REIMAGINING THE OUDERKERKERPLAS:
PATHWAYS TO A SUSTAINABLE FUTURE

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EXECUTIVE SUMMARY (ENGLISH)

Groen Gebied Amstelland (GGA), the managers of recreational area 'de Ouderkerkerplas' (situated next to Ouderkerk a/d Amstel south east of Amsterdam) have declared use of the area 'suboptimal' and demanded its transformation along lines of sustainability. This produced the following central research question:

"How can the Ouderkerkerplas land area be transformed into a more sustainable area?"

The objective of this research is to integrate ideas produced at previous stakeholder meetings, and give recommendations to GGA about more concrete projects enabled by new business models (NBM). A transition management approach was adopted to frame the research. As a preliminary action, a process of envisioning for the Ouderkerkerplas was extended by adding the views of local residents to those of government and business. This lead to an examination of the following research projects:

- **Education**
  Objectives:
  Investigating which approaches fit best in the Ouderkerkerplas as a facility of learning, and which organisational networks could assist in the development of educational activities. The research involved a literature and policy review, and semi-structured interviews with environmental education organizations.

  Recommendations:
  1. Install education as a focus point for all developments.
  2. Link education with the existing practices.
  3. Take a collective critical thinking approach.
  4. Engage with NME Amsteveel, Ouder-Amstel municipality and ANMEC as key partners to develop educational projects.

- **A co-creation centre**
  Objectives:
  Exploring the barriers and enablers for the realization of a co-creation centre, and how such a centre engages a co-creation process. A literature review and interviews with local residents were conducted to research possibilities for a centre and how it should look.

  Recommendations:
  1. Facilitate networks regarding the financing of the projects.
  2. Combine the centre with catering facilities and with the ideas on a visitors centre of the bird group.
  3. Look into yurts for a sustainable temporarily centre.

- **Wind and solar photovoltaic energy generation**
  Objectives:
  Examine the possibilities for renewable power generation, taking into account local factors, technological solutions, possible locations, and the costs and benefits.

  Recommendations:
  1. Focus on small-scale energy production projects that power local amenities and raise awareness, for large-scale projects do not seem to be feasible for this area.
  2. As one possible larger-scale project, further research could be undertaken into a PV noise barrier along the A9.

- **Local food production**
  Objectives:
  Two concrete projects were chosen: a community garden and bees. A literature review and case study/stakeholder visits were carried out to gather information on the most suitable type of garden, management style, and type of vegetation and surroundings needed for bees. For both projects the effect on biodiversity, and costs and benefits for the stakeholders were investigated.

  Recommendations:
  1. Create a food production permaculture garden for the recreation of hobby gardeners.
  2. Plant flowerbeds that bloom in periods that are currently scarce in nectar.
  3. Involve the local beekeeper Herman Groen to place beehives in the area.

New Business Models were researched as an enabling factor for the financing and realisation of projects. For the garden project a community supported agriculture model is recommended. For the financing of the co-creation centre, models are recommended where the ownership of materials stays with the manufacturer, and operational costs are cut by offering additional functions to users. For small-scale energy projects, investments from local residents can be stimulated.

Although projects can be realised as stand-alone enterprises, by linking them an integration of potential developmental pathways takes place. This results in a strong reimagining of the Ouderkerkerplas around the following **Core Qualities**:

1. **An educational facility** – all projects contribute to educational activities for all ages, making the Ouderkerkerplas a centre of learning about sustainability.
2. **A centre of co-creation** – can act as a hub to instigate partnerships between public, private and people; interface with educational activities, urban gardening and bee-keeping; use renewable energy sources; provide year-round catering facilities.
3. **A source of value creation** – using New Business Models this looks beyond economic to include social, recreational and environmental value.

4. **A recreational facility** – projects enhance the core recreational status of the area whilst acknowledging the need to carefully maintain a bird reserve.
5. **A landscape in process** – all work is not product-based but contributes towards a continuing dialogue on sustainable urban nature and its relationship to surrounding city areas.

Placing these pathways together offers a transitions agenda that instigates the transformation of the Ouderkerkerplas into an optimised, sustainable area of urban nature. It is hoped that this reimagining can encourage a commitment between public, private and people to actively participate in the realisation of a sustainable future.

