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DISCOVERING
the values of the Lutkemeerpolder

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The battle for Urban Space -
Bio-polder v.s. Business-park

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EXECUTIVE SUMMARY

Claimed to be the last piece of agricultural land in the municipality, the 43-hectare Lutkemeerpolder in Amsterdam Osdorp is being threatened by the construction of a business park. Over the years, this plan has met significant protest by supporters protecting the polder. This conflict has resulted in a complex state where both parties appeal to their perceived value of the land. These claims have led to an information void wherein contrasting information is presented by both parties. This research has made attempt to fill the information void by exploring the actual value of the Lutkemeerpolder. From literature research and field observations, the following three pillars presented itself most important to explore this actual value: agricultural-, natural- and multifunctional value. To give value to these pillars, they have been mirrored against national-, regional and municipal policies. What becomes clear from the research is that on all three pillars the Lutkemeerpolder shows significant value and are mostly in line with the presented policies. However, in most aspects, there is considerable room for improvement. Therefore, recommendations have been presented as a tool for both the municipality and the residents to improve the Lutkemeerpolder. Nevertheless, the research has shown that the Lutkemeerpolder is not just a piece of land since it shows significant value for both the environment and the wider region.

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Introduction

The city of Amsterdam grew to 854,316 inhabitants in 2019 only within its city limits. However, it is also important to look beyond the city limits to understand the development of the greater metropolitan region. Many activities are placed on the outskirts of the city to ease the pressure on the city centre, while encompassing a growing number of different demands.

Hence, the city requires more space to accommodate all its activities to offer a good quality of life to its citizens. Moreover, Amsterdam is not only home to its citizens but also includes the 3rd biggest European airport, Schiphol International Airport (Amsterdam Airport Schiphol, n.d.). The realization of various activities, interests and values can and most often does clash between various stakeholders.

This is also the case in the Lutkemeerpolder, which is the subject of research in this report. The Lutkemeerpolder is situated on the west-side of Amsterdam between Schiphol International Airport and Amsterdam Nieuw-West. Two very different values are ascribed to this piece of land. Firstly, it is an interesting plot of land to build on because of the near proximity to Schiphol and secondly, it is a clay ground which is used for agriculture and other diversified activities, due to its open and historical landscape.

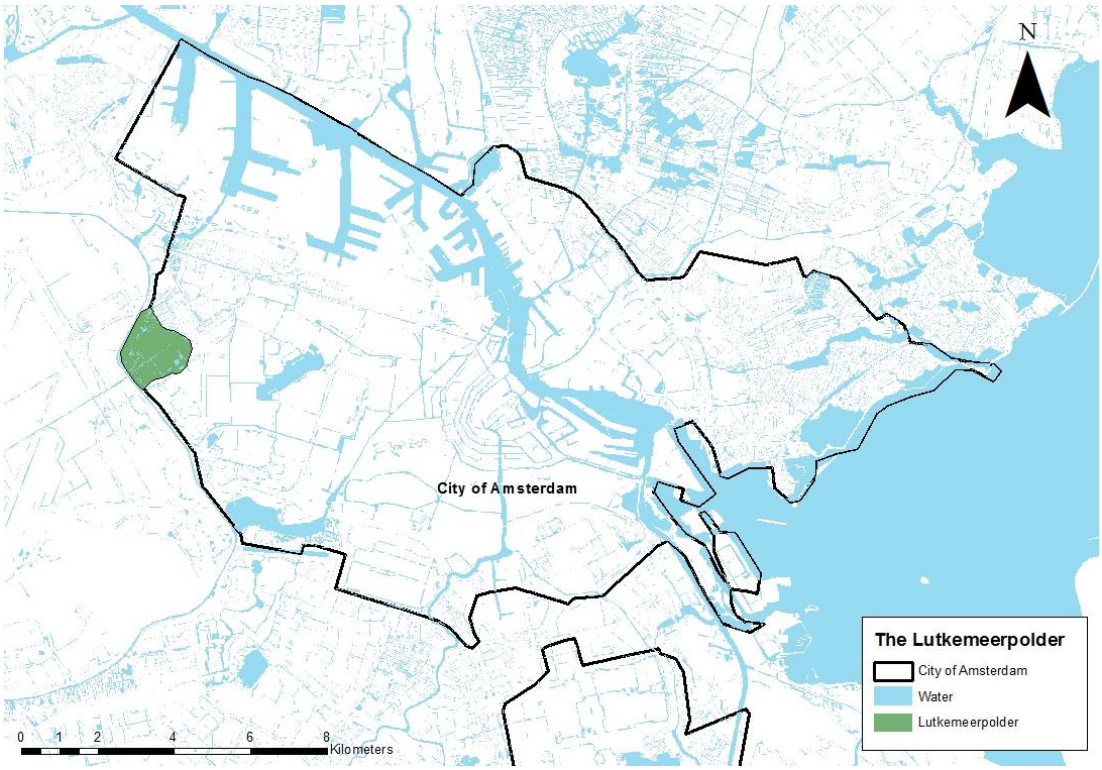

Figure 1: The Map of Study Area (The Lutkemeerpolder)

These two underlying values result in two different approaches on how to use the land in the near future. On the one hand, there are municipally approved plans to build Business Park Amsterdam Osdorp II, a business park developed by Schiphol Amsterdam Development Company (SADC). On the other hand, there is an intention to preserve the current agricultural production by the farm 'de Boterbloem' and the plan to develop a Biopolder by the platform 'Behoud Lutkemeer'.This intention is also in line with a municipal approved policy on local food production.

On behalf of the WUR Science Shop, this report deals with the current situation at the Lutkemeerpolder with respect to its functions and the respective. Thereby creating clarity over the claims made and providing a scientific analysis on the value of the Lutkemeerpolder. Hence, a scientific base will be provided for future plans made by all parties to facilitate and advance the situation in the best possible manner. The report strives to neutrally assess the current situation at the Lutkemeerpolder. The aim is not to take sides, but to unravel the value attached to this land to be able to achieve a holistic and future-proof policy.

The research question is based on what is presented to be the most important aspects of the area to value it. Thus, it is formulated as follows:

"What is the agricultural, natural and multifunctional value of the Lutkemeerpolder?"

From this research question, three main sub-questions can be derived: the agricultural-, natural-, and multifunctional value of the Lutkemeerpolder. These three sub-questions will form the basis for valuing the Lutkemeerpolder and will be discussed in different sections. Before these sections will be presented, the political context of the area will be sketched in order to fully grasp the whole situation and to be able to get more insight into its current form.

Moreover, a review based on municipal documents of the available monetary value is done next to an exploration of non-monetary value ascribed to the area. Thereafter, a short discussion is provided on valuation techniques of agricultural land. From then on, each aspect will be analysed in the same manner in a separate chapter. First, a literature study will be conducted after which the current state is analysed. This analysis differs per field, since different methodologies are required. Each chapter shortly gives in an introduction in its respective methodology, before it is applied. Thereafter, a policy review is done with respect to available levels aiming to place the quest for development within a wider societal, political and environmental context.

"What is the agricultural, natural and multifunctional value of the Lutkemeerpolder?"

Background Information to the Lutkemeerpolder

Political context of Amsterdam

The Lutkemeerpolder is situated within the municipal territory of Amsterdam within the district of Amsterdam Nieuw-West. The governing bodies of Amsterdam are threefold: namely the City Council, the College of Mayors and Alderpersons and lastly the district committees (respectively - Gemeenteraad, College van burgermeester en wethouders, stadtdeelcommissie). Also, Amsterdam is one of 15 municipalities incorporated in the Transport Authority of Amsterdam (Vervoerregio Amsterdam) in the province of North Holland.

The Transport Authority is concerned with public transport, infrastructure, cycle use and traffic safety. A general overview of the spatial planning procedures in the Netherlands is given in Box 1. In the last municipal elections, held in 2018, the GreenLeft Party became the strongest party in Amsterdam with 10 seats, followed by Democrats 66 with 8 seats. The current mayor of Amsterdam is Femke Halsema, belonging to the GreenLeft Party (Amsterdam Gemeente, n.d.).

Spatial Planning In the Netherlands

The Netherlands is referred to as a planners' paradise (Red de Lutkemeerpolder, 2018; Hajer & Zonneveld, 2000). Yet, new challenges are arising given more complex societal demands and climate change impacts and considerations. First, a distinction must be made between 'land use' defined as "territory characterized according to its current and future planned functional dimension or socio-economic purpose" and spatial plans (European Commission 2, 2018). The current land use refers to the type of use and function it is effectively used for e.g. residential use. The future planned functional dimension is defined by respective local, regional and national authorities via spatial plans (European Commission, 2018). Those depict a strategic direction for the development of an area and thus differs from land use itself. Spatial plans entail policies, programs, land allocations and influences the distribution of people and activities within the area.

The current policy is the 'National Policy Strategy for Infrastructure and Spatial Planning – Making the Netherlands competitive, accessible, livable and safe' by the Ministry of Infrastructure and the Environment (2013).

Planning practice and theory changed over the years with society. In the past, spatial planning was regarded as a procedural and comprehensive doctrine, entailing hierarchical coordinated action and a clear urban rural divide. Gerrit et al. (2012) identified three divers for change within spatial planning: globalization and the importance of networks, changing modes of delivery and the democratization and societal protest. These changes influenced the perception and direction of spatial planning, which can be found back in policy documents. The first change can be found in the 5th Memorandum on Spatial Planning (2001), which was not adopted but introduced the Layers Approach. This multi-layer approach emphasizes the different rate of changes within the three defined layers, given the layers' characteristics. The layers are defined as follows: The physical substratum, the Network Layer and the Occupational Layer, together they create the layered landscape. The next change came with the Nota Ruimte – creating space for development (2006). This policy document encouraged the decentralization of spatial planning. This implies that the national government only sets out a direction, but the regional or municipal authorities have greater freedom in their local approaches and policy interpretations. Exceptions are only made for spatial plans which concern the national interest like Schiphol Airport, the Rotterdam Harbour or flood protection. This resulted in the motto 'local when possible, national if necessary' (Gerrit et al, 2012). The current policy is the 'National Policy Strategy for Infrastructure and Spatial Planning – Making the Netherlands competitive, accessible, livable and safe' by the Ministry of Infrastructure and the Environment (2013). This policy sets out the three goals to be equally important. It keeps the decentralized approach and takes up future challenges of spatial planning like a connected mobility system on regional and national level and considers environmental impacts of spatial and infrastructural developments. It introduced the sustainable urbanisation procedure to adhere to its policy outline.

The Municipality of Amsterdam & the Lutkemeerpolder

Since 1908 the Lutkemeerpolder was used by farmers for agricultural purposes. As many other cities, Amsterdam is fast-growing and needs to balance different demands from society and businesses. Thus, urban space became a scarce resource, and some even describe it as a 'battle for urban space' (Red de Lutkemeerpolder, 2018). The land of the Lutkemeerpolder has a special value given its location close to Amsterdam Schiphol, hence the municipality and other actors adhere great monetary value to the land and its development opportunities. The Lutkemeerpolder was partially bought by the city of Amsterdam in 1950 to accommodate future town extension plans. Eight hectares were bought by the private company 'Mainland' in 2000, which was taken over by the British company 'Slough Estates' in 2005. In 2009, these eight hectares were then brought by the municipality for three times as much as the initial sales price from the now called 'SEKU BV' (cooperation between Slough Estate and Jelle Kuiper, a real estate developer). Hence, now the area is fully owned by the municipality but 'SEKU BV' still secured development rights. These transactions involved land speculation for which a former municipal member, Ton Hooijmaijers was convinced for malpractice as a politician in construction projects and land transactions (Rengers et al., 2012; van Vilsteren, 2018).

Source: www.sadc.nl

The Business Park in the Lutkemeerpolder

The development of the Lutkemeerpolder is embedded within the 'Structuurvisie North-Holland 2040' which was adopted in 2010. This policy document elaborates on the plans of the province to maintain and improve the spatial quality, defined by 'smart' combined land use and a good reachability.

The Lutkemeerpolder is defined as 'Bestaand Bebouwd Gebied' (BBG). Such areas are reserved by the province for municipalities to decrease the pressure within inner city areas. The province advocates for city densification, restructuration or transformation of inner-city areas, but acknowledges that not all activities can be realized via the three actions. Hence, BBG is kept as evasion for business parks, high-rise buildings or transportation nodes (Ruimtelijkeplannen, Amsterdam, n.d.).

Land use planning in the Schiphol Area is an issue of national interest but also rather important for the development of the Amsterdam region. The first board for planning in this area was set up in 1986 and was a union between Province North-Holland, the Municipality of Amsterdam and Haarlemmermeer and the Schiphol Group. The parties agreed on a Schiphol-covenant, depicting the rules for land use and developments. For the Lutkemeerpolder this implied that a part of it had to be used for businesses related to Schiphol so called 'Schipholgebonden bedrijventerrein'.

The Schiphol-covenant was subject to critique over the years and hence was altered in 2011. Now, the company Schiphol Area Development (SADC) is responsible for the assessment and development of new areas and their respective usage. An additional aspect is the adaptation from the provinces of the Provincial Spatial Planning Regulation ('Provinciale ruimtelijke verordening structuurvisie', PRVS) in 2010. It flows from the 'Structuurvisie Noord-Holland 2040'. This policy includes general rules which can have consequences for municipal zoning plans, such as e.g. the National Ecological Network (Natuurnetwerk Nederland) or the Green Axis (Groene AS) (Ruimtelijkeplannen, Amsterdam, n.d.). The land of the Lutkemeerpolder is now owned officially by the GEM BV, whereby the municipality and the SADC are each 50% shareholders (GroenLinks Amsterdam, n.d.)

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The development of the Lutkemeerpolder

Divergent Interest at the Lutkemeerpolder

There are two main parties related to the land use of the Lutkemeerpolder, the farm 'de Boterbloem' and the 'SADC'. They have different perceptions on how the land should be used in the future and based on what reasons. From a legal perspective the situation is rather clear. However, as it can be seen in Box 2, approved municipal plans do not necessarily reflect the final outcome. The land-use plan was updated on the 24-04-2013 (2013/int/307) and designates the Lutkemeerpolder as a business area (Ruimtelijkeplannen, 2013).

The land on which the farm ‘de Boterbloem’ is located is not part of this land-use plan. However, the agricultural land which is used for its activities belongs to this area (GroenLinks Amsterdam, n.d.). ‘De Boterbloem’ had a lease agreement for the agricultural land which was turned into a user agreement. This user agreement was terminated, and the judge decided that the farm had to leave the grounds as of November 1, 2017. However, this was postponed by a VVD alderman but on July 2018 it was decided on appeal that the grounds need to be cleared (Beroep zorgboerderij, 2018). Still, the farmers of ‘de Boterbloem’ and respective groups are refusing to leave the grounds. An overview of involved groups and a graphical overview of the relations is presented in appendix 1.

Floodplain Plan Wageningen

In 1953 the Municipality of Wageningen approved the urban planner S.J. van Embden to construct an urban development plan within the floodplains south of the city. This floodplain plan (in Dutch: Uiterwaardenplan) aimed at constructing approximately 5600 houses in order to tackle the housing needs that were a result of modern city development (Elsbet, 2016). By the end of the 60’s the plan was fully developed and approved by the municipality and provincial executives. In 1973 it was calculated that as a result of buying the land and the constantly increasing in interest rates, the municipality had spent 36 million guilders on the plans.

Over the course of these fifteen years that the plan was constructed, it faced tremendous resistance from surrounding residents and activist groups. In addition, parties from within the municipality and national government expressed their doubts concerning the idea. Their concerns were mostly based on ecological, landscape and financial issues related to building within a floodplain. As turned out, a new discourse developed during these years, one which gave greater meaning to the value of nature. A clear example that illustrates this changing discourse is the ‘recreation note’ that was implemented in 1960. This note partially states that the surrounding area of Wageningen should be kept in its natural state as much as possible to preserve its natural values. As a result of these counter voices, in 1976 the ‘Uiterwaardenplan’ was officially torpedoed by a royal decision and the municipality of Wageningen received a compensation for the money that was already spent on the plan (Reformatorisch dagblad, 1977). Since then, the floodplains of Wageningen have been free from construction and developed into one of the Netherlands’ most precious natural areas (Elsbet, 2016).

The farm 'De Boterbloem' and Local Politics

On the 21 March 2018 a motion (316) was presented by the members J.W. Nuijens, and T.A.J. Geenen, of the municipal chamber regarding the preservation of the Boterbloem and agricultural land (Gemeente Amsterdam, 2018). The motion was accepted and took into account that the Boterbloem has a great societal added value because it has a care function next to the agricultural production. In addition, the motion recognized that as much as possible of the arable lands, as well as the societal added value, needs to be preserved, which requires time and tranquillity. However, contrasting feedback is found from the municipality. In a recent reaction to an article by EenVaandag in September 2018 the municipality stated that 'GEM BV' will shortly begin with the development plan which will take into account the multifunctionality of the Boterbloem. Nevertheless, it will not be possible to maintain the extensive agricultural production (de Bruijn, 2018; de Bruijn, 2018. Reactie Amsterdam Gemeente, n.d.). In total, three hectares of arable land are omitted for the agricultural production by 'de Boterbloem' (Red De Boterbloem 2019).

Valuing the Lutkemeerpolder in a monetary manner

The motion 316 also requested a scenario evaluation of the situation regarding the maintenance of the Boterbloem next to the business area. This request was answered on the 30 October 2018 by Heiko Vader under the reference number 2018-9620 (Gemeente Amsterdam 2, 2018). This report sketched two scenarios whereby the request from the motion would be upheld. These scenarios assess the value of the farming land, which is important with respect to the added value to society but not in relation to the care-farm. Also, the scenarios are based on a multifunctional Lutkemeerpolder, which has a focus on an increased care function, as well as by making more room for expansion of the vegetable garden and preservation of the orchard.

This report sketched two scenarios which assess the value of the farming land, which is important with respect to the added value to society but not in relation to the care-farm.

The first scenario entails that the Boterbloem would receive 7,5 ha, whereby 6,5 ha is owned by 'GEM Lutkemeer BV' and 1 ha is owned by the Municipality of Amsterdam. The land would be rented or leased out to the Boterbloem by the Municipality of Amsterdam. It would mean 18% less available business area. This approach would cost a minimum of 13,5 million and does not fit into the current land-zoning plan. This financial burden would be carried by the Municipality of Amsterdam and requires the cooperation of the 'GEM Lutkemeer BV'. Within this scenario two hectares will be lost as building ground but those could be compensated by the optimization of the surface water area. The additional area of 4,5 hectares would require financial compensation by the municipality, which would amount to 300 Euro per m2. Additionally, it is stated that the rest of the area will lose value due to the loss of an access road (Gemeente Amsterdam 2, 2018).

The second scenario was favoured by the B&W, and would imply that 'de Boterbloem' receives three ha, of which two ha are owned by GEM Lutkemeer BV and one hectare is owned by the Municipality of Amsterdam. In the news articles, however, 'de Boterbloem' is always offered two ha, which was rejected by the owners of 'de Boterbloem' (Ceton et al., October, 2018; Boland, R, 2018). It is stated that they want at least eight ha (Boland, R, 2018).

The scenario of three hectares for 'de Boterbloem' is described as budget neutral and means also that 'de Boterbloem' would receive a lease or rent contract. It implies that the business park can be realized, including the agricultural production and care farm activity from 'de Boterbloem'. This approach requires a review of the zoning plan. The budget neutrality is achieved by compensating the 'GEM Lutkemeer' for the two hectares with other two ha of land zoned as Business Park. The compensation can be reached because the initial plan has an over-allocation of surface water area which would then be reduced. The value of the two hectares are six million Euro. It is stated that the success of this scenario is dependent on the re-evaluation of the zoning-plan by the Municipality of Amsterdam which is related to process costs of ca. 100.000 Euro (Gemeente Amsterdam 2, 2018).

Additionally, there are three more numbers circulating of how much it would cost to preserve 'de Boterbloem' as it is. For all numbers, ratification is not possible, since no further elaboration on their composition is given. First, Eric van Burg, alderman spatial planning stated that it would cost 26 million Euro to keep 'de Boterbloem' as it is with its farm and respective land. This cost would occur because of payments which need to compensate for the loss of income (Ceton et al., October, 2018).

