7432 Brush Street in North End. The location is in the southern part of North End.

Figure 5.2. North End (without scale)



Google Maps, 2018

The MUFI farm has its headquarter at 7432 Brush Street, but this is not the project area. MUFI operates several projects sites. Its urban farms are located in Brush Street, Custer Street and Horton Street. These areas are close to each other and can easily be reached by foot (see image no. 3). Moreover, dedicated pedestrian walkways between these areas shorten the distance.

MUFI uses plots within vacant and unused areas. One can also find occupied houses, mainly single family houses, scattered in between these plots. Moreover, the area is characterized by empty plots overgrown by trees, es-

pecially in the northern part. MUFI accounts for more than 3 acres of land. This corresponds to more than 1.2 ha in total, 0.8 ha of urban gardens and a fruit orchard with 200 trees (The Michigan Urban Farming Initiative 2016).

In image no. 3, the area of MUFI is in highlighted in grey. Within the highlighted area it is clearly visible where urban farming has already been established. Further projects will be realized on the currently unused plots.

Figure 5.3. Area of MUFI (without scale)

The Michigan Urban Farming Initiative 2018.

The Community Resource Center is a square building on Brush Street. It is located on the eastern side of the urban farm and is the headquarters of MUFI and sits just across Brush Street from the urban farm. The Center's building stands out with its flat roof and functional form (see image no. 3).

Urban farming occupies the largest share of MUFI's area. It is well connected by two streets. To the North is Custer Street and to the East Brush Street. To the South, the area is partly bordered by and partly cut by a pedestrian way.

The area has an abundance of parking spaces on the streets.

Residents and Urban Integration

Basic Data

MUFI was founded in 2011, by Tyson Gersh and Darin McLesky. They bought the building in 7432 Brush Street in a public auction for $5,025 (Rothman, 2016).

The following images show the MUFI headquarters in 2011 and in 2016. In image no. 4, showing the year 2011, the estate is mainly a green area. A dead tree borders the street and the sidewalk is not visible. In image no. 5, in the year 2016, the urban farm has been established. Five years after its founding, the property now has a hoop greenhouse, the parcel is bordered with raised beds for flowers. Moreover, the sidewalks were enlarged and are now safe for pedestrians.

Figure 5.4. Northern Side of MUFI in 2011

Facebook-page MUFI.

Gersh who is a former student of the University of Michigan, developed the idea of an urban as he wanted to change Detroit's situation (Rothman, 2016). As mentioned before, the shrinking process affected Detroit deeply. Many inhabitants left the city. The remaining inhabitants lives are challenged by the many adverse effects of the shrinkage process.

Gersh had the intention to help the inhabitants with free food from an urban farm. But this aim was not easily realized. In MUFI's first year nothing was produced and the focus lied solely on creating a network of volunteers and connections to the existing community (Rothman, 2016).

Figure 5.5. Northern Side of MUFI in 2016: North side (2016)

Facebook-page MUFI.

Gradually establishing the urban farm was only made possible by the support from volunteers and community organizations. From 2012 to 2016 alone some 8,000 volunteers participated. This corresponds to more than 80,000 work hours (The Michigan Urban Farming Initiative 2016). MUFI also receives support from large corporate sponsors such as BASF and General Motors (The Michigan Urban Farming Initiative, 2016).

Citizens are now able to buy fresh produce - change that has been very positively received. MUFI became increasingly popular and was soon able to buy more tracks of land in the surrounding area to realize further projects.

MUFI has set itself goals and aims at their realization. Among these are education and community building as well as reducing the socio-economic gap. In order to achieve these goals, urban farming plays a vital role. Detroit has been the site of urban farming project for some years, but MUFI is the first such project that aims at sustainability. MUFI does not only aim at supplying locals with fresh produce but at revitalizing and developing unused areas sustainably, too. In doing so, MUFI applies the „Infill-Style-Model“ (Jaques, 2017). This development model is a crucial part in redeveloping cities and allow for growth (Austin und Kang 2014, p 2).

Planning Status and Zoning

MUFI is an active non-profit organization and the urban farm is still ongoing. Every Saturday citizens come to the urban farm and carry food for free (Perkins, 2017).

There are other ongoing projects, but also projects that have been redesigned or cancelled. One third of the area of MUFI is in use for food production, another third is for interactive agriculture and the rest of the area is for pedestrian ways and fences (The Michigan Urban Farming Initiative 2018).

Connection

Local and National Connection of Roads, Ports, Railways and Walking Accessibility

As MUFI is outside of Downtown it cannot be reached by the People Mover. By foot Downtown is roughly an hour away.

The newly installed QLine light-rail line runs in about 20 minutes from Congress Street station in Downtown to Grand Boulevard. From Grand Boulevard MUFI is only six minutes by foot. QLine is a single light-rail line.

Public transport in Detroit mainly relies on buses. North End is accessed by several bus lines. There are two bus stops near MUFI that are about five minutes by foot away. Taking the bus, MUFI can be reached from Downtown in about 25 minutes. Buses tend to run late or even not all. Therefore, reliability is an issue.

MUFI is easiest reached by car. From Downtown it takes about seven minutes to get to MUFI. I-75 N runs nearby as well as I-375 N. East Grand Boulevard runs near the southern tip of North End.

Since 2017, Detroit also has a bike-share programme. MoGo offers 430 bikes at 43 stations across ten districts including North End (PBSC Urban Solutions, 2017). The closest station is at E Bethune Street near Bennett playground. From the station MUFI is only 130m away. As most stations are located between North End and Downtown, MoGo bikes do not allow to go to or from anywhere else (MoGo Detroit, n.d).