EXECUTIVE SUMMARY (DUTCH)

Groen Gebied Amstelland (GGA), de managers van recreatiegebied 'de Ouderkerkerplas' (gelegen ten zuidoosten van Amsterdam) hebben het gebruik van het gebied als niet optimaal verklaard en vereisen een duurzame transformatie. Dit heeft tot de volgende hoofdvraag geleid:

'' Hoe kan de Ouderkerkerplas in een meer duurzame gebied worden getransformeerd?''

Het doel is het onderzoeken en integreren van ideeën die voortkwamen uit co-creatie sessies en hieruit volgend aanbevelingen geven aan GGA over concrete projecten ondersteund met Nieuwe Business Modellen. Voordat er wordt ingegaan op verschillende projecten worden de lokale perspectieven onderzocht om op te nemen bij de uitkomsten van de co-creaties sessies. De volgende projecten worden behandeld:

- **Educatie**
  Doelen:
  Het verkennen van mogelijkheden voor educatie omtrent duurzaamheid in het gebied. Dit project onderzoekt welke educatie aanpakken het beste passen en welke netwerken kunnen helpen in de ontwikkeling van zulke projecten. Dit onderzoek is uitgevoerd d.m.v. een literatuur studie naar educatie concepten, een analyse van nationaal beleid en semigestructureerde interviews met educatie organisaties.

  Aanbevelingen:
  1. Educatie als focuspunt voor alle ontwikkelingen in the gebied.
  2. Verbind educatie met de bestaande faciliteiten in de Ouderkerkerplas.
  3. Een aanpak die collectief kritisch denken vereist.
  4. Ga de samenwerking aan met NME Amstelveen, gemeente Ouder-Amstel en ANMEC voor het ontwikkelen van de projecten.

- **Co-Creatie Centrum**

  Doelen:

  Het verkennen van de barrières en randvoorwaarden voor de realisatie van een co-creatie centrum, en hoe zo'n centrum in the co-creatie proces past. D.m.v. een literatuur studie en interviews met lokale bewoners is onderzocht hoe hun het centrum zouden bouwen.

  Aanbevelingen:

  1. Faciliteer netwerken voor de financiering van de projecten.

  2. Combineer het centrum met horeca faciliteiten en de ideeën omtrent een bezoekerscentrum van de vogelgroep.

  3. Onderzoek de mogelijkheden van Yurts voor een tijdelijk centrum.

- **Wind- en zonne- fotovoltaïsche energie opwekking**

  Het verkennen van mogelijkheden voor duurzame energie opwekking d.m.v. wind energie en zonnen-energie. Lokale voorwaarden, potentiële technologische mogelijkheden voor het genereren van elektriciteit door wind, potentiële locaties voor PV kracht winning en kosten en baten voor duurzame energie producerende projecten in acht genomen.

  Aanbevelingen:

  1. Verder onderzoek naar mogelijkheden voor een PV-geluidswal naast de A9.

  2. Focus op kleinschalige energy projecten die als doel hebben bewustzijn op te roepen.

- **Lokale voedselproductie**

  Doelen:

  Het onderzoeken van de mogelijkheden voor lokale voedselproductie. Twee projecten werden hiervoor gekozen: Een groentetuin en bijen. Literatuur onderzoek, casestudies en interviews met stakeholders verzorgden informatie over verschillende typen tuin en management en over de juiste vegetatie voor bijen en de geschiktheid voor bijen in het gebied. Voor beide projecten werd het effect op biodiversiteit en kosten en baten bekeken.

  Aanbevelingen:

  1. Het creëren van een permacultuur groentetuin voor recreatie doeleinden.

  2. Het planten van bloembedden met planten die bloeien in de periodes dat nectar schaars is.

  3. Het betrekken van imker Herman Groen voor het plaatsen van bijenkorven in het gebied.

Nieuwe Business Modellen zijn modellen voor het financieren en realiseren van de projecten. Voor de tuin wordt een 'community supported agriculture' model aanbevolen. Voor de financiering van het centrum worden modellen aanbevolen waarin de het eigenaarschap over producten en materialen bij de fabrikant blijft en modellen die de operationele kosten laag houden door de gebruikers aanvullende taken te geven. Voor kleinschalige energie projecten, kunnen investeringen van lokale bewoners worden gestimuleerd.