Second, the party GroenLinks stated that it would cost 42 million Euro to keep the situation as it is next to the fact that the GEM, the province North-Holland, the municipality Haarlemmemermeer and Schiphol would need to take part of the loss and bear costs (GroenLinks Amsterdam, n.d.). Last, in the latest newsletter of 'Behoud Lutkemeer' it was stated that it would bring the community ca 100 million euro, however it is not possible to verify this number (Red De Boterbloem 2019).

Valuing the Lutkemeerpolder in a non-monetary manner

With the provided information, it is possible to make an estimation of the value in the case that 'de Boterbloem' keeps its current size of 11 ha agricultural land. The respective price for one m2 is 300 Euros. The following calculation seems logical: 11.0000 x 300 = 33.000.000 – Hence, it would cost 33 million Euro plus another 100.000 Euros to revise the land use plan (Gemeente Amsterdam 2, 2018). As stated in scenario 1, the residual land would also lose some value because an access road would be lacking. Given the provided information it is not possible to quantify this value.

However, the question arises which value or values are actually monetized or even considered when assessing the value and functions of the Lutkemeerpolder. In history, concrete buildings received greater valuation since more tangible welfare can be deduced form it e.g. employment or the creation of new enterprises. Natural or societal value was often disregarded since it is more challenging or even not possible to measure it.

'De Boterbloem's' story stretches over quite some years now and if one listens to interviews with the protesters, visitors, experts and politicians it becomes clear that apparently more than pure monetary value is attached to this land. There are two examples which emphasize that the land is valued in different ways by many people. First, 'de Boterbloem' collected 13.000 signatures, which showed that there is broad civil society support and interest in the continuity of the Lutkemeerpolder and 'de Boterbloem' (Ceton et al., October, 2018). Second, the Bond Heemschut, an association which advocates for the protection of valued objects and areas, issued a request for the Lutkemeerpolder as a Municipal Protected Village Scene ('Gemeentelijke Beschermd Dorpsgezicht') on the 28th of June, 2018 (Bond Heemschut, 2018). This request was handed to the council of mayors of Amsterdam and alderpersons, copying the members of the city council. It stated that the preservation of this area is not only in the interest of the current generation but also in the interest of the future generation. Also, it is suggested to add the Lutkemeerpolder to the 'Tuinen van West', which is a multifunctional recreational area encompassing four polders between the city of Amsterdam de ringvaart Haarlemmermeer, Halfweg and the N200 highway.

In total seven points were made which characterized the Lutkemeerpolder as valuable to the city of Amsterdam (Bond Heemschut, 2018; 2):

1. The unique soil type and therefore historical arable farming
2. The original plot-pattern
3. The monumental orchard
4. The connection with the nature reserve
5. The spatial experience and panoramic view
6. A city outskirt that is still social and in its original form
7. The possibilities to shape local food policy

Hence, also non-monetized value is ascribed to this area. This request to the municipality is not yet processed, as of this moment. The described value is also taken into consideration within the National Policy Strategy for Infrastructure and Spatial planning, in which it is manifested within the third goal of the strategy, namely to "guarantee a safe environment in which it is pleasant to live, and in which unique natural and cultural heritage values are preserved" (Ministry of Environment and Infrastructure, 2013; 8). On page 13, it is even stated that the landscape and cultural heritage "define a region's identity". Thus, this poses the question if the Lutkemeerpolder is not a cultural landscape which defines the city-region of Amsterdam.

From the municipal documents, it was only partially deductible if this type of value has been considered, especially when it comes to the monetized scenario answer 2018-9620 by Heiko Vader on the motion 316, mentioned earlier. For example, as a strategy to compensate for the loss of hectares due to the perpetuation of the Boterbloem, surface water area will be decreased. It was stated that the quantity of the surface water area will still be within national guidelines. There is a growing body of literature which addresses valuation methods especially with respect to agricultural land, questioning the currently dominant techniques. Sanshu et al. (2019) argued that the current valuation method are disregarding externalities, positive as well as negative externalities. Within economics, environmental problems are regarded as a market failure because the allocation of resources does not maximize the utility for society since e.g. the pollution of river harms members of society. Hence, externalities "exist when activities that are controlled by one actor have effects on the welfare of others who have no control" (CSA van Koppen & G Spaargaren, 2018; 50). The solution, especially within a micro-economic domain is the internalization of external costs. This implies that the market failure is corrected with the placing of costs on the generator of environmental problems. By imposing cost, a financial incentive is created to include environmental costs in decision making procedures. However, the calculation of environmental costs is a rather debated subject.

On a macroeconomic level, the system of national accounting is used to integrate environmental cost and environmental benefits like ecosystem services. With regard to agriculture and food systems, it is crucial to be aware about cost and benefits or practices since industrial food production has a great environmental footprint. Hence, the disregarded third party in this case is often the planet itself. A United Nations environment initiative introduced the framework Economics of Ecosystems and Biodiversity in Agriculture and Food (TEEBAgriFood). It uses the True Cost Accounting method which "includes all major environmental and social costs and benefits of agriculture and food systems. TCA uses the damage function approach (damage costs) and the cost of control approach (avoidance, restoration, abatement and maintenance costs) to estimate the true cost of food production through the value chain". Sanshu et al. (2019) present four types of capital which are taken into consideration to estimate the true cost of food production:

1. Produced capital – includes all "manufactured, built and financial capital in the farming sector".
2. Social capital – includes "farming networks, trust among group members, societal norms that enable to jointly act towards a more efficient outcome", this form of capital is a prerequisite for the other forms of capital.
3. Human capital – "individuals' health, knowledge, skills and motivation that are essential for productive work" e.g. farming practices
4. Natural capital – "natural resources e.g. air, water soil biodiversity and thus ecosystem goods and services"

Even though this framework is too broad for this simple case it sheds light on an interesting aspect, how to and what to value when it comes to farms and agricultural production. It is a call to use a wider lens to see the hidden costs and benefits of agricultural production and food systems to encourage appropriate policy which takes planetary health and well-being of society into account.

Methoddology

This research used different data collection methods to adhere to the various methods applied in the following chapters. The first source of data is a semi-structured interview, led by the research group, with one of the people involved in ‘de Boterbloem’. The second method which has been used for gathering information is a survey, posted on the official Facebook page of the organic farm in object: ‘Boerderij de Boterbloem Amsterdam’ (https://www.facebook.com/BiologischeBoerderijDeBoterbloem/). Finally field observations and site visits generated first-hand impressions and gave a feel for the area and the local situation.

SEMI-STRUCTURED INTERVIEW

Semi Structured Interview

The semi-structured interview took place on the 4th of June, 2019 at the farm ‘de Boterbloem’. The purpose of the interview was to gather as much information as possible regarding the current and past situation at ‘de Boterbloem’ and at the surrounding area in the Lutkemeerpolder from a direct bearer of interest. The interviewee is actively involved as a farmer in ‘de Boterbloem’, but also as one of the main actors involved in the battle between the Biopolder and the business park. Thus, we have gathered background knowledge from the interviewee in order for a further exploration during the research. The interview was led by the group members with a predefined order of questions (see appendix 2). The key topics, around which mostly open-ended questions have been posed, were agriculture, nature, recreation and community participation. Regarding agriculture, questions were raised about who owned the land, the size of the farms currently present in the area, the amount of food produced from them and the type of products which they produce. With regards to nature, the research group highlighted three main functions of which the Lutkemeerpolder could possibly benefit: hydrology, soil type and biodiversity. Next questions were raised regarding recreation and community participation. These were about the main activities that recreants can do in the area or at ‘de ‘de Boterbloem’ and how the community is actively involved. Finally, questions were raised the role of ‘de Boterbloem’ as a green care farm. The interview has not been recorded, although the research group actively took notes.

SURVEYS

Surveys

The main goal of the survey was to gather information from a broader perspective, taking into account all the possible shareholders in this area. The survey was composed of 29 questions regarding the key concepts: provision of food from the 'de Boterbloem', educational and community participation programs at 'de Boterbloem', and recreational activities in the Lutkemeerpolder (see appendix 3). The survey was been posted on the 18th of June and filled in by 119 participants in total by the 24th of June. The assimilated quantitative data regarding the recreational questions have been used to monetize the recreational value of the Lutkemeerpolder through the Travel Cost Method (TCM), which is explained in chapter 7.

Observation

Observation

In order to get a better view on the natural value of the study area, a trip to the field was undertaken. During the field study, observations were mainly done on the hydrological status of the study area and surrounding area (water level and clarity/transparency). Due to time-related issues, no inventory of flora and fauna was done. Instead, literature documents that did prior research on species of fauna were consulted, which gave some indication about species which might be present in the area. In addition to this, inquiries were made to one fisherman fishing in the Groene AS area, and one fisherman fishing outside of this area about the fish species inhabiting the waters. On the basis of this information, the researchers could draw cautious conclusions.

Objectives tree method

Objectives tree method

Via the surveys, people also had the possibility to explain what they liked about the polder and what they disliked. This can, partially, be described to intrinsic values. Some respondents even gave recommendations to improve the recreational value of the Lutkemeerpolder. To process this information in the research, the´objectives tree method´ will be used. This is a conceptual model which describes how goals of the stakeholders (in this case recreants) can be operationalized. A tree structure shows the higher goal at the top and the smaller goals which lead to this higher goal below (TU Delft, 2014).

This method fits the research because it structures people's thoughts in a clear way. It shows what the recreants find most important within the Lutkemeerpolder.

Agricultural Value of the Lutkemeerpolder

Agriculture in the Lutkemeerpolder

The Lutkemeerpolder is a 43 hectare area of agricultural land that is currently exploited by 3 farms. Of these farms we have chosen to focus on 'de Boterbloem' because of its broad range of functions and because unlike the other two farms the owners are involved in the day to day running of the farm. 'De Boterbloem' is also the only farm in the area which is organic.

The International Federation of Organic Agriculture Movements (IFOAM) (2005), defines organic agriculture as:

Organic Agriculture is a production system that sustains the health of soils, ecosystems and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. Organic Agriculture combines tradition, innovation and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved.

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Research has shown that in a European context organic farming has lower environmental impacts than conventional farming (Tuomisto et al 2012). Tuomisto 2012 analysed 71 papers to come to a conclusion that supports organic agriculture as an environmentally friendly, most prominently because of lower pesticide use and CO2 production. Furthermore Organic farming was found to contribute to higher biodiversity in the surrounding area (Rundlöf et al., 2010).

'De Boterbloem' is a certified organic farm of eleven hectares. The agricultural activities includes a small garden with vegetables, including a small greenhouse, fields of potatoes or grain, an orchard, two goats, egg-producing chickens, and honey producing bees. This results in a large variety of products being sold in the shop on-site: potatoes, onions, a variety of local vegetables and fruits, eggs and honey. These products are sold directly to people through the shop or sold to people through local food coops in Amsterdam like Vokomokum. One of the people involved in 'de Boterbloem' said that she estimates these people that visit 'de Boterbloem' are divided about half between returning customers who travel to 'de Boterbloem' to buy there and those who stumble upon on the farm while in the area.

The farm work is largely done by the couple who owns the farm. They receive support from volunteers and from people who make use of the care farm function, consisting mostly of psychological patients.

The amount of agricultural goods the farm produces is in the tons. Last year the farm produced around nine tons of barley, six tons of marrowfat peas and two tons of mustard seeds. These products are sold to a variety of destinations. The mustard seeds are sold directly to a factory where it is processed into mustard. The barley produced on the farm is difficult to sell. The reason for this is that the relatively small production makes the selling at the going market price impossible. As a result costs when trying to sell to brewers are too high to be competitive. A local brewer has expressed interest in producing a beer with 'de Boterbloem' barley however. The amount of vegetables produced is lower, owing to the smaller area of the garden where these are produced.

Historical importance of the Lutkemeerpolder

The Lutkemeerpolder is one of the last remaining agricultural areas within the Municipality of Amsterdam that shows how the region once was. This region centered on Osdorp was largely wetland with some lakes. After the successful reclamation of the nearby Haarlemmermeer in 1852 the Lutkemeer followed in 1864.

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This farmland has been this way for over a century and offers a glimpse of what the land to the west of Amsterdam once looked like. This historical value is, of course, dependant on the continued existence of the area as agricultural land.

Consumer survey

To gain insight into the purchasing habits and motivations of the consumers who purchase directly from ‘de Boterbloem’ shop a survey was used which was spread on the social media network of ‘de Boterbloem’. This survey showed that, current consumers of ‘de Boterbloem’ products are usually not regular consumers. Most estimates of what percentage of grocery shopping was done at ‘de Boterbloem’ were in the single digits, sometimes even in the decimals. Only three of the 61 respondents that answered questions regarding their purchasing habits purchased the majority of their groceries at ‘de Boterbloem’. This data points to ‘de Boterbloem’ providing a small amount of the grocery shopping of a large group of people. The majority of respondents stated that they either shopped at ‘de Boterbloem’ a few times a year or had been there only a few times. None of the respondents stated they went there more than once a week. The reasons for shopping at ‘de Boterbloem’ can be largely grouped into two main reasons. The most mentioned reason for shopping there was that ‘de Boterbloem’ is “organic” and “fresh”. The next largest group was the group that said they purchased at ‘de Boterbloem’ to support their cause. A third smaller group mentioned that they wished to purchase more local products

Local food policy of the Municipality of Amsterdam

Amsterdam has its own agricultural policy. Even before the Milan urban food policy pact of 2015, in which 196 cities agreed to create their own policy of urban food (Milan Urban Food Policy Pact, 2015), the Municipality of Amsterdam approved their own local urban food policy. This document, Voedsel en Amsterdam: Een voedselvisie en agenda voor de stad (2014), elaborates on the goals of Amsterdam with regard to local food production and consumption. In the document the municipality explains that having agriculture around Amsterdam is something the municipality supports because it has cultural, historical and natural value and offers room to walk or cycle for the residents of Amsterdam. The document also sketches a goal of Amsterdam in 2024 with regards to food. The document states that in 2024 an increased amount of food is produced locally, thus near Amsterdam. Furthermore they hope that local production is not an exception but a regular part of the food choices on offer. Interestingly, the fear of the document is for a lack space to practice agriculture, the document asks if there will still be idle plots of land where agricultural can take place in 2024 in the city and whether policy should require them to be farmed before being built on (Voedsel en Amsterdam, 2014).

This vision of Food in Amsterdam is very much in line with what is done on ‘de Boterbloem’ as of now. It is local food production, within the municipality, with a cultural historic value. Overall ‘de Boterbloem’ seems to be mostly in line with what the document states the municipality wants to promote. In practical terms however, the document does not seem to be a good measure of municipal policy on the ground, with ‘de Boterbloem’ being everything but promoted by the municipal government.

Natural Value of the Lutkemeerpolder

One of the claims of the foundation 'Behoud Lutkemeer' is that the Lutkemeerpolder holds great values for biodiversity and ecology. To gain an understanding of those values, it is first important to gain insight into the characteristics of the soil and the hydrological situation of the area. This chapter will dive into the soil characteristics, hydrology, and lastly, the biodiversity in the area. Those subjects will be subdivided into literature, field observations, and the policy framework on the regional, national and international level.

Soil

The Lutkemeerpolder is, as the name suggests, a polder: Land reclaimed from a body of water, such as a lake or a sea bed. The Lutkemeer, literally translated as 'small lake' (Lutke = small), was drained in 1864-1865 (Schoubroeck, 2010). As the area is a polder, the water level is constantly regulated. This is done by a small, electrical, pumping station at the end of the Lutkemeerweg. The Lutkemeerpolder is the lowest polder in the North-Holland and lies approximately 45 cm below the sea. The current condition can be explained geographically with the measurement of Noormal Amsterdams Peil (NAP). NAP describes the difference of water level between Amsterdam and other regions. The ground level is NAP -4 to -5 metres on average, which indicates that the area is low land. In the study area, there is a cemetery which has been raised and has a ground level of NAP zero to minus two meters.

The Lutkemeerpolder has the soil consists of a 50 cm clay layer with sand underneath. These soils are coded pMn85A and pMn55A. Both pMn85A and pMn55A are so-called 'leek-/woudeerdgronden'; and (calcareous), (sabulous) clay soils with a top soil that is 30 to 50 cm deep and has rust spots within 50 cm in a grey, reduced substrate

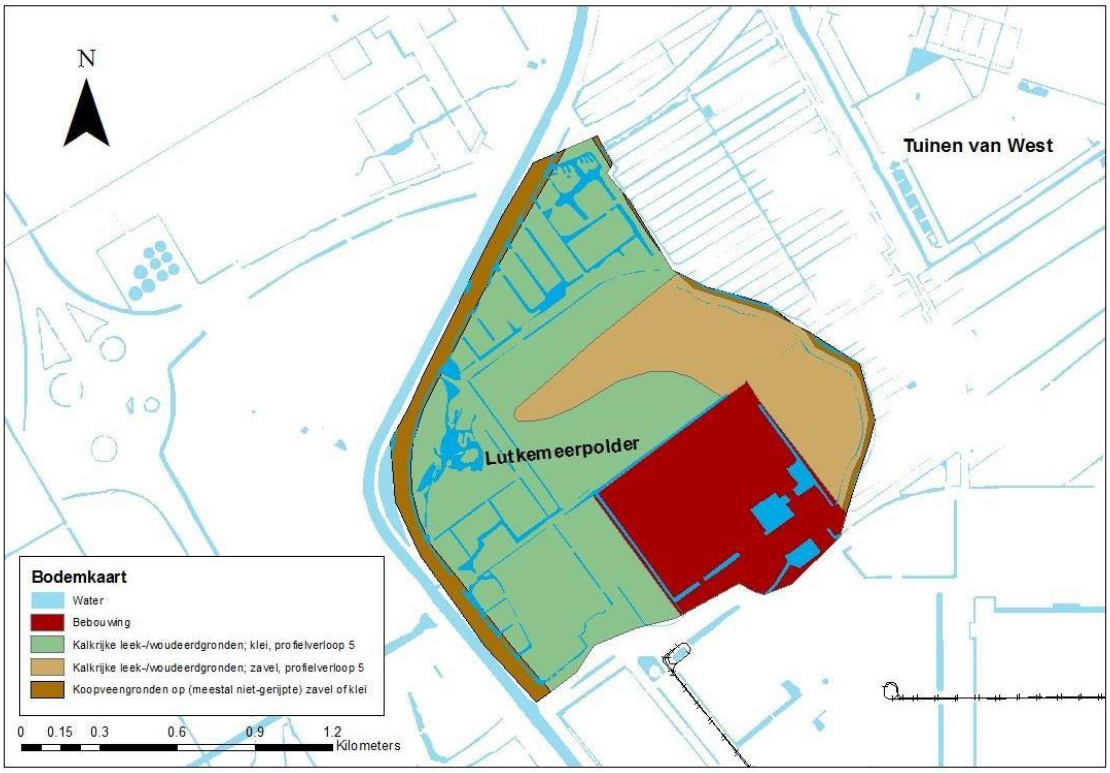


Figure 2: The Map of Soil Type in the Lutkemeerpolder

In the Lutkemeerpolder, the soil consists of a 50 cm clay layer with sand underneath. These soils are coded pMn85A and pMn55A. Both pMn85A and pMn55A are so-called 'leek-/woudeerdgronden'; (calcareous), (sabulous) clay soils with a top soil that is 30 to 50 cm deep and has rust spots within 50 cm in a grey, reduced substrate.

The Lutkemeerpolder is a clay polder, which allows for crops not possible in peaty soils (Bestemmingsplan Lutkemeerpolder, 2012). Clay, in general, is a soil type that consists of very fine soil particles (>2um), called lutum. The main difference with sand is that sand consists of grains, while lutum has a form resembling plates. Clay plates are formed chemically and consist of silicon and aluminium salts. Due to the platelet shape and chemical composition, a clay plate has a positive and a negative side, hence that water and minerals are better retained. This, in combination with the humus content, determines the fertility of the soil. Compared to sand, clay soils are poorly permeable to water. The workability of clay soil improves with increasing soil organic matter levels. Organic matter contributes to soil structure, nutrient and water retention (Römkens, 2004; Reijneveld, 2013). In dry times, they retain water for much longer, but in wet times crops drown earlier.

