URBAN AGRICULTURE IN THE CONTEXT OF GHENT

CONCEPTUAL FRAMEWORK & DEVELOPMENT VARIATIONS

Urban agriculture in the context of Ghent

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Extended abstract - ENG

ABSTRACT

This master dissertation wants to investigate how urban agriculture can contribute to sustainable urban development for Ghent. There is a growing consensus that this phenomenon gives opportunity and that cities should actively support its development. A plurality in possible approaches and an unstable field of actors make it difficult to develop a vision on the issue. Because of this inherent complexity urban agriculture is not a question of optimization, but a 'wicked problem'.

Designers are increasingly confronted with such societal problems. As they typically lack a clearly defined problem definition, a linear search process is insufficient to deal with these issues. Design offers an appropriate method to deal with the complex issue of urban agriculture, as it has the capability to continuously and simultaneously reframe the problem and possible solutions.

CONCEPTUAL FRAMEWORK

In order to avoid that the search for problem-solution combinations turns in a merely trial and error operation, there is need for a structuring element in the search process. Therefore we set up a conceptual framework organizing the issue. This framework offers a mental space which makes the different types of already existing knowledge intelligible. The three main axes of the framework – objectives, context and techniques- set the focal points for the search process.

'Objectives' are considered as the incentives to practice urban agriculture. They are closely linked with the way the issue is approached. The second focal point consists of the constraints and opportunities offered the context of Ghent. A third consists of 'techniques'; these are existing systems or means to deal with urban agriculture.

DEVELOPMENT VARIATIONS

Development variations are tangible proposals for the development in the context of Ghent, linked to different approaches to possible urban-rural relationships. Here a second role for the conceptual framework comes to surface.: apart

from the organizing/analyzing role, the framework is a useful resource when developing possible problem-solution combinations (development variations). Within the master dissertation, three development variations are elaborated.

blue-green structures

In order to realize a resilient urban landscape, more attention is given to the ecological values which are essential for the livability of the city. In Ghent this is made possible by giving more space to the river valleys. Therefore, urban agriculture is activated as provider of open space services. Due to the creation of hybrids and collaborations between agriculture and nature, a new valley oriented landscape arises.

new consumer-producer networks

In order to bring producers and consumers closer to each other, a high degree of interconnectedness between Ghent and its hinterland is needed. Within the resulting urban region, agriculture claims its position as an urban function. Therefore, the production side is made more present in the city center and the citizen is encouraged to explore the hinterland. Short food supply chains are enforced and consumer-oriented agriculture is clustered in agricultural parks close to the city center.

circular metabolism

In order to achieve a partly self-sufficient city, a sustainable and high-productive urban landscape is needed. The port of Ghent is transformed to a new production landscape which is characterized by its technological cycles between industry, agriculture and city. Agriculture turns into an industrial bioproducer and becomes an essential link in the circular metabolism of the city.

CONCLUSION

The conceptual framework has a third role to play in evaluating the different development variations. When positioned to each other in the framework, it appears that the different variations are not exclusive and have a relatively high degree of compatibility. They can be considered as explorations of possible visions, rather than as principal choices. However, it must be avoided that the combining of several variations results in any of them obtaining its highest potential.

By creating tangible proposals, the different development variations represent clear images of potential developments for urban agriculture in Ghent. This makes them interesting instruments to organize the discussion.

Extended abstract - NL

ABSTRACT

Deze masterproef onderzoekt hoe stadslandbouw kan bijdragen tot een duurzame stadsontwikkeling in Gent. Er is een groeiende consensus dat stadslandbouw een fenomeen is dat kansen biedt voor stedelijke ontwikkeling. Er wordt dan ook steeds vaker van lokale besturen verwacht dat ze een actieve ondersteuning geven aan dit fenomeen. De verscheidenheid in mogelijke benaderingen en de onduidelijkheid over bij wie de verantwoordelijkheden liggen maken het echter moeilijk om een gerichte visie te vormen voor dit vraagstuk. Deze inherente complexiteit zorgt ervoor dat stadslandbouw geen optimalisatievraagstuk is. Het is een 'wicked problem'.

Ontwerpers worden steeds vaker met dergelijke maatschappelijke vraagstukken geconfronteerd. Aangezien deze vraagstukken typisch een onduidelijke probleemomschrijving hebben, laten ze zich niet vatten met een lineaire oplossingsmethode. Ontwerp stelt in staat om voortdurend tegelijk na te denken over probleem en oplossing, en levert dus een geschikte methode om met het complex vraagstuk van stadslandbouw om te gaan.

CONCEPTUEEL KADER

Om te vermijden dat het zoeken naar mogelijke probleem-oplossingscombinaties op een louter trial en error-proces uitdraait, is er nood aan een element die het niet-lineaire ontwerpend zoekproces structureert. Daartoe richten we een denkkader op die het vraagstuk organiseert. Dit kader schept een mentale ruimte die relevante reeds verworven kennis verzamelt en inzichtelijk maakt. Het kader schept daarmee richtpunten voor het zoekproces: doelstellingen, context en technieken. Doelstellingen zijn aanleidingen om aan stadslandbouw te doen. Deze doelstellingen staan in nauw verband met de manier waarop het vraagstuk benaderd wordt, zo zal een benadering vanuit klimaatsoverwegingen andere doelen stellen dan een die vertrekt vanuit de heersende crisis in de landbouw. Een tweede richtpunt omvat de randvoorwaarden en kansen die geleverd worden door de specifieke context van het vraagstuk, in deze masterproef is dit de context van Gent. Een derde bevat 'techniekjes', dit zijn bestaande systemen

voor het omgaan met stadslandbouw. (bvb. korte keten, cradle-to-cradle…)

ONTWIKKELINGSVARIATIES

Vervolgens worden er ontwikkelingsvariaties ontworpen: dit zijn concrete voorstellen voor de ontwikkeling van stadslandbouw in de Gentse context, gekoppeld aan verschillende benaderingen voor mogelijke stad-landrelaties. Hier komt een tweede rol van het conceptueel kader naar voor. Naast haar organiserende/analyserende rol, vormt ze een hulpmiddel bij het ontwikkelen van mogelijke probleem-oplossingscombinaties en dus ontwikkelingsvariaties. In deze masterproef zijn drie ontwikkelingsvariaties uitgewerkt.

groen-blauwe structuren

Om een veerkrachtig stedelijk gebied te realiseren wordt meer aandacht besteed aan de ecologische waarden die de leefbaarheid van de stad bepalen. In Gent wordt dit mogelijk gemaakt door meer ruimte te geven aan de riviervalleien. Stadslandbouw wordt hierbij ingezet als beheerder van de open ruimte. Door hybrides en samenwerkingen tussen landbouw en natuur ontstaat een nieuw landschap, geënt op de groen-blauwe structuren van Gent.

nieuwe consument-producent netwerken

Om producenten en consumenten dichter bij elkaar te brengen is er nood aan een hoge graad van verbondenheid tussen Gent en haar hinterland. In de stedelijke regio die zo ontstaat claimt landbouw haar plaats als stedelijke functie. Hiertoe wordt de productiezijde meer aanwezig gemaakt in de stad en wordt de stedeling tegelijk aangespoord om het hinterland te verkennen. De korte keten netwerken worden versterkt en consumentgerichte landbouw krijgt in landbouwparken een plaats aan de rand van de stad.

circulair metabolisme

Om een gedeeltelijk zelfvoorzienende stad te verwezenlijken is er nood aan een hoogproductief en duurzaam stedelijk landschap. De Gentse haven wordt getransformeerd tot een nieuw productielandschap dat gekenmerkt wordt door technologische kringlopen tussen industrie, stad en landbouw. Landbouw wordt hierbij een industriële bioproducent die een essentiële link vormt in het circulaire metabolisme van de stad.

CONCLUSIE

Het conceptueel kader krijgt een derde rol toegewezen bij het evalueren van de verschillende ontwikkelingsvariaties. Deze kunnen in de mentale ruimte ten opzichte van elkaar gepositioneerd worden. Het blijkt dat de verschillende

variaties een vrij hoge graad van compatibiliteit hebben en elkaar niet hoeven uit te sluiten. Het zijn dan ook exploraties van mogelijke visies, eerder dan principiële keuzes. Er moet echter op toegezien worden dat door het combineren van variaties, geen enkele zijn hoogste potentieel kan bereiken.

De verschillende ontwikkelingensvariaties verbeelden potentiële ontwikkelingen voor stadslandbouw in Gent aan de hand van concrete voorstellen. Deze eigenschap stelt hen in staat om de discussie scherp te stellen en te organiseren.

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1

INTRODUCTION

The effects of good government on city and country

Ambrogio Lorenzetti

Introduction & statement of intention

In the fourteenth century Ambrogio Lorenzetti already pointed at the importance of a harmonious relationship between city and countryside. His 'Allegory of good and bad government' consists of two frescoes portraying the devastating consequences when a city does not care for its hinterland, and the delight if it does.

The phenomenon of urban agriculture evokes the question what such an allegory of good government could look like today.[1] This is shown by the growing consensus that urban agriculture is a phenomenon that should be embraced and that cities should actively support its development. This attitude towards urban-rural relationships is quite new for the post-industrial city, which since the Second World War continued to evolve in opposition and often in conflict with its rural hinterland. Small-scale agriculture in urban areas was considered inefficient and thus worthless. The eventual added value of this agricultural land was completely neglected. Farmland within the urban area was often considered as nothing but a potential area for urban expansion.[2] In Flanders however, where a quarter of the agricultural acreage is situated in a highly urbanized setting, the potential to reframe the presence of agriculture in an urbanized setting as urban agriculture arises.[3] It is to this reframing that this master dissertation wishes to contribute.

1 Carolyn Steel, *"How does food shape cities?"*, interview by Alison Stewart, accessed 14 may 2013, http://m.npr.org/story/152455629.

2 Danckaert S., Cazaux G., Bas L. & Van Gijseghem D. (2010), *Landbouw in een groen en dynamisch stedengewest*, Departement Landbouw en Visserij, afdeling Monitoring en Studie, Brussel, p4.

3 Mathijs E., Nevens F., Vandenbroeck P. (2012), *Transitie naar een duurzaam landbouw en voedingssysteem in Vlaanderen: een systeemanalyse*, Milieurapport Vlaanderen.

THE COMPLEX ISSUE OF URBAN AGRICULTURE

Although there might be a growing consensus that urban agriculture offers opportunities, the existing approaches to the phenomenon are multiple and divergent.

A common approach attached to urban agriculture is that of climate change. Urban agriculture is considered to be a possible solution for a range of ecological and climate problems. The reduction of food miles plays an important role in this, but other aspects such as water management and urban heating are discussed as well.[4,5]

4 Further reading: Paxton A., Foodmiles, in: Viljoen A., (2006), CPULs, (Oxford: Elsevier), p40.

5 Mathijs E., Nevens F., Vandenbroeck P. (2012), p 63-64.

The matter of 'feeding the city' also often appears. This approach brings the importance of awareness for the origin of our food to the surface. This does not

only benefit the ecology, but also the food quality, health and economics of the city. Thus, it's not surprising that an increasing number of cities are elaborating on a food strategy.[6,7]

Yet another approach presumes the crisis of the existing agricultural system. This crisis is the result of both internal and external factors: on the one hand problems such as ageing and low profitability appear within the sector, on the other hand urban pressure is felt through increasing land prices and fragmentation of the acreage.[8,9]

Others put the need for urban agriculture down to an urban crisis. The many people returning to the city bring along their suburban desires and project them on the city. The city now starts to acknowledge the potential of agriculture to meet the wishes of this new generation of citizens.

As a consequence of this plurality in the framing of the issue, the governance of urban agriculture doesn't fit within existing sectorial arrangements. Situated in a no-man's-land between different sectors and themes, the urban agriculture question affects many different actors but leaves unclear who has to take responsibility. This indeterminacy enhances the complex character and makes many actors unsure of the position they should take in the issue. The result is an unstable field of actors hesitating to take a stance on the urban agriculture idea.

6 Food council Toronto, Voedseladviesraad Leuven, …

7 Further reading: Steel C. (2011), *De hongerige stad*.(Rotterdam: NAI Uitgevers).

8 Danckaert S., Cazaux G., Bas L. & Van Gijseghem D. (2010), p 8-9.

9 Further reading: Douwe van der Ploeg J, (2008), *The new peasantries: struggles for autonomy and sustainability in an era of empire and globalization*, (Earthscan).

Research question

This master dissertation explores how the complex issue of urban agriculture can contribute to a sustainable urban-rural relationship. The question asked is which plans/policies the city of Ghent could develop in order to actively inscribe urban agriculture policies within their sustainable development agenda.

Terminology

When terms become fashionable, they often turn into catch-all terms. This poses a threat to 'urban agriculture' as well. Therefore, a description is given of what is understood under 'urban agriculture' within this dissertation. Key factors are[10] :

Location

Urban agriculture is located at a relatively short distance from the city.

Activity

The main activity remains agricultural production.

Professionalism

Urban agriculture is a professional activity and thus market-oriented

Relation with the city

The crucial factor distinguishing urban agriculture from regular agriculture is, rather than the location, the interaction with the urban area. Urban agriculture is integrated in the economic, ecologic and social system of a city.

10 based on: Danckaert S., Cazaux G., Bas L. & Van Gijseghem D. (2010), p11-13.

Methodology

As described in the introduction, urban agriculture is an issue which is characterized by its complexity. The difficulties encountered in only formulating the problem make clear that there shouldn't be high hopes for an unambiguous solution. It is impossible to get in a straight line from problem to solution. Today's society is increasingly confronted with such 'wicked problems' and the different strategies to tackle them.

Given this complexity, this master dissertation starts with the constructing of a conceptual framework. This framework primarily functions as a mental space to organize/analyze the problem of urban agriculture. It thus has the ability to bundle the existing knowledge on the topic and to make it intelligible. Simultaneously the conceptual framework is a helpful resource in the development of possible problem-solution combinations or 'development variations'. Moreover, it can be used in the evaluation of possible solutions.

The inherent complexity of the issue is tackled by the design of three concrete development propositions for the case of Ghent. These 'development variations' can be considered as possible directions for the development of urban agriculture in Ghent. The use of design as a strategy makes it possible to create tangible proposals and to visualize a new reality.[11] Doing so, these development variations have the capacity to clarify possible interpretations of the problem and to put opportunities in concrete form.

11 Vandenbroeck P. (2012), *Working with wicked problems*.

Case Ghent

Given the complexity and contextual specificity of the subject, the focus on a case is indispensable in this master dissertation. Ghent and its environs provide a specific context to explore different approaches in dealing with the issue of urban agriculture in a Flemish context.

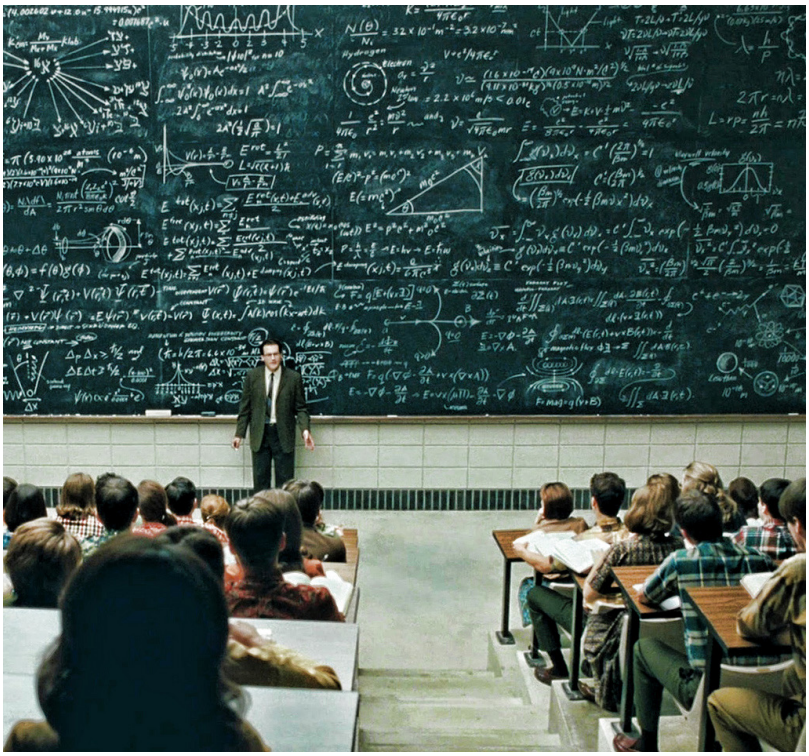
There is already a certain dynamic towards urban agriculture in Ghent. This is shown by the variety of urban agriculture related initiatives popping up in the urban area.[12] The choice for Ghent as a case-study is thus also consistent with the focus in this master dissertation on the role cities (local authorities) could play in developing pro-active policies towards urban agriculture in order to avoid a proliferation of ill-conceived initiatives. An overarching vision is important in order to take full advantage of the opportunities offered by urban agriculture.

As the issue of urban agriculture is a globally discussed phenomenon, working on a specific case inevitably leads to some global aspects losing their relevance. It is clear other matters are at stake when thinking about urban agriculture in developing countries than in Western Europe (e.g. food deserts[13]). However, several worldwide issues involving urban agriculture are relevant for urban agriculture in the context of Ghent. Discussions about sustainable cities and the pressure on open space, climate change, food security and transition towns are possible examples.[14]

12 Extended list see: Naert J., Crevits M., Vander Vennet B., (2012), *Strategie voor stadslandbouw in Gent*, pp4-5.

13 A food desert is a city district with no access to (large) grocery stores that offer fresh and affordable foods needed to maintain a healthy diet.

14 Danckaert S., Cazaux G., Bas L. & Van Gijseghem D. (2010), p15-17.



Wicked problems & design

WICKED PROBLEMS

"They are 'wicked' problems, whereas science has developed to deal with 'tame' problems. Policy problems cannot be definitively described. Moreover, in a pluralistic society there is nothing like the undisputable public good; there is no objective definition of equity; policies that respond to social problems cannot be meaningfully correct or false; and it makes no sense to talk about 'optimal solutions' to social problems (…). Even worse, there are no 'solutions' in the sense of definitive and objective answers." [15]

15 Rittel H. , Webber M.,(1973), *Dilemmas in a General Theory of planning*, (Amsterdam, Elsevier), p 155.

This quote from planners Rittel and Webber is one of the first recognitions of the existence of problems for which no definitive answers can be found. When dealing with such 'wicked' problems it is essential to accept their inherent complexity and conflicts. Characterized by their intense interconnectivity with other and partial problems, the 'boundaries' of a wicked problem are hard to define.[16] Moreover, the available knowledge concerning these issues is often incomplete and contradictory. On top of that, the many different stakeholders involved in wicked problems are looking at it out of diverse perspectives and form completely divergent opinions on the nature of the problem.[17]

16 Vandenbroeck P.(2012), p9.

17 Kolko J. (2012), *Wicked problems: problems worth solving*, (Austin center for Design)..

Rittel and Webber defined ten key factors that describe the nature of wicked problems.[18] With regard to the issue of urban agriculture, the most relevant characteristics are the following:

18 Rittel H. , Webber M. (1973), p161-167.

There is no definitive formulation of a wicked problem.

"It is impossible to state an exhaustive formulation containing all the information the problem-solver needs for understanding and solving the problem. This is because the needed information depends upon one's idea for 'solving' it." [19] As mentioned before urban agriculture knows a plurality of different, not necessarily compatible incentives. Therefore it's hard to define the issue and how to approach it.

19 ibid.

Wicked problems have no stopping rule. Nor is there an ultimate test of a solution.