De verschillende projecten kunnen apart gerealiseerd worden, maar er ontstaat een geïntegreerde ´pathway´ voor de ontwikkeling van het gebied als ze gelinkt worden. Dit leidde tot de herleving van de Ouderkerkerplas rondom de volgende **Kernwaardes:**

1. **Een plaats voor educatie** – alle projecten dragen bij aan educatieve activiteiten, dit maakt van de Ouderkerkerplas een centrum voor educatie omtrent duurzaamheid.
2. **Een centrum voor co-creatie** – kan partnerschappen faciliteren tussen publieke, private en lokale bewoners; kan samengaan met educatieve activiteiten, stadslandbouw en bijen-houden; het gebruik van duurzame energie; jaar-rond horeca faciliteiten.
3. **Een bron van waarde creatie** – Nieuwe Business Modellen kijken verder dan economisch waarde creatie, ze creëren ook sociale, recreatieve en milieu waardes.
4. **Een plaats voor recreatie** – de projecten versterken de recreatieve status van het gebied, terwijl de noodzaak voor het beschermen en in standhouden van de vogelreservaat wordt erkend.
5. **Een landschap in beweging** - dit onderzoek draagt bij aan de dialoog omtrent duurzame stadsnatuur en de relatie met de omliggende stedelijke gebieden.

Door deze 'pathways' te combineren ontstaat er een transitieagenda die de transformatie van de Ouderkerkerplas in een geoptimaliseerde, duurzaam stadsnatuur gebied faciliteert. Er wordt gehoopt dat dit deze herleving betrokkenheid kan stimuleren tussen publieke, private en lokale bewoners om actief deel te nemen in de realisatie van een duurzame toekomst.

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WORD COUNT OF REPORT SECTIONS

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Executive Summary (English)	749
Executive Summary (Dutch)	750
Group work	2480
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Track: Global Change and Ecosystems – Cora Verdijk & Annemieke Wijnakker	5333
Track: Environmental Governance – Steve Clarenbach & Milena Pillkahn	5789
Track: International Development – Daniel Hayward	2890

CHAPTER 1: INTRODUCTION TO THE CASE AND RESEARCH APPROACH

[1]

[1] (photo retrieved from: http://de.wikipedia.org/wiki/Ouderkerkerplas)

THE CASE

The Ouderkerkerplas is a 127-hectare recreational area situated in southeast Amsterdam (figure 1). The A9 motorway borders its southern edge. To the east lies the A2 motorway, followed by the Amstel III business-park and Amsterdam southeast residential area. To the northwest lies the historic village of Ouderkerk aan de Amstel. The recreational area is dominated by the presence of a large man-made lake (figure 2), created in the 1970s through excavations for the construction of the A9. The area also contains a bird reserve and a wind turbine.

The managers, Groengebied Amstelland (GGA), have deemed the area suboptimal, with recreational usage and a public profile lacking, alongside poor transport access points. This has resulted in the demand for a concerted project of transformation, following lines of sustainability.