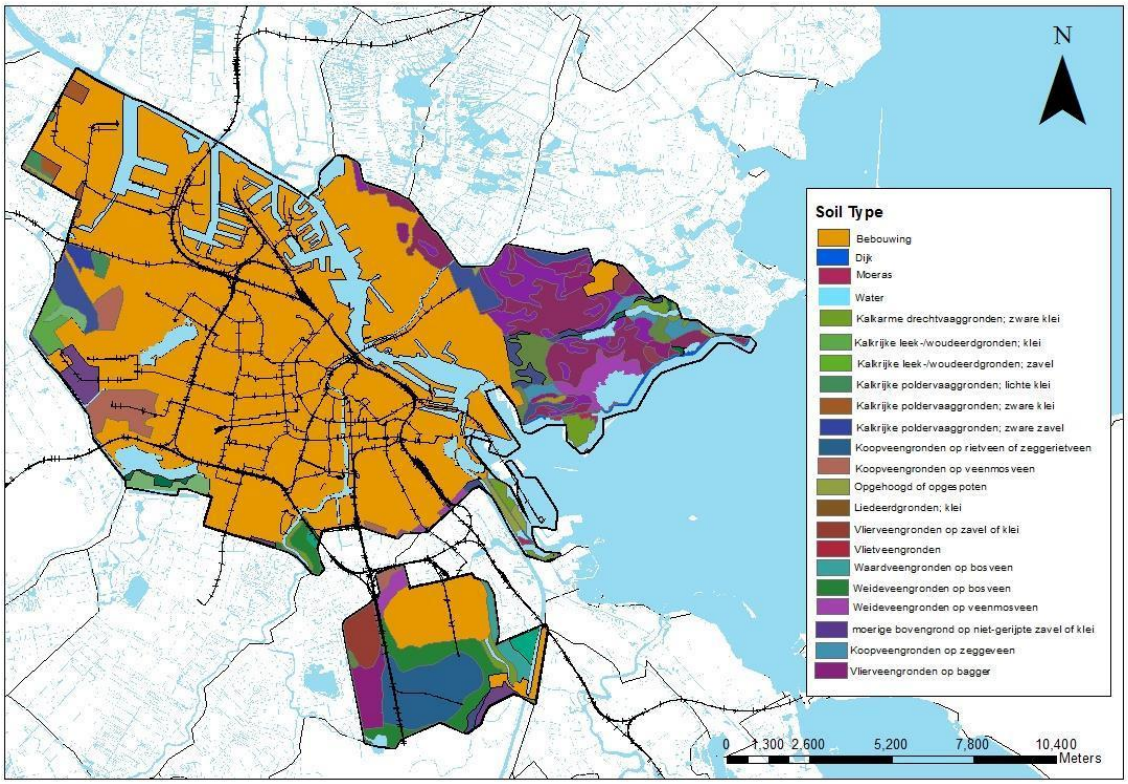


Figure 3: The Map of Soil Type in Amsterdam

Figure 3 shows a map of Amsterdam by soil type. Note that the majority of soils on the non-built areas are peat with a covering of sand or clay, depending on the soil type. Peat is an accumulation of (partially) decayed vegetation or organic matter. The Amsterdam peat is 'laagveen', meaning that it has formed under the influence of the regional groundwater level, which is often relatively rich in nutrients. When lowering the water level, the organic material decomposes as a consequence of increased oxygen availability. Decomposition leads to volume decrease; subsidence occurs (Hoeksema, 2007). The oxidation of peat soil is irreversible. Peat is not particularly suitable for agriculture, as the groundwater level is too high and the pH often too low.

The main claim of the foundation 'Behoud Lutkemeer' is that the Lutkemeerpolder area is the last farm on a clay soil in the Municipality of Amsterdam. Figure X shows a map of the study area in which the areas which are both classified as land use type 'farm' and as the 'leek-/woudeerdgronden' mentioned before. It is worth to note that the arable farms are mainly located on marine clay (Mulder, 2005).

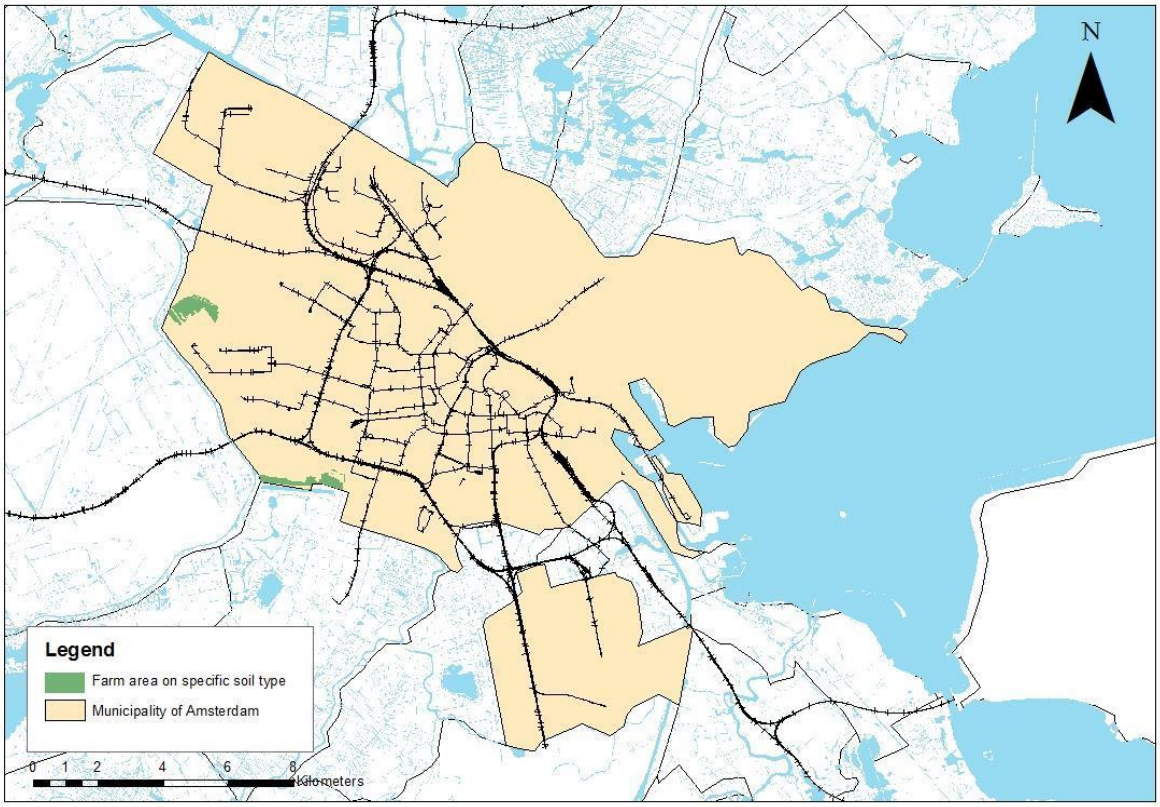


Figure 4: Map of the Municipality of Amsterdam. Areas which are both classified as 'farm' and are located on the aforementioned soil types are marked in green.

As seen from Figure 4, the Lutkemeerpolder area (the green one in the western part on map) is not the last farm area on clay soil in Amsterdam. However, inspection with Google Maps shows that the southern area is actually 'het Amsterdamse Bos'. Inspection showed that only part of the area is extensively grazed by cows, while the rest of the area is nature. The 'farm' located in the area is focused on catering and does not seem to be actively involved in farming activities. The claim that the Lutkemeerpolder is the last farm on a clay type soil can therefore justly be used.

Hydrology

According to the water system of Amsterdam Nieuw-West, there are two water intake options, from the Middelveldse Akerpolder at the tram loop of line 2 and from the ring canal at the pumping station. The pumping station of the Lutkemeerpolder is located in Lutkemeerweg with a low groundwater level (Amstel, H., & en Vecht, G, 2014).

The water system of the Lutkemeerpolder is built to drain the water which flows in from the north, from the Osdorperbovenpolder, to the pumping station in the south. The pumping station has enough capacity to drain extra water from the Osdorperbovenpolder with an adjustable overflow gate of 1.0 metre, a range between NAP -4.90 and -4.40 (Hersbach,

2012; Waterschap Amstel, Gooi en Vecht, 2015). The groundwater table shows the variability between land use and soil type. When the groundwater is close to ground level, the natural value increases (Römkens, 2004). Agricultural land uses commonly has a lower groundwater table than other land use types (Mulder, 2005).

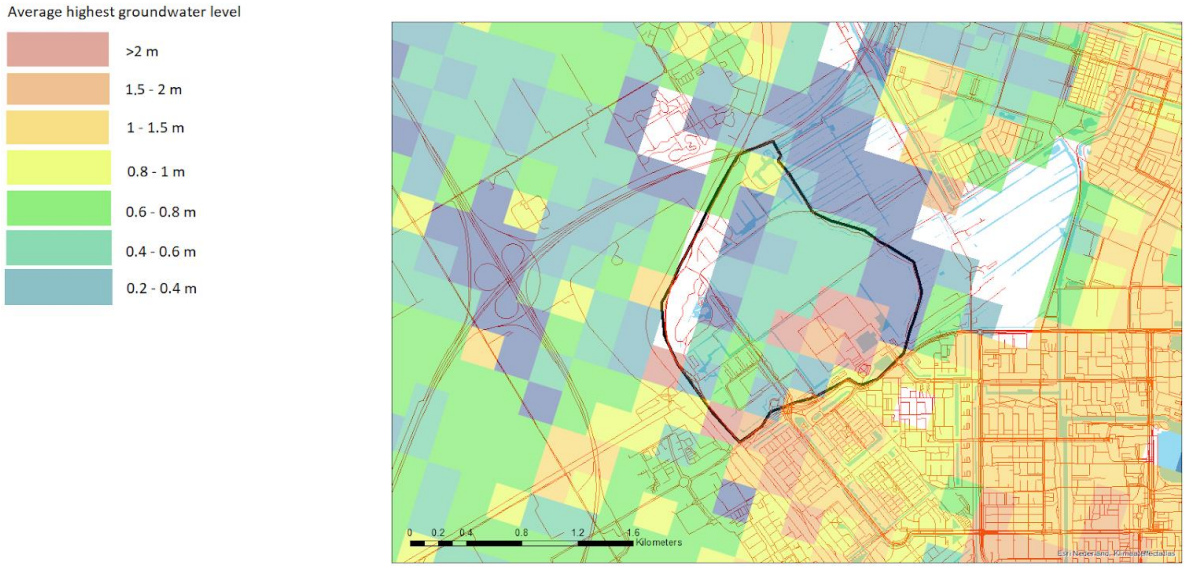


Figure 5: Map of Average Highest Groundwater Levels in the Study Area

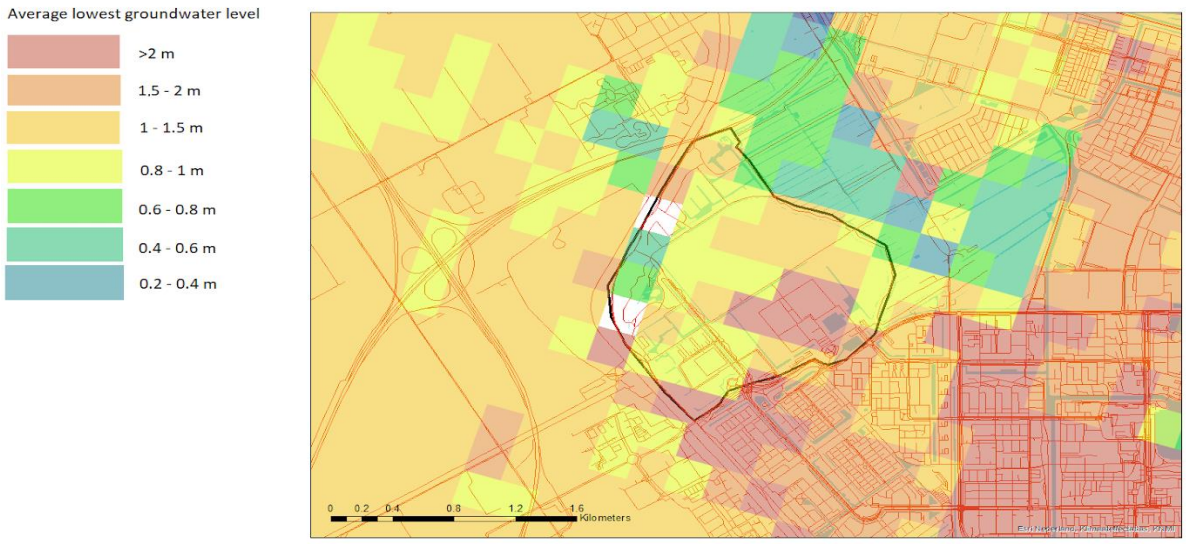


Figure 6: Map of Average Lowest Groundwater Levels in the Study Area

Figure 5 and 6 show the average highest and lowest groundwater levels, respectively. Note that the areas which have been built upon have lower groundwater levels on average, while the groundwater levels of the Groene AS or green corridor (available data) are higher. The groundwater level of the cultivated lands is between 0.8-1 metres at its lowest, and around 0.4-0.6 meters at its highest. This suggests that the water levels are regulated according to the function of the land.

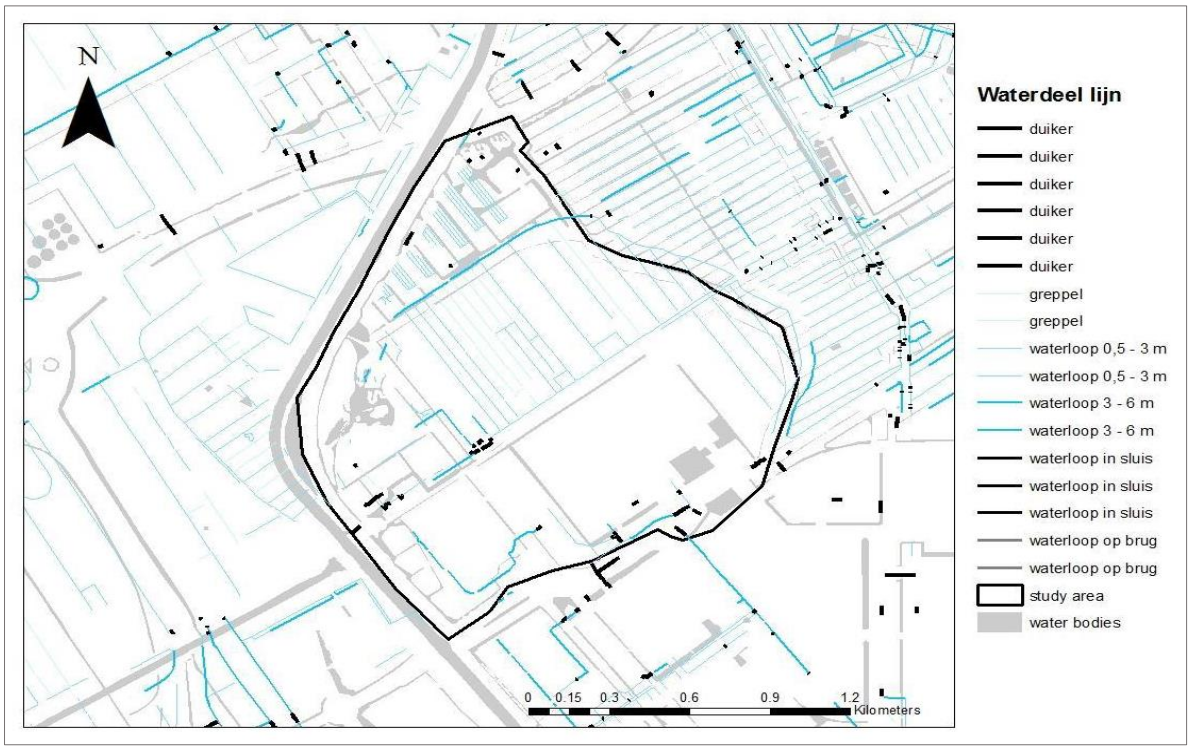


Figure 7: Map of Waterline in the Lutkemeerpolder

Figure 7 shows that the agricultural area has a higher density of ditches than the natural area, which is logical, as agriculture needs lower groundwater levels than nature, as to prevent crops from drowning. Furthermore, there are divers (duiker) which are shown in figure 7. Diver is kind of small tunnel underneath the paved surface as connecting underpass that make the migration of fauna possible. Walking ridges of approximately 10% of the width come in these divers called as eco-divers (Bestemmingsplan Lutkemeerpolder, 2012). These dry runs must be initiated naturally from the area. This is to prevent a fragmentation of nature from the wet ecological connecting zones. Fragmentation may often lead to a decrease in migration opportunities for fauna, which may eventually lead to a genetically unfit population.

Field observations indicate that the groundwater table of the agricultural part of the Lutkemeerpolder is lower than the surrounding nature areas (Groene AS). In addition to this, the water in the Groene AS was clearer than the water in the (surrounding) agriculture parcels, which was often very murky. This suggests that the bodies of the Groene AS and the agricultural water bodies are closed off from each other.

A water board in the Netherlands is a level of government that monitors and regulates water management. The duties of a water board in the Netherlands include flood defense, water quantity management and water quality management. As shown in figure X, the study area is under the management of 'Waterschap Amstel, Gooi en Vecht' (AGV).

Source: Waterbeheerplan (Waterschap Amstel, Gooi en Vecht, 2015)

Figure 8: Management Area of Water Board Amstel, Gooi and Vecht (AGV)

When the water board makes decisions regarding water in this area, the Waternet agency carries out this policy. Waterschap AGV has written a water management plan for the period of 2016-2021, in which the study area falls under the area of 'Amsterdam Nieuw-West'.

The vision of water system in the Lutkemeerpolder is aimed at obtaining a healthy and sustainable water system by, for example, applying water-permeable paving stones and increasing water storage as a whole. The ultimate goal is to bring nature into the city through the implementation of a chain of nature-friendly banks which ecologically contribute to improving the water quality and the perception of nature for city dwellers. In the Lutkemeerpolder, all banks are built with a slight embankment and those banks which located in the ecological zones are laid out in a nature-friendly way.

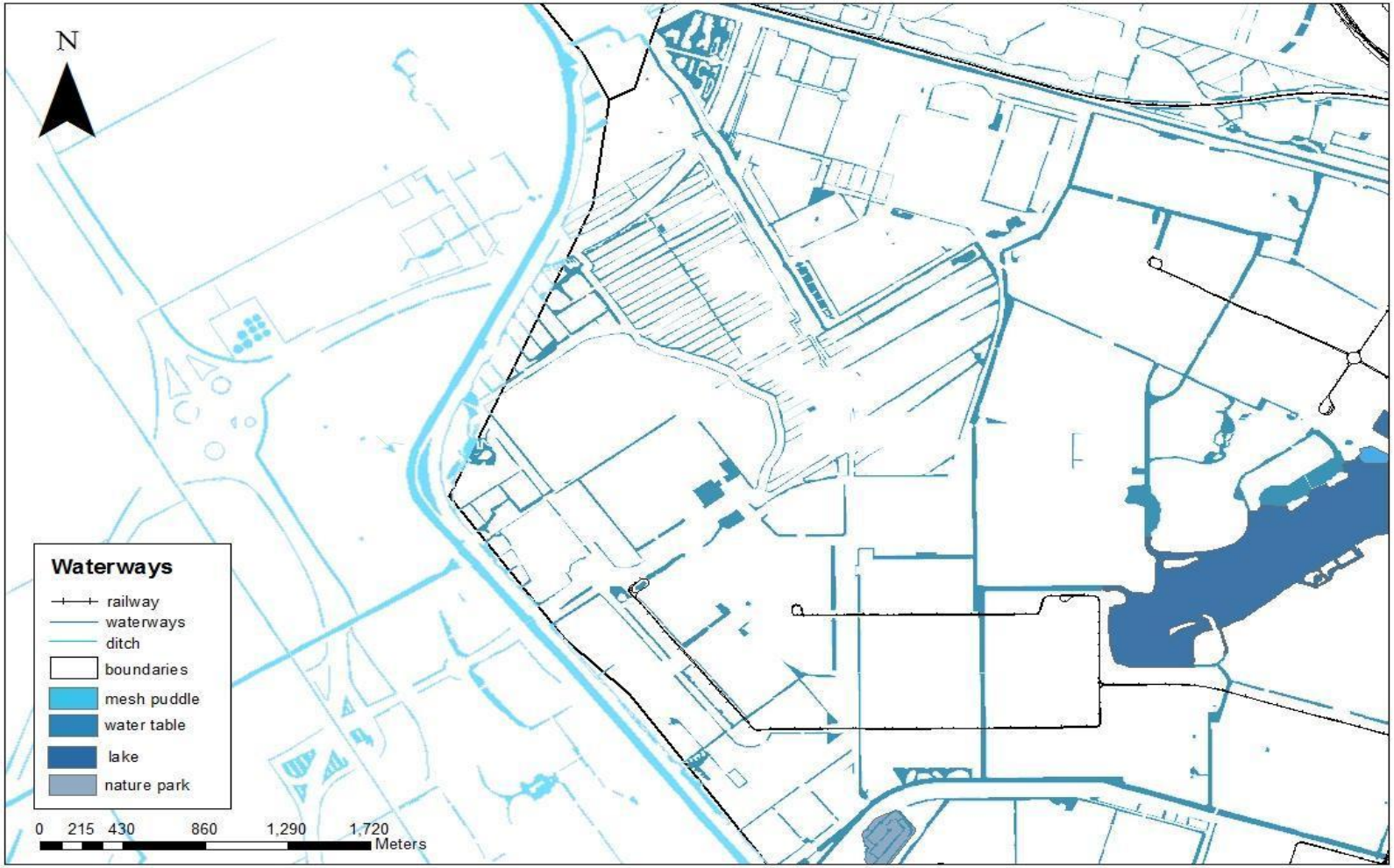


Figure 9: The Map of Waterways in the Lutkemeerpolder

Both primary and secondary waterways are present within the Lutkemeerpolder. The different watercourses are connected to each other via connections in the Boterbloem. In this way, dead-end watercourses are avoided (Bestemmingsplan Lutkemeerpolder, 2012).