"There are no criteria that tell when 'the' or 'a' solution has been found. Moreover, there is no way to determine on the spot how good a solution-attempt has been. It is impossible to trace all

Image left: *Big problem,* Brett Jordan.

consequences, not even in a limited time span." [20]

Solutions to wicked problems are not true or false, but good or bad. As stated earlier, the issue of urban agriculture affects many different actors. *"The different parties are equally equipped or entitled to judge the solutions, although none has the power to set formal decision rules to determine 'correctness'."* Therefore, a solution is never uncontested and proposed solutions are found to be better or worse from a given point of view.[21]

Wicked problems do not have an enumerable set of potential solutions. *"There are no criteria which enable one to prove that all solutions to a wicked problem have been identified and considered. Mostly, in the pursuit of a wicked problem, a set of potential solutions arises. It is then a matter of judgment whether one should try to enlarge the available set or not."* [22]

Every wicked problem is essentially unique.
Despite many similarities between a current problem and a previous one, there might always be an additional distinguishing property that is of overriding importance.[23] Solutions are thus always case-specific: the opportunities for urban agriculture in Ghent are not the same as those for urban agriculture in New York.

DESIGN

Design presents itself as a promising strategy in dealing with the wicked charac ter of many contemporary problems. Design processes are searching for internal and context consistent problem-solution combinations, rather than for solutions for previously defined problems. This means that in a design process, design problems and solutions are developed simultaneously and not sequentially. The definition of both problems and solutions is thus kept fluid until fitting and intelligible problem-solution combinations have been discovered.[24]

20 ibid.

21 ibid.

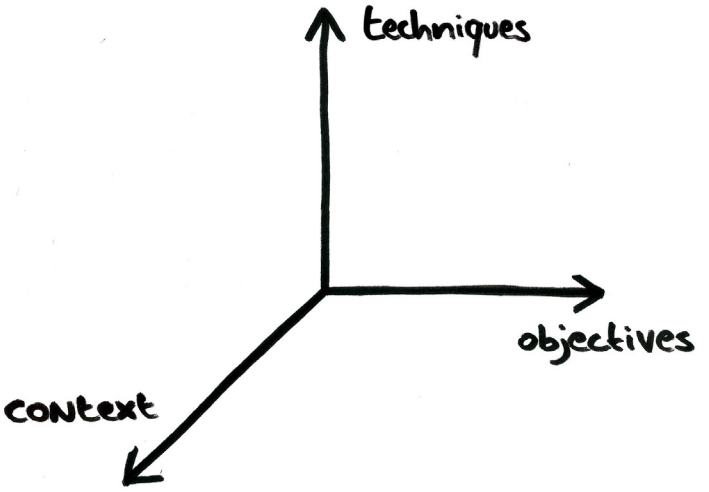
22 ibid.

23 ibid.

24 Bertolini, L.(2010), *Coping with the Irreducible Uncertainties of Planning: An Evolutionary Approach, in: J. Hillier and P. Healy, eds. The Ashgate Research Companion to Planning Theory. Conceptual Challenges for Spatial Planning.* Farnham: Ashgate, p 415.

II

CONCEPTUAL FRAMEWORK


techniques
objectives
context

Conceptual framework

As mentioned before, design has the capacity to simultaneously develop problem definitions and solutions in order to find relevant problem-solution combinations. However, there is a danger that the wicked character of the problem turns the search in a merely 'hit & miss' operation. To avoid such trial and error process, a search strategy is required. Such strategy tries to structure the not-linear search process as much as possible and gives a grip on the problem.

Therefore, we set up a conceptual framework which organizes the generally knowledge already developed on the subject. It's a mental space which makes the different types of existing knowledge intelligible. The three main axes – objectives, context and techniques- set the focal points for the search process.

Objectives

A first axis contains possible objectives for urban agriculture. The objectives can be considered as a variety of incentives for the development of a vision on urban agriculture. The variation of objectives stems from different approaches on the issue. Dependent on the angle the issue is approached from another set of objectives will be targeted. It is clear that somebody approaching urban agriculture as a response to the agricultural crisis will set other goals than someone looking at it out of climatologic considerations. Objectives thus offer frames to look at the issue but are not always compatible.

In what follows they are assembled under three main categories: economic, ecological and socio-cultural objectives.

ECONOMIC OBJECTIVES

Notwithstanding the value of urban agriculture is not to be reduced to merely its economic production, there are some major economic incentives for urban food production. The economic value is very actor-bound.

A major parameter in the farmer's point of view towards urban agriculture obviously is the profitability. As a result of overproduction, heavy competition on the global market and the power of distributors and supermarkets, the income of many farmers has noticeably decreased. At the same time, there is an increase of production costs: wages and land prices are rising.[1] Merely focusing on food production thus not necessarily results in a decent income and many farmers seek refuge in alternatives to acquire an additional income. For agriculture in proximity of the city, the switch towards 'multifunctional agriculture' offers more financial security.[2,3]

A first strategy in urban agriculture which contributes to a higher profitability is intervening in the composing parts of the production process. By transforming or expanding the agricultural activities practiced within de company, the production can better respond to the consumer's expectations.[4] This way, the

1 Danckaert S. & Roels K. (2012), *Community Supported Agriculture (CSA). Consumentenparticipatie op een landbouwbedrijf*, Departement Landbouw en Visserij, afdeling Monitoring en Studie,Brussel, p4.

2 de Graaf P., (2011), *Ruimte voor stadslandbouw in rotterdam*, p51.

3 Danckaert S., Cazaux G., Bas L. & Van Gijseghem D. (2010), *Landbouw in een groen en dynamisch stedengewest*, Departement Landbouw en Visserij, afdeling Monitoring en Studie, Brussel, p8-9.

4 NL: Verdieping

urban farmer generates added value within the agricultural company. The most common ways to do this are making the switch towards biological agriculture, focusing on high quality niche products and including another part of the production chain (e.g. selling products).[5] By putting his products on the local market, the farmer can maintain a close relationship with the consumer. This position offers the producer a clear view on the changing needs of his consumers and enables him to respond to them. Doing this, the farmer can take fully advantage of his urban position.[6]

Another strategy is founded on economic diversification.[7] This means the urban farmer enlarges his activities with other services. These services are not necessarily of agricultural nature, but anticipate on the opportunities offered by the local context and the willingness of local actors to pay for these activities. These services can range from socio-cultural activities (e.g. recreation, tourism, healthcare) to open space- and milieu management or even energy production.[8]

Urban agriculture doesn't merely improve the economic situation of the farmer, but can also offer economic advantages for the city. Firstly, agricultural and food processing activities are mostly labor-intensive and thus generate employment for both low-skilled and highly skilled citizens. Besides, urban agriculture can offer services which are for the benefit of the city. A common example is the engaging of agriculture in urban green management.[9]

ECOLOGICAL OBJECTIVES

Next to possible economic advantages, there is a range of ecological incentives to consider urban agriculture. These motives are less actor-bound, but are rather of general interest. More and more it is assumed that the city must bring the answer for ecological problems. The city is an important disturbing factor for a lot of ecological systems and thus has the responsibility to maintain them.[10]

The emerging climate change is an important impulse in the attention for urban agriculture. Urban agriculture can be a measure in both moderating the climate change and anticipating the possible consequences it brings with.

An important aspect in moderating the climate change is the awareness for food miles. Reducing these food miles, or the distance food travels from producer to consumer, instantly reduces CO2 emissions, which are an important factor in climate change. As urban agriculture brings production closer to consumers, it noticeably reduces food miles, but also the need for cold stores and the emissions they cause.[11,12]

5 Leinfelder H.(2007), *Dominante en alternatieve planningsdiscoursen ten aanzien van landbouw en open ruimte in een (Vlaamse) verstedelijkende context*, (doct. diss, Universiteit Gent), p 205.

6 Danckaert S., Cazaux G., Bas L. & Van Gijseghem D. (2010), p19.

7 NL: verbreding

8 Leinfelder H.(2007), p 205.

9 Danckaert S., Cazaux G., Bas L. & Van Gijseghem D. (2010), p19.

10 Nolf C., Putseys I., De Meulder B., Shannon K., Willems P. (2012), *Ruimte voor water in de stad: naar een meer geïntegreerde steden- en waterbouwkundige benadering*, WT Afvalwater jg. 12, nr. 1: p3-16.

11 Danckaert S., Cazaux G., Bas L. & Van Gijseghem D. (2010).

12 Paxton A., Foodmiles, in: Viljoen A., (2006), *CPULs* (Oxford: Elsevier), p40.

Climate change will confront urban areas with less predictable and more extreme weather patterns. In our regions, this will probably result in hotter summers and wetter winters. This may bring water scarcity in hot periods, but also increase the flood risk in wet periods. As urban regions largely consist of hardcovered areas, they are extra sensitive for this latter phenomenon.[13] Urban agriculture can be an important factor in controlling this flood risk as it offers water retention and enhances evaporation.[14] In hot periods, the temperature in urban areas gets even more high as a result of the so-called 'urban heat island effect'. The green structure offered by urban agriculture has a cooling and thus positive effect on this phenomenon.[15]

Apart from its climate control capabilities, urban agriculture can also contribute to an 'urban ecology'. It can help cities to create a circular metabolism. This means resources such as energy, water and nutrients don't longer follow a linear circuit in which in- and outputs are treated as totally unrelated flows. Instead, urban outputs are considered as inputs for (other) urban systems.[16] Such cycles can be closed on different levels, ranging from a building to a city and its hinterland.[17]

Also the ecological quality of the environment can be increased by using urban agriculture. This can notably improve the living quality in urban areas. Crops and trees have the ability to capture particulate matter and absorb CO2.[18] Since the absorbing capacities of plants are at its highest in the growing phase, agricultural vegetation is even more efficient than natural systems.[19] Agricultural activities thus can be commissioned in the purification of air and be considered 'lungs' for the city.[20] Ground water on the other hand, gets purified by the crops and the soil they are rooted in. Besides, cultivation can also be conductive for the soil quality.

Next to the opportunities for the improvement of air, water and soil quality, urban agriculture also offers chances for biodiversity. In a direct way, food production -if taking measures- can function as a corridor for flora and fauna.[21] Also in a less direct way, biodiversity is affected. Competitive production for distant markets requires specialization and therefore enhances monocultures. The enormous loss of crop varieties this brings about, is not only a threat for bi odiversity but also for food security, as it increases the likelihood of widespread crop failure.[22]

13 Mathijs E., Nevens F., Vandenbroeck P. (2012), *Transitie naar een duurzaam landbouw en voedingssysteem in Vlaanderen: een systeemanalyse*, Milieurapport Vlaanderen. p 63

14 Deelstra T., Girardet H., *Urban agriculture and sustainable cities*, Thematic Paper, p52.

15 Mathijs E., Nevens F., Vandenbroeck P. (2012), p63.

16 Deelstra T., Girardet H., p50.

17 Mathijs E., Nevens F., Vandenbroeck P. (2012), p64.

18 ibid, p23.

19 Deelstra T., Girardet H, p53.

20 Danckaert S., Cazaux G., Bas L. & Van Gijseghem D. (2010), p18.

21 ibid, p18.

22 Paxton A., Foodmiles, in: Viljoen A., (2006), *CPULs*, (Oxford, Elsevier)., p44.

SOCIO-CULTURAL OBJECTIVES

A third range of incentives to consider urban agriculture are of a socio-cultural nature. These motives have to do with trends or problems which arise in our society.

A first trend is the growing distance –physically and mentally- between people and their food. Consumers don't know the origin of their food and undergo the increasing homogenization of products. Nor are they familiar with the seasons and the matching available crops.[23]

23 Danckaert S. & Roels K. (2012), p4.

Urban agriculture can be an appropriate tool to provide education to citizens about food, health, nature, history of the region, etcetera. This can be realized through making the production side of agriculture more visible in the city. An example is to be found in small agricultural projects throughout the city which contribute to raising awareness for agriculture among the citizens (e.g cultivations methods, seasonal vegetables).[24]

24 Danckaert S., Cazaux G., Bas L. & Van Gijseghem D. (2010), p19.

Further, urban food growing activities are valuable educational resources within schools with potential for use in relation to traditional subjects.[25] As such, a collaboration between schools and farms is important in the education of children who are living in the city. These schools can have their own educational garden, they can participate in an agricultural project in the city or they can organize excursions to farms in the hinterland.[26] Besides this educational purposes, agriculture can also provide internships in a context of higher education.[27]

25 Viljoen A., (2006), CPULs, (Oxford, Elsevier), p58.

26 de Graaf P., (2011) Ruimte voor stadslandbouw in rotterdam, p 88.

27 ibid, p 35

Next to these educational opportunities, urban agriculture can also anticipate on the recreational needs of the citizen. One possibility to do this is 'farm-based recreation': actively organized recreational activities on the farm. As a steady stream of consumers is required to make this profitable, a location near an urban area is recommended for this farms.[28] Also the possibility of agro-tourism is to be considered in this case. On the other hand agricultural land provides the potential to become an attractive area for recreational shared use.[29] Urban agriculture doesn't only act as an 'organizer': such recreational side activities can be a motivation for farmers to maintain the natural amenities of the cultivated landscape.[30]

28 Brown D.M. , Reeder R.J.(2007), *Farm-based recreation, United States Departement of Agriculture*, economic research service p11.

29 Danckaert S., Cazaux G., Bas L. & Van Gijseghem D. (2010), p19

30 Brown D.M. , Reeder R.J.(2007), p11.

People in urban areas are more and more dealing with problems of health (e.g. obesity) and social integration of divers cultural populations. Urban agriculture has the potential to partially respond to these problems. As such agricultural projects in the core city provide the opportunity to bring different communi

ties together, which has a positive impact on the community building of the neighborhood. Moreover, in some cases there can even be noticed a positive evolution of the local economy at district level.[31,32]

Another point of interest for urban agriculture is social justice. Since urban agriculture can deliver more fresh, direct and cheaper food for the city, it improves the accessibility of healthy and good food, also for the poor and underprivileged. This way it contributes to the food security of the city. Further, urban agriculture can play a role in the healthcare sector by means of therapeutic work (e.g the hosting of disabled people or ex-detainees).[33]

31 Danckaert S., Cazaux G., Bas L. & Van Gijseghem D. (2010), p18.

32 de Graaf P., (2011) Ruimte voor stadslandbouw in Rotterdam, p50.

33 Danckaert S., Cazaux G., Bas L. & Van Gijseghem D. (2010), p18.

Context

A second axis, called 'context', puts forward the contextual constraints and opportunities. This axis thus consists of directing preconditions offered by the particular context working on; in this dissertation this will specifically be the urban area of Ghent.

'Context' is a broad term containing everything which is case-specific and ranges from the social setting working in (policy decisions, current discussions…) to the territorial aspects affecting the search for problem-solution combinations. Which part of this broad context has relevance as a 'guiding line' depends on the approach to the problem. Each approach will bring up other contextual aspects as constraints or opportunities.

An example can be given considering the territorial aspects concerning the issue of urban agriculture. Dependent on how urban agriculture is approached, other territorial aspects, and thus other maps will come to surface. Some aspects are quite often relevant (e.g. ruimtelijk structuurplan Ghent, groenstructuurplan Ghent, land use map (Gewestplan)…) other aspects are only relevant for specific approaches (e.g. existing short food supply chain networks, bekkenbeheerplan, heat island effect…)

Techniques

The third axis is defined by a range of 'techniques' which can help in the development of solutions for the issue. These 'techniques' can be considered as existing and tested means used when dealing with urban agriculture. They are no solutions on their own but they give possible directions to solution approaches.

In order to illustrate what is understood under 'techniques' and without the ambition to be exhaustive or complete, some techniques (essential for the continuation) are shortly discussed:

SHORT FOOD SUPPLY CHAIN

Short chain is a sustainable supply system which is characterized by a close contact between producer and consumer. Beside this main characteristic, a few other basic principles can be distinguished. At first, the system is typified by a limited number of links involved in the production and distribution process. Furthermore, given the local cultivated and sold products, the system has a local character. And finally, the producer has a certain authority, he is autonomous in his price fixing and defines his production method and offer by himself.[34]

34 Keymeulen M., *Strategisch plan korte keten, Departement landbouw en visserij, afdeling duurzame landbouwontwikkeling*, Brussel, p4
Mathijs E., Nevens F., Vandenbroeck P. (2012), *Transitie naar een duurzaam landbouw en voedingssysteem in Vlaanderen: een systeemanalyse*, Milieurapport Vlaanderen, p62.

CSA

Community Supported Agriculture is a specific form of short chain in which producers and consumers share the costs and benefits of the agricultural enterprise. In a CSA, community members pay the farmer an annual membership fee in return for a weekly share of the harvest during the local growing season. The CSA system guarantees financial support for the farmers and enables small organic farms to remain in business.[35]

35 *The Robyn van En Center*, CSA, 2009. (flyer)

CRADLE-TO-CRADLE

The cradle-to-cradle (C2C) concept is based on a changing view on the current industrial system which 'takes, makes and pollutes'. The concept can be seen as a part of a recycling economy where materials are circulating in closed cycles. Three basic principles are to be distinguished: waste is food, use renewable energy, and bring human and nature in balance.[36]

36 de Regt E., Van Gijseghem D. (2010), *De rol van cradle to cradle voor de landbouwsector*, Departement Landbouw en Visserij, afdeling Monitoring en Studie, p6 -10; further reading: http://www.c2cplatform.be/

AQUAPONICS

Aquaponics is a combination of aquaculture and hydroponics, inspired on polyculture. Both systems have some downsides, hydroponics requires expensive nutrients to feed the plants, and a periodic flushing of the system. In aquaculture however, the excess nutrients need to be removed which implies a renewing of the water on a regular basis. Thus, the combination of the two turns their negative aspects into positives and results in a efficient cycle. The aquaponics system lends itself for both a high-tech and low-tech utilization.[37]

37 What is aquaponics?, [website], www.backyardaquaponics.com/guide-to-aquaponics/what-is-aquaponics/, accessed on 20 may 2013;
de Graaf P., (2011) Ruimte voor stadslandbouw in rotterdam, p30.

COOPERATIVE

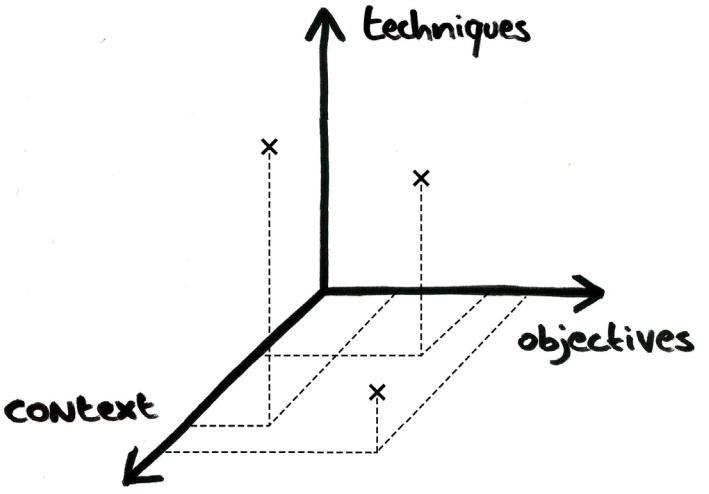
A cooperative is an interesting system for small scale agricultural enterprises. Farmers' cooperatives play an important role in helping farmers to capture a higher share of the value added in the food supply chain. The key functions of cooperatives are improving the bargaining power of their members and letting members benefit from economies of scale. In addition, cooperatives are reducing market risks, reducing transaction costs, providing access to resources, and strengthening their competitive position through product innovation and guaranteeing food quality and safety.[38]

38 Bijman J., et al. (2012), *Support for farmers' cooperatives*, Wageningen University, p9-10.

AGROFORESTRY

Agroforestry is an agricultural system in which agriculture, forestry and nature are combined. As such, agroforestry parcels are characterized by a multifunctional use. The cultivation of crops and trees on the same parcel implies the simultaneous realization of both short-time and long-time production. In addition, these productions protect soil, water and biodiversity and contribute to the diversification of the landscape[39].