Accesitbility of Markets and Customers

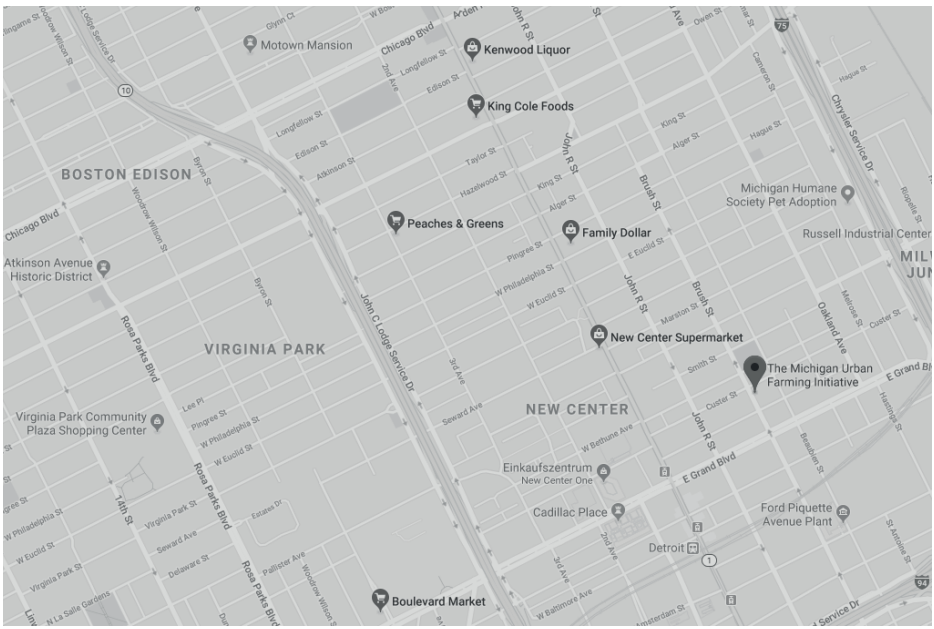
The image above shows markets that are near the urban farm. New Center Supermarket is about 1 km from MUFI. Although called a supermarket, it is actually a liquor store. New Center One, 1 km west from MUFI at W Grand Blvd and 2nd Avenue, is only 11 minutes by foot away. Peaches & Greens, a farmers market, is 2 km northwest of MUFI. Another market is King Cole

Food. Its 1.9 km from MUFI at outside of North End. By cars its four minutes away, by foot it takes 23 minutes to get there. Further away is Virginia Park Community Plaza Shopping Center with a Family Food Super Store. It's in Virginia Park and 2.8 km from MUFI. By car its seven minutes from MUFI, by foot 36 minutes.

In conclusion, it has to be noted that North End lacks food markets. All of the above mentioned markets are outside of North End. Though most are reached easily by car, some inhabitants cannot make longs trips to these markets – be it due to health reasons or the simple fact that they don't own a car. To these people MUFI is immensely important. Living in a "food dessert" can leave people prone to lack of healthy foods, malnutrition or even hunger. Thanks to MUFI locals can afford healthy foods and safe money.

MUFI also sells its produce to the nearby markets. Hereby, it is able to finance its projects and serve the community.

Figure 5.6. Markets Near MUFI



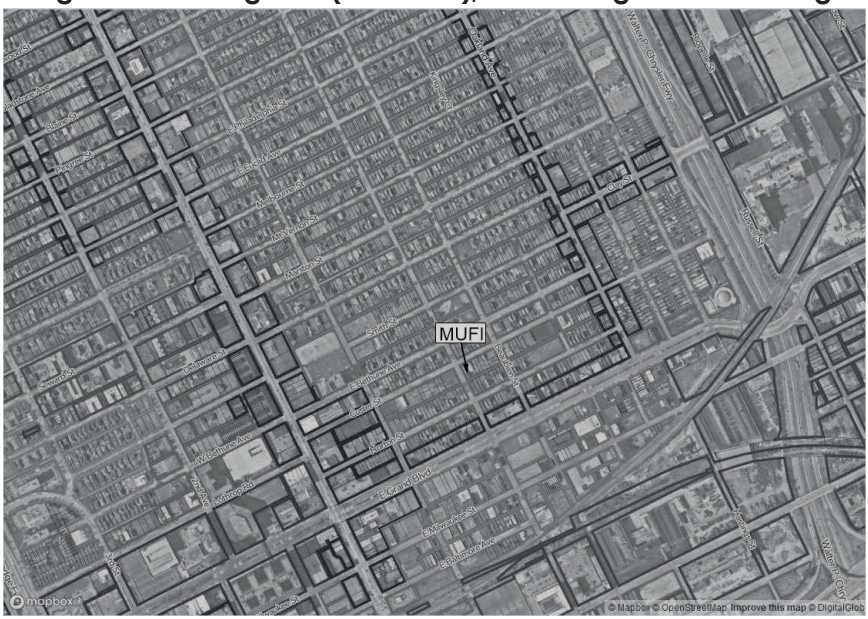
Google Maps 2018.

Area / Environment

Restrictions of the Area

Figure 5.6 shows the zoning for the area around MUFI. Mainly different kind of housing are located around MUFI. These are open space such as parking lots, but also parks or leisure facilities.

Figure 5.7. Zoning Plan (unscaled), Entwurf: Eigene Darstellung



TU Kaiserslautern 2018, City of Detroit, n.d.

Urban Settlement

Emissions

The urban farm does not emit emissions as far as noise or air pollutants are concerned. MUFI headquarters aren't finished yet. After its completion it's expected to contribute less to emissions than a single family home.

Since MUFI is near E Grand Street, it is impacted by noise and pollution from this major road.

Existing Buildings

Building Stock, Uses

Figure 5.7 shows the currently planned projects. In total MUFI has 13 projects that are either in planning stages or currently being developed. These projects are realized by the support of sponsors and the work of volunteers and volunteer employees.

Figure 5.8. USA Urban Farm 1 Aktuelle Projekte (ohne Maßstab)

The Michigan Urban Farming Initiative, 2018.

Conversion / Demolition

Community Resource Center

The Community Resource Center was built in 1915 and in use until 2009. It has six rooms on three floors. As it became uninhabitable, it was rendered unusable. MUFI aims at restoring the building for its uses. The building will be used to contribute to sustainability and urban development (The Michigan Urban Farming Initiative, 2018).