Flora and Fauna

Amphibians and reptiles

The natterjack toad (Epidalea calamita) has been known to call in the area in May 2009, which indicates presence of suitable reproductive waters. The study area is, next to this, suitable for species such as marsh frog (Pelophylax ridibundus), edible frog (Pelophylax kl. esculentus), common frog (Rana temporaria), common toad (Bufo bufo), and common newt (Lissotriton vulgaris; formerly Triturus vulgaris). The grass snake (Natrix natrix) has been spotted in the area before 2002, but may occur in the area due to the layout of the area being tailored to the needs of, the grass snake, among others.

Birds

In the North Holland nature management plan (Provincie Noord-Holland, 2009) - ILG region South-West Rhineland, the Osdorper Bovenpolder and the Osdorper Binnenpolder South have been marked as important meadow bird habitats, especially for godwit (Limosa), lapwing (Vanellus vanellus) and northern shoveler (Spatula clypeata).

At the time of the aforementioned study, territories of partridge (Perdix perdix) and Eurasian skylark (Alauda arvensis) have been spotted (Zoon Buro voor Ecologie, 2008). It is plausible that the agricultural plots within the study area are important as breeding areas or foraging areas.

Bats

General dissemination data and habitat suitability data suggest that several species of bats may be expected in the study area. Farms and sheds of the farms, as well as the ceilings of the auditorium building, the Bastion and other buildings in the same style, are considered suitable for relatively common species that occupy buildings, such as the serotine bat (Eptesicus serotinus) and the common pipistrelle (Pipistrellus pipistrellus).

Trees with hollows may prove to accommodate species such as Nathusius' pipistrelle (Pipistrellus nathusii (Keyserling and Blasius)), common noctule (Nyctalus noctula) and/or Daubenton's bat (Myotis daubentonii). Suitable foraging area is present in the study area, especially in the south western corner of the polder (Groene AS) and on the terrain of the Westgaarde. This foraging area is suitable for all bat species mentioned before.

Linear elements, such as rows of trees, may serve as flying routes for the bat species mentioned before. Flying routes are essential to bring the bats from residence to foraging area and vice versa.

Field observations

Flora

A discussion with a recreant indicated the presence of (species of) Orchidaceae in the Groene AS area. Due to time-related issues, no research has been done on plant communities in the area.

Birds

Figure X shows a map on which bird sightings are indicated. Note that nearly all sightings are in or around the Groene AS area, which suggests that the Groene AS area is more suitable as forage/breeding area. However, figure X and X indicate that this may also be because the walking/cycling paths exclude the agricultural fields.

Figure 10: The Map of the Birds Sighting in the Study Area

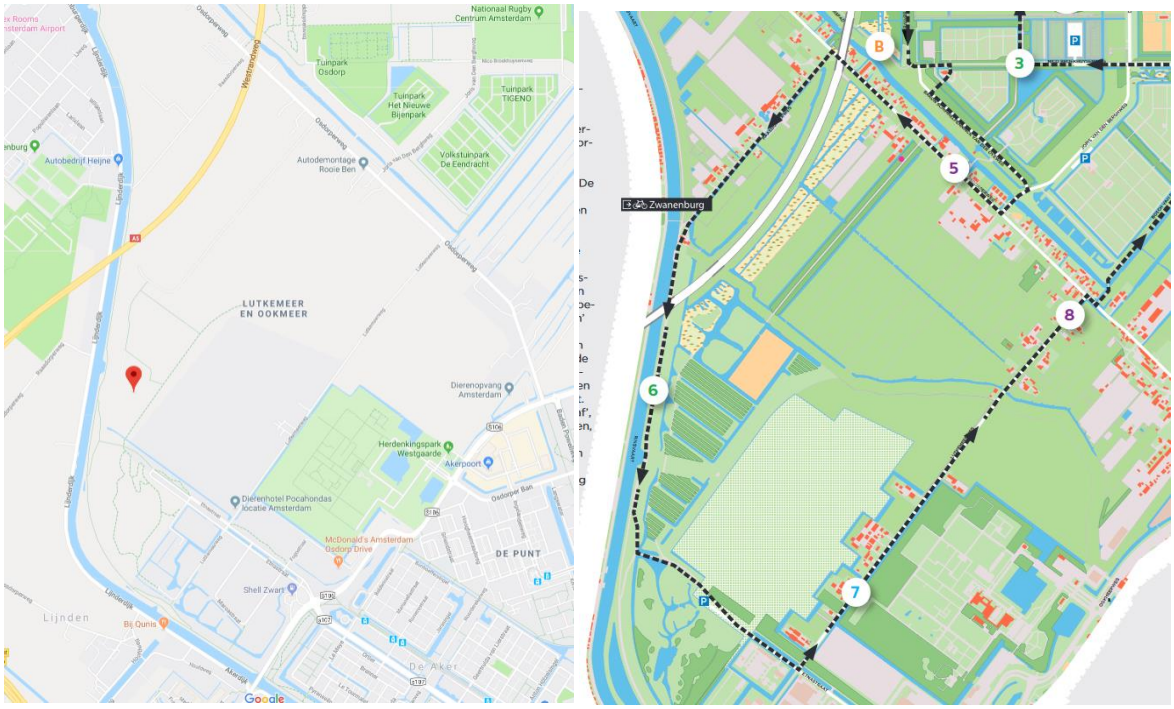


Figure 11: The Map 11a shows walking routes in the study area, map 11b cycling routes (https://tuinenvanwest.info/dynamic/media/12/documents/fietsroute-nieuw.pdf)

Field observations on bird species indicated that there are storks (Ciconia ciconia), tufted duck (Aythya fuligula), common pochard (Aythya ferina), gadwall (Anas strepera), great crested grebe (Podiceps cristatus), and greylag goose (Anser anser) in the area. There is no/limited data available on the purpose of these species/individuals in the area (e.g. breeding (establishment) or foraging behaviour). See https://waarneming.nl/locations/13760/observations/ for a full, recent list of observations on bird species in the study area.

Fish

From a hydrological viewpoint, the groundwater table in the Groene AS area is higher than in the agricultural area, and field observations proved that the water quality is higher. In the Groene AS area, the water was clearer and there were more plants and visible aquatic life. A discussion with a local fisherman proved that the waters of the Groene AS were habitat to fish species such as northern pike (Esox lucius), European perch (Perca fluviatilis) and common rudd (Scardinius erythrophthalmus). These species are all typical for (mesotrophic, clear) waters rich in plants.

In contrast to this, the waters surrounding the study area (e.g. next to the Slibveldenweg) were murky, and discussion with another fisherman proved that these waters were home to European carp (*Cyprinus carpio*), common rudd (*Scardinius erythrophthalmus*), common bream (*Abramis brama*) and minnow (Cyprinidae, species unknown). The feeding behaviour of carp and bream is to dig up the soil, which return phosphates in the soil to the water column. With a nutrient-rich soil and a large population of carp, this leads to a prosperous growth of the floating algae (phytoplankton). Together with the submerged soil particles, this leads to the water becoming cloudy and a decrease in the underwater flora.

Natural Policy

Within the Netherlands, the Ministry of Agriculture, Nature and Food is responsible for the legislation which protects nature throughout the country. In total it has nine spheres of work among which agricultural and nature and biodiversity can be found. Policy on nature and biodiversity aims to “preserve and strengthen the Netherlands’ natural environment (Government of the Netherlands, n.d.). Thereby it is important to be aware that nature conservation and the sustainable exploitation of biodiversity is a pan-European task. Three important European directives shaped the Dutch nature policy; the Convention on Biological Diversity, the Birds Directive and the Habitats Directive.

The Estate (Conservation) Act, which aims to maintain estates and incentives this with tax benefits. In return, the estate needs to be opened to the public.

Within the national border of the Netherlands, nature areas, wild animals and plants are protected by the Nature Conservation Act (Government of the Netherlands 1, n.d.). The Act came into force on the 1 January 2017 and replaces three other laws, namely the Nature Conservation Act 1998, the Flora and Fauna Act and the Forestry Act. Within this legislation the tasks and responsibilities between the national government and the provincial authorities are set out. The central government is responsible for the main water bodies and international nature policy. Also, the goals of natural policy and the respective framework is designed by the national government. Provincial authorities establish more detailed rules and regulations for natural protection within their own province and implement the national nature policy. Interesting to note is the Estate (Conservation) Act, which aims to maintain estates and incentives this with tax benefits. In return, the estate needs to be opened to the public.

A healthy environment is understood by the Ministry of Agriculture, Nature and Food as a prerequisite for economic opportunities and other societal activities. Hence, the Dutch government promotes ‘green growth’, which implies economic growth without a negative effect on the environment (Government of the Netherlands, n.d.). To accomplish this goal new technologies are crucial.

National & Provincial Natural Policy

There are two main set of rules to protect Dutch natural areas, a national and a European one. The established Dutch legislation to protect natural areas is called the 'National Ecological Network' (NEN) (Government of the Netherlands 2, n.d.). The provincial authorities are responsible for the maintenance and continuation of the NEN. It is a network of existing and planned natural areas, aiming to link natural areas with each other and surrounding farmland. These areas can be understood as ecological connection zones through which species of fauna can migrate or rest in. Next to the ecosystem services and functions, these areas also provide services to people, like recreation and cultural landscape. It encompasses five aspects, ranging from 20 National Parks, to agricultural land under nature-friendly management to all Natura 2000 areas. Natura 2000 is a European network of protected natural areas, in which species of animals and their natural habitat aim to be protected in order to preserve biodiversity (Government of the Netherlands 3, n.d.). There are in total 160 Natura 2000 areas in the Netherlands. All of them are part of the National Ecological Network. Additionally, there is a pan-European Ecological Network to which the NEN will eventually be connected to.

Figure 12: Map of Ecological Network through the Lutkemeerpolder

Figure 12 shows the respective situation at the Lutkemeerpolder, outlined in red. There are two aspects to note. Firstly, the southwest area of the Lutkemeerpolder overlaps with the National Ecological Network. Secondly, figure #X shows the ecological connections zones, which runs along the border of the Lutkemeerpolder as well as shortly through the Lutkemeerpolder.

Birds in the Lutkemeerpolder

Wild bird species protection often requires transnational cooperation, since migration is inherent to their being. Moreover, urban sprawl, transport networks or intensive agricultural practices challenge their population continuity. Hence, the members' states of the European Union already decided in 1979 to fight against their decline. This directive was amended in 2009 and can be found now as Directive 2009/147/EC, commonly known as the EU Birds Directive. These guidelines were taken up into the Nature Conservation Act. The EU Birds Directive concerns the protection via Special Protected Areas (SPAs), the hunting periods, regulations of these species with respect to their nests. Additionally, it fosters research into their protection, management and use (European Commission, 2019).

As stated earlier, several birds were sighed. All of them belong within category A, which is defined as "those species recorded in an apparently wild state since 1950, which occur regularly and naturally within the EU" (Directive 2009/147/EC). The individual classification of the bird types can be found in Annex #.

Nature-based agriculture

The Dutch government recognizes that agricultural practices have a great influence on nature and biodiversity. Therefore, it published the report 'Measures for Nature-based agriculture' in December 2017. It defines nature-based agriculture as a "form of sustainable agriculture which makes optimal use of ecological processes and integrates them into farming practice" (p.5). Thereby, it aims to utilize natural capital to the fullest around and beneath the farm, while placing a minimum burden onto the environment and its biodiversity. Nature-based agriculture and farming practice is defined by measures with are utilized by the farmer, measures that are aimed at particular species and measures which strengthen the natural system. There is a distinction made between arable agriculture and dairy farms. For arable agriculture measures include the expansion of the crop rotation plan, conservation tillage, green manure crops, winter coverage and field margins (Louis Bolk Institute, Wageningen University & Research, 2017). The possibilities of any measure always depends on the ambition of the farmer and the environmental circumstances. The analysis of the Louis Bolk Institute and Wageningen University and Research (2017) concluded that "most of the measures have a positive effect on one or more of the aspects for biodiversity, the environment and climate" (p.5). However, nature-based agriculture requires investment into

produced, human and social capital. In the short-run this will most likely result in lower economic returns but in the long-run (financial) benefits are most likely to increase.

In a letter from the minister of agriculture, M.H.P. van Dam, nature-based agriculture is supported and its benefits as well as its development path are sketched out (House of Representatives, 2016/2017). Based on the report by the Louis Bolk Institut und Wageningen University and Research (2017), three dimensions of nature-based agriculture are defined. Each dimension is shortly introduced, further explanation can be found in the report Measures for Nature-Based Agriculture and Letter No. 144 to the House of Representatives (2016/2017). Firstly, a nature-based system is grounded on biodiversity secondly, by closing nutrient cycles based on those services provided by nature and lastly, the matter of maintaining landscape elements and measures for specific species on the farm. Appendix 4 provides a short overview of the different dimensions. Additionally, four different levels of nature-based agriculture are set defined. The underlying idea is that farms can advance through the different levels, depending on their circumstances and possibilities. The level depends on the "coherence between measures and the connection between the farm and its environment" (House of Representatives, 2016/2017;3). The needed incentives for farmers to engage in nature-based agriculture are meant to be developed and the responsibility of the provincial level. The description of the nature-based agriculture levels can be found in appendix 5.

Nature-based agriculture and the Lutkemeerpolder

As stated before, one out of three farmers on the Lutkemeerpolder is engaging in unconventional agricultural practice, namely organic agriculture at the farm 'de Boterbloem'.

With respect to the three dimensions of nature-based agriculture it can be stated that the first dimension is (probably) fulfilled, especially 'de Boterbloem' is in line when it comes to soil fertility and soil structure. The second dimension relates, next to closing nutrient cycles also to the reduction of harmful impact on the natural environment, thereby enabling fauna on the farm site and surrounding area. The surrounding area of the Boterbloem is defined as ecological connection zones under the NEN, as well as the southwest part overlaps with the NEN itself. Hence, it can be argued that with the organic practices of the Boterbloem the impact and purpose of the ecological connection zones as well as the NEN area itself are enhanced. The farm does not engage into disturbing practices, for either soil, water or air. Concerning the circulation of nutrients further research and questionnaires with the respective farmers are required. The last dimension relates to landscape elements and measures for specific species on the farm. Landscape elements are defined by "natural and semi-natural vegetation, such as hedgerows, rows of trees, copses, headlands with rough vegetation, banks of ditches and nature-friendly banks" (Louis Bolk Institut und Wageningen

University and Research 2017;27). The Boterbloem itself provides such landscape elements, however, the farm land itself does not do so.

It is important to mention that this analysis is no in-depth evaluation of the dimensions related to nature-based agriculture. Further and more elaborated analysis is required.

Farms which engage in nature-based agriculture can be classified into different levels (Appendix 5). With respect to the farm ‘de Boterbloem’ Level 0 is reached and (probably) Level 1 as well. The farm engages into nature aware agricultural practices which takes biodiversity into account and features landscape elements. Nevertheless, a more thorough assessment of the defining features with respect to the farm ‘de Boterbloem’ is required to indicate a concluding classification.

Provincial Natural Policy

The province in which the study area is located is the province North-Holland. Within this province alone there are 19 European protected areas, classified as Natura 2000 zones (Provincie Noord-Holland, n.d.). As elaborated upon in the previous section, each province has the legal task to implement the Natural Ecological Network. However, the province North-Holland also has their own natural policy.

The protection of nature and landscapes is anchored within the ‘Provincial Omgevingsvisie’. The respective policy application with respect to its development, management is laid out in the ‘Programma Natuurontwikkling (PNO), running from 2019-2023 (Provinciale Staaten van Noord-Holland, 2018). It entails all kinds of green projects to maintain and enhance the natural and cultural landscape. The reason to preserve these kinds of areas is threefold. The first reason is the purely intrinsic value (intrinsieke waarde) which nature has. This relates back to the Rio de Janeiro convention from 1992, which coined the importance of biodiversity. Secondly, the user-value (gebruikswaarde) of nature is elaborated upon, implying that nature provides us with necessities like food. Here, also the storage of CO2 is considered. Lastly, there is the amenity value (beleevingswaarde). This type of value and influence of nature on humans can be described as calming, relaxing and anastatic.

The province of North-Holland welcomes the structure provided with the NEN but strives to enhance nature conservation also outside of these areas. Therefore, it established the program ‘Green Capital’ (Groen Kapitaal) (Provincie Noord-Holland 1, n.d.). It is a network platform to support initiatives which support biodiversity. The goal is to create innovative solutions which combine local economy, agriculture, infrastructure and a good quality environment. To keep track of the development of a monitoring program was set up, resulting in the report ‘Biodiversiteit in North-Holland’ (Provincie Noord-Holland, n.d.).

To additionally support connection between different sectors, the ‘Natuurbeheerplan’ was created. It is part of the PNO but focuses on which subsidies can be given out to incentive the maintenance of natural and landscape areas. This system was also especially set-up in joint conversations with (agricultural) entrepreneurs, municipalities and nature, recreation and nature, - policymakers.

Provincial & Municipal Natural Policy

As in the previous part on national policy, cooperation in nature protection is key. Therefore, the province North-Holland and the municipalities are working closely together to realize favorable natural projects. A well-known example is the ‘Groene As’ which connects natural areas between Spaarnwoude, de Westeinderplassen and Amstelland (Gemeente Amsterdam, n.d.). The Amsterdamse Bos is an important part of the Groene As. Other areas, like ‘het Schinkelbos’ are already finished. The intention behind this project is to create migration routes for fauna and flora. The project is also related to recreational activities, since the landscape now offers this to the people living in the area. The province of North-Holland and de Hoogheemraadschap van Rijnland making this project possible, by giving out subsidies and cooperation.

Lutkemeerpolder and the Groene As

Figure #X shows the current situation at the Lutkemeerpolder. The light blue areas indicate areas, which are going to be part of the Groene As and blue striped areas indicate (planned projects for the area(s).