39 Agroforestry, [website], www.wervel.be/agroforestry, accessed on 24 may 2013.


techniques
objectives
context

Cases

Cases are existing projects and thus can be considered as 'applied knowledge'. These cases can be positioned in the conceptual framework as 'abstract points': they are matches that already have been made between the main axes and thus can be used as illustrations of how the framework works. It is important to understand that these cases are not at the same level of the problem-solution combinations looked for in this dissertation. They are no visions on the development of urban agriculture in Ghent. Cases don't have to be Ghent bound to be relevant, but should have a somehow comparable context in order to distill relevant knowledge.

As an illustration, we shortly discuss three cases according to the context they started with, the used techniques and the objectives they achieve.

OBJECTIVES

profitability	xx
employment	x
climate control	x
waste management	x
education	xx
recreation	xx
landscape quality	x
community building	xx

UIT JE EIGEN STAD

'Uit Je Eigen Stad' is a city farm located in the port of Rotterdam. The farm covers an area of 2 hectares on a vacant parcel called the Marconistrip which has an area of 6 hectare. This parcel became available due to the crisis context: the plans for the realization of a new residential quarter on this site are delayed due to the crisis in the building sector. This made it possible to realize the city farm project 'Uit Je Eigen Stad'. As such, the farm has a temporary character (about 10 years) and contributes during its existence to the generation of a positive dynamic of this future residential part of the city. The location and character of the project are thus responding to the opportunities offered by the specific context of this city quarter.

Image source: Uit Je Eigen Stad

Due to the polluted soil of the former industrial site, Uit Je Eigen Stad applies not land-based cultivation methods for its outdoor production. This farm cultivates fruit and vegetables but also small livestock (chickens) and will soon apply the technique of aquaponics.

Because of the small scale of the parcel, the production quantity of this farm is limited. To be profitable they apply the short chain technique. The cultivated products are directly sold to the customer through the shop and/or restaurant on the farm which results in a more profitable business. When the product offer of the farm isn't sufficient, it is completed with products of local farmers which cooperate with this city center project. This way, 'Uit Je Eigen Stad' also becomes a drop-off point for these farms. This city farm has chosen for a membership model, a specific short chain system which is very similar to the CSA principle. The customer pays a membership fee at the beginning of the season which makes him a shareholder and gives the farm a standard income and thus a starting capital. Through this membership, the citizen gets deeper involved in the farm and gets in close contact with food production.

Moreover, the city farm offers a range of extra activities such as workshops and cultural activities. They also offer a protected workplace for patients of local institutions and participate in research. Apart from providing food, 'Uit Je Eigen Stad' thus also contributes to educational and social objectives. Also the sustainability of the production process is taken into account: Uit Je Eigen Stad works in an ecological way, using compost and participating in the closing of cycles (in-house and with the environment). Urban waste flows such as organic material, excess water or waste water and residual heat are recycled.[40,41]

40 see also: http://www.uitjeeigenstad.nl/

41 de Graaf P.(2011), Ruimte voor stadslandbouw in Rotterdam, p60-63, 73-4, 77-8, 83-5.

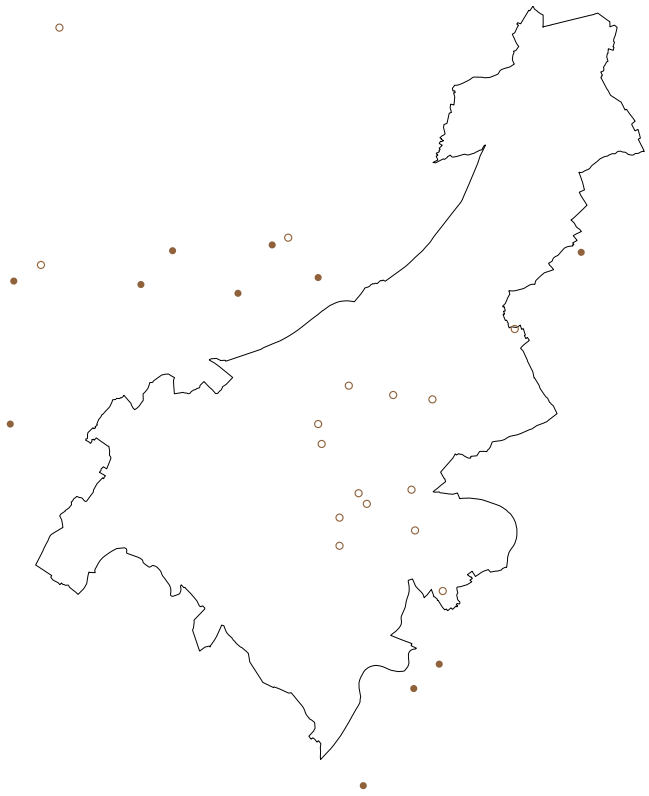
VOEDSELTEAMS VZW

'Voedselteams vzw.' is a non-profit organization which is active in all city regions of Flanders. Also in Ghent there are active participants in this project devoted to the creation of new food systems on city regions level.[42] The project initiated in the context of general concern for food quality after different food crises in the late nineties. The organization tries to bring consumers and producers together and create a relationship of trust between the two. They do this by means of 'Voedselteams'; teams which assemble consumers living in the same neighborhood who want to buy directly from local producers. 'Voedselteams vzw' links these groups of consumers to a network of local producers taking part in the project.

42 see map

OBJECTIVES	
profitability	xxx
climate control	x
environmental quality	xx
education	x
community building	x
social justice	xxx

The outcome of this relationship should be both a sustainable, profitable company for the producer and the access of sustainable, healthy food for the consumer. 'Voedselteams vzw.' therefore organizes a short food supply chain, using a webshop as interface. Every week the products needed within the consumer group are passed to the producers which deliver on a weekly basis. The system applied thus allows the consumer to buy what he needs, without the obligation to buy on a weekly basis. Also the autonomy of the producer and his control on the pricing is preserved within this system. The ordered products subsequently are delivered at the consumers group's own depot.



The consumer groups are self-organizing groups of neighbours. The organizing of such group requires meetings and thus can enhance the community building in the neighbourhood. Moreover, the Voedselteams project has the ambition to make local and healthy food available for every consumer, also for the under-privileged ones. By keeping the membership fee low (minimum €10/year) also these citizens have the chance to join a consumer group. The social concerns maintained by the 'Voedselteams vzw' project are also illustrated by their will to raise awareness, educate and to galvanize the civil society. Also ecological concerns are taken into account by the organization. The producers operating in this short chain are selected on the sustainable character of their business. (e.g. measures for biodiversity, energy efficiency, fertilizers used…) Apart from that, the short distance between food production and consumption reduces food miles to a minimum.[43]

43 see also:
http://www.voedselteams.be/

VZW 'T BOERENLANDSCHAP

VZW 't Boerenlandschap is an association of farmers and villagers located in Heuvelland, West Flanders. This association was founded in 2001 in the context of the project 'Regionaal Landschap West-Vlaamse Heuvels' which deals with the maintenance and preservation of important nature and landscape elements in the region. By stimulating the planting of trees and hedges on the farmers' property, they want to preserve the original landscape image for the future and create an attractive environment. In order to maintain all these green elements on a regular basis, some farmers decided to unify and founded the vzw 't Boerenlandschap.

OBJECTIVES

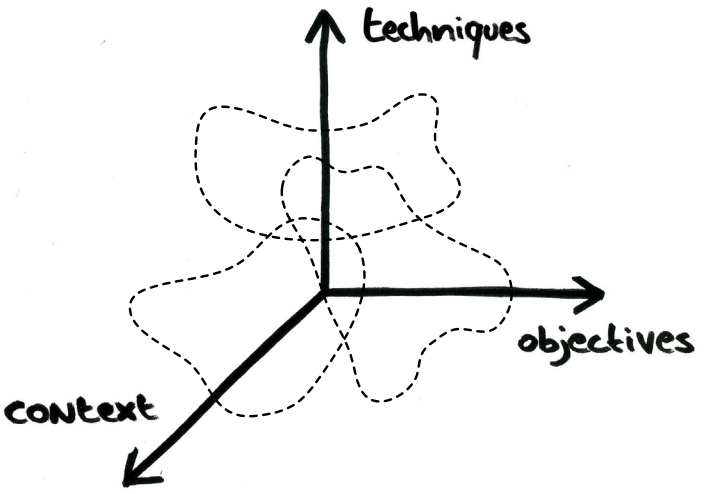
profitability	xx
employment	x
climate control	x
waste management	x
environmental quality	xx
recreation	x
landscape quality	xxx

Image source: Agrocycle

Subsidized by the local government, the association works on agriculture, landscape and nature at the same time. As their main activity is the maintaining an preservation of landscape elements, they contribute to the creating of an attractive landscape for recreational shared use. To obtain this goal, the association has several tools and machinery for the maintenance which can be rent by the association members. Another important aspect of the association is the involvement of villagers in the delivered efforts on nature and landscape.

Apart from their maintaining activities, the association applies also one of the cradle-to cradle principles. By farm composting the principle of 'waste is food' is applied. This composting method transforms organic waste into a high-quality soil improver. This way farmers' compost and soils can be kept in optimal condition. As this method improves the soil quality, it contributes to the ecologic objective of environmental quality.[44]

44 see also:
www.boerenlandschap.be/
www.rlwh.be


techniques
objectives
context

Development variations

In what follows we will elaborate possible 'development variations': these are concrete propositions for the development of urban agriculture in the context of Ghent.

Doing so, a second role of the conceptual framework comes to surface. Apart from its organizing/analyzing role, the framework seems to be a helpful resource in the elaboration of possible problem-solution variations. It offers a kind of grip and structures the search process.

Within the mental space of the conceptual framework, development variations are not presented as single points (= cases) but as three dimensional fluid shapes or clouds throughout the framework. However the framework is helpful when developing these variations, you cannot derive from it which development variations should be elaborated. The framework offers an infinite number of possible variations.

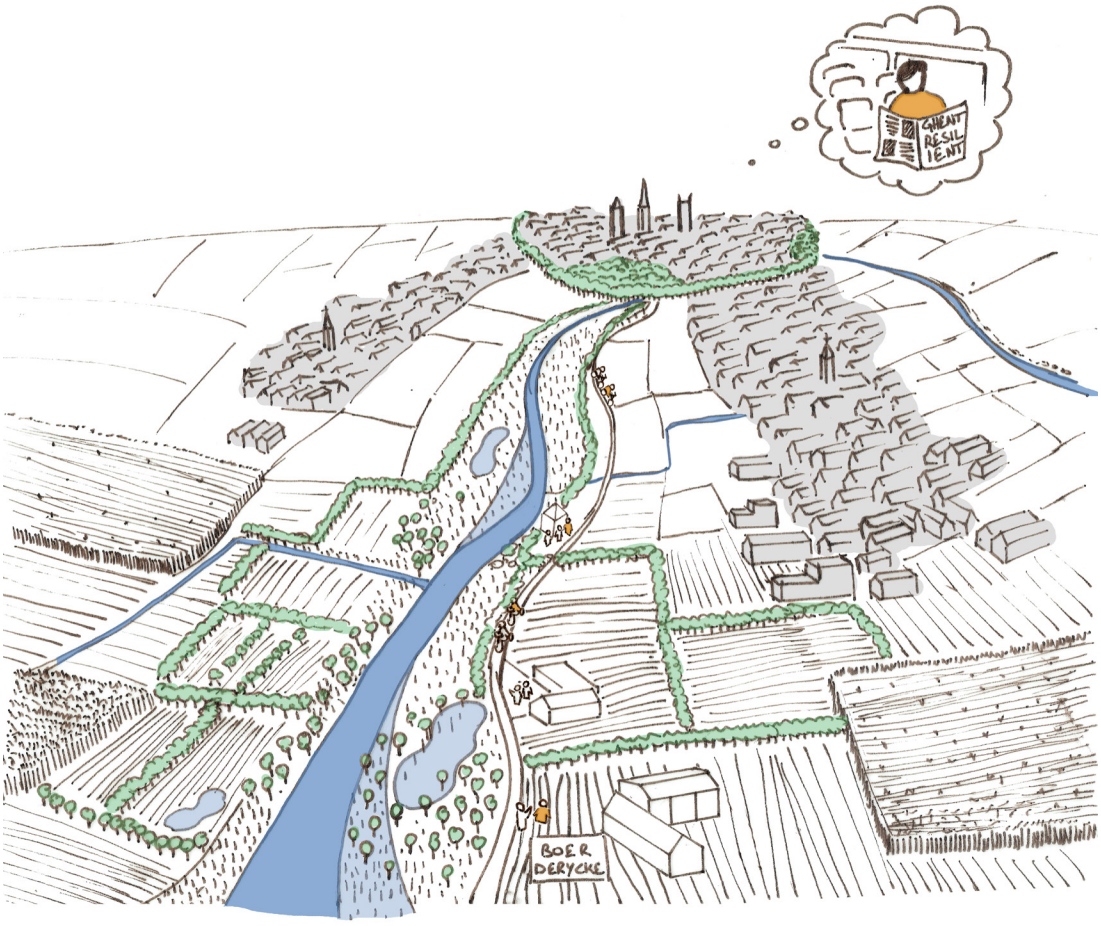
The three variations treated in what follows are thus not the only three possible development directions for urban agriculture in Ghent. They are the result of different approaches to sustainable urban-rural relationships and combinations made with the help of the conceptual framework. Therefore, the following development variations must not be regarded as three principal and exclusive choices, but as the exploration of possible futures for urban agriculture in a sustainable Ghent.

In the following part of this dissertation, each development variations is initiated by a short narrative. By following some important actors, these story gives a first insight in the urban context of Ghent in 2030. This narrative is followed by a general vision for Ghent's urban area which stems from different relationships between city and hinterland. This vision is further developed in the following parts. The structure of this description is varying according to the different variations. Finally the vision is projected on the territory of Ghent by means of 'operations'. Without the ambition to be exhaustive, this part focuses on some initial interventions illustrating the spatial effect of the considered development variations.

III

DEVELOPMENT VARIATION

BLUE-GREEN STRUCTURES



veduta di Ghent 2030

Ghent, 09/04/2030

‘City of Ghent shortlisted for most resilient city in the world’: it’s today’s headline of the local newspaper. Mr. Derycke is reading the paper on his way to the city center, where he has an appointment with the head of the urban agriculture department. Attracted by the management contracts offered by the city, this young organic farmer wants to settle in Ghent.

As the civil servant wants to give him a guided tour along the river valley, they meet at the R4, a green city belt surrounding the city. When Derycke arrives the civil servant is already there, talking with a farmer. The latter is responsible for the verge management in this area and they discuss the conclusions of last meeting. After a short talk the civil servant and the young farmer start exploring the river valley by electric bicycle.

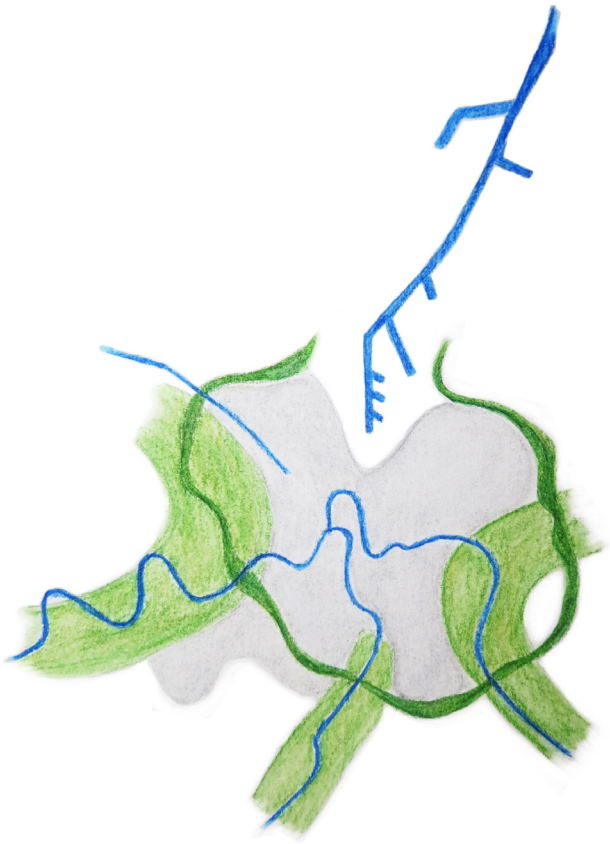
Due to the gentle springtime sun a lot of other bikers cross them on the bicycle path. All of them are enjoying the view on the river and its borders. There are even some horsemen passing by. After a while the civil servant tells Derycke to get off his bicycle so he can show him something. They walk down a path and end up at a nature reserve along the borders of the river. A short walk and some pictures later, they arrive at an observation hut. It gives out on the river and its wetlands. The civil servant brings out two binoculars and hands one to Derycke. Together they admire the splendor of the lively waterfowls in front of them.

After a while another man enters the hut. He introduces himself as Patrick, a bird lover living in Sint-Denijs-Westrem. He’s enjoying his daily walk and just loves living here. Especially the fact that he can enjoy the benefits of city life and yet live so close to such a wonderful open space seems like heaven on earth to him.

After this pleasant encounter, the civil servant and Derycke get back on their bikes. When they pass a farm selling local products to the passers-by they decide to take a break. The owner is in conversation with a woman who seems to be a friend of the civil servant. He introduces her as Sarah, a young researcher investigating the biodiversity in the river valley. She has been taking samples on the farmland and is giving advice to the farmer on how to obtain a good standard for the habitat. Sarah suggests to have a drink together but the civil servant declines. He still wants to show Derycke to one other place to end the day: a piece of farmland that is for sale. It’s the property of an old farmer and includes an area reserved for nature. Derycke is delighted and already dreams of his own farm along the river.

Vision

In order to achieve a resilient urban landscape, more attention should be given to ecological values. Therefore, open space should claim a more structural position in the urbanized territorial system and play a more central role in the development of the urban area. Within this vision urban agriculture should be considered as the reconceptualization of agriculture as the provider of open space services.



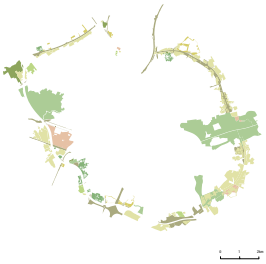
Resilient urban landscape

Given the future climate changes, there is a lot of attention for ecological objectives. The values pursued in this development variation - water balance, biodiversity, landscape, and open space- are often considered as 'weak values'. They can't be taken for granted any longer and must take position as structuring elements in the urban development. As they are essential values in obtaining a resilient urban landscape, they are considered as common interests to both city and country.

Biological value
see appendix

The river valleys are a crucial factor in the transformation process towards a resilient Ghent. They offer an opportunity to take care of several 'weak values' at once. Investments in these areas thus can contribute in working towards the achievement of several objectives.

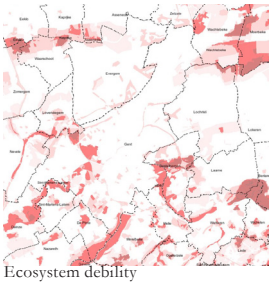
The rivers and their valleys are obviously crucial places to deal with water management problems. Considering their linear and continuous character, the river valleys can also be very interesting areas to keep biodiversity up to the mark. As proven by the biological value map, the river valleys already are housing green areas with a high biological value. However, due to their fragmented character, these areas do not obtain their highest biological potential. Moreover, the valleys offer potential to create a qualitative landscape connecting city and hinterland.