The first floor will be used as a meeting area for new or small charitable organizations. The area would allow for team working and meeting. According to MUFI, they are developing a business plan to realize this plan (The Michigan Urban Farming Initiative, 2018).

Additionally, another sustainable structure will be erected. This will be used as a multi-purpose hall where workshops could be held. Workshops will help engage the community and enable knowledge sharing. This could encompass topics such as cultivation, practical experiences and preparation of foods. An industrial size kitchen will enable MUFI to sell locally made products at markets (The Michigan Urban Farming Initiative, 2018).

Figure 5.9. Community Resource Center

Michigan Radio, 2017.

The next image shows one of the planned projects for the center. This extension of the building on its nothern side is built as a greenhouse. A veranda will wrap around the extension. The aims is to supply customers with products to “grab and go”. The plan is to cater for the busy urbanites who tend to buy products that are easily and quickly made. Therefore, the greenhouse will house a for-profit marketplace that also offers outdoor seating. There, customers will be able to enjoy a view of the farm as well as its products (The Michigan Urban Farming Initiative, 2018).

Figure 5.10. Draft of the Farm to Table Café

The Michigan Urban Farming Initiative, 2018.

Urban Farm

Since 2011, the urban farm has produces over 50,000 lbs (22,000 kg) of fruit and vegetables. The produce is distributed to several places following a list of priorities (The Michigan Urban Farming Initiative, 2018).

First priority are individual households. This is organzied by the „pay-what-you-can" method – meaning those who receive the produce pay as much as they can afford (The Michigan Urban Farming Initiative, 2018). Over the past few years the farm was able to supply over 200 households within a two mile radius (The Michigan Urban Farming Initiative, 2018).

Second in line are local markets. Thousands of pounds of produce go to five markets in a five mile radius (The Michigan Urban Farming Initiative, 2018).

Local restaurants and vendors are next to be supplied. Thousands of pounds of produce have been delivered all over south-east Michigan.

Lastly, the farm's produce is brought to the food pantries of local churches and the Coalition on Temporary Shelters (COTS) & Forgotten Harvest (The Michigan Urban Farming Initiative, 2018).

The following image shows how the area of the urban farm has changed. Image no 34 shows the undeveloped lot in 2013. The estate is almost completely empty and has potential for reuse. MUFI realized that potential and started work on the urban farms within the same year.

Their goal was it to establish an urban farm and to brighten up the lot as well as the whole area. Image no 34 and 35 were taken five months apart showing a stark contrast. This was achieved mainly by volunteers from diffe-

rent organizations some of who have travelled long distances in order to help (MUFI Blog, 2014).

The following figure, finally, shows how the empty plot has been turned into an urban farm. The image also shows the contrast between the urban farm and its surroundings. One can see how the entire area has appreciated through new greenery - at the same time improving the surroundings as well as the local climate.

Figure 5.11. Urban Farm March 2013

MUFI Blog, 2013.

Figure 5.12. Urban Farm July 2013

MUFI Facebook Page, 2017

Figure 5.13 Urban Farm 2017

GreenGrow n.d.

Another project is planned for 325 Horton Street. The building on the site will be dismantled except for its foundation and basement. The latter will be transformed into a retention pool by applying a rubber membrane to the basements walls. The transformation would save money as the foundations would not have to be torn down (The Michigan Urban Farming Initiative, 2018). Optionally, MUFi could built a water retention system or connect to the water main (The Michigan Urban Farming Initiative, 2018).

Figure 5.14. 325 Horton Street

The Michigan Urban Farming Initiative, 2018.

The figure above shows the project site in 2017. The house that stood on the site has been demolished.

The planned cistern would have a volume of 16,000 gallons (60,000 liter) (The Michigan Urban Farming Initiative, 2017).

The cistern is meant to collect water and allow for the irrigation of 0.8 ha of the urban farm. The project was realized thanks to contributions of funds and materials. Sponsors included Garnier, TerraCycle and the Target Corporation. Aaron Scarlet, a

landscape architect, supported the installation of the cistern (The Michigan Urban Farming Initiative, 2017).

In addition to the cistern, MUFI plans to set up a common room. This room will be open and within the green. Locals and visitors will be free to visit and relax. This project will also rely on sponsors Garnier and TerraCycle to provide outdoor furniture and materials needed for the realization of the project. The outdoor room is planned for four pavilions with 14 picknick tables. MUFI has won the materials and $25.000 in a competition by Garnier (The Michigan Urban Farming Initiative, 2017.

Hoop Farm

Figure 5.15. Hoop Farm

Faceboom page MUFI, 2016.

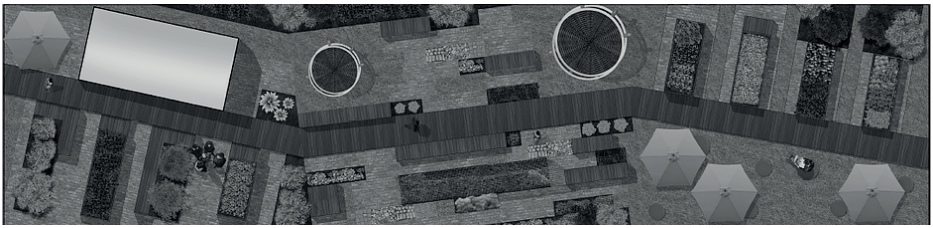
The hoop farm is located on Custer Street. It is a greenhouse and serves for scientific purposes as well - 250 varieties will be cultivated there. The greenhouse is especially useful in winter when it will allow for warmth requiring minimal energy. MUFI aims to be able to grow through the winter season (Growers Supply,n.d).

Children's Sensory Garden

This garden caters especially to children. Designed for interaction, it is meant to stimulate children's senses. The learning environment is divided into five zones thereby establishing one area for each sense. The garden has already been established and can be used by children. Image no 40 shows a

plan of the garden. The project has been supported by the Scotts-Miracle Gro Company (The Michigan Urban Farming Initiative, 2018).