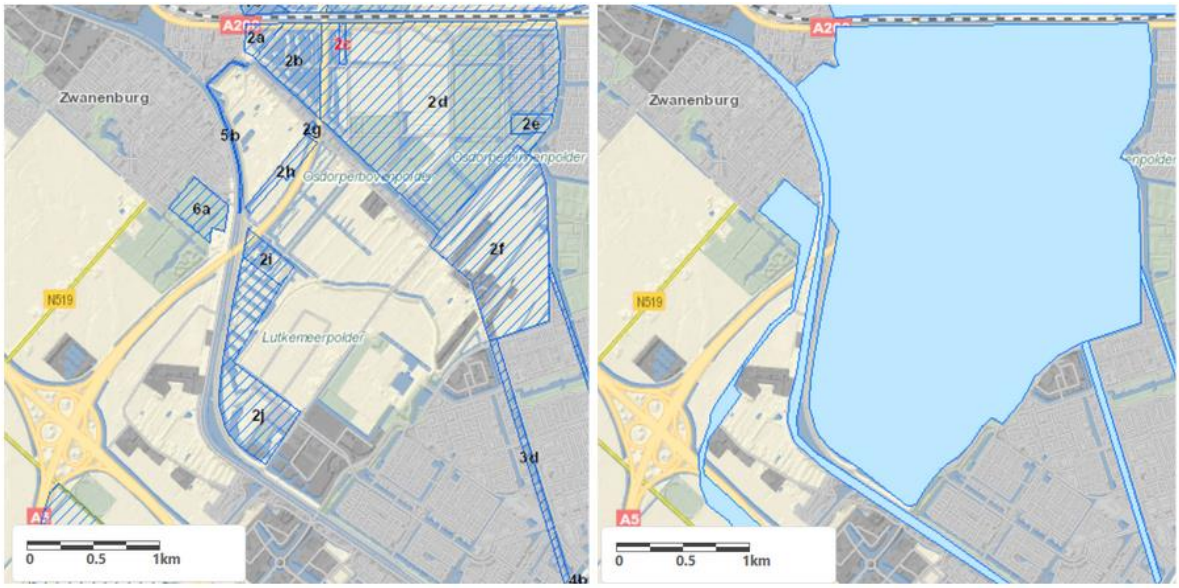


Figure 13: Overview of the Lutkemeerpolder

Municipal Natural Policy

The municipality of Amsterdam is also concerned with green and water policy because it enhances the well-being of the citizens of Amsterdam (Gemeente Amsterdam 1, n.d.). Also, it is stated that green (policy) became an important economic factor. Moreover, the Municipality of Amsterdam emphasizes that green is not a luxury good but a necessity for its citizens. This is especially evident when addressing green in the city. This relates to the so-called Urban Heat Island effect, which can be mitigated with the help of a green infrastructure.

All of the above aspects are manifested within the 'De Hoofdgroenstructuur' (HGS). It was firstly addressed in the structural plan 'de open stadt' from 1996, which emphasized a continuous, green infrastructure throughout the city. Thereafter an additional assessment framework was presented and approved by the council in 2002. To kickstart the development, three master plans were developed, one of which is of interest to the Lutkemeerpolder; the Tuijnen van West. The area consists of four polders, which were taken up into the HGS in 2007 (Tuijnen van West, n.d.). The district Nieuw-West is since then responsible for their continuation and maintenance. Several activities are combined within the Tuijnen van West, such sport/recreation, horeca, art and culture and urban agriculture. Moreover, the area offers space for visitors to cycle or simply walk around in the area and enjoy the surrounding nature. The Lutkemeerpolder within the context of Tuijnen van West is especially known for its polder landscape and vista.

Figure 14: Ecological Structure of the Lutkemeerpolder

Figure 14 shows the respective situation at the Lutkemeerpolder. Hereby, it is important to mention that national, regional and municipal green policy structures can overlap. It can be seen that parts of the Lutkemeerpolder are part of the respective policy frameworks and also plays an important role within the municipal green policy. However, it is important to mention that the respective arable land of the farm ‘de Boterbloem’ is not within any green policy directive.

In February 2011, the Structuurvisie Amsterdam 2040 was adopted. It consists out of five pillars, of which one is the development of green and blue structures for recreational use and to increase the overall well-being. In Figure X# it can be seen that the Lutkemeerpolder is mostly classified as ‘Stadsrandpolder’ (p.241). Within this category the use is defined to be ‘landscape experience and agricultural production’, which should be nature-based. The area is set out for recreants, who wish to walk or cycle. Such areas are well frequent by visitors.

Figure 15: Structuurvisie Amsterdam for the year 2040

There is the intention to not create any activities that attract car traffic in order to keep the calm profile of the area. Moreover, a clear policy intention is set out. It is the aim to strengthen urban agriculture, care-farm activities and nature education. Thereafter, it is stated that such areas define their value with their open landscape, which may not be disturbed. Three examples are presented; Waterland, Amstelland and Tuijnen van West. For the former two, it is said that they are defined by their cultural-historical landscape.

A small part marked in brown, is defined as ‘Curiosa’ for which the use is laid out as diverse. Within such areas it is central to keep the unique cultural-historical, natural landscape. Also, the policy in terms of usage is geared to maintain the current value. The full definitions of a Stadsrandpolder can be found in appendix 6.

Concerning the situation at the Lutkemeerpolder, we see that the land which is currently used as organic agriculture in not included within the boundaries of the Stadsranpolder. Each new building plan within the HGS is closely examined in order to assess their fit within the area to ensure to maintenance of the green character and typology of the respective area. Nothing is mentioned about the building requirements within areas next to the HGS. It can be argued that especially, with the intention to maintain the open landscape as a defining element of the area, a weather eye should be kept on the building plans of the surrounding area.

Diversification Explanation

Apart from the natural value of the land and the agricultural value that contributes to the overall valuation of the land, there are side-activities that the Boterbloem makes use of. These side-activities are in literature coined as multifunctionality of agriculture (Wilson, 2007; Garzon, 2005). In this section, the value of these side-activities will be investigated. In order to do that, a variety of steps are taken. Firstly, the literature concerning multifunctional agriculture will be discussed to understand its history and its importance. Secondly, the history and scope of multifunctional agriculture in the Netherlands will be elucidated. Thirdly, an introduction to the specific types of multifunctional agriculture that concern the Boterbloem will be discussed. Finally, the most apparent diversification practices on the Lutkemeerpolder will be examined independently.

The beginning of multifunctionality

In the early 1990's the notion of multifunctionality within the agricultural sector was introduced (Potter & Tilzey, 2005). This development came rather late when compared to other sectors like forestry, which already got notion of multifunctionality in the late 18th century. Multifunctionality, that basically means 'having multiple functions', reevaluates the initial meaning of a sector and complements these practices with additional ones that can positively affect each other mutually (Wilson, 2007). The debate concerning multifunctional agriculture was firstly used by the discipline of urban planning. By the end of the 80's, within urban planning, discussions arose concerning the changing functions of urban spaces. The increasing pressure on space and the enlarging population triggered policy makers to consider multifunctional land use especially involving multiple socio-economic factors within the same area. The claim that led to these debates was the notion that most urban spaces had become 'monofunctual', resulting in the inefficient use of scarce spaces (Potter & Tilzey, 2005). Therefore, within a variety of countries across Europe, policy makers started promoting the mixed uses of urban spaces. Agricultural spaces within and surrounding the

city were stimulated to diversify or make use of pluri-activities. Where diversification refers to the working area, where the variety of products and services is broadened, pluri-activity is defined as the sum of all activities that take place within an area (Wilson, 2007).

Both these terms refer to multifunctional use of the land, yet they both come from different backgrounds of multifunctionality (Hassink, Agricola & Thissen, 2016). These different backgrounds come simply from the different tasks people concern to be important. Consequently, a wide variety of literature concerning the sole investigation of the most important side-activities of multifunctionality of land exist (Potter & Tilzey, 2005). From this literature, the most important conclusion is that the ideal side-activities are time- and space bound. When the multifunctionality reached the agricultural sector in the 1990's, something special happened: the term was simultaneously embraced in the academic- and the policy making discourses (Wilson, 2007). This led to a situation where policy makers were appropriating the notion of multifunctional agriculture without a theorization from the academic world, subsequently leading to a relative absence of explorative literature. According to Garzon (2005) the notion of multifunctional agriculture can therefore most straightforwardly be marked out through the analysis of policy and political debates.

The first institutional notion of multifunctional agriculture was made by the commission of European communities in the book 'The future of rural societies' (1988) that emphasized on the 'multiple contributions' the European agricultural sector can make on the feasibility of rural communities and socio-economic improvement. Delgado et al. (2003) argues that one of the first times this idea was brought into use, was at the Earth Summit in 1992 where article 14 of Agenda 21 stated that agricultural policies should consider the multifunctional aspects of agriculture. Afterwards, multifunctional agriculture was slowly becoming more apparent within policy schemes. Especially, after the European Council for Agricultural Law issued the term in 1993 as an attempt to harmonize agricultural legislation within Europe, the term found broader attention. This resulted, three years later, in the Cork Declaration which acknowledged that small-scale conventional agriculture was losing its economic relevance and needed some serious rethinking (Wilson, 2007). Additionally, it stated that agriculture should be the crossing point between society and the environment and to actively pursue this need. The Cork Declaration argued that: "integrated rural policy must be … multifunctional in effect, with a clear territorial dimension. It must apply to all rural areas in the Union ... It must be based on an integrated approach, encompassing within the same legal and policy framework: agricultural adjustment and development, economic diversification ... the management of natural resources, the enhancement of environmental functions, and the promotion of culture, tourism and recreation". The discussion concerning multifunctional agriculture as depicted in the Cork Declaration resulted in the agreement of the term by the European Council in 1997 and was ultimately approved at the Berlin Conference in 1999. This approval also lay the foundation for the contemporary Dutch agricultural policy concerning multifunctionality.

Diversification methods

As stated above, a more specific form of multifunctionality is diversification, which focuses on the farm expanding its activities on the farm itself. It can be defined as “the reallocation and merging of farm resources as an addition to its original purpose” (Hassink, Agricola, Thissen, 2016 p. 196). Ilbery (1991) made the distinction between “agricultural” and “structural” diversification. Agricultural diversification can be classified as non-conventional agricultural practices (i.e. using unconventional techniques, growing unconventional crops). Structural diversification is categorized as the side-activities alongside the conventional farming (i.e. tourism, recreation, education and care functions). In the following sections, the focus will mostly be aimed towards the research of structural diversification, since the agricultural diversification has already been explained above.

As a consequence of the European legislation concerning multifunctional agriculture, the Dutch ministry of agriculture issued a Taskforce for multifunctional agriculture (Taskforce Multifunctionele Landbouw) between 2008 and 2012 (Hassink, Agricola & Thissen, 2016). This Taskforce’ core focus was to stimulate diversification practices within the Dutch agricultural sector for a short period of time. They differentiated a number of structural diversification practices: on-farm sale, nature conservation, tourism, recreation, care farming and educational practices. From then onwards, the Dutch government and private organizations have kept on encouraging the diversification of Dutch agriculture and advocated for their importance to maintain a healthy and interesting sector.

Diversification in the Lutkemeerpolder

In the coming sections the most relevant structural diversification practices on the Lutkemeerpolder and especially on the Boterbloem will be evaluated. Consecutively, the paper will discuss the recreational practices, the care-farm performances and the educational value. All sections will follow the same logic, which will primarily focus on evaluating the practices against the available policies on a national, regional and city scale.

The three diversification methods described above do not necessarily exclude each other. On the contrary, when an area enjoys a high recreational value, it is more likely that the number of visitors increases. This can positively influence the educational and care function potential within the area. Besides, multifunctionality of agricultural land can generate a situation where the total result is more than the sum of its parts. This can for instance be witnessed when exploring the wider effects of care-farming. In this situation, both agricultural and care-practices are being performed on the same plot of land. However, this can develop into a situation where both aspects benefit each other mutually. This happens in a situation where local agriculture remains viable in monetary terms and the patients enjoy the outdoor and agricultural experience.

Recreational Value of the Lutkemeerpolder

This chapter explores the recreational value of the Lutkemeerpolder by means of both monetary and intrinsic values. The monetization of non-monetary goods becomes more important as a tool to compare non-monetary goods with market goods. It is stated that the Lutkemeerpolder is appreciated for values like openness, green, nature and biological farming. However, it has never been investigated how much recreants value this area. Therefore this research explores what people appreciate about the polder, how much it is appreciated, what downsides people experience, how much this is experienced, and how this polder can be valued in recreational terms.

Monetary and non-monetary valuation of recreation

Constructing a business park may reduce the recreational appeal of the polder. It should therefore be clear what choices are available and what benefits those choices entail. The revenues of a business park can be estimated and shown in economic terms. Nonetheless, data on the perceived recreational values for citizens of the Lutkemeerpolder are weak or absent. Subsequently, there is a lack of economic comparability (Everitt, 1983).

The concept of intrinsic values is seen as a natural value in its own right. For a long time it was not right to monetize intrinsic values of nature. However, due to changing paradigms, monetary values (anthropocentric approach) and intrinsic values (ecocentric approach) do not have to be mutually exclusive. Both perspectives can be used. This approach will be more effective than solely valuing monetary nor intrinsic values. If humans are seen as part of the environment and not separated from the environment, it is obvious that environmental well-being and human well-being are interrelated. The current paradigms of anthropocentric and ecocentric approaches need to be shifted in order to unite humans with nature. In other words, a concept that uses a shared well-being is used to create a common future. From this viewpoint, humans and nature are placed at the same level. Decision-making frameworks will be developed which considers both anthropocentric and ecocentric perspectives (Rea, & Munns, 2017).

There is more to recreational areas than monetary values only. Recreational value also includes spiritual, mental, and social wealth which is fundamental to human fulfilment and well-being. However, the methods to quantify monetary value of ecosystem services is much more accepted than the intrinsic values of nature (Rea, & Munns, 2017).

People can show an interest in an object or area which gives humans a value-ability. However, people can value nature both instrumentally and intrinsically (with no instrumental reference). The latter means that people appreciate the size, resilience, beauty, strength and majesty of the nature (Attfield, & Belsey, 1994). There is a difference in what humans value in nature (intrinsic values), and what the value of nature is for humans (monetary value of land and resources) (Attfield, & Belsey, 1994). However, every person appreciates these aspects of nature in different quantities. The concept of intrinsic value of nature to humans has some shortcomings. First of all, people are not likely to be moved anymore when they hear claims about so-called intrinsic values of nature to humans. The general public is nowadays much more interested in claims made about the contributions nature offers to human health and human well-being. Secondly, claims about intrinsic values will disinterest specialists in the field of e.g. economics and business management. They see all values related to intrinsic values as value-to-humans only. This precludes the way environmentalists want to show the natural value to humans (McShane, 2007).

Research shows that nearby natural areas are indeed likely to be beneficial to the public health. Most research therefore focuses on the built environment and link it to its negative aspects like obesity and physical inactivity. However, it is less known that a lack of accessible natural environments close by leads to a negative effect on the psychological well-being of humans. By undertaking leisure activities, viewing nature or through, for example, gardening, people interact with natural environments. Besides psychological well-being, this also improves satisfaction and social coherence. It has been observed that walking in green areas reduces stress and blood pressure. These health effects are often neglected (Björk, Albin, Grahn, Jacobsson, Ardo, Wadbro, O'stergren, & Skärbäck, 2007).

In this research the activities people undertake in a natural area (walking, cycling, and picnicking and so on) are seen as recreational activities (Björk, et al., 2007). When people go to a natural area for the openness of the landscape, the fresh air or beauty it is perceived as intrinsic values to humans (Attfield, & Belsey, 1994). This is different from natural intrinsic values, which means the value of nature in itself (Rea, & Munns, 2017). In the next paragraph the Travel Cost Method will be explained to value recreation. To map the people's thoughts the objective tree method will be used, this method has already been explained in method chapter. These methods are based on the recreational values and the perceived intrinsic values, not on the natural intrinsic values.

Single Site Travel Cost Method

To be able to attach a monetary number to recreational aspects, the Travel Cost Method (TCM) will be used. By using this model, the recreational uses of the environment can be valued. However, values can only be estimated since this model is based on observed behaviour only. There are also other constraints which will be raised below. Within this model

the´single site model´ will be used. This model is used when the goal is to estimate the ´total access value´ of an area. Within the´single site model´ the demand for trips to a specific area by a person over a set time span is analysed. The price is calculated by taking into account the trip cost to that area which includes the time needed to make that trip and the travel expenses. An important factor is the place where someone lives. The total trips costs and the time used to travel and stay in the area is called the 'individual's access value'. The recreational value of the Lutkemeerpolder will flow from the individuals' access value. Nine steps need to be followed in order to come to this monetary value. These steps will briefly be explained in appendix 7 (Parsons, 2003). The TCM values the consumption of a non-market good (environmental goods and services) in a monetary way. The method was popularized in 1966 by Clawson and Knetsch (Cameron, 1992).

Outcomes monetary and intrinsic valuation

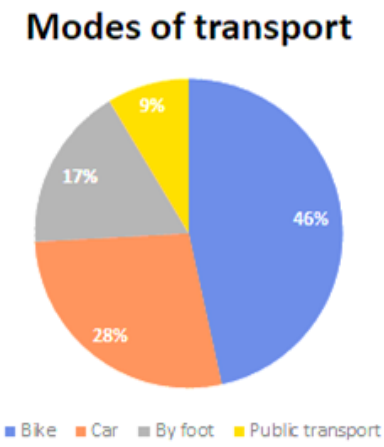


Figure 16: Modes of Transport by People

The sampling method we used for distributing the surveys is off-site sampling. By using the Facebook site of the Boterbloem both people who visit the Lutkemeerpolder regularly and people who do not often visit the polder could be surveyed. The people who filled in the survey are, hence, concerned with the activities going on in the polder. In this way people are reached who are attached to the topic, which is a strength for the content. All surveys are handled as single purpose trips. This means that people who combine their trip to the polder with other activities outside of the polder are seen as a trip to the polder only. Travelled distances and time spent on the activities outside of the polder are not included. The survey can be found in appendix 3.

Due to time constraints 70 surveys have been analysed for the recreational part, however 119 surveys have been filled in. Of these 70 surveys 58 could be used to research the recreational value. Of the 70 surveyed persons, 18 were male and 52 were female and the average age is 54 years. In **table 1** their mode of transport to the Lutkemeerpolder can be seen. Most people are highly educated (HBO and WO). They mainly use the bike to come to the polder, followed by the car and by walking. The main recreational activities they undertake can be seen in **Figure 19**. Sometimes people undertake different activities in one visit. In total the recreants mentioned 95 activities they undertake when they are in the Lutkemeerpolder. A lot of what is being said overlaps, therefore these activities are bundled and subdivided in 10 groups. In this way the main activities are shown.

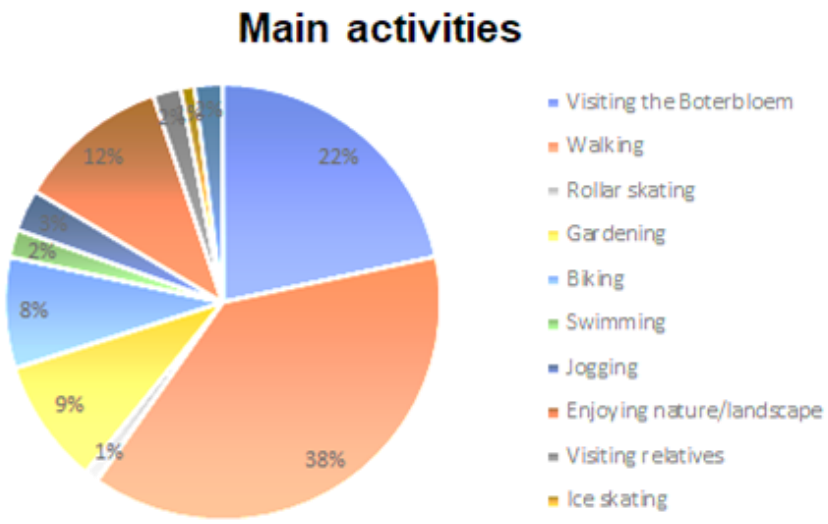


Figure 17: Main Activities by People in the Lutkemeerpolder

Monetary value

Based on the modes of transport, the time needed to reach the Lutkemeerpolder and the time spent in the polder the monetary recreational value per month has been calculated per person using the following formula (CBAbuilder, n.d.):

$V = ((T \times w) + (D \times v)) \times Va$

V: recreational value
T: time travelled to the polder (in minutes)
w: average wage
D: distance travelled (in km)
v: operation costs vehicle
Va: amount of visits per month

Based on this formula and the sampled population of 58 respondents, an average total price can be given to the Lutkemeerpolder. In other words, the total recreational value of 58 people. However, not all people who make use of the Lutkemeerpolder are surveyed. In that sense, this number is useless. From this perspective, it is better to give an 'average value per person per month' and / or an 'average value per person per trip' based in the sample. This is also represented in **figure 18**. This figure also includes a 'total group price'. This price is based on all 58 recreants plus their companions as a lot of people do not recreate alone. To calculate the price of time, the average Dutch wage is used. This is € 33,40 per hour (CBS, 2019). For the vehicle operation costs an average of € 0,52 is used per car per travelled kilometer (NIBUD, n.d.).