Green belt R4
see appendix

Therefore, the river valleys of the Leie and Schelde present themselves as priority areas, offering a strategic opportunity toward creating blue-green fingers within a highly urbanized territory. These different fingers are to be linked to each other by a green belt, which is formed along the R4. Shaped as a necklace, this belt links all of the green areas around it and thus acts as a biological corridor.

Interweaving



Ecosystem debility
see appendix

In order to give more space to the river valleys, both city and agriculture must make way. By occupying the riversides, these two occupations are causing inundations and biological contamination. Therefore, the urban areas will be densified and land previously zoned for urban expansion must be rezoned to create more space for the vulnerable blue-green system on which the city relies for its livability. The space claimed for the installation of these blue-green fingers also affects the agricultural land in the area, as it inevitably leads to a loss of acreage.

Multifunctional land use is needed in order to make it possible to activate these lands for the achievement of the considered ecological objectives. This development variation is thus not a single layered story of one occupation making place for another, but a story about the creation of hybrids and the interweaving of different land uses.

Water management is a priority issue to deal with in the river valleys. Given its capacity to retain and evaporate water, the installation of more nature can be used as a tool to save the urban area from severe inundations. This means that if the areas most prone to flooding are converted into nature areas, they can play a critical role for upstream water retention. Besides, this intervention results in a very specific habitat and can become a biodiversity hotbed. In this way, the 'serviceable nature' simultaneously realizes a great portion of the environment needed to meet other objectives.

AGRICULTURE-NATURE

Farmers whose acreage is partly located in floodplains must be compensated when turning their land into a nature reserve. They can choose to take part in a conversion program and some of them can be engaged in the maintenance of the renaturalized areas and in the development of new forms of bio-production within the floodplains.[1]

1 www.sigmaplan.be, accessed on 8 may 2013.

In areas that are not completely renaturalized areas, hybrids between nature and agriculture can be applied. As inundations have a temporary nature, floodplains offer an opportunity for shared use with agriculture or foresting. When applying agriculture, basic characteristics of the territory as a bio-physical substrate should be taken into account. The condition should be put forth that farmers bear in mind the importance of water retention when applying cultivation techniques in the river valleys.

For the cultivation of these areas, integrated production systems can be applied. The mixture of crops and trees cultivated in agroforestry systems for example offer a good protection against possible erosion.[2] It also enables farmers to create corridors on their acreage and thus to enhance biodiversity values. By combining different cultivations, integrated production systems can also remarkably increase the quality and quantity of production. Moreover, these systems are able to improve the water quality and are thus very appropriate in the river valleys.[3] Agriculture benefits from this increased water quality as well, as it results in a significant decrease of cultivation damage caused by eventual inundations.[4]

2 www.wervel.be/agroforestry, accessed on 10 may 2013

3 www.wervel.be, accessed on 10 mau 2013

4 Van Gijseghem D., Piessens I., Maertens E., Vuylsteke A., Vandenbroeck P. & Goossens J. (2009) *Witboek Landbouwonderzoek*, Platform voor Landbouwonderzoek, Brussel, p19.

These possible added values for agricultural use make it clear that ecological objectives can be combined with the economic objectives of the farmer. Management contracts between the city government and agricultural companies assure the involved farmers of an extra and assured income. On the other hand, their business gets added value as it enables the local government to deal with different ecological considerations in an affordable way.

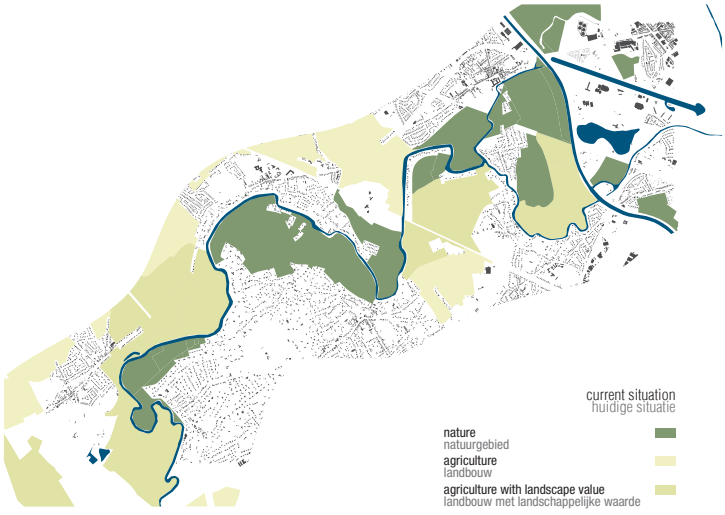
QUALITATIVE LANDSCAPE

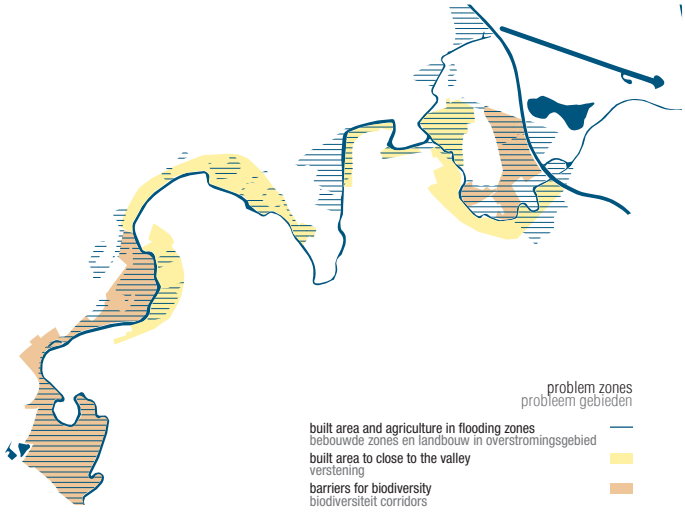
Consolidating the river valleys as a blue-green network not only results in the improvement of ecological values, but also generates an attractive landscape for shared recreational use. The presence of agriculture in the valley plays a critical role in balancing the urban/recreational claims on these natural structures. Recreational routes can be inserted halfway in the valley, between the ecologically more fragile parts and the cultivated parts. These routes give visibility to the river valleys as new productive landscapes. On weekends, some farmers can sell their products directly to the passers-by. The more attractive entrance of such farms is oriented to the bikepath rather than to the road. Others have a bed and breakfast or camping site, which is specifically aimed at bicycle tourists in the summer months.

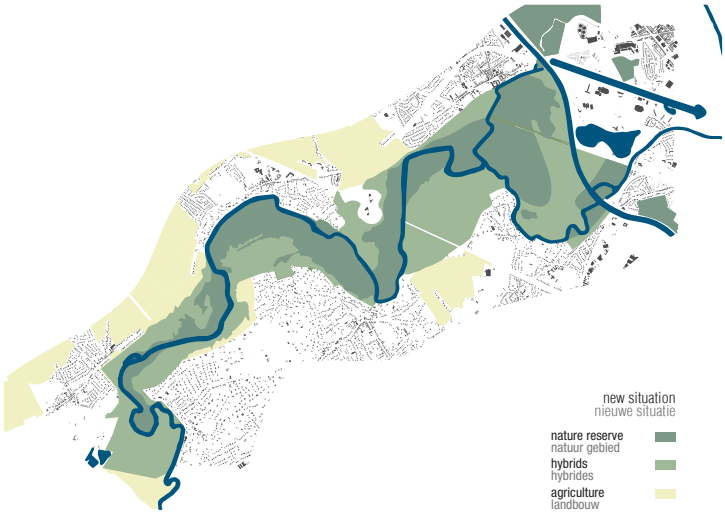
Apart from a recreational landscape, the blue-green fingers also offer an attractive landscape for residential programs. The existing built area in the river valley will gradually be pushed back and new housing typologies will enter. These typologies closely interact with the environment, making the river and its valley a determining factor for the character of the city lobes.

OBJECTIVES	
profitability	x
climate control	xxx
environmental quality	xxx
recreation	xx
landscape quality	xx

Operations


current situation
huidige situatie
nature
natuurgebied
agriculture
landbouw
agriculture with landscape value
landbouw met landschappelijke waarde


problem zones
probleem gebieden
built area and agriculture in flooding zones
bebouwde zones en landbouw in overstromingsgebied
built area to close to the valley
verstening
barriers for biodiversity
biodiversiteit corridors



The Leie valley, situated west of the city, clearly shows the issues mentioned before. The current situation consists of different problems. Different urban lobes are situated too close to the river and are important problem zones. The ones on lower levels are subject to inundations, the ones on higher levels can lead to a fast water runoff towards the Leie and can thus cause a peak that exceeds the river's storage capacity.

Likewise, the lower agricultural lands on the riversides are subject to inundations. Moreover, the application of irrigation techniques leads to a faster runoff towards the river. However, they especially cause trouble on an ecological level. First of all they can lead to contamination of the valley through eutrophication and acidification. Apart from that, the agricultural lands form barriers between the nature areas. In most cases, these lands have none or little biological value- and thus form barriers for biodiversity.

Solving this problems will transform the Leie and its valley to a blue-green finger claiming its position in the highly urbanized region. In what follows, we discuss how the wanted situation can be achieved by considering the river valley as an organizing principle.

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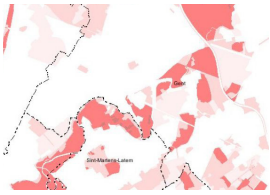
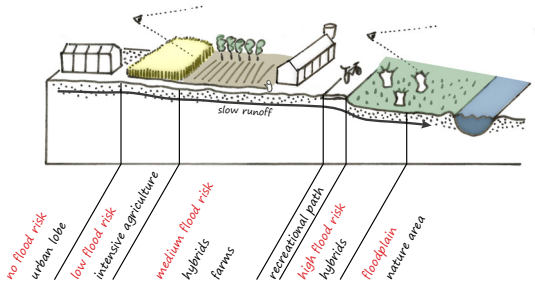
Flood risks Leie


Ecosystem debility Leie
Total map: see appendix


Biological value Leie river
Total map: see appendix

VALLEY SECTION

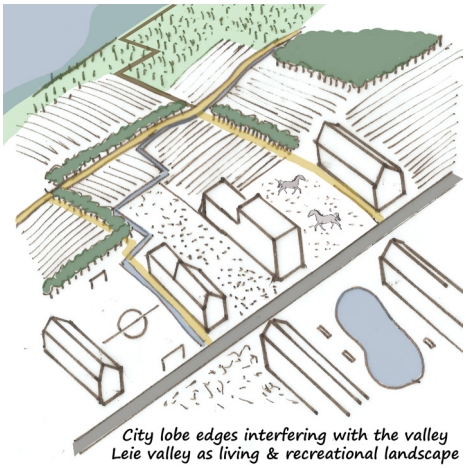


The blue-green structure of the Leie is confronted with two main challenges: water and landscape. The valley functions as an organizing principle for these two challenges. This organization is projected in a 'valley section', showing the relation between the flood risk and the occupation.

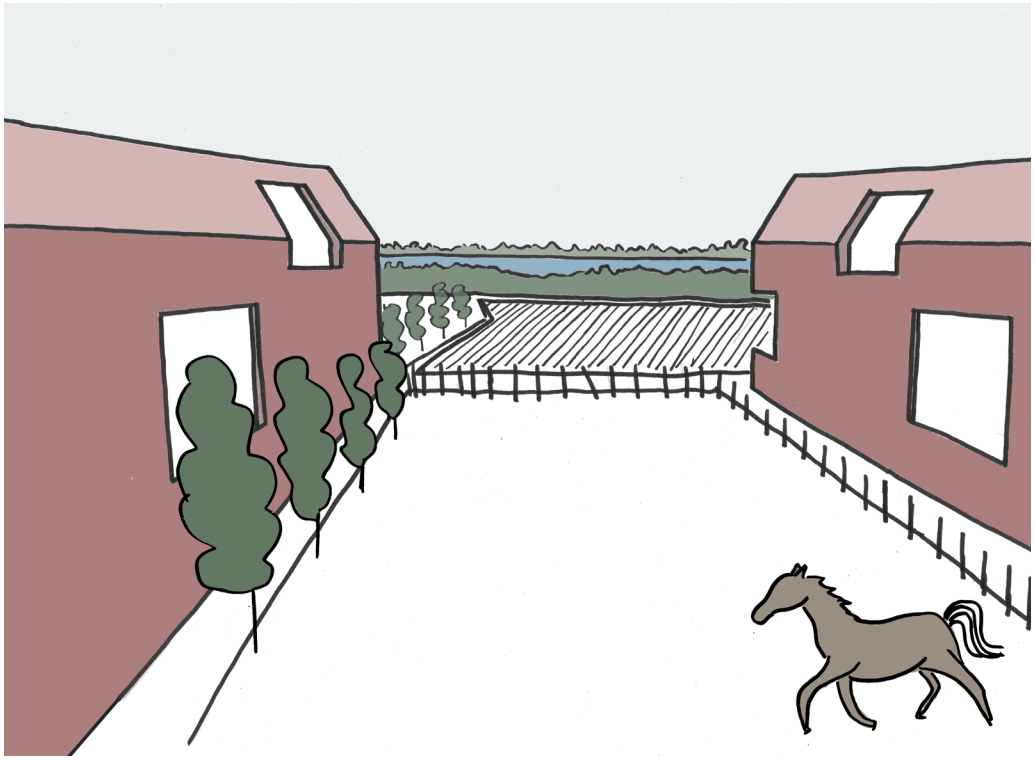
The water challenge is twofold: on the one hand, the storage capacity of the river has to be increased, on the other hand the infiltration capacity of the riverside needs to be updated. In response to the first issue, flood plains are created in the lowest areas of the valley. Simultaneously they house nature reserves which are important for the green structure of the valley. The infiltration capacity of the riverside is tackled by the use of hybrids between nature and agriculture. In the lower areas these hybrids mostly consist of very extensive cultivations which are able to retain water running down the valley. These areas also function as an extension of the floodplains when necessary and prevent erosion. The hybrids on higher ground mostly consist of integrated production involving trees. The roots of these cultivations hold the water, the trees are capable to evaporate it. Also at the edges of the urban lobes infiltration is taken into account: open spaces between the buildings are left uncovered and thus contribute to a more permeable form of urban settlement in which water is locally infiltrated and the runoff towards the rivers is slowed down.

The landscape challenge consists of increasing the spatial identity of the river valleys. The measures taken for the water challenge already result in a recognizable and structured landscape. In order to make this landscape experienceable, a recreational pathway runs between the more fragile nature areas and the more cultivated areas with a lower flood risk and makes both sides accessible. Starting from the pathway, secondary unpaved paths run down the nature area. On the other side, farms are oriented to the passersby and offer local products or lodgings.

The recreational pathway is also connected with the housing at the border of the city lobes. This new collective forms of dwelling play an important role in the revaluing of the valley's landscape. The collective open space not only increase the infiltration capacity, but also the visual interconnection with the river valley. By creating windows on the valley, the collective open spaces thus add to the construction of a meaningful landscape in which interesting relationships between fore- and background are restored. These 'cut-outs' in the typical ribbon development along the river work as a mediator between the built area and the valley.



City lobe edges interfering with the valley
Leie valley as living & recreational landscape

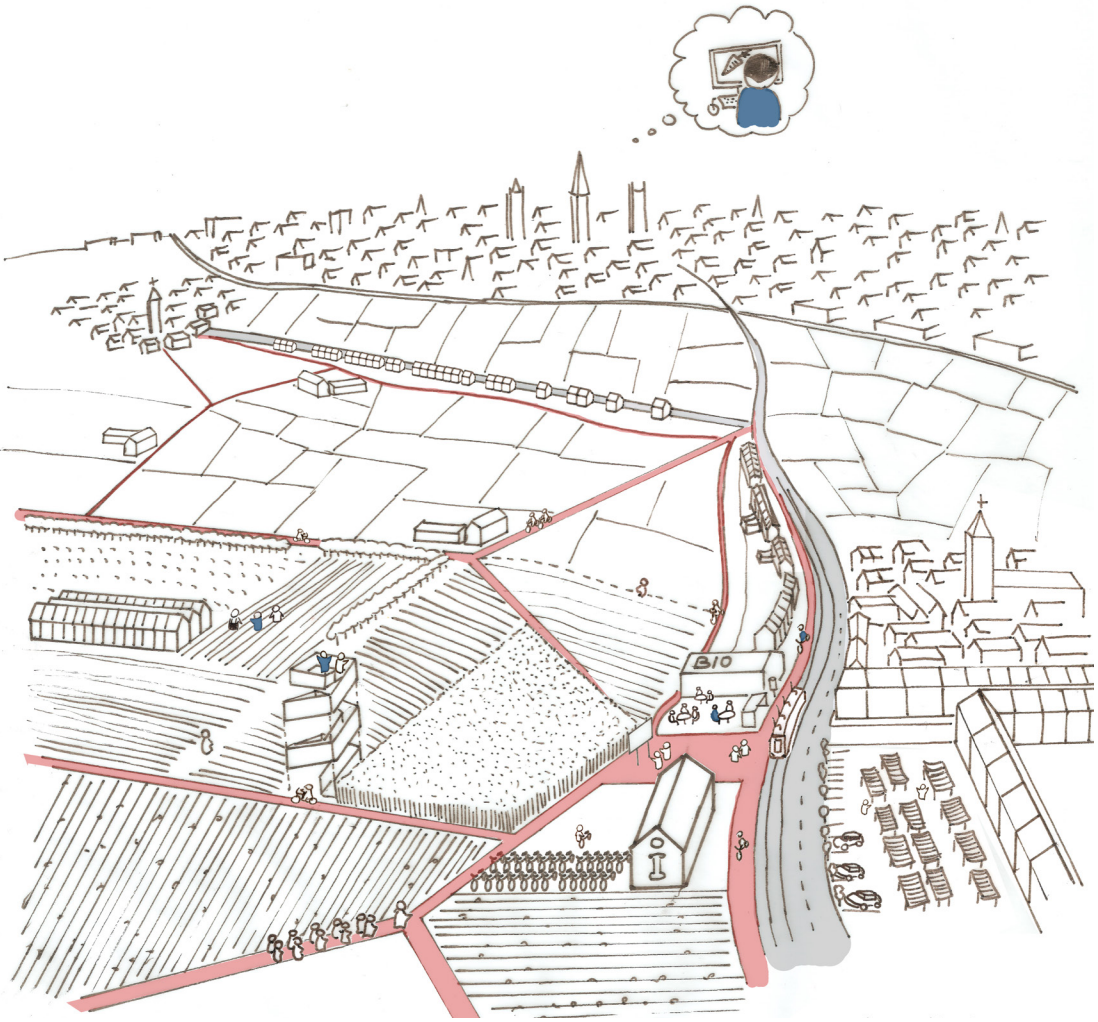


streetview valley

VI

DEVELOPMENT VARIATION

NEW CONSUMER-PRODUCER NETWORKS



veduta di Ghent 2030

Ghent, 18/06/2030

Rachid, a young social worker, is enjoying the sun on the terrace of his city apartment. However he has a day off, he is working on a business plan. He wants to start a new community garden project in the city center to enhance the social integration of minority groups. Suddenly his wife pops up on his screen. She's calling him from work and tells him that some friends will stay for dinner tonight. The vegetable package weekly delivered to their home will not be to feed these unexpected visitors.

As it's a nice day, Rachid decides to get extra supplies at the CSA farm of which he is a member. He has a good relationship with the owner, who frequently gives workshops in cultivation techniques and thus is a great help in improving Rachid's agricultural knowledge. As the CSA farm is located in an agricultural park close to the city, Rachid will go there by carrier bike. Before he goes, he quickly checks which vegetables are available this week. He's in luck: both the carrots and eggplants are ready for harvest.