Figure 5.16. Planung des Children's Sensory Garden



The Michigan Urban Farming Initiative, 2018.

Figure 5.17. High Density Fruit Orchard

The Michigan Urban Farming Initiative 2018

High Density Fruit Orchard

The orchard is situated between the Children's Garden and the area for the planned Shipping Container Building. It hosts seven types of trees e.g. cherry trees in high density allowing for a total of 200 trees. Each type has its own cutting strategy.

The trees are planted in rows that are run in a north-south direction. The orchard has been sponsored by Mercedes Benz Financial Services (The Michigan Urban Farming Initiative, 2018).

Soil and Water Contamination

The city of Detroit is burdened by abandoned industrial sites. These are often polluted and can only be used after intensive clean-ups.

The district of North End is lucky in that it used to be home to the affluent middle and upper class. This fact is reflected in the remaining grand houses. The area around MUFI has long been zoned for housing so that there has been no industry (Eligon, 2014).

The area around MUFI is paved as far as the streets in the area and the parking lot at Custer and Beaubien Streets is concerned. As this lot will remain there are no changes planned in regard to unsealing paved surfaces.

Restrictions on Further Use

Cost Calculation for Possible Clean-Up / Disposal

Property Prices & Land Values in Comparison to the National Average

According to realtor.com, as of February 2018, the average price for a square foot of land is $28. One square foot corresponds to 0.09 m². There has been an increase from 2017 when the price was $24 (Realtor, 2018). In February 2018, the national average is $141 (Zillow, 2018).

The median price for a house in North End is $55,000 (Realtor, 2018). In comparison, the national average is $261,000 (Zillow, 2018).

The comparison of these values shows clearly how much Detroit diverges from the national average. The shrinking processes of the past as well as the rising vacancy rate have made it much cheaper to buy a house in Detroit than on average in the US.

North End profits from its location within the city. It is near to Woodward Avenue and Downtown, both are attracting newcomers. MUFI itself is located at Woodward Avenue and Grand Boulevard making its immediate surrounding one of the more popular ones (Perkins, 2017).

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5.3. Switzerland: Mismatch of public and business interests – the bio-economy company Amgen looking for a new production site…

Andreas Hengstermann, Patricia Hammer

Time and money are two main factors for companies. Therefore, this case from Switzerland highlights how companies proceed in their search for production sites and underlines the importance for cities to be prepared for the demand and reuse of land.

In 2004, the worldwide known US-company Amgen publicly announced their plans to expand: the company searched a new location for production of around 55 ha and planned to create about 1,200 new jobs at that location (Hengstermann & Geber, 2015).

Amgen (Applied Molecular Genetics) is a bio-technology company founded in 1980 in Thousand Oaks, California, USA (Amgen 2018 a). Amgen develops bio-pharmaceuticals to treat serious illnesses and typically addresses diseases with a limited number of treatment options. With around 18,000 employees, Amgen is the biggest bio-technology company worldwide with an annual turnover of around 23 billion US-dollars (Wikipedia: Amgen, 2018). On the one hand, Amgen combines innovative research with high quality bio-pharmaceutical production; on the other hand, Amgen develops both biological drugs (biologics) and bio-similars (Amgen 2018 b).

At the beginning of the new millennium, Amgens' company management was looking for a new production site in Europe. Due to competiveness factors (in this case: promised tax subsidies), only sites in Switzerland or Ireland were seen worth considering. As the company's European headquarter had been located in central Switzerland (Lucerne) already, the company started searching for potential sites in Switzerland only.

The planned production site needed an area of approximatively

55,000m². Besides the general linkage to the road system, the handling of chemical raw material and products requires a potent railway connection. Due to financial reasons, the site itself should preferably be built on a flat terrain. Moreover, the enterprise wanted proximity to an attractive city, to be attractive for highly qualified workers. Therefore, the vicinity to a university or similar educational institution is seen as advantage.

After the announcement of the company's plans, a competition between Swiss municipalities was triggered. Many local politicians strived for attracting the industrial plant. Besides direct tax revenues, they hoped for indirect effects in their municipalities resulting from the prospective 1.200 employees.

A first clarification between the national government and the company showed that in all of Switzerland only three locations met the company's needs. From those, two, namely Galmiz and Yverdon-les-Bains, started the preliminary planning process.

The village Galmiz (canton of Fribourg) has about 700 habitants and is located at the Lake Morat within the city triangle of Bern-Fribourg-Neuchâtel. The municipality is served by the highway A1 as well as the local railway line Lyss-Murten. The potential site is located north from the village center in the Greenfield area Grand Marais. Due to its high quality of the soil and the longstanding tradition in cultivating the land, the area is also known as the Swiss veggie heart („Gemüsekammer der Schweiz").

The city of Yverdon-les-Bains (canton Vaud) has approximatively 30.000 habitants and is located at the Lake Neuchâtel between Lausanne and the city of Neuchâtel – about 50km south-west of Galmiz. The city is connected to the highways A1, A5 and A9 and is a crossing point of several regional railway lines. The designated site is next to an existing industrial area in the south of the city center. In Yverdon-les-Bains, the School of Management and Engineering Vaud is located.

Both municipalities and their respective cantons showed immense interest in hosting the new Amgen production site. Both potential sites convince as far as the technical specifications go. Both locations are close to the highway. In Yverdon-les-Bains, the site would have been located directly at the highway with a direct access via an existing exit. In Galmiz a new highway exit and a short access road would have been necessary. In both cases, there is a railway line which would allow a connection. But, in the case of Galmiz, an additional track would be necessary to avoid any congestion on the single railway line. Both sites were also topographically and in terms of structural engineering appropriate for the proposed development. As the site in Galmiz is a potential floodplain, protection measures would be necessary.