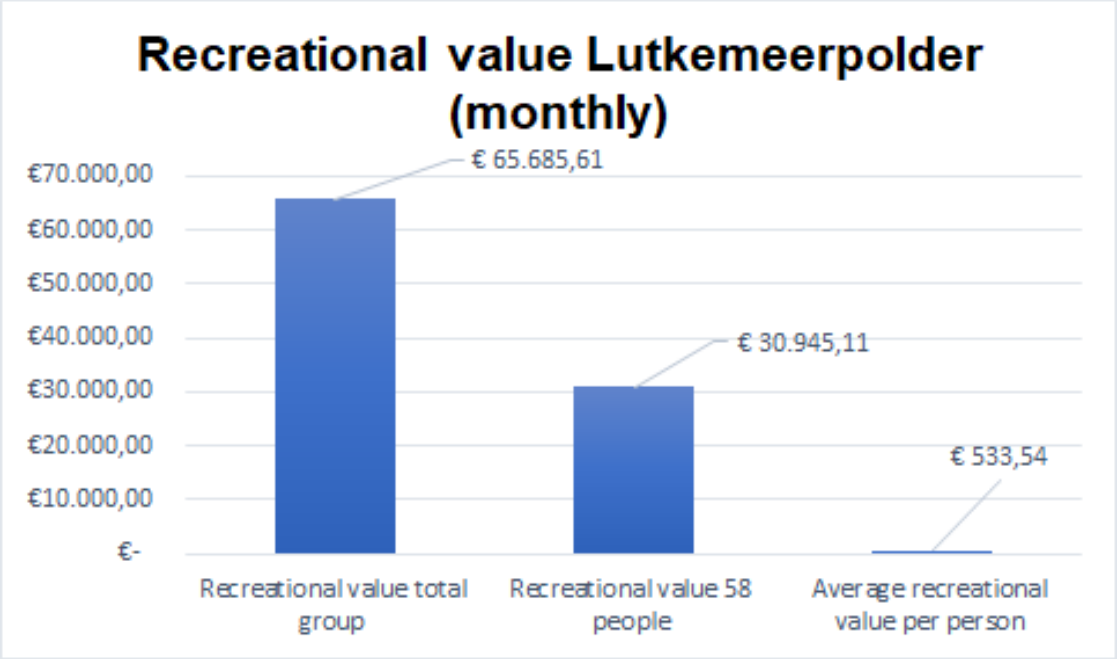


Figure 18: Recreational Value in the Lutkemeerpolder

The TCM is mostly used for analysing the recreational value of national parks or other areas with a high recreational use. In this sense the TCM may not be the perfect method to analyse the monetary recreational value of the Lutkemeerpolder which has an agricultural destination. Here, the amount of visits are not very high. The monetization is also based on the ability of people to memorize how often a month they visited the polder, how they got there, how long it took, how long they stayed and what activities they undertook. More research should be done to analyse more samples over a longer timespan to create a better understanding of the recreational value. Given the lack of theory on this topic, a case study from Germany is used to give a reference of the TCM used for rural agricultural land. According to the zoning plan of the Lutkemeerpolder it is not agricultural land. However, crops are still cultivated and from this specific perspective it is seen as agricultural land.

In 1996 research has been done in Germany to rural tourism using the TCM. Sometimes this kind of tourism is compared with farm tourism. In this research rural tourism is explained as tourism in a non-urban environment where agriculture is practiced. There is not much attention in the literature about this topic. The study area was located in the Southern part of Germany, in Baden-Württemberg. This area is characterized by moorlands and / or grasslands. This research also made use of surveys to analyse the length of stay, their activities and group size (Oppermann, 1996). The researchers found out that the expenditures were around 45 Deutsche Mark, converted € 31,73,- per day trip. This based on a price rise of 37,9% and an inflation rate of 1,3% between 1996 and 2019.

For the Lutkemeer the average recreational price is € 533,54 per month per person. On average people visit the polder twelve times per month. The cost per visit therefore is € 44,46. This is based on a travelled distance of 20,46 km, a travel time of 42,52 min (round trip) and an average residence time of 119,74 min (see table x). To put it in context with the German example the travel costs to the Lutkemeerpolder are relatively high. However, these two situations are not totally comparable given the inflation over time, the difference in salaries over time and given the changes in economic prices over time for travelling and so on. Nonetheless € 44,46 seems still significant.

Table 1: General Numbers about the Lutkemeerpolder

Average travel time to the polder:	21,46 min.
Average distance to the polder:	10,23 km.
Average residence time in the polder:	119,74 min.
Average amount of visits per month:	12 visits.

Intrinsic and other perceived values

To visualize the intrinsic and some other values, a tree structure will be used. Based on the recreants' objectives one objective tree will be made. This tree will show the perceived (intrinsic) values of the polder. See illustrations on figure 18.

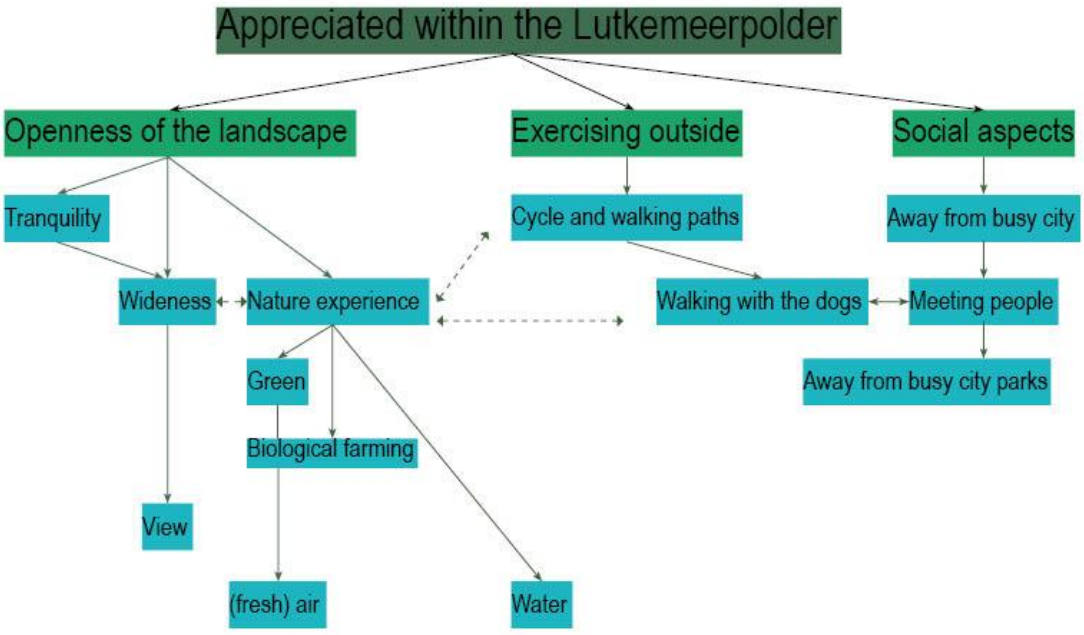
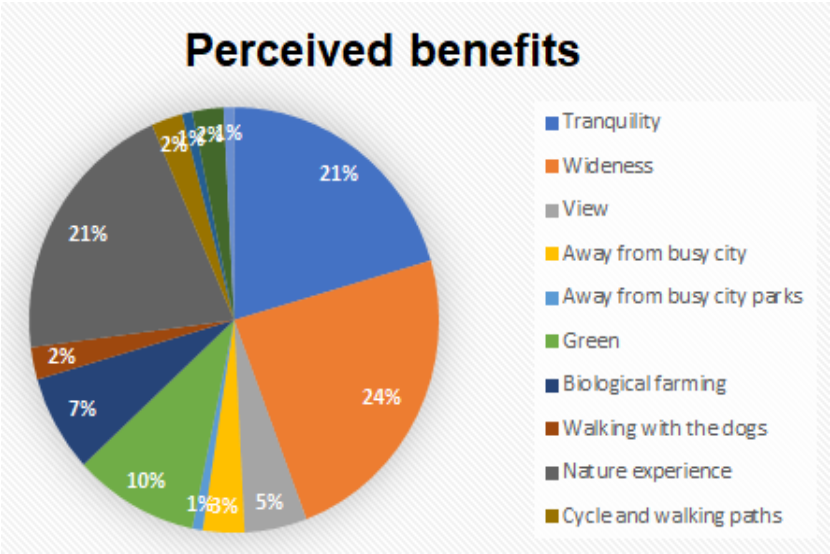


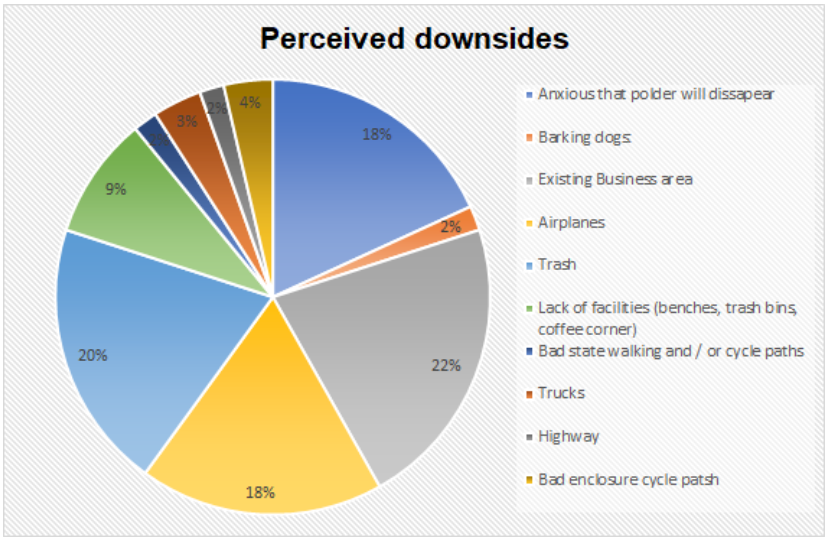
Figure 19: Intrinsic Value in the Lutkemeerpolder

When something is mentioned more often, it will be placed higher in the tree because it is perceived to be more important. The two pie charts will therefore indicate how many percent of the positive reactions were about 'what' positive perceived value and how many percent of the negative reactions was about 'what' negative perceived value. In total recreants mentioned 212 positive perceived benefits which also sometimes overlap. Therefore 13 categories are shown which indicate what people find important. The same is done for perceived downsides of the area mentioned by the recreants. The recreants mentioned 53 downsides in total which can be subdivided into 10 categories.



Pie chart x shows that recreants indeed value the rest they perceive in the polder, besides they also largely value the wideness and the natural experience. The greenery, the biological farm and the views are in addition also often mentioned and appreciated.

Figure 20: Perceived Benefits in the Lutkemeerpolder



Based on pie chart x it can be concluded that most recreants perceive the existing business park as a downside. They do not like to cycle through the area which, according to them, has no soul and is disturbing the view.

Figure 21: Perceived Downside in the Lutkemeerpolder

With the business park also comes a lot of trash. This is often mentioned by the recreants. They say that trash from the McDonalds (on phase 1 of the business park) can be found everywhere in the polder. The recreants therefore also fear the new business park and that the polder landscape will disappear. Given these facts it can be concluded that the recreational function of the Lutkemeerpolder will largely decrease when a business park is constructed.

By looking at the monetary value of the Lutkemeerpolder it can be stated that people are willing to pay (indirectly) a high price to visit the polder. They travel more than 40 minutes (round trip) in total, spent almost two hours in the area and undertake divergent recreational activities. These people are real rest-seekers as they mostly mention rest, wideness, openness, views, nature, landscape and biological farming as the main reasons to go there. This may relate to the average age of the visitors, which is 54 years. The recreants often heard compliant is that they fear that the polder will disappear.

Care Function of 'de Boterbloem' Within the Lutkemeerpolder

The second section of the structural diversification aimed to explore the contribution of the care farm value of 'de Boterbloem'. This section will first dive into the general aspect of the care farms in the Netherlands. Followed by an overall literature review concerning the perceived benefits from the patients by the care farm activities. Afterwards, the specific situation of 'de Boterbloem' will be elaborated on and finally its connection with Dutch policies.

Green care farm in the Netherlands

Nowadays, many farmers do not see any advantages in further intensification of the agricultural production and are engaging secondary activities (Elings & Hassink, 2006). Farmers are increasing their interest in organic farming and multi-functional agriculture (Hassink, Hulsink, & Grin, 2014), or landscape and nature conservation, energy production and recreation (Elings st al., 2006).

The Netherlands is a pioneer in the care farming, leading the way with approximately 1.000 care farms (Haubenhofer, Elings, Hassink, & Hine, 2010), which is an interesting example of multi-functional agriculture which connect agriculture and health (Elings et al., 2006). This kind of diversification from the common agricultural activities is also known as "Green Care", which uses natural elements to produce health, social and educational benefits (Hine et al. 2008, as cited in Haubenhofer 2010). Despite that, providing care can contribute to the solution of problems in Dutch cities (Eweg, & Hassink, 2011). Furthermore, care farms as stated by the Federatie Landbouw en Zorg (Federation of Care Agriculture) (n.d.) have four different financing options, so care farm activities can be an added income to the farm itself:

1. Care that is financed by the AWBZ;
2. Financing in the context of labor (re) integration;
3. Financing from agriculture;
4. Other sources of financing such as funds and subsidies.

The General Exceptional Medical Expenses Act (AWBZ) gives to every Dutch resident the right to various forms of assistance, care or daily activities. It is for people who need long-term care and support. Meanwhile, labor integration lies in a paid job for the patient and the employer can make use of financial help from that. Initially, the main target group were people with mental disorder or psychiatric problems, although, it has been seen a growing number of other target groups, for instance elderly, long-term unemployed, people in isolation or homeless people (Elings et al., 2006). Regarding the activities in which the patients are involved, mostly are horticultural activities followed by care for poultry, cattle and livestock (Elings et al., 2006). The perceived benefits of being involved in the activities from a green care farm are threefold: physical, mental and social well-being (Hassink et al., 2014). Furthermore, according to Elings (2006), these benefits are perceived because plants and animals are living creatures and clients feel part of a community instead of patients from a health institution.

Organic care farm 'de Boterbloem'

The family of the owner of 'de Boterbloem' has been farming in the Lutkemeerpolder for generations. The most recent generation turned the farm into an organic care farm. In fact, as stated by Hassink (2014), most of the care farms are also organic.

The organic care farm 'de Boterbloem' does not have AWBZ recognition or admission to that, although it works with Landzijde, which has received AWBZ accreditation in 2003. The scope of Landzijde is to bring together several care farms and stimulate collaboration between them, so that people who seek support with their day-to-day care in North Holland

can find a care farm more easily and there is a place for everyone on a care farm in his or her immediate living environment. The research group could not gathered information about the activities done in the past by 'de Boterbloem'. Currently, de Boterbloem, according to the interview with the person actively involved in the farm, gives daily care service to about five patients per day and in a weekly routine are about nine different patients. The patients who the organic farm is taking care of are persons with social handicaps, mental problems or burnouts. Those clients are no longer able to find employment in the society. Although, there is not really a rehabilitation program for them, and the patients are free to help the farmers in the activities which they prefer most. Some of the patients can be really active in gardening, others prefer helping in the housekeeping tasks and some of them just take the chance to being outside in nature instead of staying in a health institution. The care farm receives an income of about 50 to 80 euros per patient. This is possible because of the personal budget (PGB). PGB was introduced in 1995 for clients with mental disabilities, elderly people and youth with multiple problems in order to support them by giving them a budget which they can spend according to their own needs (Hassink et al., 2014).

Value of a green care farm

A green care farm, as stated by Eweg et al. (2011), establishes a value chain between rural and urban areas accounting different target groups. In the table X below, it is shown which are the different target groups and their related value.

Table 2: The Different Target Group and Their Related Value

Target Group	Value
Clients	– A daily routine outside an institution environment – Development of new skills and competencies – Recovery of self-esteem – Green environment
Farmers	– An extra source of income – Creates new network – Extra employees
National, regional and local level	– Improves the social well-being of urban inhabitants – Strengthen the economic value of the farms around the cities – Gives rehabilitation or reintegration program to people – Preserves agricultural landscape
Institutions	– Satisfaction of clients – Lower cost for daily care than health institution

The research on the perceived benefits from the activities in a green care farm is limited, although there are strong signals that this side activity has a positive impact (Anderson, Chapin, Reimer & Siffri, 2017). Studies have reported effectiveness of green care farms in adults with mental illness due to promotion of social interaction, possibility of doing exercises, increased self-esteem, and fewer negative behaviour (Anderson et al., 2017). Lastly, a green care farm is also community-based, engaging the participants in outdoor activities, social inclusion and to interact with farms, farmers, or other participants rather than health care facilities or professionals (Anderson et al., 2017).

In conclusion, it has been clearly stated the real value of a green care farm within an urban area and the perceived benefits to the participants. Unfortunately, all of the potentialities aforementioned are not fully developed at de Boterbloem due to a high level of uncertainty about the future situation.

Policy care farm

The farm ‘de Boterbloem’ fits within the goals of the national government for multifunctional agriculture. In their document “vier jaar impuls voor de multifunctionele landbouw” (2012) the national government describes its goals with regard to care farms among other aspects of multifunctional agriculture. The national government has explained that a growth in the number of care farms is a desirable situation and that existing care farms must be promoted. One large area of concern named in the document is the lack of actual agricultural products produced on many care farms. This is a result of care-institutions moving to farming instead of farms moving to care. The document goes on the explanation that 80% of people found it important that care farms are real farms with real agricultural production.

Within this context ‘de Boterbloem’ stands as a farm which moved into a care function and produces real agricultural products that can be purchased by the local community. ‘De Boterbloem’ and potentially the Lutkemeerpolder can fulfill a role in this increased demand for care in an agricultural context.

Educational Function of the Boterbloem Within the Lutkemeerpolder

The final section of the structural diversification aimed to explore the contribution of educational value in the Lutkemeerpolder. As stated above, the current situation does not depict the ideal situation for 'de Boterbloem' due to the continuing pressure of the scheduled business park. Therefore, also past educational activities will be evaluated. This section will follow the same logic as the previous sections. Namely, the literature concerning the educational aspect of urban agriculture will be discussed. Afterwards, the specific situation of 'de Boterbloem' will be elaborated on and finally its connection with Dutch policies.

Literature agricultural education

As being part of one the diversification goals, agricultural education has been depicted as one of the key side-activities that farmers can choose to engage in. In particular for urban agriculture, educational programs are stimulated by reason of their proximity to schools and 'urban inhabitants'. The nearness of agricultural land and urban inhabitants invites public participation for people from all age categories. According to Light (2002) this participation is crucial because a great deal of the urban population has lost their connection to nature and what it provides. He argues that "direct participatory relationship between local human communities and the nature they inhabit or are adjacent to is at least a necessary condition for encouraging people to protect natural systems and landscapes around them" (Light, 2002 p 157). This relatedness with and awareness of nature is what Light (2002) specifies as urban environmental citizenship. As an urban environmental citizen, you are concerned with "the fulfilment of ecological aims in a city concerned with both caring for ecosystems and building better civic communities" (Light, 2003).

Agricultural educational programs provide the starting block for people to become engaged with nature. Traveline & Hunold (2010) distinguish two social learning dimensions from participation with urban agricultural practices. First, by gaining knowledge concerning the production of food, the participants learn the origin of their food and the craftsmanship it requires. This can stimulate to make more informed decisions concerning their eating and consumption patterns. Secondly, by participating in these programs, people can learn to become more effective citizens. This implies certain positive effects on neighbourhood cohesion and feeling of meaningfulness by citizens.

The specific programs that farms provide differ substantially depending on the type of farm and the eagerness of the agriculturalists. However, most programs involve a chance for people to 'get their hands dirty' and experience the day-to-day activities concerned with growing food (Iles, 2005). The aim of these programs is to inform a new generation with a better understanding of the true value of food and the knowledge to make educated decisions in the future. Besides, by experiencing how to grow food both children and adults learn practical skills that can be useful for their future careers (Veenhuizen, 2014).

Educational function of 'de Boterbloem'

The farm 'de Boterbloem' has also organized a variety of (educational) programs. In the Boterbloem's business plan from 2011 it explicitly mentions one of its goals to be child education. In the following section a list of these activities will be provided, and some will be inspected more thoroughly. Unfortunately, the activities under investigation have not taken place during the period of research and are therefore solely based on evaluation reports, descriptions and interviews with participants.

From survey data and past activity lists, a variety of educational activities that were organized on 'de Boterbloem' can be indicated (see table #). As an indication of the educational value of these programs, some will be discussed more in depth.