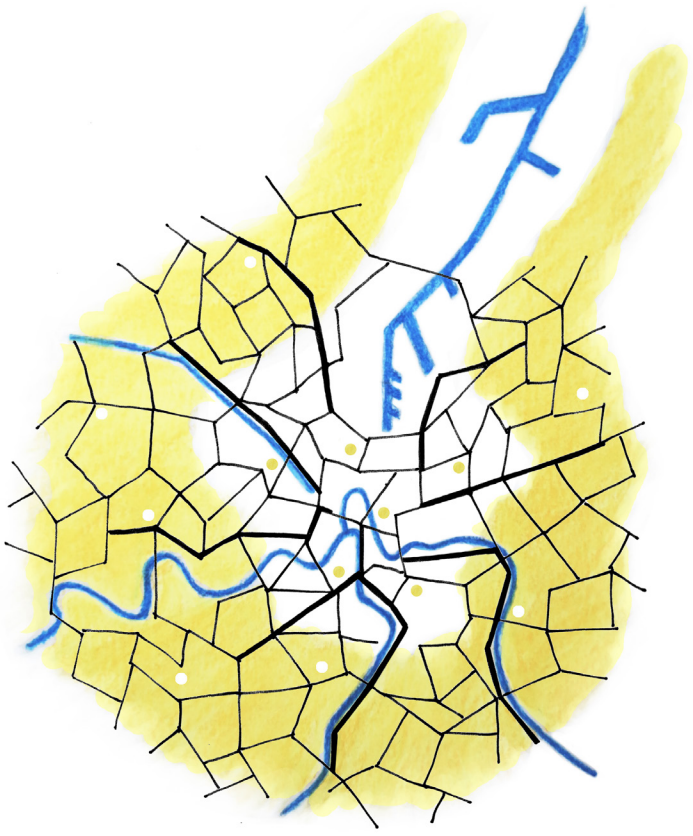
On his way to the park, Rachid suddenly remembers what he saw earlier on facebook: an old friend of his is staying at a farmhotel in the park. A few texts and kilometers later, Rachid and his friend find themselves enjoying a fresh fruit beer on the terrace of a bio restaurant in the park. After a while, a group of primary school children joins them on the terrace. They have been following the educational route through the park and are chatting about their school garden. Rachid and his friend decide to move to the quietness of the CSA garden. As it takes a ten-minute ride through the park to get there, Rachid's friend picks up a bike at the bike rental.

Using the main bicycle tracks, Rachid and his friend can quickly navigate through the park. It doesn't take long before the greenhouses of the CSA farm appear. While they are harvesting Rachid's dinner, the farmer passes by. After a quick explanation about this week's harvest, the farmer says Rachid came up in a conversation with an acquaintance recently. He's a short chain farmer from outside the park, who is looking for drop off points in the city. Rachid's eyes twinkle: this could be a potential partner for his community garden project! The CSA farmer tells him that he can meet this farmer at the local farmers' market in the town center next to the park.

Before getting there, Rachid wants to take his friend and his vegetables to a watchtower at the periphery of the park. Up there, with a panoramic view of the park and the surrounding villages as background, they enjoy an appetizer. Rachid's friend points out the characteristic skyline of Ghent. Rachid is looking at the awnings of the market he will soon explore.

Vision

In order to rearrange the relationship between producers and consumers a new dynamic within the urban area is needed. The city and its hinterland should become highly interconnected through economic, social, and physical networks. As a result, the two cooperate as one urban region. Agriculture claims its position as an urban function by creating a mutually beneficial relationship with the citizen.



Farmer 2.0

The creation of a sustainable relationship between the production- and consumption side of an urban area can be realized by the development of networks that enhance a close contact between the citizen and the producers of his food. To make such a relationship possible, a new agricultural landscape must be created. The citizen becomes an ecologically conscious consumer who is aware of the origin of his food. At the production side, the entry of the 'farmer 2.0' takes place. This new generation of farmers can be described as agricultural entrepreneurs. They are characterized by their fresh point of view on the farming profession, exceeding the merely production oriented activities of the traditional farmer.

Presence of the production side in the city

In Ghent, the entry of the farmer 2.0 has already begun. This is visible in the different short food supply chain initiatives already present in and around the city. Within these projects, the farmer-entrepreneur reduces the number of links in the production and distribution processes. By reinventing the agricultural enterprise, this farmer liberates himself of the traditional distribution system and the price-fixing attached to it. To make this system feasible, a good relationship with the customer/citizen is essential. Thanks to this close contact, the farmer finds himself in a good position to respond to the changing wishes of his customers.

Short chain networks Ghent
see appendix

Today's customer demands imply both high quality food and product differentiation. This need of differentiation includes the wish for a variety of high quality products, but also for a range of alternative and cheaper products.[1] Willing to satisfy this wish, the farmers 2.0 in and around Ghent are beginning to work in cooperatives. Through such collaboration, small complementary agricultural companies are able to offer the desired variety of products. Another advantage offered by the cooperative is the possibility of sharing transport and tools, without subverting individual ownership[2].

As most citizens want to get their daily food delivered close to their homes, the urban area of Ghent should be equipped with a multitude of distribution points. Such 'drop off points' can range from privately owned depots (e.g. garage boxes) to local retail stores and even supermarkets. Another way to get the local products into the city is by the organization of farmers' markets. These

1 Pagoulatos E., (2003), *A consumer-oriented agriculture for the 21st century*, (University of Connecticut), p7-8.

2 Coöperaties blijven onmisbaar in land- en tuinbouw [website], www.wageningenur.nl/nl/Expertises-Dienstverlening/Onderzoeksinstituten/lei/show/Cooperaties-blijven-onmisbaar-in-land-en-tuinbouw.htm, accessed on 20 may 2013.

markets must cover the whole urban area: they take place in each and every city quarter of Ghent on highly recognizable places. The markets are of very high value because they encourage the direct social contact between farmers and customers and thus enhance the visibility of the production side in the city.

Next to their social and recreational aspects, urban gardening projects have the ability to raise awareness for sustainable food consumption. Therefore, these projects have an important role to play in the education of the citizen: they bring the citizen back in touch with food and how it is produced. This educational aspect of food production can also be utilized by schools, which can take part in an existing project or set up their own school garden. Through cooperation with farmers in the hinterland, these projects can become drop off points and workshop centers, but can also organize excursions to professional farms. Urban gardening projects thus open a window on the production side in the city center.

From consumer to user

Apart from enhancing the presence of the production in the city center, the presence of the citizen/consumer on the production side is also essential in realizing a sustainable urban-rural relationship. Consumers can be involved in the production side by attracting them to the local farms in the hinterland. As such the citizen gets to know how and where his food is produced and which variety of products is available at different times of the year. Attracting the citizen to the hinterland can noticeably change his attitude towards the production side and can thus can affect his consumption behavior: he acknowledges the added value of the hinterland and becomes a participant or user, rather than a consumer.

In order to increase the attraction of the hinterland, the farmer 2.0 can create a range of user-oriented activities. The nature of these activities depends on such factors as location, environment, owners, scale and activity of the agricultural enterprise. The most common activities are guided tours, farm shops, self-harvesting (csa), conference rooms, guesthouse accommodations, … Next to the organization of such activities, the maintaining of ecological values and qualitative landscape elements also contributes to the attraction of citizens. As such the cultivated landscape presents itself as an area with high amenities for shared recreational use.

By involving the citizen in its activities, agriculture in the urban area can claim its position as an urban function. Therefore agriculture must be given a place in

the territorial reality of the city. By clustering different user-oriented projects in strategic areas of the urban area, a mediator between the city and its hinterland can be created. These clusters thus become 'agricultural parks', operating as recognizable showcases for the production landscape. They give a face to the production side and thus increase the identity of the city's hinterland. Within these reserved areas, professional farmers get the opportunity to practice their profession in favorable conditions.

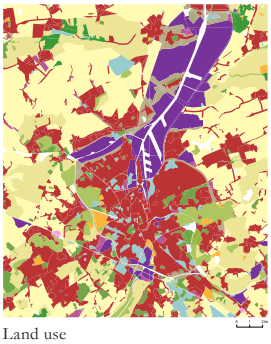
In order to make the hinterland - and in particular the agricultural parks- accessible for all citizens, a network of efficient and qualitative connections between city and hinterland should be installed. On the one hand, these quick connections can be made through the further development of radial trunk lines of public transport, on the other hand safe and functional bicycle routes with high amenities must be provided.

Potential park areas

Within the urban area of Ghent, three areas seem to lend themselves for the development of an agricultural park: the area stretched between Evergem, Sleidinge and Lovendegem (ESL), the area between De Pinte, Zwijnaarde and Sint-Denijs-Westrem (PZS) and the area between Heusden, Laarne and Wetteren (HLW).

All three areas have the potential to become highly accessible from the city center. Each of them is situated in the vicinity of a train station. Also other forms of public transport are well represented: ESL and PZS are situated along a trunk line and thus are very good accessible by tram. As this is not the case for HLW an upgrade of the bus services is necessary to make this area's accessibility acceptable. Apart from that, there are opportunities for each area to provide a good connection for bicycle traffic: each of them is connected with the city center with at least one bicycle axis with relatively high amenities.[3]

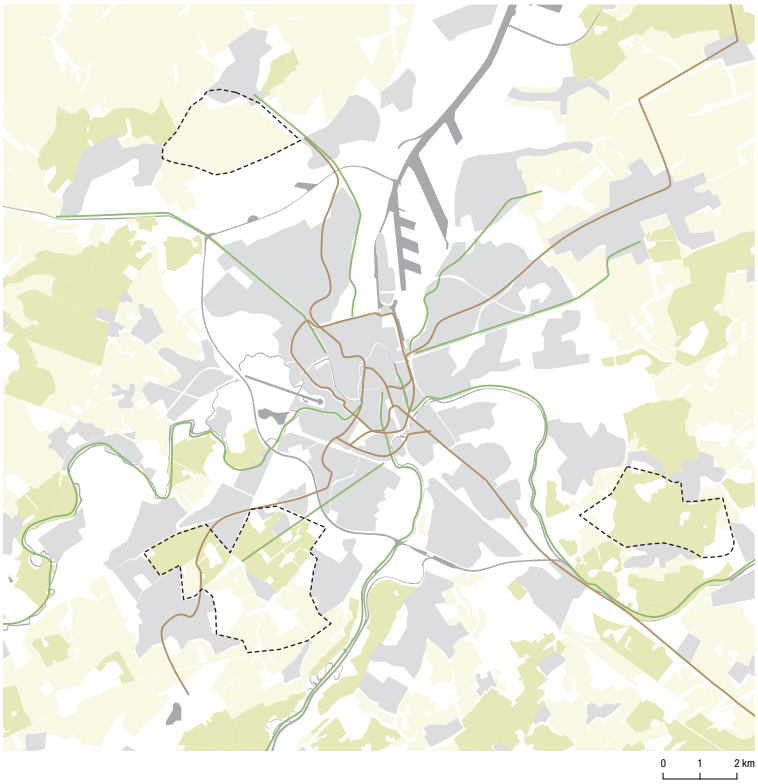
3 In the case of PZS this axis is yet to be completed

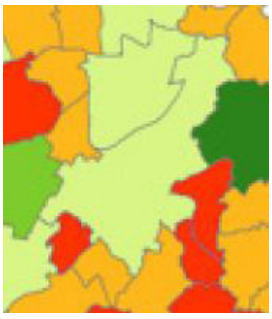


Land use
see appendix

Each of the areas is characterized by a relatively continuous landscape of open space. The landscape quality is important, as these areas will become 'showcases' for the hinterland. In HLW the land use merely consists of agriculture with a high landscape value. In the PZS area this is combined with castle parks and modal agriculture. The ESL area however, merely consists of agriculture without added landscape qualities. In order to create an attractive park in this area measures should be taken to improve this situation. Moreover, all three areas are characterized by a quite clear separation between open space and built area.

The existing agriculture in all areas has a rather unstable character. The creation of an agricultural park can improve the social and economic situation of the farmers in and around it. The number of existing urban agriculture projects the ESL area, points at an existing dynamic which can enhance the creation of an agricultural park.





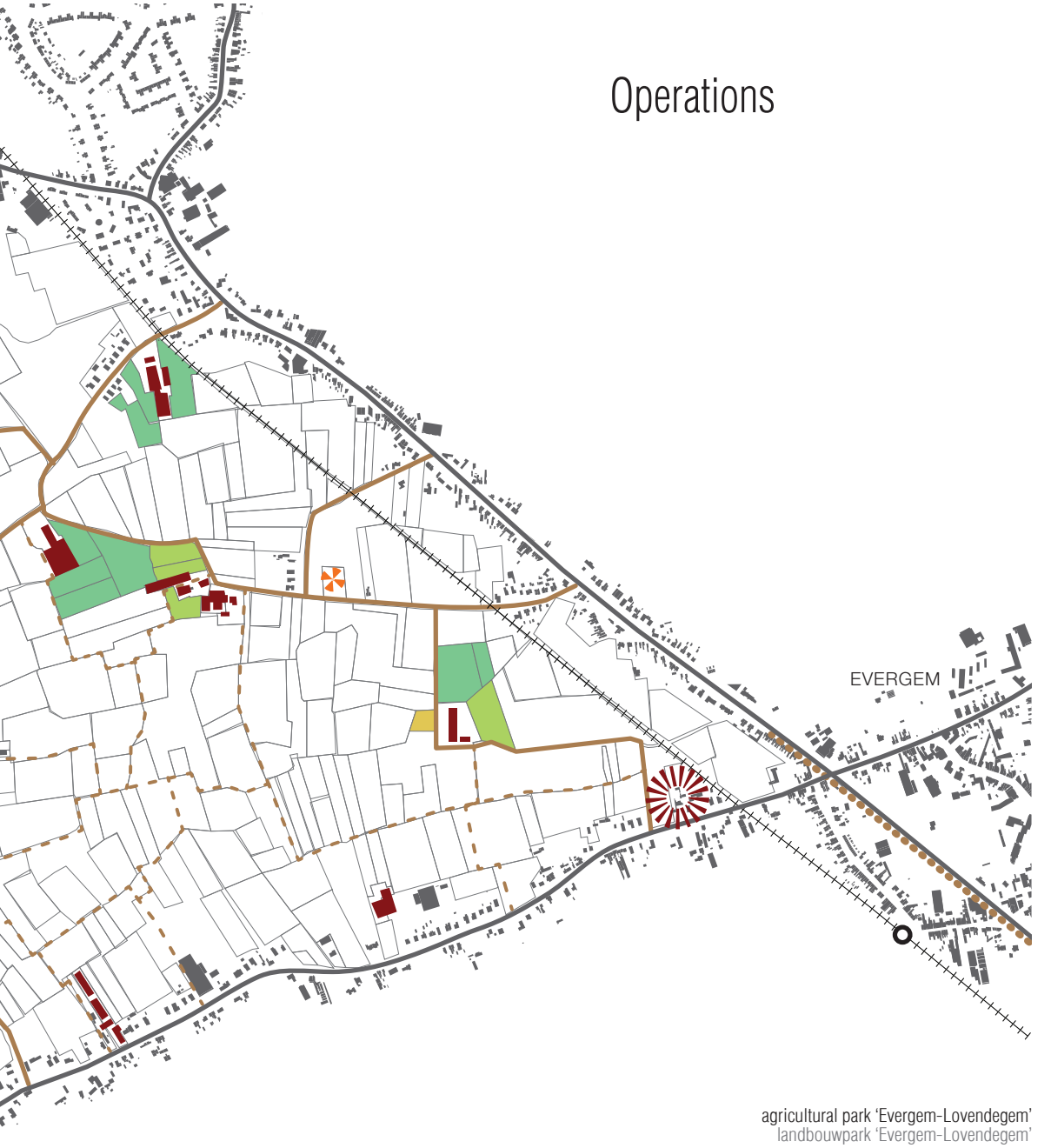
stability agriculture
see appendix

In what follows one of these areas, Evergem-Sleiding-Lovendegem, will be further elaborated. An initial design concept for the agricultural park is given and decomposed in order to investigate some essential aspects for the quality of the park. If the main principles coming to surface are adapted to the specific context, they probably can be applied for parks in the other potential areas as well.

OBJECTIVES	
profitability	xxx
employment	x
climate control	x
education	xx
recreation	xxx
landscape quality	xxx
community building	xx
social justice	xx


SLEIDINGE
LOVENDEGEM

Operations



agricultural park 'Evergem-Lovendegem'
landbouwpark 'Evergem-Lovendegem'

main bicycle route
hoofdfietsroute

permanent parkroute
permanente parkroute

dynamic parkroute
dynamische parkroute

portal
portaal

parkelement
parkelement

farmshop
boerderijwinkel

user-oriented farm
gebruiksgerichte boerderij

camping spot
kampeerplaats

arable farming
akkerbouw

orchard
boomgaard

livestock
veeteelt

csa
csa

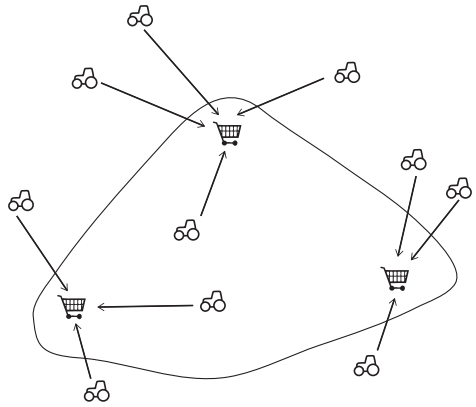
NETWORKS

extern networks

The agricultural park of Evergem-Sleidinge-Lovendegem is very well connected to the city center. A main axis runs from the city center to Evergem, next to the park. This axis consists of both a trunk line of public transportation and functional bicycle route. The railroad runs parallel to this route and has two stops: one in Evergem and one in Lovendegem.

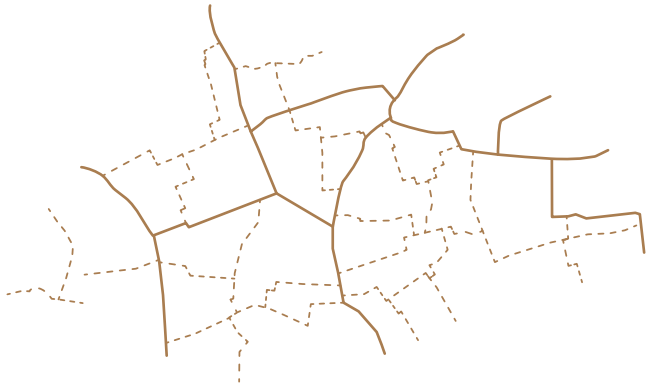
A second, very attractive axis runs along 'the Lieve'. The standalone bicycle path following the creek offers a recreational connection with high amenities. This set of connections makes the area highly accessible for every citizen. Moreover, some networks can be double used. Cargo-trams can be used for the nightly transport of products to the city center for example.

There are also virtual connections between the park and the city. An interactive map works as an interface between the citizen and the farmers in the park. At every moment the citizen or park visitor can check where which products or activities are available.



Next to city - park networks, there are also networks between the park and producers outside of it. These farmers can deliver some of their products to drop-off points located in the park and thus reach local customers.

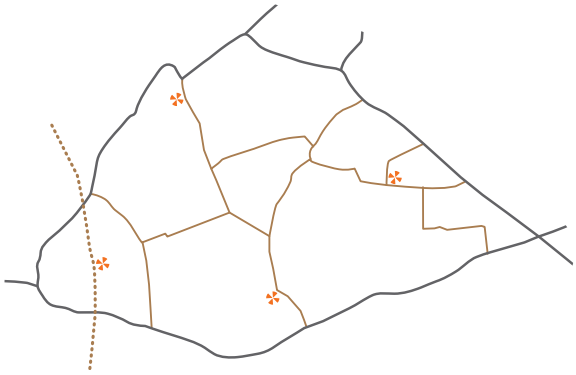
intern networks



In order to make the agricultural park accessible, a hierarchic network is set up. The main routes in this network are asphalted and connect the farms which are spread over the park. Next to these -mostly already existing- permanent routes, there are also secondary routes crossing the park. These routes have a temporary character and run along and through the acres. Since these are dynamic routes, the farmer keeps the accessibility of his lands under control. This secondary routes consist of pathways mown out of the crops and restored field tracks. They thus can be moved when necessary. When needed (e.g. in breeding or harvesting season) these paths can be closed. The accessibility of the park thus can change in space and time.