As for soft location factors, Yverdon-les-Bains is slightly superior. The local university of applied sciences could guarantee the training of employees and the city itself serve a certain quality of life. Moreover, Yverdon-les-Bains, as a regional center, has better connections to the infrastructure. Generally, the clarification showed that Yverdon-les-Bains would be more appropriated, but both sites would technically be feasible.

Aside from technical aspects, planning law related circumstances were considered. Here, Yverdon-les-Bains appeared clearly superior. The local site was already zoned for industrial and commercial use in the municipal zoning plan. Moreover, the site was categorized as strategic area for economic development in the cantonal structure plan. Oppositely, the site in Galmiz was zoned for agricultural use only which includes general construction ban. Moreover, the cantonal plan and the national plan designate a special protection for the area due to its high agricultural value "Fruchtfolgeflächen". The site was also of archaeological importance as well as prone to floods as mentioned before. Thus, considering the legal situation, the site in Yverdon-les-Bains was more feasible than the one in in Galmiz.

Nevertheless, Swiss politicians and the company's management decided in favor of Galmiz. The Swiss government absolutely wanted the settling of the promising enterprise. For the company both locations were technically fine. However, it turned out to be very important to start construction as quickly as possible. The presumably more appropriated area in Yverdon-les-Bains by planning perspective, however, was in the hand of several private owners. Negotiations with them would have been necessary – possibly lengthy, and with an unpredictable outcome. The site in Galmiz, presumably less appropriate by planning perspective, was in the property of the canton, which planned to build a prison in the 1960s that was never realized. This coincidence allowed the public body to secure the site quickly – and moreover cooperate with the enterprise on the pricing of the land. The quick and cheap availability of the land in Galmiz was a more important reason for government and the enterprise than technical and legal planning criteria.

The obstacles of the planning law were solved within a short time. The site was, with the approval of the cantons and the state, quickly rezoned and declared as an industrial zone. The cantonal plan was amended subsequently. The special protection of the agricultural land was nullified likewise. All planning law obstacles were removed within a few weeks approved by all political institutions (ARE 2005). As a result, planning law has not been broken technically, but it was adjusted to the political will quickly (Bachmann 2005: 4, Riva 2006).

Table 5.1. ***Characteristics of the potential sites discussed - in comparison to company's requirements***

	Company's requirement	***Galmiz***	***Yverdon-les-Bains***
Taxes	avoidance	General low taxes in Switzerland, Additional tax reduction granted by national government	
Surface area	55.000m^2	> 100.000m^2	58.800m^2 plus minor reserve options
Flat terrain	preferred	Yes	Yes
Highway connection	indispensable	Highway close, Access easily buildable	Highways close, access existing
Cargo railway connection	indispensable	Existing, but need for expansion of capacity	Existing
Connection to public transport	Preferred	Existing, but on low quality	Existing, high quality
Legal status	Ready for development	On municipal level: Zoned for agricultural purposes only. Additionally protected by cantonal and national planning level	On municipal level: Zoned for industrial and commercial uses. Additionally marked as preferred location for economic development by cantonal planning level
Property Owner	Ready for purchase	Public (Canton of Fribourg)	Private (several private landowners)
Availability	immediately	immediately	Generally available, depends on negotiations
Land Price	Low	Depends on government, willing to sell below market price	Depends on negotiations, probable for market price
Further assets	As many as possible		Proximity to educational institution Attractive place of residence
Further Issues	As few as possible	Floodplain Area Archeological suspected area	

Source: Own elaboration.

Despite this speed-up based on political consensus, the entire procedure took too long for the company. The management reviewed its decision in favor of Switzerland and finally changed its mind. Instead, Cork in Ireland was envisaged as new location (Weiss, 2008). Ironically, even this site was not realized. Based on the development of the world economy, the company decided to cease from Europe and finally realized the project in Singapore.

However, the Galmiz case shows two main contradictions of the Swiss planning system: On the one hand, entrepreneurial thinking that focuses on speed and cost-efficiency meets on spatial planning system that has to coordinate and harmonize different and conflicting requirements. Whereas the company's management prefers quick and cheap solutions, time and money play only underlining roles for public actors (Martinson 2006). Instead of that, political legitimacy and acceptance are highly important – and the prospect of regional economic development. On the other hand, planning as public policy meets the system of property rights. From a planning perspective, Yverdon-les-Bains was superior to Galmiz. Nevertheless, Galmiz asserts itself, as the land was available quickly. The final location decision was shaped by the property rights level more then by the planning considerations.

Finally the case shows how competitive and parochial thinking occur (Martinson 2006). While the two locations are less than 50 km away from each other and both cantons would have had benefitted from a project of this size, there was no dialogue or joint approach. The company took advantage of this behavior by playing of the two municipalities against each other – to get the best conditions (Martinson, 2006)

This case shows:

1. How weak the Swiss spatial planning is prepared for requests of this size
2. How quickly cantons and communities compete with each other, instead of looking to cooperate across borders in order to find the best possible overall solution.
3. How little property rights are taken into considerations of planning decisions and how strong they can be

It is essential for cities willing to attract investors that they possess spatially and environmentally adequate site offers, which on request by a company would be available. Starting the search for an adequate location only after an investor requests it, cannot be a solution (Bühlmann, 2005). More coordination makes sense, because this example clearly shows how social, ecological and economic interests collide in spatial planning (Rumley, 2004).

This case is in Switzerland symbolized the malfunction of the spatial planning system (Bühlmann 2005, Bachmann 2005, Enz/Wiesmann 2005,

Martinson 2006, Riva 2006). An area with the highest protection in the planning law against being overbuilt, was available for entrepreneurial interests in record time. Protection of nature and landscape were less important than the creation of 1,200 new jobs. The binding character of planning laws held up only as long as it harmonized with politico-economic thinking.