Figure 22: Educational Programs in the Lutkemeerpolder

Children education days

Between 2009 and 2011 the Mantaan foundation organized ‘het ei van Ka en To’ on the soil of ‘de Boterbloem’. From the evaluation report of 2009 it becomes clear that the purpose of these daily events was to bring urban youngsters closer to the agricultural heritage in their surroundings. To add, the project was aimed to connect children with nature and agriculture in a playful manner. School classes from the surrounding area participated in the daily practices and only in 2009 already 483 students visited ‘de Boterbloem’ to participate in the events. The activity days consisted of a full program which included theatre, harvesting, making fire, playing with animals and learning about the food. Because of the success formula, it was held on the same location for three years in a row. Furthermore, the project also included days for children with a handicap. By means thoughtful organization ‘de Boterbloem’ was made wheelchair friendly and in that way gave the opportunity for wider public to enjoy an outdoor day.

Action day - Tuinen van Lutkemeer

As a countermeasure against the business park, the organization of ‘Behoud Lutkemeer’ has organized the event: ‘Tuinen van Lutkemeer’. During this event the protesters against the plan squatted a part of the Lutkemeerpolder in order to grow food as a sign of protest. During this event, also room was given for educational practices of the participants. Through workshops and active gardening, the goal was to show the participants the importance of nature and the soil.

Interactive food and harvesting days - Aardappel Rooidag Program (Potatoes Harvesting Day)

During the Aardappel Rooidag children and grownups harvest their own potatoes which they can take home afterwards. The purpose of this event is to teach the participants the origin of their food and bring them closer to nature by doing the act themselves. From an interview with a person actively involved in ‘de Boterbloem’, it became clear that over the course of the day you can witness the children change their perception towards the act of harvesting. Before the harvesting commences most of the children are withdrawn and do not feel excited to participate in the ‘dirty’ act. However, after a couple of potatoes have been harvested the mindsets of the children change into an ongoing harvesting spree.

As already stated above, the scope and number of some of these activities has decreased significantly with the increasing pressure from the business park. According to the interview with the respondent from ‘de Boterbloem’ most parties have chosen for different locations and do not want to invest time and money in such a precarious situation. However, it must be noted, that ‘de

Boterbloem' is not connected to the 'platform Boerderijeducatie Nederland' which is an authority specialized in connecting schools with educational farms. Until this moment 'de Boterbloem' has solely been organizing sporadic events which make it difficult to build a large network.

Vision of educational function urban farming

In the 'Agenda Groen 2015-2018' (2014) (Green agenda) from the Municipality of Amsterdam their perceived importance concerning the educational aspects of urban agriculture is explicitly mentioned. It states that aside from the economy and sustainability, urban agriculture is important for raising awareness. This awareness is mostly focused on factors of health since taking part in the production and consumption of healthy products in a nourishing environment is seen to be important. Furthermore, the municipality perceives neighborhood participation and social cohesion as two beneficial results of urban agriculture.

Discussion

In the following section, the principal results from the research will be analyzed and discussed. Per section the different outcomes will be given meaning to their multifaceted context. This context is important for conferring meaning to the values that are sought for as it provides understanding to which aspects are more crucial for the area and which are of less relevance. The discussed policies will provide the tool to give this meaning to the findings since they represent the future direction that the country wants to head into.

The valuation

The review of the municipal documents revealed that there are different perspectives on the valuation of the Lutkemeerpolder. This can be especially seen when the motion 316 was issued. Before that motion, the same political party approved the construction of the business park without considering the societal value and the arable land. However, it can be argued that a paradigm shift happened over the years justifying the alteration or at least review of the land use plan. Thus, the valuation of the Lutkemeerpolder and the farm 'de Boterbloem' is not consistent within the municipal government. The land is valued in two manners, in a monetary and non-monetary way. These methods of evaluation are rather different, focusing on economic welfare and societal welfare, respectively. This report stepped away from valuing it solely in either way but aims to describe and analyze the witnessed values within the Lutkemeerpolder and the farm 'de Boterbloem'. Nevertheless, it is important to point out that there is a legal perspective to this issue. The Municipality of Amsterdam entered a contract, which legally binds to either actions or financial compensations. Moreover, there is the wider context of Schiphol International Airport, which is within the national planning interest.

Organic farming

As a start, the comprehensive value of organic farming was researched. From the literature it becomes clear that organic farming positively affects the environment. By the environmentally friendly use of fertilizers and pesticides, organic farming can be considered an additional value to the natural surroundings when compared to conventional farming. Therefore, the organic practices of 'de Boterbloem' can be considered to be of value to the Lutkemeerpolder. In addition, the majority of the interviewed consumers state that they purchase Boterbloem products because it is organic and fresh. Another motivation to purchase organic products is to support local entrepreneurs. This line of thought fits within the statements and vision of the Municipality of Amsterdam with regards to their food policy. As they argue that steps should be made to ensure that in 2024 organic local produce is regularly available in Amsterdam. The municipality even go so far as to say that land must be made available to reach this goal. The stated goals of the municipality with regards to food are shared with these consumers who support 'de Boterbloem'. Interestingly, the municipality does not bring its goal of supporting agricultural land within the city borders into practice. Its involvement and investment in the SADC ensures that its own fear of insufficient agricultural land for local production becomes a reality. The local government can play a considerable role in either promoting or hindering local agriculture.

Natural value

To assess the natural value of the Lutkemeerpolder, two perspectives were taken. Firstly, a wider angle was chosen to assess the natural qualities and defining characteristics of the area and secondly, the natural qualities of the organic farm 'de Boterbloem' were evaluated. This valuation was based on a literature study and field visits as well as a policy review. From this it became clear that there is value to the farms' land, in terms of its soil quality especially with respect to its agricultural fertility. Moreover, the current condition of the water system in the area will be beneficial for supporting the agriculture activities particularly organic farming due to its lower groundwater level. It is of importance to retain the current quality of surface water in the Groene AS area, especially since both literature and field observations proved that the water quality of the areas surrounding the study area is worse than within the Groene AS. A deterioration of water quality in the Groene AS area means a decrease in biodiversity. Additionally, it can be stated that that the land offers space for foraging or breeding/nesting grounds for species of fauna.

When valuing the wider area of the Lutkemeerpolder it becomes clear that the defining value is twofold. Firstly, a part of it belongs to the NEN, the Groene AS and an ecological connection zone for the migration of flora and fauna runs along its border. Secondly, the area is classified by the city of Amsterdam as a 'Stadsrandpolder', exempting the farmland of the farm 'de Boterbloem'. However, the area identified as a Stadsrandpolder defines its value via the cultural-historical landscape. This defining characteristic is crucial to maintain the calm, recreational profile of the area. Whereas, building plans within HGS are examined for their impact on the green and

recreational infrastructure, building plans next to HGS areas are not scrutinized on their impact on flora, fauna, the green infrastructure and recreational value. This presents itself as a shortcoming, keeping in mind that landscape value is created by the wider surroundings of an area.

Multifunctional farming

Finally, there is a potential added value to the Lutkemeerpolder through its multifunctional functions. From the literature and inspection of the area, three important multifunctional functions were distinguished: Recreational, care, and educational. The recreational value was analyzed for the Lutkemeerpolder, whereas the care and educational function were solely focused on the farm 'de Boterbloem'.

The recreational value was analyzed both in monetary and non-monetary terms. Firstly, what became clear from initial analysis is that the Lutkemeerpolder was perceived more important for a wider public as what was initially expected. A relatively high level of effort was observed for people to travel to the particular location. As an explanation for recreating in the Lutkemeerpolder the participants stated the openness, natural values and tranquility to be the most important. In their views, these factors make the area unique for the hectic city of Amsterdam and preferable over (closer) city parks. Furthermore, 'de Boterbloem' itself was also considered to be a valuable place for recreating. The biological products and the 'green' open farmland gave reason for people to travel significant distances to spend time at the farm. Through the use of the travel cost method, it became clear that people spend a relatively high amount of money to travel to the Lutkemeerpolder.

In terms of the care function, over the past decade the Netherlands has become a pioneer in combining agriculture and aspects of health care. When executed correctly, care farming is considered a formula of success in which the (small) farmers can maintain a healthy enterprise and the green area very promising for treating patients (remedying). Furthermore, with the aging population, care farming can take part of the burden from existing care institutions. The Municipality of Amsterdam recognizes these benefits and has actively pursued their upsurge. The farm 'de Boterbloem' fits into this policy because of their care program, however, the care function which is currently in effect is basic and without any rehabilitation or integration program. For these reasons, the value of the current care function can be considered inadequate given the support one can receive and the potential of the area.

Given the literature concerning farm education, it becomes clear that education as being one part of the diversification methods, can be of substantial value for both the farmer (in monetary terms) as for the wider region (in education and health benefits). The Municipality of Amsterdam considers this 'agricultural educational value' to be of importance and supports certain projects in monetary terms. To create adequate educational value on a farm, constant and active

organization is required. In the Lutkemeerpolder this is only partially the case since there is only one farm (‘de Boterbloem’) that organizes educational activities. Besides, the activities that are organized at ‘de Boterbloem’ are only by occasion and are not actively maintained. Therefore, the current educational value can be considered insufficient given the available land and the support one can receive. Given the demand and interest of the municipality on this aspect of agriculture, this can be considered an aspect in the Lutkemeerpolder that can substantially increase its value, if organized systematically.

Conclusion

The Lutkemeerpolder has been a point of discussion between various stakeholders over the past decades. Over time, the dispute has developed from one concerning claims to one piece of land into one that concerns a wider context. Various claims were made by parties involved about the relevance of their project on this plot of land. These claims are related to their perceived positive contribution to the wider metropolitan area of Amsterdam and the natural environment. Countless statements were made; however, few could be verified.

In the past sections, the research has dived into the valuation of the Lutkemeerpolder in Amsterdam as an attempt to clarify the claims made around its value. It aimed to do so in a scientific sound manner to ensure the absence of any inconsistencies. Through thorough literature studies and field observations, the most important aspects of the area were indicated. These aspects of study eventually brought the following values that were investigated: agricultural-, natural- and multifunctional value.

These values can be implicitly divided into natural and societal values. The most apparent retrieved value stems from the agricultural production in the sense that it is indeed the last plot of fertile ‘clay’ soil within the boundaries of the municipality of Amsterdam. This does not solely relate to the land’s natural value, but also gives it a sense of uniqueness. In addition, ‘de Boterbloem’ is farming organically. This adds significant value to the land for both society and nature. First, organic agriculture releases significant pressure from the environment. On the other hand, it fits well within the demands of the municipality and consumers. Moreover, the researched examined the respective natural values. It was found that part of the Lutkemeerpolder is within the NEN and that an ecological connection zones runs along its border. The farm land itself does have a unique soil profile for the Municipality of Amsterdam. Also, it can be argued that the farm land provides indirect landscape value to its surroundings which are classified as a ‘Stadsrandpolder’ by the municipality in its Structural Vision 2040. an

The societal value of the Lutkemeerpolder is mostly contributed by the farm ‘de Boterbloem’. Both care-functions and educational activities are organized on this farm. The active character of the participants of this farm, has led to a situation where the farm is known by a wide range of people. However, by analyzing both functions, it becomes clear that the land is not being used to its full potential. Both the care-programs and educational activities are insufficiently being used given the demand from the municipality and the people residing in the wider region. Additionally, the recreational value of the Lutkemeerpolder is mostly depicted by the openness and the tranquility of the area. Recreants from the wider region visit the area for these specific aspects that some say cannot be found anywhere else in the city.

In the above, the most important values have been explained separately and put into their policy context. What becomes clear from the analysis is that some aspects can be considered to have higher values than other ones. However, what does this mean for the bigger picture of the Lutkemeerpolder. As described above, the polder is in a state of transition where the pressure from the business park has been influencing its state for the past decades. This document has made an attempt to depict the comprehensive values of the area. These values give a realistic image of the Lutkemeerpolder’s contribution to society and the environment. What one perceives to be more important, a business park or an agricultural polder, is a matter of preference? Nevertheless, this report has shown that national-, regional- and municipal policies/visions are mostly in line with the values attached to the Lutkemeerpolder. For that reason, the governmental policies on different scales have, themselves, shown the value of the area as it is now.

It should be noted, however, that in all researched pillars significant room for improvement could be noted. Therefore, as a last section, specific recommendations will be presented. These recommendations have crystallized during the research process and are aimed at improving the value of the different aspects within and around the Lutkemeerpolder.

Recommendation

Derived from perceived room for potentials during the research, a list of recommendations will be provided. These recommendations will be partially directed towards municipal policy and partially towards ‘de Boterbloem’. All of them are situated in the context of the Lutkemeerpolder and were designed after thorough considerations. The order of the recommendations follows logically from the same layout as the chapters.

Agricultural recommendations

Recommendation:
The Lutkemeerpolder should be fully used as organic agricultural land in order to meet the goals of the Municipality of Amsterdam for local organic farming

Considering the goals and the situation of the Lutkemeerpolder now, promotion of the region as an agricultural area makes sense. The area is suited for agriculture. It is located near the city and as can be seen with 'de Boterbloem', people are willing to travel and appreciate the ability to buy local fresh food. From this policy vision it is logical to use this land as organic agricultural land for the local market. When the Amsterdam food policy expresses the fear that their goals for increased local food production and autonomy may not be met due to lack of available agricultural land it makes little sense that the city government is a large stakeholder in a company that seeks to actively replace agricultural land with a business park.

With regards to the local food policy goals in place, the idea of the local government promoting the Lutkemeerpolder as an area of diverse organic agricultural production for the local market makes sense. This would allow a farm like 'de Boterbloem' to continue its existence and makes it possible for the remaining land in the Lutkemeerpolder to move towards organic production focused on the local market. This area could then be used to offer people interested in farming opportunities on this land (fitting with the goal of promoting and providing opportunities for agricultural/food education).

Nature based recommendations

Recommendation:
Conduct research into plant and animal species (permanently) present in the study area

More research needs to be done into the species that are present in the area, either permanent or temporary. The literature studies that were looked into for this report were based on secondary sources: the practical data is, at the point of writing this report, still recent (an ecologist visited the area on the 14th of March, 2016). On the basis of the available data (report from 2010, quick scan on ecology from 2016), it is recommended that an in-depth study on plant and animal species is to be carried out, this research is needed to get a better overview on species present to get a better indication of the natural value of the area. In addition to this, data on, for example, soil nutrient status and soil (water) pH may give insights into the possibilities for development of the area/desired species.

Recommendation:
Open an inquiry into whether the rest of the Lutkemeerpolder is suitable to be included into the National Ecological Network and the Groene As or Tuijnen van West.

As the analysis above showed, the surrounding area is almost completely included within a green infrastructural project, either on (national) provincial or municipal level. Hence, the question can be posed if the farm and its respective land should not be taken up as well. An argument for this can be made, since the analyzed activities are in line with the ambitions of the province North-Holland and the Municipality of Amsterdam, in terms of a creative combination of agricultural production, education, recreation and a good quality environment. Also, it could be argued that if the current building plans will be executed, a decrease in the cultural-historical landscape value for the surrounding area will occur.

Recommendation:
The farm 'de Boterbloem' should adhere to fulfill the standards of a nature-based agricultural farm.

A short analysis was provided with respect to the characteristics of nature-based agriculture. Yet, this analysis is too superficial to come to a concluding classification. However, such an assessment can be of value to the farm 'de Boterbloem' to strengthen its competitive position as an urban agricultural enterprise. The involvement of the WUR Science Shop provides a good starting point for such an assessment.

Care-farm recommendations

Recommendation:
'de Boterbloem' should engage in cooperative entrepreneurship through collaboration with the care farm organization to facilitate the creation of a proper rehabilitation or reintegration program.

The engagement in cooperative entrepreneurship by 'de Boterbloem' in the care activities will be facilitated by being a partner with the Landzijde Foundation. This could increase the amount of participants through the network. By joining this network it will be possible to create a proper rehabilitation or reintegration program with detailed activities for different patients with different disabilities, and benefits from their related specific benefits.

Recommendation:
'de Boterbloem' should increase the current quantity of animals present at the farm.

The survey conducted during research often mentioned a lack of animals at 'de Boterbloem'. Research has shown that animal therapy can improve social behaviour and emotional regulation (Anderson et al., 2017). According to Haubenhofer (2010) different animal-based therapies have been recognized: animal-assisted activities, animal-assisted therapy, animal-assisted interventions and other animal-based healthcare interventions. This is an area in which 'de Boterbloem' could improve its care function.

Appendix 8 summarizes the research by Haubenhofer et al., (2010) and Anderson at al., (2017) on the different care activities which could be organized and the perceived benefits from the related clients. Thus, could be helpful for 'de Boterbloem' to better define its care activities, focusing on specific target groups and engage a cooperation with different health institutions.

Educational recommendation

Recommendation:
Increase and structuralize the educational activities on 'de Boterbloem' by joining 'Platform Boerderijeducatie Nederland'.

For a farm that aspires to have an educational function (as described in the business plan of de Boterbloem 2011), the current activities can be considered limited. Apart from sporadic events, 'de Boterbloem' does not structurally organize educational activities in order to use the full educational potential of the land. This is not solely a result of the pressure from the business park, since also in the preceding years, 'de Boterbloem' did not substantially organize educational events.

Taking into account the goal of 'de Boterbloem' and the agricultural educational aspirations from the municipality, stimulation of the educational practices on 'de Boterbloem' can be considered preferential. One way to do this is by joining 'Platform Boerderijeducatie Nederland'. This platform links local farmers' small- and large-scale educational programs. By signing up, immediate involvement in a network of schools will follow. This interconnectedness will not only provide a wider range of students who can visit the activities, but also more people will experience the nature which can serve to stand stronger against the municipality's plans. Moreover, by joining the platform a certification will be granted which will contribute additional value to the farm.

Recreational recommendations

Recommendation:
Improve the quality and the connectivity of cycling routes in the Lutkemeerpolder.

It has been indicated by many recreants that the cycle and walking paths are of a bad quality in some places around the Lutkemeerpolder. Especially for older people this can be a problem. Cycling routes in the Business park (phase one) needs to be improved. Recreants experience trucks to be unpleasant in the area. Also the accessibility and enclosure of the polder with cycle routes needs to be improved.

Recommendation:
Keep the landscape of the Lutkemeerpolder as open as possible.

The open and natural landscape of the Lutkemeerpolder is very much appreciated by the recreants. This is also one of the main drivers for them to visit the polder. When these values are gone people will not find quietness anymore in this specific polder. It has also been proposed in the surveys to plant more trees and use more green barriers to cover up the existing business park. When possible, the municipality and SADC needs to facilitate this.

Recommendation:
More recreational facilities are needed within the business park phase one and within the polder itself.

Recreants experience a lot of (fast food) trash within the polder and the business park. More disposal facilities and surveillance is needed. Furthermore people miss facilities like benches, coffee corners and other places to rest. People with walking difficulties and elderly people do not have enough possibilities to stop over. When possible, the municipality needs to facilitate this.

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Appendix

1. Appendix: Stakeholder Overview

Stakeholder long-list

The situation surrounding the Lutkemeerpolder is highly complex. There are many stakeholders involved which relate to the future development of the land. List of stakeholders can be seen below:

'De Boterbloem'

'De Boterbloem' is an organic agricultural farm focused on small scale and ecological sound food production. It sells its products but also organizes harvest activities, theatre plays and offers education and recreation to its visitors. Additionally, is it used a care-farm.

Stichting Landzijde

The aim of the Stichting Landzijde is to provide daycare on farms to people who require special care. 'De Boterbloem' is one of three farms which are part of the Stichting, the others are De Kwekerij and Boer(en) Zorg. This association pays 50 to 80 Euros a day per participant to the farms.

Workgroup 'Behoud Lutkemeer'

The WBL designed a future plan for the Lutkemeerpolder. This plan focuses on local food production and societal benefits in terms of community involvement. The group is composed out of consumers and agricultural businesses.

Werkgroup 'Biopolder'

WB is a group of concerned group of citizens. These citizens advocate for a preservation of the current situation but also created the future plan for the area, namely a Biopolder.

Municipality of Amsterdam

The Lutkemeerpolder lies in the jurisdiction of the Municipality of Amsterdam. The municipality is a stakeholder (50%) in the 'GEM Lutkemeer BV', together with SADC. It is also involved in the SADC with 25%.