NODES

park elements



Different 'park elements' are positioned at strategic points in the park. They are attractive objects or places put along main routes and are intentionally placed at the periphery of the park (≠ the edge). As such, they have the ability to lure people out of the built environment into the park. These element thus can encourage the exploration of the park. Elements ranging from a watchtower to picnic places can fulfill this role.

farms

The greater part of the farms located in the park are actively oriented on the visitors. The others participate behind the scenes, by fulfilling maintenance tasks for example. The actively user-oriented farms operate as nodes in the network of the park. By providing a diverse set of activities, they function as stopping places for the park visitors. These activities are organized around the farm and can range from farm shops, educational fields, orchards, camping

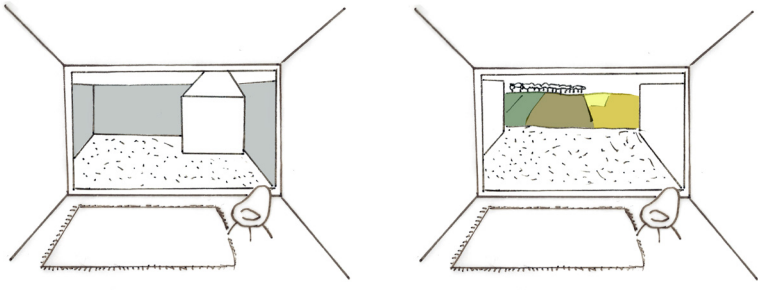
spots to guided tours or even lodging accommodations and spaces for parties or meetings.

portals

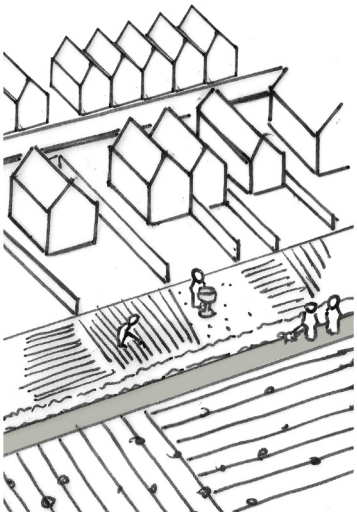
At the borders of the area 'park porches' are created. These portals function as main entrances to the park and are always combined with a transferium. These transferium enhance the modal split and consist of a public transport stop, a bicycle rental and parking area. Moreover, the park portals are linked to the surrounding village centers and their catering industry: therefore they are located next to the centers of Evergem, Sleidinge and Lovendegem. Next to their function as transferium, they also act as reception points. In order to provide information to park visitors, the smaller portals offer maps of the park, bigger ones such as the one in Evergem can be equipped with an information desk, combined with another program. This program can be a drop off point for products from in and around the park.

EDGES

ribbon development



The agricultural park is banded with the typical Flemish ribbon development. These ribbons are densified and thus the border of the park is strengthened. The ribbons –typically turned away of the landscape at their backside- are put in relation to the park. The typical fences and shacks separating the private backyard from the landscape is abandoned and the former backsides are turned into second front sides facing the agricultural park. When the public character of the agricultural park conflicts with the private backyard, a mediating strip is inserted, making a gradual transition between the private backyard and the 'public' park.

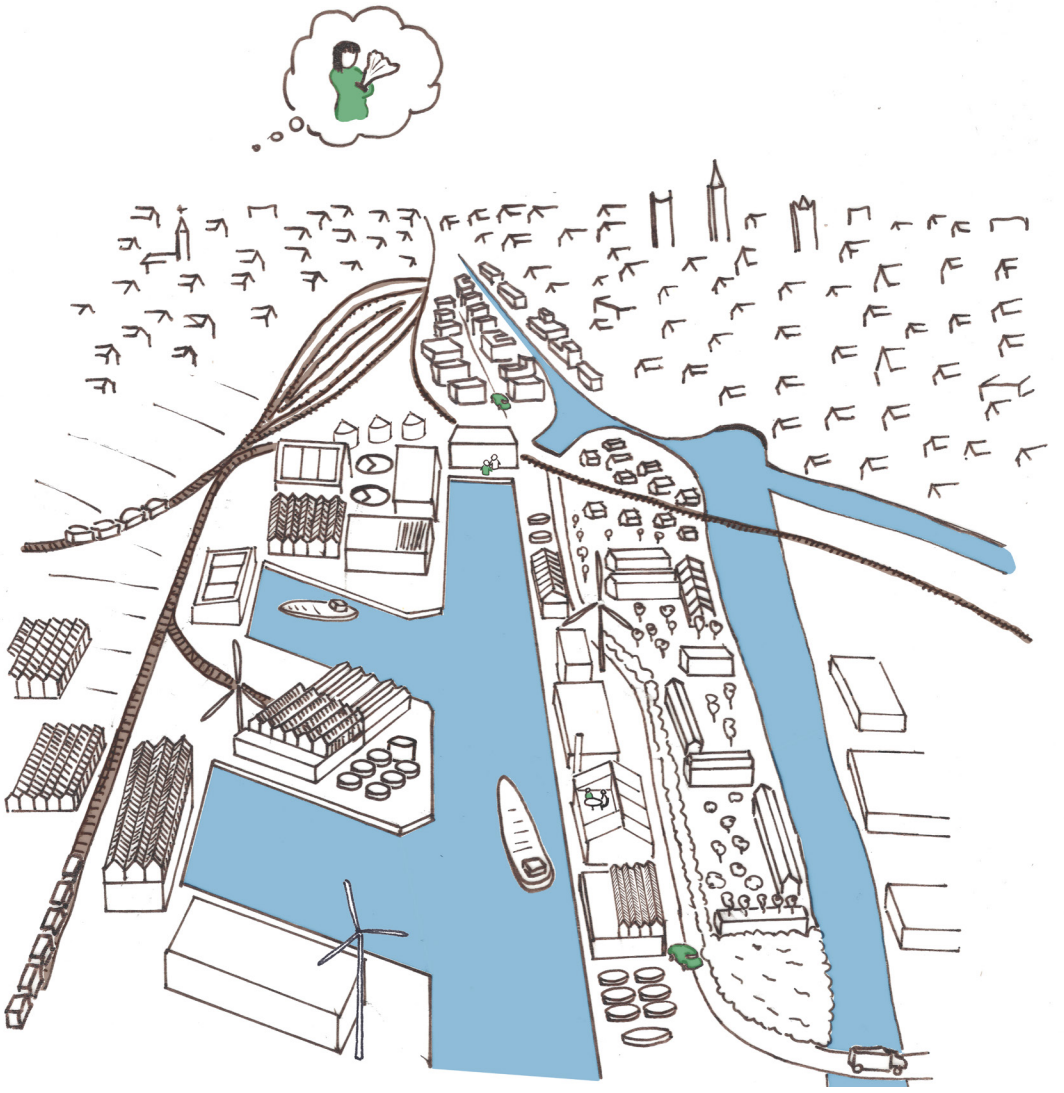


streetview portal agricultural park

V

DEVELOPMENT VARIATION

CIRCULAR METABOLISM



veduta di Ghent 2030

Ghent, 17/10/2030

"The sustainable entrepreneurship award of this year goes to 'Sophie Van Dale'!" The subsequent thunderous applause following slowly turns into a monotonous beeping. Sophie wakes up to the sound of her alarm, cutting short the dream about her nomination for the award presented next Saturday. The busy day ahead of her leaves no time for further dreaming. After a quick breakfast of locally produced algae Sophie is heading to the technical centre on the corner of her street. She is responsible for the local waste cycles of her neighbourhood in Sint-Amandsberg and thus has to check once a week if the system works properly.

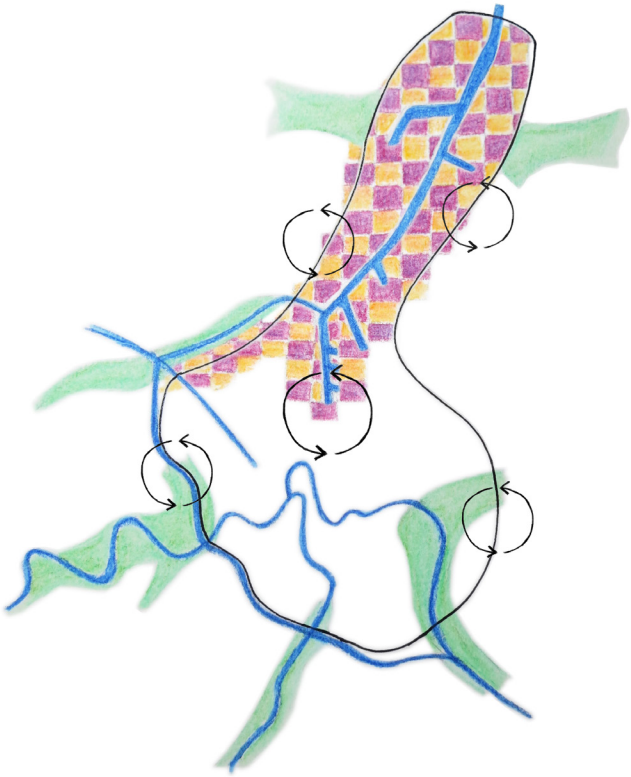
After this quick checkup Sophie drives her electric company car to the food stock exchange situated at the harbor. She's the head of a company producing vegetables and fish. As her production is focused on the local market, the food stock exchange of Ghent is almost her second home. After arriving, she meets with the statistician of her company. As they go through the sale results of the day together, Sophie is beaming. Her company is doing well and this is translated in good sales. Her customer base is growing and even some restaurants are becoming regular buyers. This is due to the good reputation of the company: it is well known for its sustainable production methods. The jury for the entrepreneurship award referred to this fact for her nomination. They also expressed their appreciation for her recruitment strategy, making her an important employer for low-educated citizens. Sophie knows her winning chances are high, but there's no time for daydreams: she has to go to the office in the port because she has an appointment with a new intern.

The intern is a student at the university of Ghent. The innovative production methods used in Sophie's company wouldn't be possible without the close cooperation she maintains with this university. In order to encourage this interaction, her company offers multiple internships every year. Sophie shows the intern the around and tells him that the company is part of a bio-enterprise cluster. Within this cluster, the companies are exchanging waste flows and residual heat. While saying this, Sophie thinks about her last appointment of today. She's invited for a dinner with the head of the neighbouring enterprise. It's a new chemical company working with local biomass, and a potential donor of residual heat for Sophie's greenhouses. Sophie takes leave from the intern and prepares herself for the dinner.

Sophie gets a little nervous as she approaches Emiel. Apart from her neighbour, he also is one of the judges who nominated her for the award. He gives Sophie a warm welcome and congratulates her with her achievement. He wants to talk to her about their possible collaboration. Some matters have to be set straight before they go talk with the harbors' net provider. The business talk soon turns into a cosy dinner at the roof terrace of Emiel's company. With the particular harbor noises in the background, Sophie realizes that apart from a good business partner, she has found a friend. Meanwhile, a cargo ship leaves the harbor for the hinterland…

Vision

In order to achieve a partly self-sufficient city, a highly productive and sustainable urban landscape is essential. This landscape is characterized by technological cycles between industry, city and agriculture. As such, an urban metabolism arises in which the city and its surroundings work together in a circular relation. Agriculture turns into an industrial bio producer, installed as an essential link in this new urban metabolism.



From farmer to industrial

Today, Ghent is already well known for its leading initiatives in the development of a bio-based economy. The 'Ghent Bio-Energy Valley' initiative offers the opportunity to develop a bio-enterprise cluster in the port, which can bring agricultural and industrial activities together.[1] These can team up in order to become an important innovative cluster in the development of sustainable bio-production technologies. Within this development the university is an important R&D partner. Such public-private collaborations are essential to achieve a knowledge-based bio-economy.

1 see also: www.gbev.org

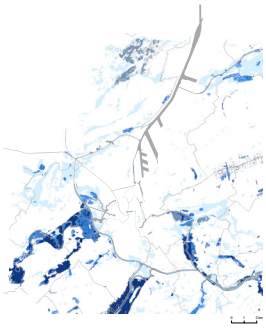
Within such a bio-based economy, two main parallel categories of agricultural production can be distinguished. On the one hand there can be a focus on food production and processing, on the other hand on the production and processing of biomass.

Food production is characterized by its innovative and sustainable production processes (e.g. aquaponics and hydroponics), but also by the application of industrial food technologies and the use of genetically modified crops. In order to create public support for such systems, transparent communication, active participation of local citizen platforms and good mechanisms for quality control are essential. The knowledge-based production processes used, turn farmers into industrials. The contribution of these new industrials to the urban sustainability is multiple. First of all, the intensive food production methods used by these entrepreneurs enable them to generate a large portion of the local food production. By selling these products at a new local foodstock exchange, structural relations between food production and the direct hinterland are enhanced. The farmers-industrials also become important players in the local energy market and can take part in waste recycling programs. Such interactions can be enhanced by a strategic location choice within the urban agglomeration. This location also provides an opportunity for organizing the company's logistics in a sustainable way by using rail- and water transport.

Bioproduction in the port should not be limited to food; a specialization in the production and processing of biomass is also possible. The needed biomass can be drawn from the region and from specialized production techniques in the port area (e.g. algae production). If necessary, biomass can be imported from overseas. To avoid the undermining of a partially self-sufficient Ghent region, biomass production should be limited to those areas where regular food pro-

duction isn't possible or productive. Most of these areas are to be found in river valleys and other areas subject to flooding risks.

Inside the port, biomass production will focus on the production of algae. The use and development of algae is still at an early stage, so further research and development is needed to make the production profitable and sustainable on a large scale. The use of algae is possible in the chemical sector but it is also a potential resource for the production of bio-fuel or even food supplements. The cultivation of algae fits perfectly in the harbor area, near bio-tech companies.[2]



flood risk
see appendix 1

Urban metabolism

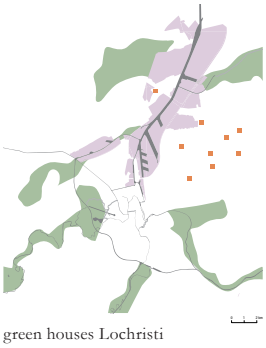
Apart from the application of innovative bioproduction methods, agriculture in this development variation plays an important role in the closing of urban cycles. As such, agriculture intensively contributes to the creation of an urban metabolism, in which the city and its hinterland exchange flows and operate as one organism.

2 *Het groene goud*, Peter de Jaeger [website], http://eoswetenschap.eu/artikel/het-groene-goud, accessed on 5 may 2013.

The development of technological networks between agriculture, city and industry results in farms working in partnerships with non-agricultural companies and the arising of new spatial clusters of diverse companies. These collaborations are possible through the development of techniques such as the exchange of waste flows and networks for the recuperation of residual heat. In order to make these systems operate efficiently, proximity to the city is desirable. This enhances the foundation of short and localized cycles but also makes it easier to attract the appropriate workforce. As the new port-bound bioproduction sector offers opportunities to both high- and low-educated citizens, it becomes an important actor on the local labour market.

The companies in the bio-productive cluster in the port become active providers for the local energy market. A high temperature energy net can be fed by a local biomass central and the residual heat of industrial production processes. Greenhouses, for example the nearby greenhouses of Lochristi, especially draw residual heat from this local high temperature energy net.[3] By means of a cascading system even the low temperature urban heating network can be supplied.

3 Van Dyck B., *Reststromen in de Gentse kanaalzone*, p53.



green houses Lochristi
see appendix 1

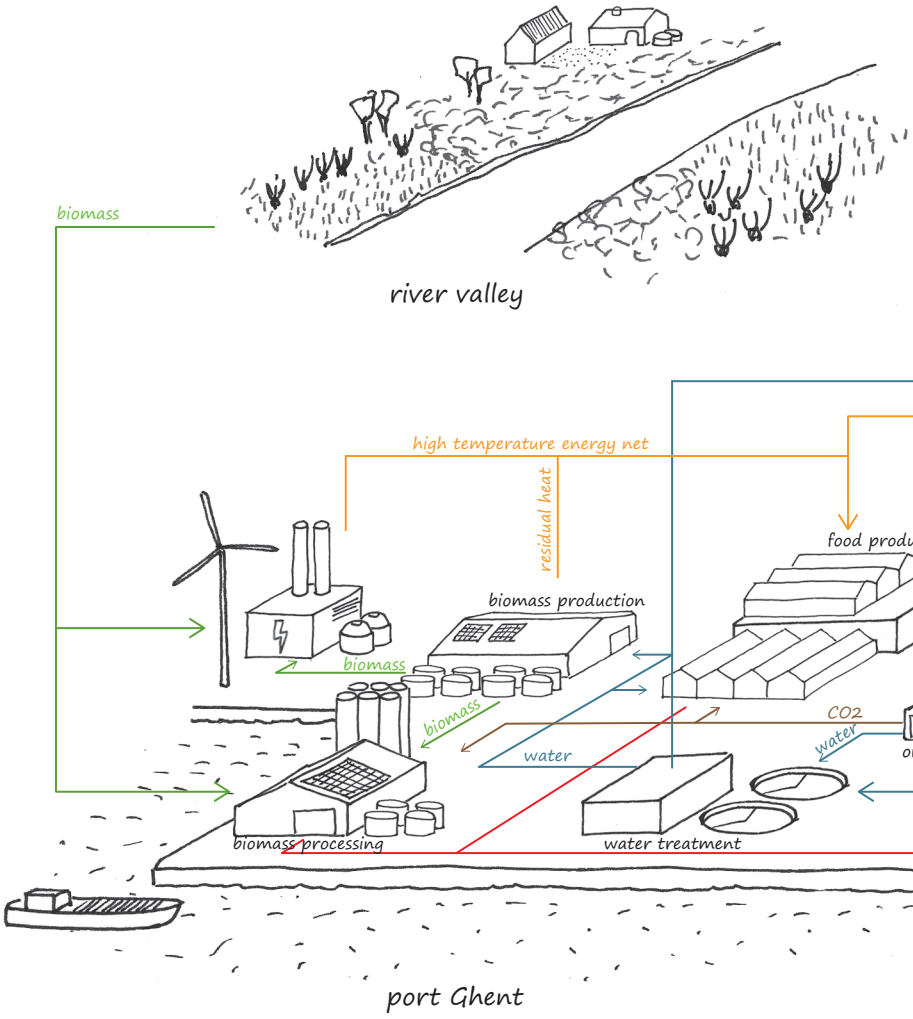
The port of Ghent has the potential to become a production park including both industry and agriculture. These two production sectors have been working side by side for a long time, but can now become essential partners. Agriculture has the potential to not only work as a buffer between the productive and resi

OBJECTIVES	
profitability	xxx
employment	xx
climate control	xx
waste management	xxx
education	x
social justice	xx

dential landscape, but to interact with both.