However, the Galmiz case became a symbol in Swiss political debates and mutated into a turning point in Swiss planning law. The environmental and landscape protection organizations were shocked by this incident (Martinson 2005) and initiated a popular initiative that demanded to improve the legal protection for natural livelihoods. The initiative included, inter alia, a nation-wide zoning moratorium in the Swiss constitution. Quickly, the initiative got the necessary amount of signatures and was approved formally. With this initiative as political leverage, the initiators were able to work on a reform of the Federal Act on Spatial Planning (SPA) with the federal government. The resulting, partly reviewed law focuses on the protection of Greenfield areas by fostering infill development. As one implementation mechanism, instruments dealing with property rights were inserted into the law, such as the mandatory capturing of betterment or the obligation to build unused building potentials (Hengstermann 2018). Altogether, the planning system should be strengthened to protect vacant areas effectively. The economic associations and property owners saw a restriction of their constitutional property guarantee and objected to the law change. Finally, Swiss people had to vote on the draft law in 2013. With almost 63% votes in favour, the law came into force on 1 May 2014. The case of Galmiz could therefore be seen as a lucky turn for spatial planning in Switzerland (Weiss 2006) and mark a change from a passive land-use planning system towards an active land policy (Hengstermann/Gerber 2015, Hengstermann 2018).

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5.4 Bosque Pedagógico de Agua, Zapopan (Metropolitan Area of Guadalajara)

José G. Vargas-Hernandez

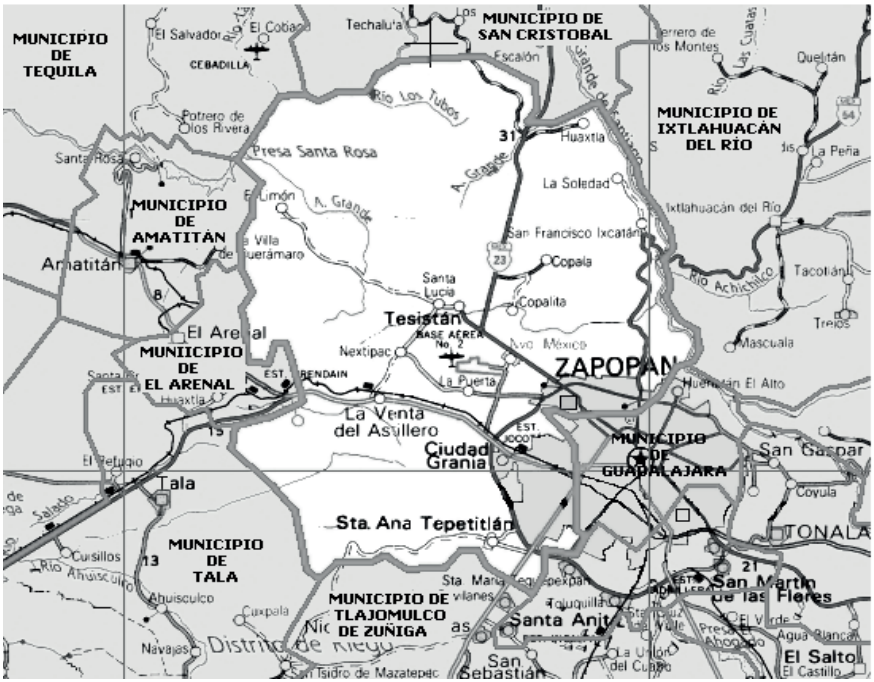
The Pedagogical Water Forest Bosque de Agua is almost in the same location as the Agroecological Zapopan Park, so this case study will show similarities like the population, the buildings that connect this point with the city and the services this park has. The climate and the soil condition is also the same because of the location where this park is.

The education of the citizens, the whole economy system, the life expectancy, the gross national income, etc. are also the same ones considering the zone in which this study case is studied.

Pedagogical Forest of Water is located in Santa Cecilia 652A, Lomas Del Bosque, Real del Parque, 45140 Zapopan, Jalisco, in the Atemajac-Colomos hydrological sub-basin and is part of a hydrobiological corridor in "Los Colomos". This polygon has 36.5 hectares and is characterized by its infiltration capacity due to its geological condition conformed by an abundant layer of tufa or pumice and it functions like a natural regulating glass where networks of filter galleries have been developed to supply water to 17 colonies.

Due to intense construction in Atemajac-Colomos sub-basin, it is necessary counteract this predatory tendency by attaching great importance to the presence of two streams: "La Campana" and "La Coronilla" (Agua Prieta) that join downstream to the height of "La Campana" spring system. The park has a complete biodiversity that has expanded in its species, appropriating them to the ecosystem and in five biosphere realms (vegetal, animal, protista, fungi and monera (Ruiz Barajas, 2016).

Figure 5.18. Local and national connection of roads, airport, railways



https://www.facebook.com/bosquedelagua/

Figure 5.19. Location of the Pedagogical Forest of Water in Zapopan

https://www.facebook.com/bosquedelagua/

The inhabitants of Zapopan in particular and the Metropolitan Area of Guadalajara have a new green space to visit, to know and protect it: the Forest of La Campana, with more than 30 hectares of extension within the polygon of Los Colomos, with its already 25 Thousand trees planted, although it has room for 50 thousand more.

The local and national connection of roads, ports, railways and walking accessibility is contemplated for the Zapopan municipality as well as all the environmental regulations, the emissions it suffers and the air pollution.

Figure 5.20. Buildings and construction in Pedagogical Water Forest

https://www.facebook.com/bosquedelagua/

About 100 workers from the Public Services Department did the work within an area of 28 hectares from the entrance to the street Santa Cecilia in the colony of Santa Margarita. Stairs were made with logs to reach the viewpoint of the Pedagogical Forest of Water, known as Colomos III that are also part of all facilities restored by Zapopan City Hall staff. In 28 hectares, of the total of 45 hectares that make up the Forest, restoration work was done to make the Forest a meeting place for citizens, as well as being a venue for cultural events and other environmental services (Prieto, 2013).

The municipal authority of Zapopan is currently prevented from carrying out any improvement work for the Pedagogical Forest of Water, because some individuals have undertaken trials to fight for the ownership of that property and have announced measures to defend them from its field of action. An agreement with the Ministry of the Environment and Natural Resources was imposed so this land can never be changed and to decree the estates that are part of the polygons of the Natural Protected Area (*El Informador*, 2016).