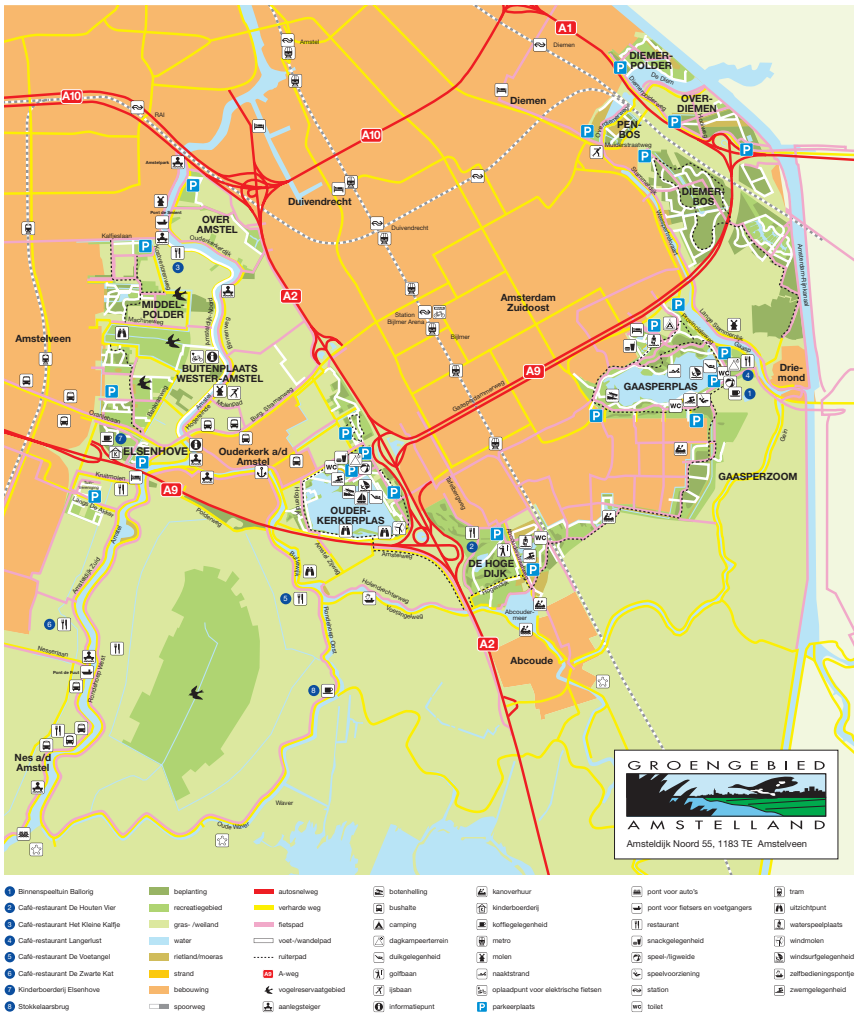

Figure 1: Ouderkerkerplas within the surrounding area (Groengebied Amstelland 2014)

Figure 2: Ouderkerkerplas (Apple Maps)

Initial appraisals have taken place. Firstly, local and regional levels of government have discussed general landscape developments in relation to wider infrastructural plans for the area (Bestuurlijk Overleg Amstelscheg 2011). Secondly, a series of workshops (co-creation sessions) have engaged local business and government to brainstorm and specify ideas for sustainable projects around the lake, assessing their willingness to collaborate in the realisation of these projects (Stijkel 2014). The challenge now lies in taking the next step towards the concrete realisation of development processes. Hence, the objective of this research is to give recommendations to the Groengebied Amstelland on concrete projects that will make the Ouderkerkerplas area a role model of recreational value and sustainable practices. The focus of research is land development, with a separate research group concentrating on water concerns.

CENTRAL RESEARCH QUESTION

"How can the Ouderkerkerplas land area be transformed into a more sustainable area?"

- *What are the demands of the stakeholders within the area?*
- *What are concrete projects that fit the demands of the stakeholders and make the Ouderkerkerplas a more sustainable place?*
- *What are business models for the investigated projects?*

THEORETICAL FRAMEWORK – THE URBAN TRANSITIONS MANAGEMENT APPROACH

To direct research in the Ouderkerkerplas, the transitions management approach has been adopted. It acts 'as a framework for "guided evolution", seeking to balance emergent changes, bottom up innovation, guiding visions and collective agenda-building processes' (Loorbach & Wijsman, 2013, p. 24). To solve complex problems of sustainability, transition management argues 'for processes of governance (rather than government), for involvement of different actors and knowledges, and for explicit recognition of the uncertainties and limitations of science-based expertise' (Shove & Walker, 2007, p.764). It is a process- rather than goal-seeking approach, demanding a 'co-creative collaboration between actors and researchers' (Nevens et al., 2013, p.111). In linking to sustainable development, the research and its resulting recommendations must:

1. Address and mediate between social, economic and environmental factors relating to the case and its component projects.

2. Take account of inter- and intra-generational equity, whereby spatial and temporal scales of sustainability are addressed.

(Bradley Guy and Kilbert, 1998)

With the Ouderkerkerplas acting as a defined space, sustainable development should harness the potential of urban nature to contribute to the physical, social and psychological well-being of inhabitants within a sustainable city (Chiesura 2004; Tzoulas et al. 2007).

The transitions management approach sets out a cycle of six different phases, although they need not necessarily be followed in a strict linear fashion (see figure 3):

1. Analysing the system – getting an overview of the system of study.
2. Envisioning – creating an image of a more sustainable society.
3. Exploring pathways – looking for strategies to attain the future image.
4. Experimenting – the delivery of innovative practices, putting plans into action.
5. Assessing– monitoring the success of the transition process.