The result of this development variation is a circular urban metabolism, an urban region which is partly self-sufficient and keeps waste production as low as possible. Such aims can only be achieved in a knowledge-based city facilitating innovation and enhancing cross-sectorial collaborations. The city government of Ghent also has an important role to play by creating the right constraints and opportunities needed to make ecological en sustainable investments possible. They can take responsibility in order to provide the required utilities needed for the success of a circular urban metabolism.

further reading:
Coenraadts W., de Klerk B., Warmerdam J., *Kansen voor de agrosector in de bio-economie*, Agro & co Brabant, (Drukkerij Romein).
Spitz G., Koks E. (2011), *De groene economie*, NCDO Globaliseringsreeks (Amsterdam: Zwaan Printmedia).


river valley
biomass
water
high temperature energy net
residual heat
CO2
food production
biomass production
biomass
biomass
CO2
water
water
organic waste treatment
biomass processing
water treatment
food/products
port Ghent

Operations

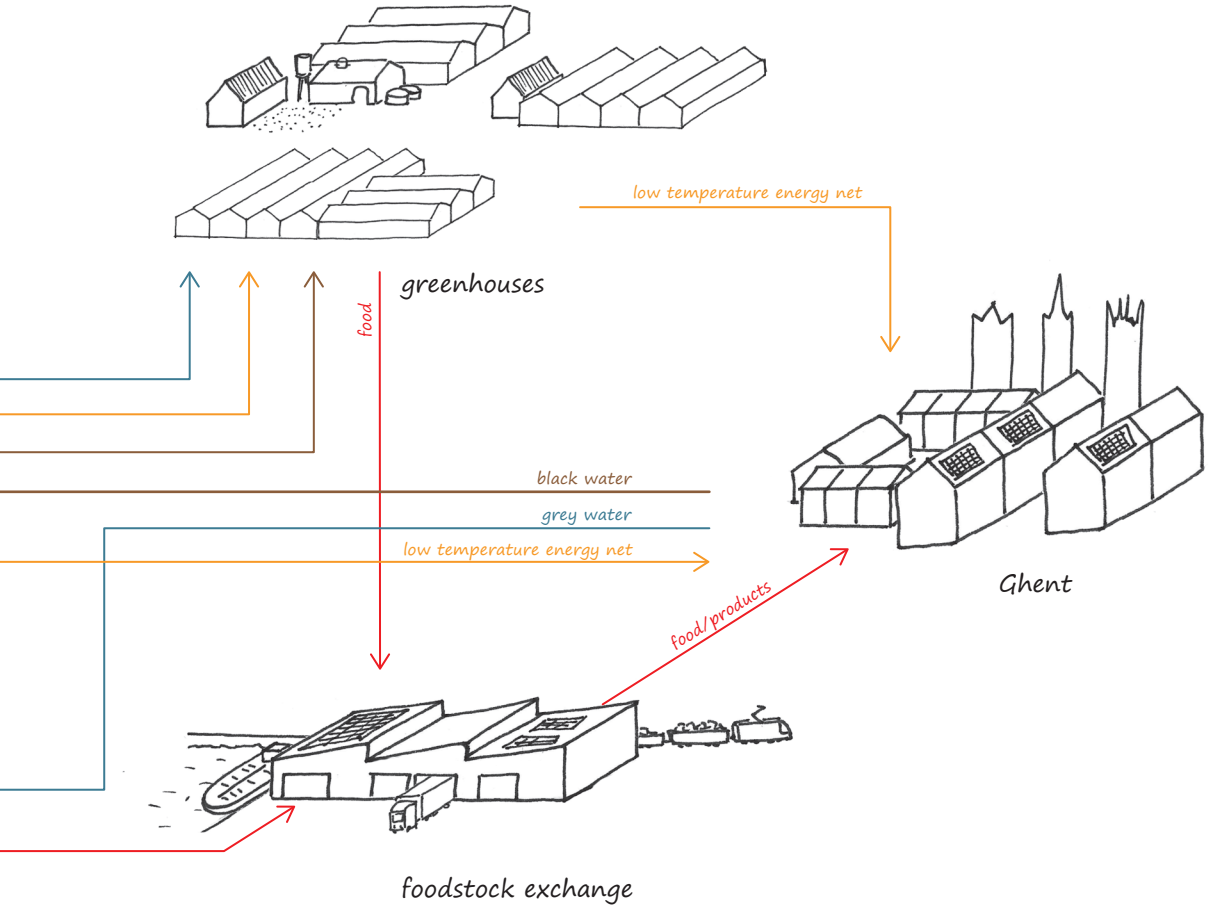
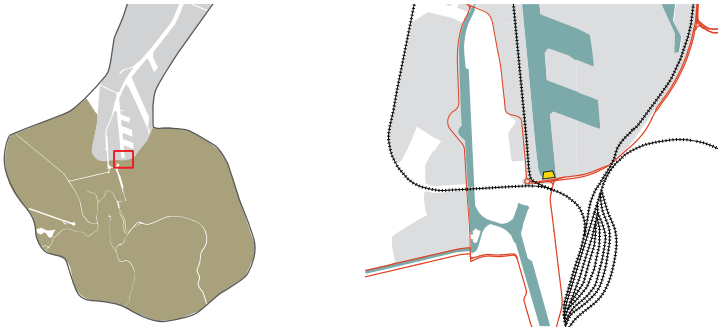

low temperature energy net
greenhouses
food
black water
grey water
low temperature energy net
food/products
Ghent
foodstock exchange

Image pervious page: based on *routekaart afvalwaterketen 2030*, www.except.nl

This development variation is characterized by the different networks between city, agriculture and industry. Within this part, we give a systemic impression of how such circular metabolism of the urban area functions. The metabolism exists of several cycles in which different flows can be distinguished. The production and processing of biomass is a first important flow. Biomass produced in the river valleys or at the port can be brought to the biomass central, which drives the high temperature net, or it can be processed in the port in order to make products for the city. Residual flows such as grey and black water coming from the city are processed in the port. After a treatment, these flows can be utilized within the greenhouses for the production of food. For example CO2 which is derived from organic waste flows (black water), is useful for food production in the greenhouses. Another important network within the circular metabolism is the local energy net. A high temperature energy net can be fed by the local biomass central and the residual heat of industrial production processes. Greenhouses draw heat from this net and by means of cascading even the local low temperature net of the city is supplied. Products made in the port or food cultivated in the nearby greenhouses are brought together in a local food stock exchange, from where they are distributed to the city.

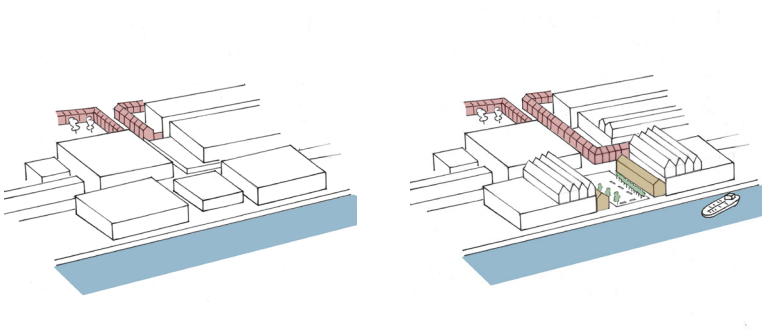
However these networks characterize the circular urban metabolism, they are not directly visible in the spatial urban context. In order to make these networks efficient they should be considered as structuring elements for the new production landscape.



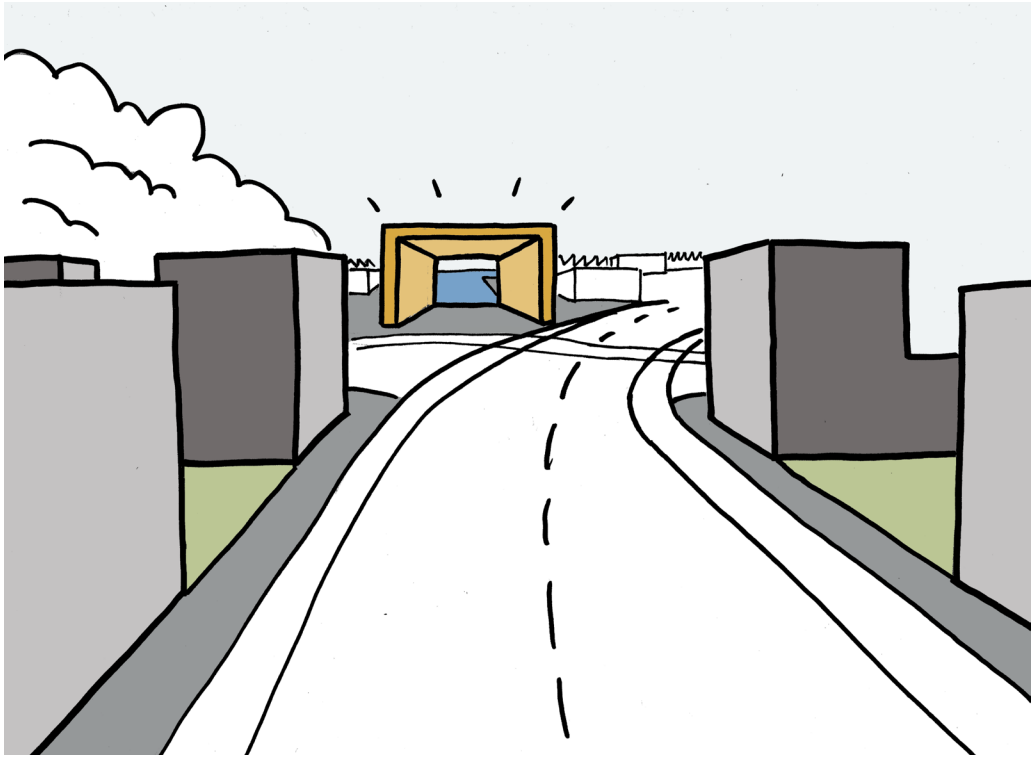
Only the places where different flows come together or start from, are visible in the landscape as nodes of a further invisible network. One of these nodes, which has potential to generate symbolic value, is the food stock exchange. This food stock exchange is the place where the city and the new productive landscape meet as two equal elements of the urban area. By positioning this node

also on their physical point of contact, it becomes a linking element between this two complementary parts of the city. Apart from it's symbolic value, this is also a strategic position for distribution of goods. Situated next to the dock, railroad and the ring road, the food stock exchance can take fully advantage of the port's trimodal infrastructure.

LIVING WITH THE NEW PRODUCTIVE LANDSCAPE



The current port landscape of Ghent is characterized by both industry and several historic port villages. These two functions lie next to each other without interaction. Also the city quarter Muide is turned away from the industrial landscape next to it. Within the circular urban metabolism idea however, a collaboration on a technical level can be supposed. Therefore it seems interesting to imagine ways of interaction between the two on a more experienceable level as well. In that spirit, a punctual cut out in the continuous industrial strip for example can enhance the contact between the dwelling and the new productive landscape and the specific image quality of the docks.



streetview foodstock exchange

VI

CONCLUSION

Urban agriculture is a complex phenomenon. Given the multiplicity of possible approaches and the unstable field of actors, the issue of urban agriculture can be considered a 'wicked problem'. In order to deal with the wicked character of the problem we set up a search strategy. We constructed a conceptual framework. This framework organizes the established knowledge on the issue and offering focal points for the non-linear search process: objectives, context and techniques.

As such, the conceptual framework offered a good starting point to develop 'development variations'. These are concrete propositions for the development of urban agriculture in Ghent. The framework acted as a helpful resource during the development of these variations. However, the framework is not a static item but changes depending on the approach of the considered variation.

The development variations express different urban-rural relationships and bring different compatible aspects of the conceptual framework together in a coherent and tangible proposition. For every variation the role of urban agriculture in the achievement of these sustainable urban-rural relationships is investigated.

In the first variation the focus lies on the common interests connecting Ghent and its hinterland. These common interests are 'weak values' such as biodiversity, water management and landscape. They are essential in realizing a resilient urban landscape. In Ghent this is made possible by giving more space to the river valleys as blue-green structures in the urban area. Therefore, urban agriculture is activated as provider of open space services.

The second development variation explores how urban agriculture can contribute to new consumer-producer networks. Ghent and its hinterland becomes an urban region in which agriculture claims its position as an urban function. Therefore, agriculture becomes consumer-oriented and is clustered in agricultural parks close to the city.

A third variation focuses on the completion of cycles within the urban area of Ghent. These technological cycles between agriculture, city and industry in the port are essential in order to achieve a circular urban metabolism. Within this metabolism, agriculture becomes an essential link as an industrial bioproducer.

Besides its other functionalities, the framework can be used to juxtapose the different development variations and to compare their objectives, context and used techniques: the variations are not exclusive, but can exist parallel and

simultaneously. They investigate different approaches of the problem of urban agriculture and bring other aspects and partial problems to the surface. They thus can be considered as means to identify and unravel different opportunities, which can be partly recombined afterwards. Notwithstanding the compatibility of the variations, there are also conflicting elements (e.g. focus on optimal food production versus focus on optimal contact between producers and consumers). It thus must be avoided that the combining of several variations results in none of them obtaining their highest potential.

The development variations give a clear view on the opportunities of urban agriculture in Ghent and show the importance of an overarching vision on this issue. They also shine a light on the different roles the government can play in facilitating the considered urban-rural relationships. These roles can range from the management of weak values to placemaking and the provison of utility services and needed infrastructures.

The ability of the development variations to represent a clear image of what the development of urban agriculture in Ghent could look like makes them interesting instruments to organize the discussion. They enable different actors to form a meaningful opinion and to promote it. This powerful characteristic of tangible propositions or 'objects' is clearly described by Latour:

"Each object gathers around itself a different assembly of relevant parties. Each object triggers new occasions to passionately differ and dispute. Each object may also offer new ways of achiev ing closure without having to agree on much else. In other words, objects – taken as so many issues – bind all of us in ways that map out a public space profoundly different from what is usually recognized under the label of 'the political'." [1]

1 Latour B. (2005), *From realpolitik to Dingpolitik*, in: Krisis nr. 2, p5.

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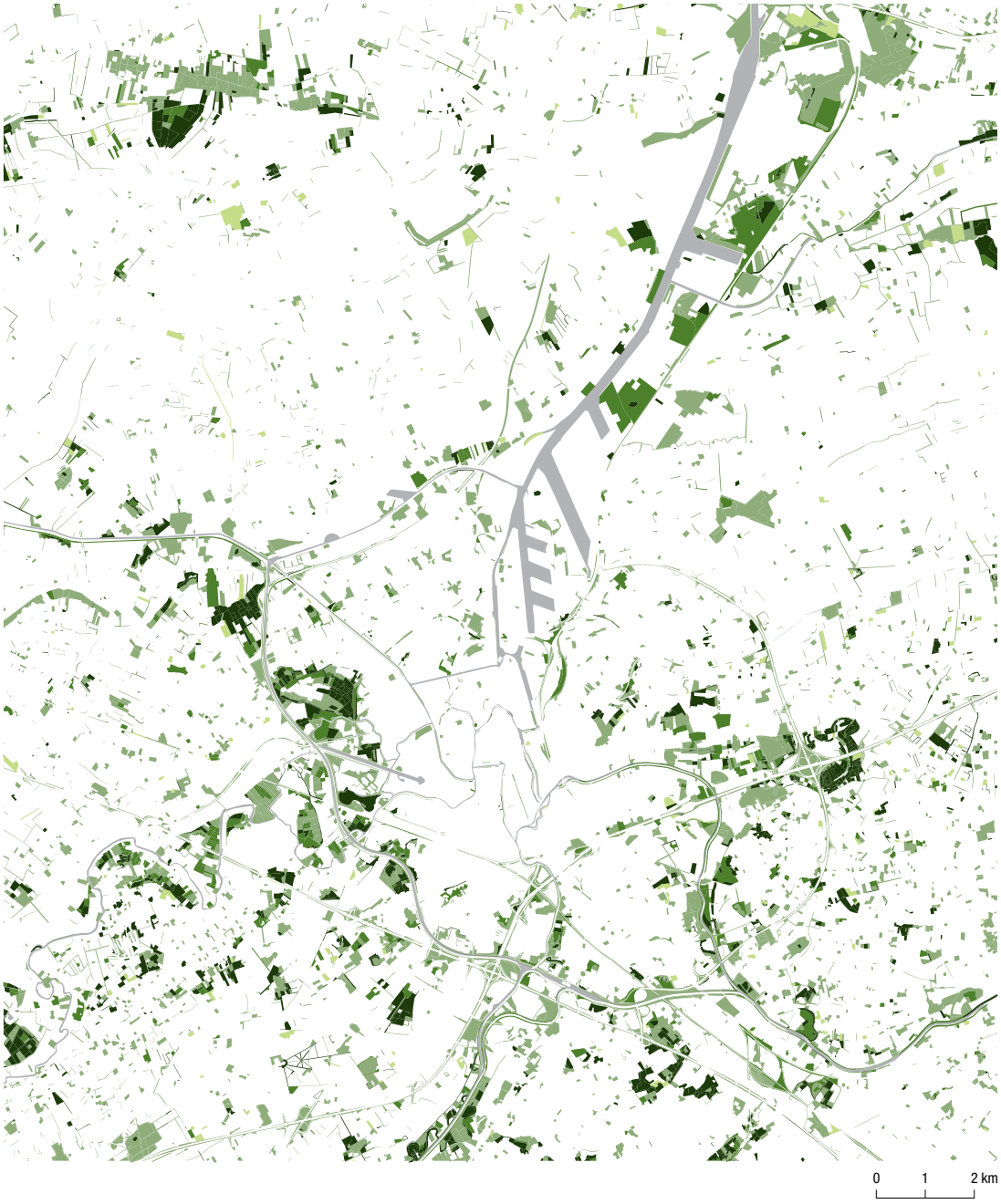
VIII

APPENDIX

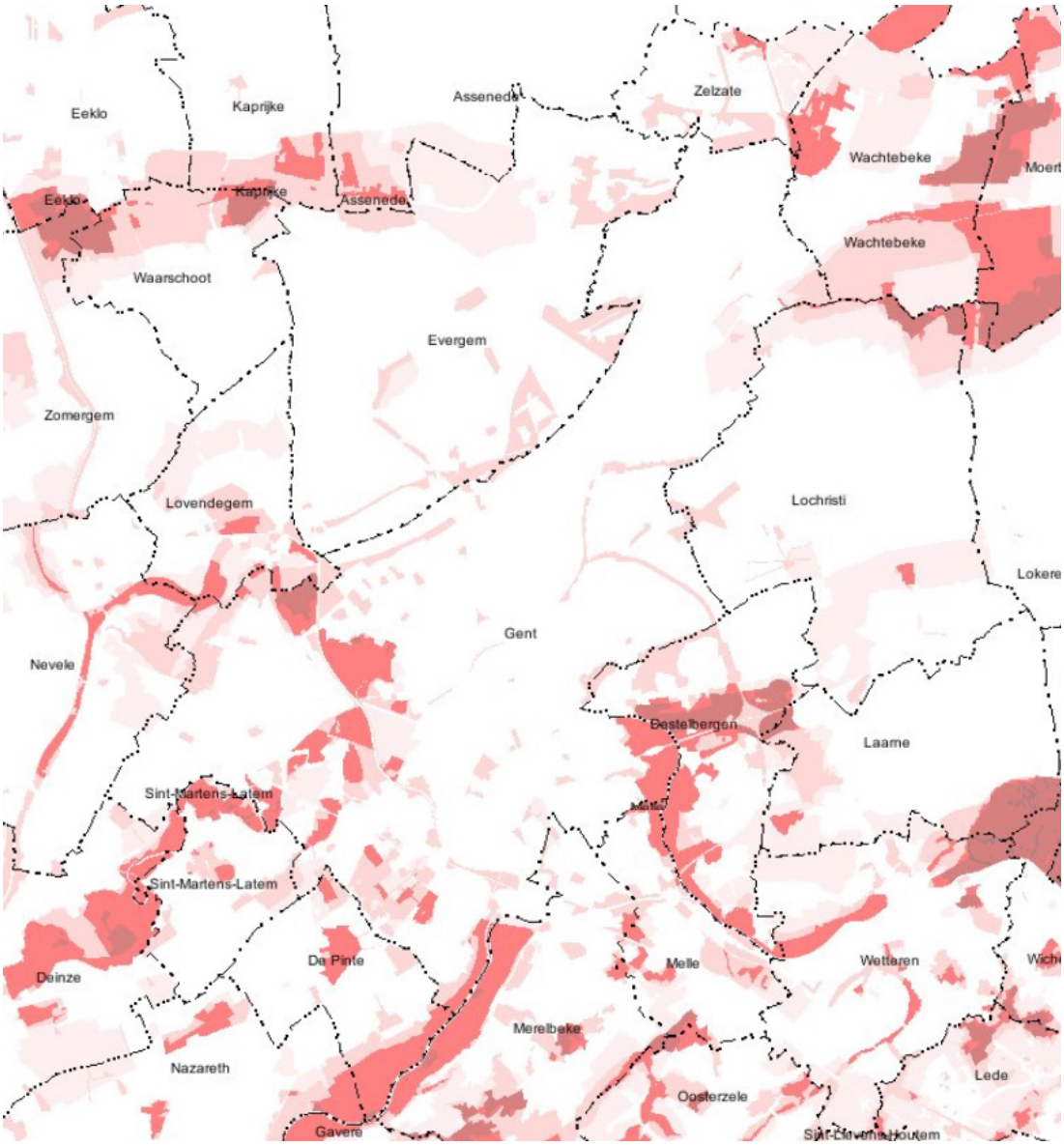


biological value map
biologische waarderingskaart

- very valuable
  zeer waardevol
- valuable + very valuable
  waardevol + zeer waardevol
- valuable
  waardevol
- less valuable + very valuable
  minder waardevol + zeer waardevol

data source: Groendienst Ghent.