As the matter of contamination it can also be said that is has the same ones as the Zapopan Agroecological Park Due to the altitude and the hydrographic network of the region, where the Municipality of Zapopan is located.

The Sector in which this proyect is developed is Colomos III, which is a Municipal Area of Hydrological Protection. It has an impressive hydrological value, and it is a beautiful spring with a couple of streams, a consolidated source of water supply and a source of life. This area located in the headquarters of the Pedagogical Forest of Water, an has 36.4 hectares that will become a that practice and promote an environmental culture and will favor its protection, restoration, conservation, responsible preservation and rational use, since the Congress of Jalisco approved it as protected municipal area of Zapopan (Ramírez, 2014).

This park is an important opportunity provided by the ecosystem, being a living laboratory and formidable scenario for meaningful learning. The pedagogical sense is based on a fundamental principle, which should regulate the cognitive and the awareness work of learners and the general population: "Educating with water and for it" (Ruiz Barajas, 2016).

The pedagogical water forest is a municipal project that seeks the recovery of the public land known as "Arroyo La Campana" to serve the community and the environment through the restoration of the natural environment, the consolidation of infrastructure for visitors and the promotion of an environmental culture, sustainable management of the water resource, the conservation of the ecosystem and environmental services.

This is a strategic environmental project that benefits the sustainable management of water resources, provides improvements to the use of water supply and quality, promotes the conservation of the ecosystem and its biodiversity, proposes comprehensive solutions for flood management, and promotes environmental culture. The surface of hydrological conservation benefits 64 thousand inhabitants in direct way and more than 20 colonies of Zapopan.

The goal vision, and the idea of this projects started with the state owning this public space since 1898, which was leaded to the municipality of Zapopan in 1993. This place was in a state of several deterioration and systematic invasions that violated public property and therefore its environmental value. By the end of the 19th century, the area was renowned for its high hydrological value until 1897, when the Governor Luis C. Curiel purchased 248 hectares to protect and conserve river beds and springs such as "Colomos", "La Campana", "Chochocate", "Barrenos" and "La Culebra".

The water network was implemented to distribute the water to the city. Since 2009 there was the political intention to consolidate the urban forest according to environmental protection criteria.

The Territorial Strategy for Urban Prosperity Zapopan 2030 is an interdisciplinary planning exercise that identifies Zapopan as a municipality of great values and serious threats. It is essential to understand how Zapopan

wants to be a prosperous territory and it proposes three strategies for taking action: The first one is having a sustainable management of natural capital and its ecosystems, the second one is having a system of connectivity and integration of territorial networks which is based on the direct experience of the ecological environment that allows us to immediately assimilate the importance of the rivers in which surface waters flow and the springs that are outcrops of groundwater that come from hydrological and geomorphological flows of the aquifer, as well as Natural sources of water for human consumption and supply for the inhabitants and especially children and young people of a growing metropolitan area. The third one is fight for be a "Compact City" model with the tendency of re-concentrate population. (Ruiz Barajas, 2016).

The forest forms part of an estate in the "Arroyo La Campana Colomos III" has an area of 36.4 hectares that was declared a natural protected area by the local Congress in July 2014 in order to conserve that hydrological zone threatened by real estate developments. This was allowed by The Technical Committee of Colomos III, headed also by a counselor and composed of councilors, municipal offices (Ecology and Parks and Gardens) and representatives of civil society, among them the academic Jaime Eloy Barajas (Bello, 2015).

This agreement represent the participation of various organizations, groups and citizens committed and compromised to the forest, that for almost 20 years have worked in the forest restoration and have demanded the recovery of those areas that have been illegally invaded and that are part of the original polygon of the lands that were acquired, as public patrimony, by the government of the state, between the end of century XIX and principles of the XX, in order to protect them and to preserve them by the presence of Springs for the water supply of the city.

The University of Guadalajara, through the teacher Jaime Eloy, has been making tree plantations for several years that have been certified by public notaries, we have fully accredited possession acts as a public use of this forest. Citizen members of civil society who have participated in the reforestation of the soils of this area have been involved in this work, adding to the work of weed removal, cleaning, improvement and conservation of soil, planting and tree improvement as ahuehuetes, magnolias, sapote and willows.

The intervention of the Pedagogical Forest of Water was considered as one of the emblematic projects of the present Zapopan government that would have paths for a landscaping, agrological park and an area of urban agriculture.

The Pedagogical Forest of Water is a citizen project that started in back in 1998 and was given continuity by the citizens. They assumed the challenge of reforesting the property seeking to convert it from an unused lot to an

environmental forest, which counts with infiltration of rainwater and feeding springs within the city and recover it as a public space that is continuously threatened. (CCPROBPA, 2017).

The Collective Pro-Pedagogical Water Forest and the Government of Zapopan agreed on the protection of the forest and announce a proposal to create a Citizen Council between organized civil society and the authorities. (Bello, 2017). This collective is a non-governmental organization that was composed by people committed to the improvement of environmental conditions; neighbors, universities and students that form a multidisciplinary and interdisciplinary group with the purpose of strengthening the necessary actions to consolidate, above all, the biophysical and ecological characteristics of the ecosystem. In this way, organized citizens participate with the municipal authority in an important challenge of environmental and patrimonial rescue. (Ruiz Barajas, 2016).

The CCPROBPA is an independent civil organization of governments and political parties that, among its objectives, seeks to promote the protection, preservation, restoration and conservation of the Pedagogical Water Forest and the hydrological system to which it belongs, as well as to promote the integration and citizen participation in favor of this forest and of other socioenvironmental causes (CCPROBPA, 2017).

A Decentralized Public Organism has the responsibility to administrate and guarantee the correct use of the forest with the contributions of the City Council. Each with two million pesos, and also with donations from Citizens who are concerned about the protection of space. The Government Board that heads this Decentralized Public Organism is composed exclusively of citizens and selected members which are selected based on a public call. They evaluate the proposals for forest management and who also have an exemplary management for the authorities in the transparency of the use of resources.