Schiphol Amsterdam Development Company (SADC)

SADC is a company established 30 years ago in order develop land surrounding the Schiphol area. It was set up by the municipality Amsterdam, Haarlemmermeer, Schiphol Real Estate and the province Nord-Holland. Their aim is to develop the Lutkemeerpolder into a business park. Each party has 25% stake in the company.

‘GEM Lutkemeer BV’

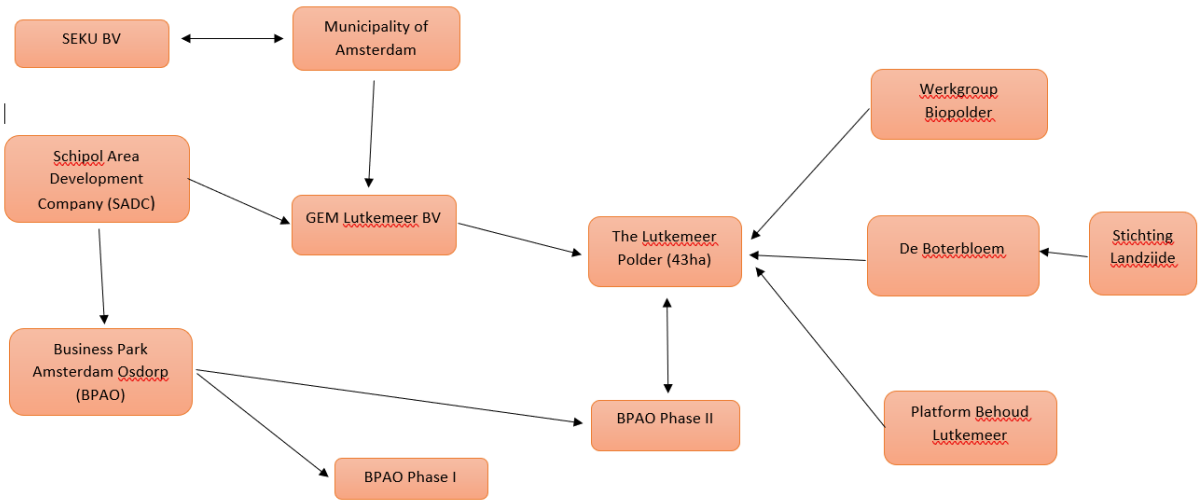
The GEM Lutkemeer BV is a company set up by the SADC and the Municipality of Amsterdam in order to develop land into business areas. Each have 50% stake in the company.

‘SEKU BV’

The SEKU BV is a project developer which bought 8 ha of the land and sold it with an increased price to the municipality. The land was bought for 2,3 million and sold for 8 million. Yet, SEKU BV also secured rights to develop the land (33%). SEKU BV is now pressing to develop the land.This process was not legally sound since corruption was involved. Ton Hooijmaiers, the former politician responsible for land development policy received money from this transaction. He was convicted for corruption and a process against the CEO SEKU BV is going on.

Civil Society

Civil society is engaged with the Lutkemeerpolder and the farm ‘de Boterbloem’ in different ways. Firstly, there is a relation to the agricultural production in terms of the purchase of organic products at the farmer’s store. Secondly, individuals engage into recreational or/and educational activities on the farm and within the Lutkemeerpolder.



2. Appendix: Personal Interview

Questions for the Interview

Farm-Agriculture part:

- Is the Lutkemeerpolder 43 or 42 hectares?
- Boterbloem is now …. Hectares?
- What percentage/how many hectares of that is used as agriculture?
- What type of agriculture are you doing?
- What types of agricultural products are produced?
- Has this changed over time?
- What amount is being produced?

- What products are being made from this if any?
- How is the food distributed now?
- Where is it being sold? How do people get it? Is it only available on site?
    - Has this changed over time?
- How many people eat from this food?
- How many people work on the farm now?
- How many of these full-time?
- Is the Boterbloem certified organic?
- Does the Boterbloem get subsidies?
- Who owns the other land in lutkemeer?
    - You mentioned two farmers?
    - One rents it out? And the other has sold his land?
    - What does this mean “sold his land”? When and to whom? He is no longer the owner then?
- How many hectares do these farmers both have?
- Who works on the land now?
- What do they produce?
- Is it “pacht”” or does he hire “loonwerkers”?
- Does the plan for the businesspark infringe on both these farmer’s land?
- Have you talked to these other farmers about the situation?
    - What do they think?
- What is their agreement with the city?
- Gebruikscontract? Do/did they (other farmers) own the land? Did they rent it?

<u>Recreational part:</u>

- What kind of people / groups of people come to the Lutkemeer to recreate? (elderly, families, youngsters)
- Where do they mostly come from? (city centre, surrounding neighbourhoods)
  Are there, in the Lutkemeerpolder, enough spots to stop over or is the area more focussed on passing by recreants?
- Are there situations when you experience ‘crowding’ in the Lutkemeerpolder when it comes to recreation? So, too crowded situations?
- What are the most important recreational activities in the Lutkemeerpolder?
- What is considered the most valuable aspect of the Lutkemeerpolder when it comes to recreation?
- What is missing in the Lutkemeerpolder when it comes to recreation? (connections, things to do)

<u>Communal part:</u>

- According to you, what is the most important aspect that the community currently recognized in the polder?
- And related to that, what do you recognized as important for the community at the current situation?
- Are currently organized any festivals / initiatives open to the public at the Lutkemeerpolder?
- If yes, what kind of initiatives are? (food-related, natural-related etc.)

- What are the claims of the inhabitants living close by the polder about this situation?
- How will you see involved the community in the bio-polder plan?
- How are they involved nowadays?
- Is there currently a program for people with disabilities or mental disorder in the Boterbloem?
- Does the Boterbloem have volunteers? Which activities do they do?
- Do elderly people feel the importance of keeping the Lutkemeerpolder? Are they involved in any activities or programmes?
- Are there any workshop, regarding agriculture, food production, sustainability that are organized in the Lutkemeerpolder?
- Which is the closest neighbourhood? How easy is it to reach the area? How accessible is the area?
- Are those neighbourhoods identified in the Lutkemeerpolder? Is it considered by them a kind of a landmark, which should be maintain?
- Do you think that around the bio-polder their opinion can change?
- Are you, or the Boterbloem, collaborating with some association?

Educational part:

- What educational activities are offered?
- Do you have to take home messages which you want to convey?
- By whom are educational activities offered?
- For whom are those educational activities designed?
- Do you have groups (pupils) that come on a regular base?
- Do you make advertisements for the educational services which are offered here?
- Do you make use of external learning materials?

Natural part:

- What is historical landscape use (before current situation) in Lutkemeerpolder? (is it initially peatlands/grassland/Biopolder/lake or what? Is there any data available? Any documents?
- Do you think the Biopolder has a function for climate adaptation?

Hydrology:

- What is the water source and where does the water flows (outlet)? Do you have access to any documents on hydrology/maps?
- Is there any floods event or water level rise in Lutkemeerpolder? if yes, do you think the Biopolder has a function as flood risk protection?
- Are there any wetlands in this area. If any, what is the function of wetland surrounding the area? For wastewater or irrigation?

Agriculture:

- Have you ever heard about struvite (as fertilizer for farming)? Or zeolite/clinoptilolite?
- What about agro-ecology? Are there documents available, or knowledgeable stakeholders we can interview?

- What crops do you use/plan on using? Any crop rotations? Is there information available/written down? Have you done research on that before?
- Any specific plans as to the biological/ecological agriculture?

Biodiversity:

- Do you have access to any specific documents on biodiversity/natural values?
- Do you know any experts on biodiversity in the area? Perhaps ornithologists, ecologists, et cetera?
- Is there any (specific) wildlife habitat in Lutkemeerpolder?
- Is there any native plant as an identity of nature in this area?
- Is there data available on flora/fauna species in the area?
- What did you or community do to preserve biodiversity in Lutkemeerpolder? (what action or what have they done)
- Is the area being used for citizen science purposes? (vogelteldag, vlinderteldag/insects)

3. Appendix: Consumer Survey

Survey:

Wij stellen het zeer op prijs dat u de tijd wilt nemen om deze korte survey in te vullen! Voor een onderzoek van de universiteit Wageningen met betrekking tot de Lutkemeerpolder zijn wij geïnteresseerd naar zijn huidige waarde. De volgende vragen hebben zowel betrekking tot de Boterbloem als de gehele Lutkemeerpolder. Wij vinden uw privacy zeer belangrijk en garanderen u dat er zorgvuldig met de informatie omgegaan zal worden en u te allen tijde anoniem zult blijven.

Leeftijd: .....

Geslacht: .....

Opleidingsniveau: .....

Onderwerp 1. Bereikbaarheid en waardering Lutkemeerpolder

1. Met welk vervoermiddel bezoekt u de Lutkemeerpolder?

Auto / fiets / lopend / openbaar vervoer / anders, namelijk: .....

2. Uit welke woonplaats komt u? (wanneer uit Amsterdam, welke buurt?)

.....

3. Hoe lang doet u erover om bij de Lutkemeer te komen?

..... minuten.

4. Wat is de afstand die u aflegt om bij de Lutkemeerpolder te komen?

..... kilometer. Als u niet zeker bent, maak een inschatting: 0 tot 5 km / 5 tot 10 km / meer dan 10 km.

5. Hoeveel tijd brengt u gemiddeld door in de Lutkemeerpolder?

..... minuten.

6. Met hoeveel personen / met wie bezoekt u de Lutkemeerpolder?

..... personen, namelijk…….

7. Hoe vaak per week / maand komt u in de Lutkemeerpolder om te recreëren?

..... keer per week / ..... keer per maand.

8. Welke activiteiten onderneemt u wanneer u in de Lutkemeerpolder bent?

.....

9. Wat waardeert u het meeste aan de Lutkemeerpolder gezien de recreatieve waarden?

.....
....

10. Wat vind u een minpunt binnen de Lutkemeerpolder gezien de recreatieve waarden?

.....

<u>Onderwerp 2. Activiteiten georganiseerd door de Boterbloem</u>

11. Neemt u deel aan de activiteiten van de Boterbloem?

ja/nee

12. Zo ja, hoe vaak per jaar? …….

13. Hoe hoort u over deze activiteiten?

Social media/ krant/ flyer/ nieuwsbrief

14. Wanneer u vaker aan de activiteiten deelneemt, komt u dan dezelfde mensen tegen?

Ja/nee, anders, namelijk…….

15. Worden er ook activiteiten voor ouderen georganiseerd en gaat u hierheen?

Ja/nee, wanneer ja welke zijn dit?:

.....

16. Ik ben tevreden met hoe deze activiteiten worden georganiseerd

Zeer mee eens / mee eens/ neutraal / niet mee eens / totaal mee oneens

17. Heeft u suggesties voor veranderingen/ nieuwe activiteiten? Zo ja, welke?

.....

Onderwerp 3. Educatieve programma's voor kinderen op de Boterbloem

18. Heeft u, of een van uw kinderen, ooit geparticipeerd in een van de educatieve programma's die plaats hebben gevonden op het terrein van de Lutkemeerpolder (Boterbloem)? Zo ja → Wanneer en welke?

19. Zou u geïnteresseerd zijn in een kort telefoongesprek (ca 5 min) m.b.t. uw ervaring over de desbetreffende educatieve activiteit? Laat dan uw voornaam en telefoonnummer hieronder achter, dan neem ik contact met u op.

……..

Onderwerp 4. Biologische winkel van de Boterbloem

20. Hoe vaak koopt u producten bij de boterbloem?

……. keer per …….

21. Welke producten koopt u meestal van de boterbloem?

…….

22. Welk percentage van uw boodschappen komt van de boterbloem?

…….

23. Waarom koopt u bij de Boterbloem?

……

4. Appendix: Dimensions of nature-based agriculture

An overview over the different dimensions with respect to nature-based agriculture. Retrieved from Letter No. 144 to the House of Representatives (2016/2017).

1. A nature-based system is based on biodiversity, which makes essential contributions to farming practice, including natural prevention of diseases and pests, pollination, the supply and treatment of water, natural soil fertility and a good soil structure. This is known as functional agro-biodiversity. Nature-based agriculture starts with the maintenance, improvement and utilisation of biodiversity and the services it offers the farm.
2. By closing nutrient cycles based on those services provided by nature, more efficient use can be made of natural resources and the negative impact of farming practices on the natural environment - water, soil and air - can be reduced further and further. This creates opportunities for specific species on the farm and in the surrounding countryside.
3. Finally, there is the matter of maintaining landscape elements and measures for specific species on the farm. The construction and conservation of landscape features make it possible to maintain a green infrastructure at agricultural establishments. This is important for the flora and fauna in agricultural areas. Landscape elements, in turn, also play a part in improving the functional agro-biodiversity on the farm.

5. Appendix: Nature-based agricultural levels

An overview of the different levels on which nature-based agriculture happens. Retrieved from Letter No. 144 to the House of Representatives (2016/2017).

- Level 0: There is compliance with regulations only. The inclusion of nature does not feature in the farming practice.
- Level 1: Biodiversity is advanced by taking measures for specific species on part of the land, for example, measures connected with the collective approach of agri-environmental schemes, but also by putting up nest boxes or through farmyard vegetation. Organic pest control in greenhouses is also included at this level.
- Level 2: In order to improve functional biodiversity nutrient cycles on the farm are optimised, scope is given for animals' natural behaviour, and landscape elements are constructed and maintained as a means of supporting functional agro-biodiversity. In addition, measures in respect of specific species are taken.
- Level 3: An adaptive system where cycles are optimised and where the crops grown and livestock breeds kept reflect the characteristics of the environment, as well as the options it offers and precludes. Creating and preserving landscape elements and measures for specific species are an integral part of farming practice. The farm is part of an integrated system with the surrounding landscape and neighbouring farms

6. Appendix: Definitions Green Areas within HGS

Definitions of green areas 'Stadsrandpolder' and 'Curiosa' retrieved from Structuurvisie Amsterdam 2040: Economisch sterk en duurzaam (2011).

Stadsrandpolder	
Gebruik, gewenste beleving	Landschapsbeleving en agrarisch gebruik staan centraal. Voor recreanten is routegebonden recreatie van belang. Beleven van de openheid en het historische landschap.
Gewenste zonering	Niet van toepassing.
Type beheer	Agrarisch natuurbeheer (bij voorkeur).
Ontsluiting	Kavels zijn particulier eigendom en dus niet ontsloten. In overleg kunnen natuurpaden worden uitgezet. Buiten de kavels ontsluiten voor wandelaars, fietsers, kanovaarders en schaatsers, en beperkt voor de auto (autoluw).
Curiosa	
Gebruik, gewenste beleving	Divers. Centraal staat het behoud als uniek cultuurhistorisch, natuurhistorisch of landschapsarchitectonisch monument.
Gewenste zonering	Niet van toepassing.
Type beheer	Varieert van intensief tot extensief en is gericht op behoud van de huidige waarde.
Ontsluiting	Zeer beperkt toegankelijk: Stenen Hoofd. Alleen tegen betaling toegankelijk: Hortus botanicus en Artis.
Bezoekersdruk	Afgestemd op de capaciteit.
Voorbeelden	Stenen Hoofd, Artis en Hortus botanicus. Van het Stenen Hoofd vallen alleen de kademuren onder de Hoofdgroenstructuur vanwege de beschermde muurplanten.
Beleidsintentie	De unieke kwaliteiten van het gebied moeten in stand blijven. Binnen die randvoorwaarde streven naar zo optimaal mogelijke recreatieve waarden en belevingswaarden. Ook niet toegankelijke gebieden moeten beleefbaar zijn, bijvoorbeeld via routes in de nabijheid. Het gebied moet zorgvuldig worden beheerd volgens een vastgesteld beheerplan.
Inpasbare voorzieningen	Betaalde toegang: passend bij aard van de functie. Stenen Hoofd: onbeperkt op de dam.

7. Appendix: Steps of the Travel Cost Method

Steps of the Single Site Travel Cost Method based on Parson, 2003

Step one is defining the recreational site to be valued. The boundaries are easy to determine when the recreational area is a lake, park or reserve. When the recreational are includes a river, it is harder to set the boundaries. Governmental agencies often have maps which can help to determine the site (Parsons, 2003).

Step two is defining the season and the recreational uses. It is important to identify the primary purpose of a trip. Some areas will have a dominant recreation use. Sometimes uses are aggregated if they are similar enough. This may be true for recreational uses attached to the Boterbloem. This will simplify the analysis although it is really important not to bundle activities which are dissimilar (Parsons, 2003).

Step three is developing a sampling strategy to sample the users of the Lutkemeerpolder. A difference can be made between on-site and off-site sampling. On-site sampling includes written of oral surveys filled in by intercepted recreationists. In this way the target population is addressed immediately. Nevertheless, people who did not visit the site are not included in the research. In addition, a strategy is needed to conduct the random sampling. For example; where and when do you sample? And how often? Selection bias also needs to be taken into account. Endogenous stratification occurs when people are surveyed who come more often. Another sampling method is off-site sampling. The biggest advantage is that people who are not taking regular trips to the recreational site are able to respond to the survey. This can be done true electronical communication. However, this surveys must reach people who are attached to the area. Otherwise the output data is not usable (Parsons, 2003).

Step four focuses on specifying the model. Variables need to be identified in order to compare the data. Normally surveys include one to five so called 'shifters'. Shifters are variables of the research population. Most used shifters are; age, education, gender or living area (Parsons, 2003).

Step five is about processing the data of 'single purpose trips' and 'multipurpose trips'. Single purpose means that someone will only recreate at the site. Multiple purpose means that the recreant combines his/her trip with multiple other activities. Consequently, the travel costs are higher and more time is spend on travelling. The question is how to asses this when it comes to the recreational value of the Lutkemeerpolder. It is more complicated as it includes a package of activities inside and outside the recreational area. Logically, there is no best way to do this. The easiest way is to indicate all multiple purpose trips as single purpose trips. This is therefore the most reasonable way to analyse when it comes to day trip data (Parsons, 2003).

Step six is making and implementing the survey. The survey includes the following four parts; introduction, trip counts, experiences, and demographic characteristics. The used questions are short and easy to answer. However, there are some difficulties with questions about the number of trips taken over the past months. It can be questioned how accurate this recall of someone is. One way to overcome this problem is to assume that an individual's trip rate is constant through time (Parsons, 2003).

Step seven is to measure the trip costs. The prices of each individual's trip behaviour are calculated. Trips costs includes the time, the equipment, access fees and the travel costs. When it comes to time costs, it is the time spend on travelling plus the time spend on the recreation site which could be used for other endeavors. In most research, the travel costs are calculated by multiplying someone's wage with the time spend on recreational activities. However this approach is not always valid. It is implausible for people who recreate during the weekend (and not under work time), students, retired people and unemployed people. However, costs related to time can still be wage-based by using average wages. Equipment costs are the costs needed to execute certain activities like fishing or sunbathing. In some occasions areas have access fees to enter the site, this is included in the travel costs. The same counts for parking costs. Lastly, the travel costs are taken into account. This includes all travel expenses. When people travel with a car, the average costs to operate a car per kilometer are calculated, also called the round trip costs. This includes upkeep and fuel (Parsons, 2003).

Step eight is estimating the model to calculate the travel costs. In this model the number of trips is the dependent variable. The most often used formula is a Poisson regression to count the travel cost data (Parsons, 2003).

Step nine is calculating the total access value of a recreational site. This can be done in four ways, namely; an average value per person per season, an average value for the population per season, the value per person per trip or a total accurate value of the whole area (Parsons, 2003).

8. Appendix: Overview of Care Benefits

Care activities	Target group	Perceived benefits
Green exercise	– Not specific	– Improvement of self-esteem – Reduction of anger – Reduction of depression – Reduction of tension
Ecotherapy	– Vulnerable people with disabilities or mental health	– Improving health – Improving social inclusion – Benefiting the environment
Wilderness therapy	– Psychological problems	– Separate participants from negative influences and stressful situation

Horticultural therapy	– Physical or mental disabilities – Rehabilitation process from illness, injury, or abuse	– Learning new skills – Regaining lost ones – Improved memory – Attention to details – Improved responsibility – Problem-solving skills
Social and therapeutic horticulture	– Vulnerable people	– Not specific clinical goals
Animal-assisted activities	– Not specific	– Social, recreational and educational
Animal-assisted therapy	– Certain client with certain therapeutic needs	– Improved social functioning, mood, behaviour and emotional regulation
Animal-assisted interventions	– Not specific	– Physical and mental well-being
Animal-based healthcare interventions	– Not specific	– Health promoting value