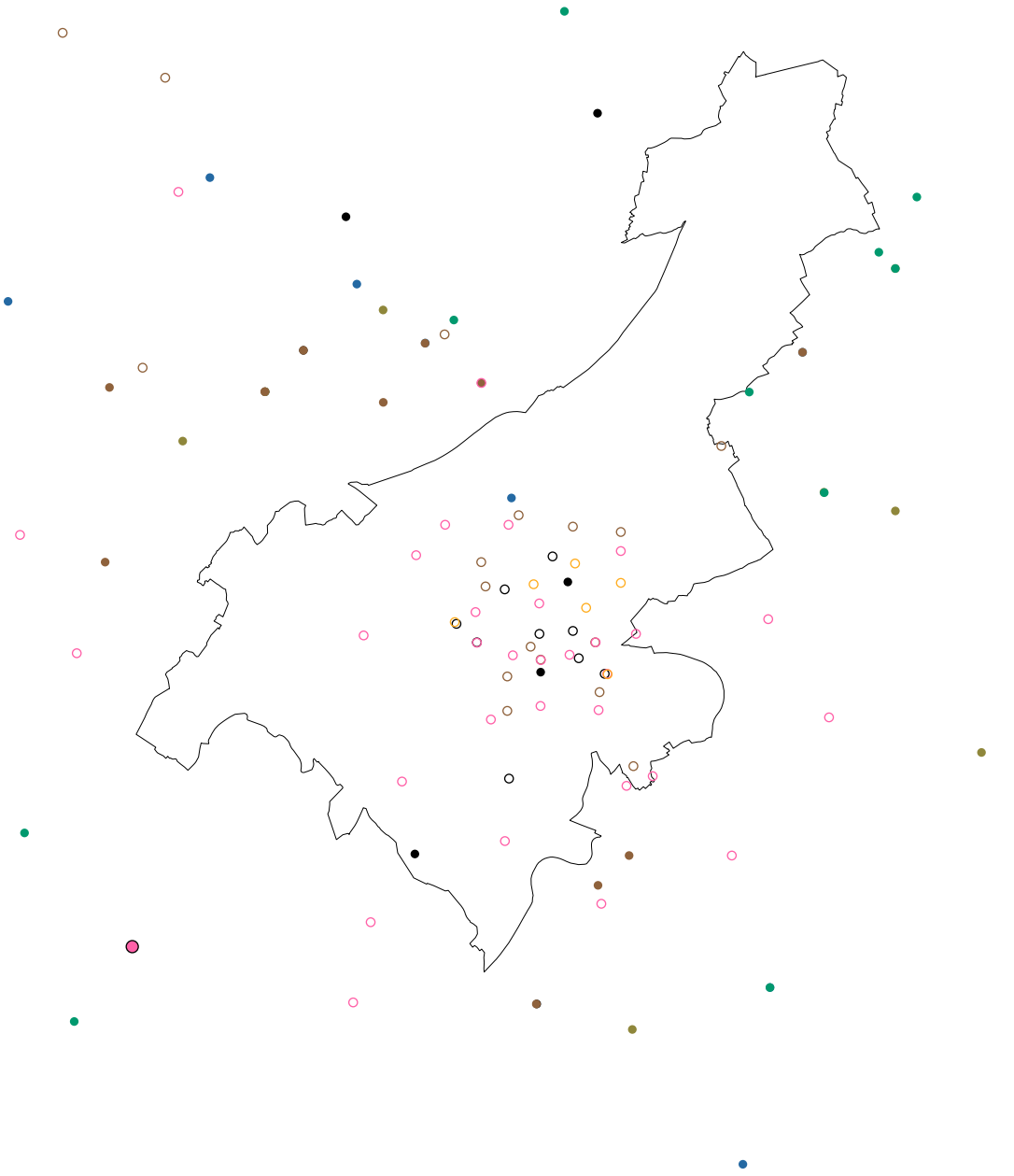
data source: Groendienst Ghent.



ecosystem debility
ecosysteemkwetsbaarheid

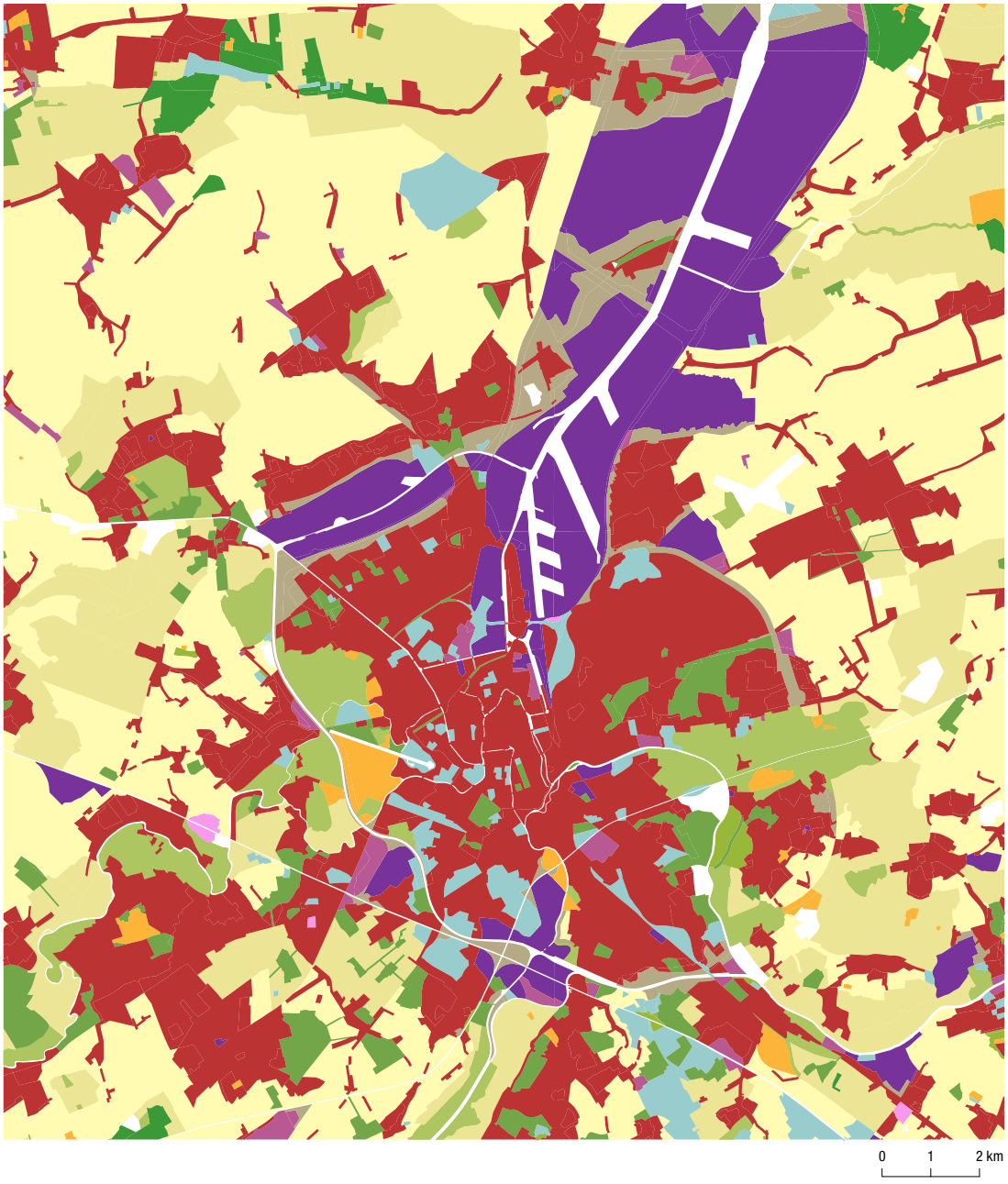
- zone 1A / zona 1A
- zone 1B / Zone 1B
- zone 2 - priority / zone 2 - prioritair
- zone 3 - priority / zone 3 - prioritair
- zone 4 - priority / zone 4 - prioritair

data source: AGIV geoloket

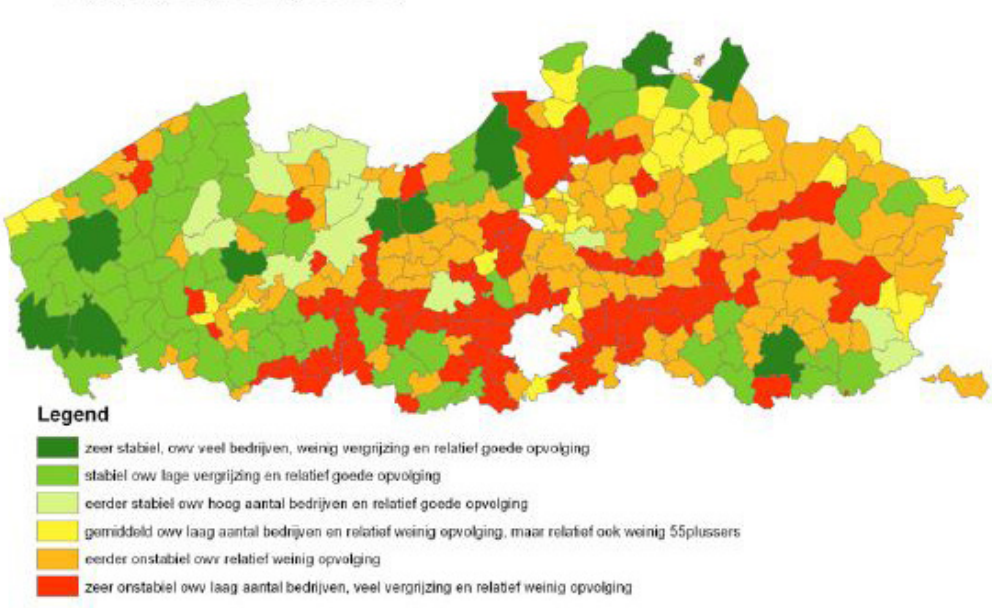


short chain networks Ghent
korte keten netwerken Gent

- producer Boer'n Brood / producent Boer'n Brood
- events Boer'n Brood / evenementen Boer'n Brood
- FERM producers / FERM producenten
- VLAM producers / VLAM producenten
- producer 'voedselteams' / producent 'voedselteams'
- farmers market / boerenmarkt
- drop off point 'wassende maan' / afzetpunt 'wassende maan'
- educational networks / educatieve netwerken
- drop off point 'voedselteams' / afzetpunt 'voedselteams'



data source: Labo S, UGent



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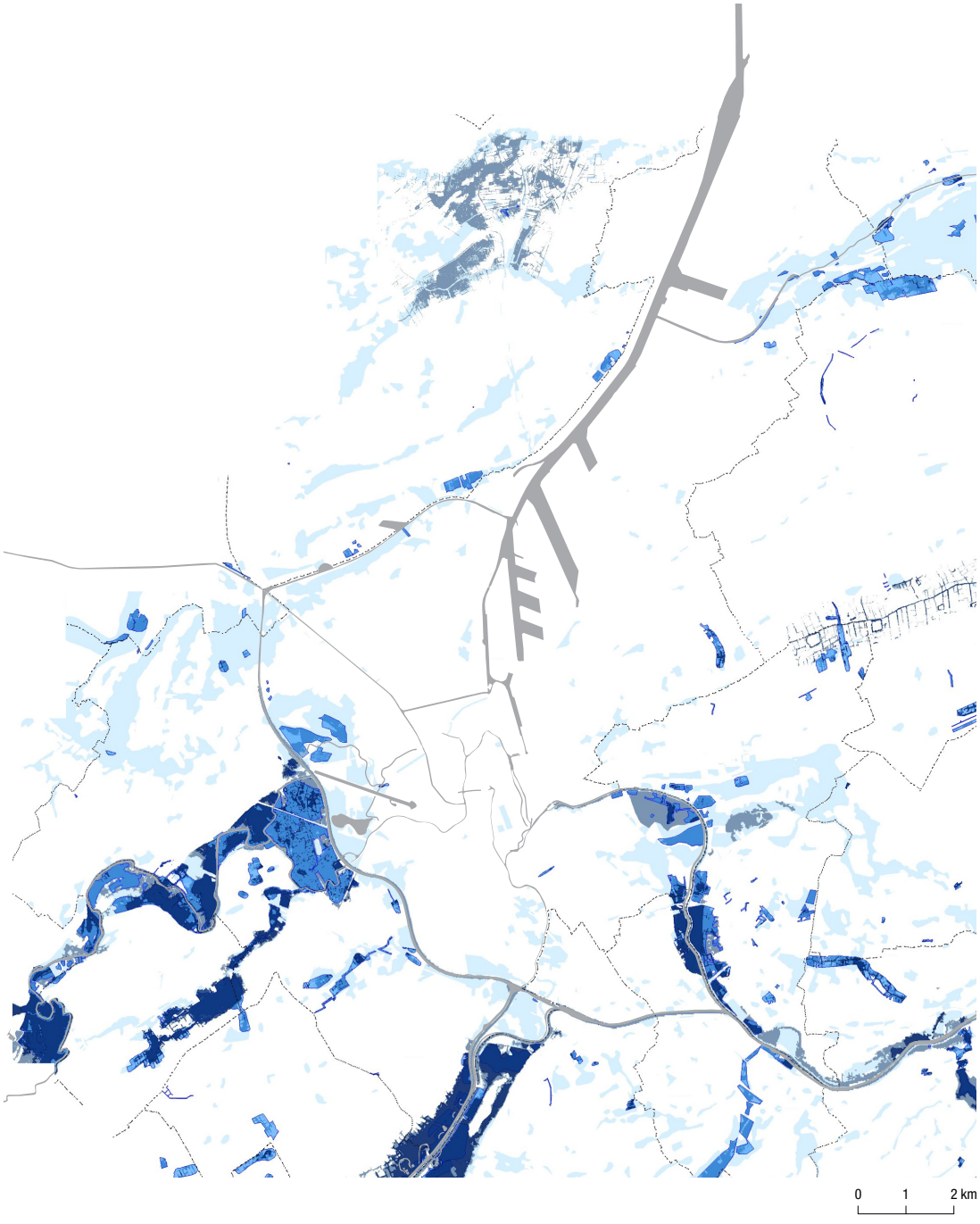

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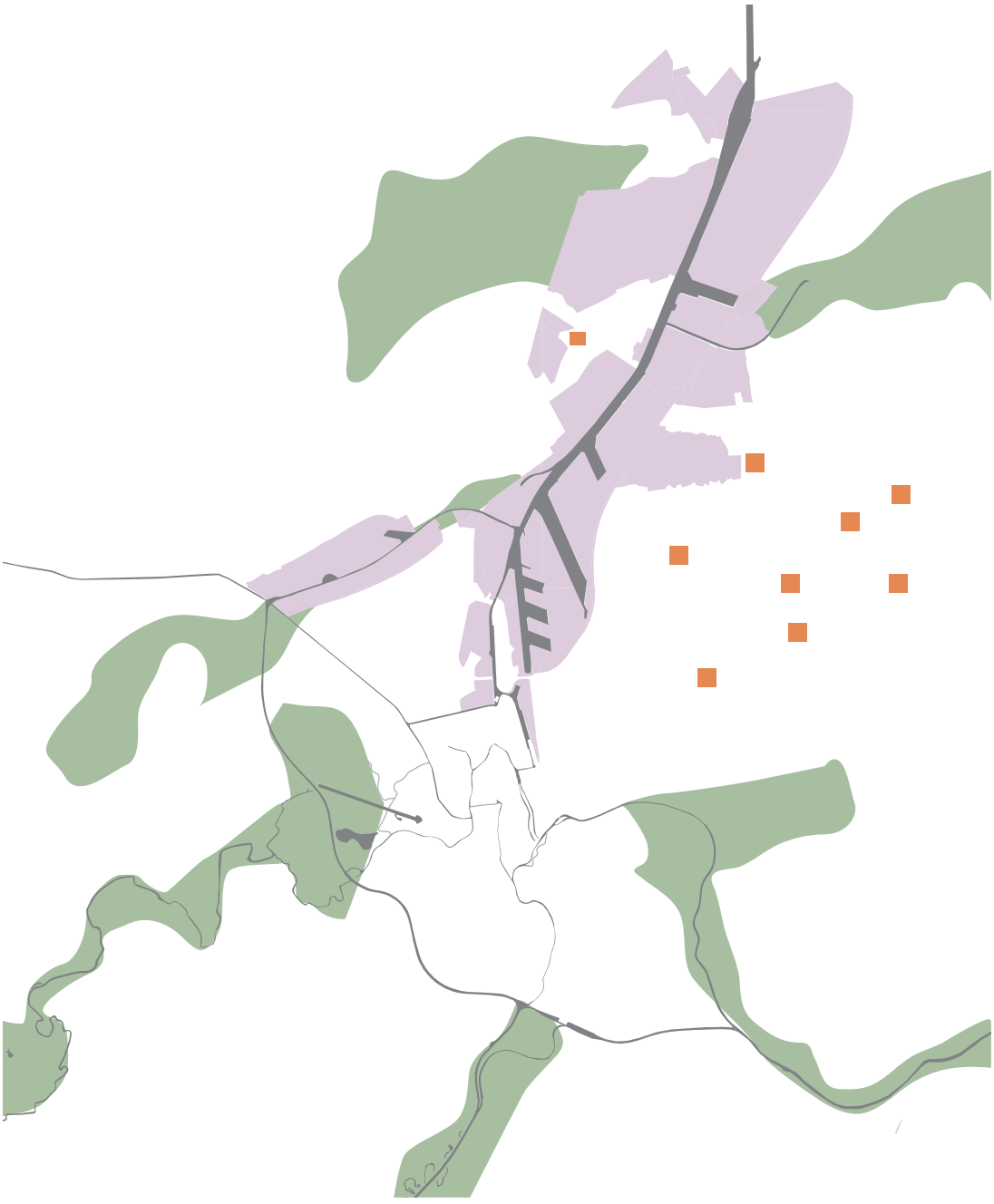

potential zones biomass production
biomassa productie

port
haven

biomass production
biomassaproductie

greenhouse concentration
serre concentratie