The Pedagogical Water Forest, also known as Colomos III, is actually owned by the Government of the State of Jalisco, part of which has been delivered on loan to the Zapopan City Council since 1983 and currently has a Municipal Hydrological Protection “Area La Campana - Colomos III” (Decree: 24920 / LX / 14 of November 25, 2014). This area is part of the hydrological system that integrates the Forest of “La Primavera”, “The Bajío del Arenal” and “the “Atemajac-Colomos” sub-basin (CCPROBPA, 2017).

The infrastructure needed for the urban integration of the forest is indispensable so that the place is accessible, has a continuous income and it can be a space of high environmental and social value. The adequacy of the income of Santa Cecilia’s and Las Palmas streets are a part of the strategy to consolidate this space in an Urban Forest.

The public perception has a decisive place in this park, there a lot of people and organizations compromised with the work that has been done by the administration, there are also a lot of activities and events that the community has been and is making in order to preserve the area.

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Conclusions

Karina Pallagst

The question arises, after having compared and worked with a set of highly interesting and innovative examples and the respective stakeholders, what can we learn from these examples in order to better understand the notion of green innovation areas? In addition, what, in a broader sense, will it take to better sustain the many facets of bioeconomy both in German, and in Mexico, and potentially also other countries?

The following aspects can be derived from the examples as general conclusions.

Social impact

This may or may not come as a surprise, but most cases of bioeconomy we found in Germany and in Mexico, and also the US case, show high affinity to social factors. In some cases, sustaining neighborhoods, community building and supporting society at large are the main goals. For this reason, the authors added 'social factors' in the rationale of the book chapters. However, the spectrum of societal factors is wide and it varies from recreational purposes to crating business opportunities to preventing malnutrition in marginalized communities (Totem). All in all, in the editors' and authors' opinion, social factors should be considered in any bioeconomic development.

Economic impact:

In the best practice examples two major factors can be seen:

1. The economic impact is often highy connected to innovative ideas, as the cases of the Völklingen aquaculture farm FRESH, or the Mexican rabbit farm Totem, among others, demonstrate. This innovation can transform the local economy in part, and create new jobs. However, they operate on a small scale, and cannot be a replacement for vast job losses in a manufacturing sector.
2. The economic impetus of these examples cannot be seen disconnected from other factors – they are strongly rooted in sustainability goals and reach out to environmental aspects and also social aspects.

Environmental impact:
Green innovation areas are a source for the environment, as they operate in a clean economic scheme, and they often function to preserve the green infrastructure of a city. They can in part be seen as a 'common good', in particular when it comes to a neighborhood-based food production.

Governance
Governance is an important factor when it comes to initiating and implementing green innovation areas. Some examples displayed mismanagement which caused problems and a bad image for the projects (Völklingen/Switzerland). Other examples place governance at the forefront of their projects (Zapópan) and are capable of building solid connections and structures for the projects. One learning outcome would be to not underestimate the requirements of management, professional know-how and capacity-building of projects in the frame of green innovation areas.

Time and scale of green innovation areas
Time and scale of green innovation areas differ to a large extent. While some types of green innovation areas are well established, such as urban farming, as we have seen with the Essen and Detroit examples, other innovative uses are relatively new in particular when it comes to being placed in an urban setting. This is true for urban forests demonstrated with the cases of Leipzig and of Bosque Padagógico de Agua/Mexico. These green innovation areas are at the beginning of their development, and their full potential is not yet highly advanced. At present their function is to preserve green areas, or reinstall them where other land use types used to be. Their purpose is environmental or recretional, not yet economic. However, when viewed from a bioeconomc

perspective, these forests might also be used in the future for economic purposes, in particular connected to the sustainable and economic use of timber.

Another difference is also the factor scale. The FRESH aquaculture system for example only utilizes a comparably small area to perform its business, while other types of green innovation areas operate on larger grounds (such as the urban forests, or plant-based farming).

This volume shows that green innovation areas are quite heterogeneous in their scale, timing, and type of business, and also their objectives. Yet they all sustain innovative bioeconomic business types within urban areas, even in close proximity to settlements.

Green innovation areas, as showcased in this volume, have the potential to connect the sphere of bioeconomy with the requirements of urban development and land use. Any type of use will have to consider the existing regulations and requirements of the locale when it comes to reusing parts of the inner urban fabric. Yet the stakes are high, as these areas usually are in close proximity to housing areas, they might affect the job market, and people might have the fear that they could potentially be harmful in their emissions.

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As part of a German-Mexican research collaboration, the project GIAGEM (Green innovation areas in Germany and Mexico) aims at enhancing the use of vacant inner city spaces as green innovation areas for bio economic uses and their potentials for implementation in German and Mexican cities. One of the first steps in the projects was to define what Green Innovation Areas could or should be. Thus, the authors came up with the following definition:

'Green Innovation Areas (GIAs) are a new kind of land use type with the purpose of revitalizing vacant or abandoned spaces. GIAs are locations for new innovative uses that are not yet specified, yet they are of experimental and innovative character. The range of uses can be attributed to the area of bio-economy (among others). GIAs address a number of public, private and civil society actors. They aim in particular at connecting the communities' and the entrepreneurs' interests by means of long-range land use planning and sustainable land use allocations. In doing so they support two aspects: sustainable and land conscious settlement planning, and implementing bio-economic (or other entrepreneurial) uses in urban revitalization processes.'

Applying green innovation areas as a revitalization tool for shrinking cities still needs to prove if it is suitable as a model for future development and revitalization in search of a new quality of life.

This book presents the results of a joint German-Mexican research project in order to enhance the use of vacant inner city spaces as green innovation areas for bio-economic uses and their potentials for implementation in German and Mexican cities. In addition, it presents relevant projects within processes of green infrastructure, policymaking and decision making on bio economic land uses in a novel way, in the form of green innovation areas.

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