6. Translating – allowing all stakeholders in the system effective access to the knowledge and lessons learned.

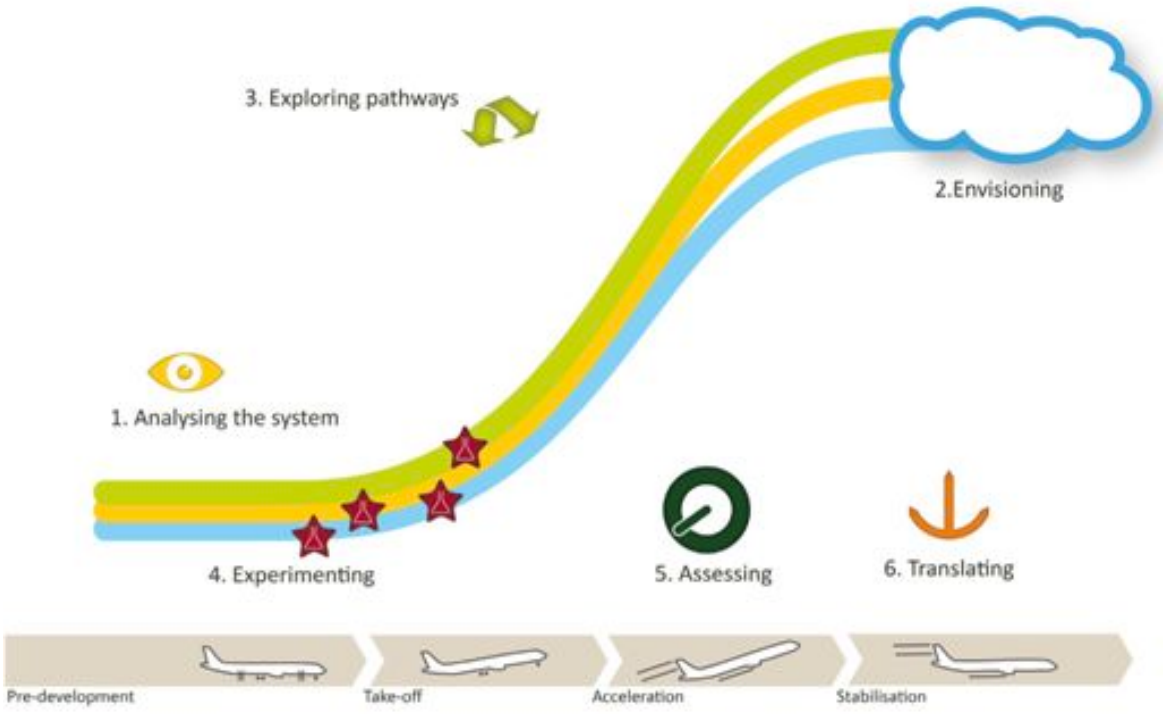

Figure 3: The urban transitions management approach (Nevens et al., 2013, p.114)

The work carried out so far involves gathering data on the locality and assessing the views of local government and business for the Ouderkerkerplas. This represents the first two stages of the transitions management approach. The job now is to extend the envisioning process by including perspectives of local residents, and to explore pathways for the translation of envisioning into the realisation of concrete projects. Together, these concrete projects promote a transitions agenda that instigates the transformation of the Ouderkerkerplas into an optimised, sustainable area of urban nature.

IDENTIFICATION OF RESEARCH TASKS FOR INDIVIDUAL STUDY

Three areas of research were identified as necessary for examination. Firstly, the views of local residents extend an envisioning process alongside existing ideas of government and business. Secondly, specific research fields implicating concrete projects of development were pinpointed for closer attention. The inspiration for these fields was derived from eight 'sustainability goals', which were established during two co-creation sessions held in April and May 2014 (Stijkel 2014):

- Energy efficiency and generation
- Education
- Local food production
- Recreation
- Biodiversity
- Decentralized water management
- Enforcing local economy
- Circular economy

Using these goals, specific project ideas brought forward in the co-creation sessions, and discussions with the client, the following research fields were identified as potential pathways to sustainable development:

- Education
- A co-creation centre
- Wind and solar power generation
- Local food production (urban gardening and bee-keeping)

Thirdly, an investigation into new business models was conducted to provide innovative new ways to engage stakeholders and act as an enabling factor for the realisation of concrete projects. Figure 4 draws these research tasks together showing the individual work within the context of the transitions management approach.

STRUCTURE OF REPORT

The report takes on the following structure. Following this discussion of the case and resulting division of labour, the second chapter addresses local views on the Ouderkerkerplas in order to extend the envisioning process. The third chapter presents work in different research fields, namely education, a co-creation centre, energy generation and local food production. Individual results and recommendations are provided alongside suggestions of linkages between fields. The fourth chapter looks at new business models as an enabling factor to the realisation of concrete projects. The fifth chapter integrates the results and specifies a set of Core Qualities for the transformation of the area. Together with the individual work, this integration provides a transitions agenda for the sustainable development of the Ouderkerkerplas, thereby answering the central research question.

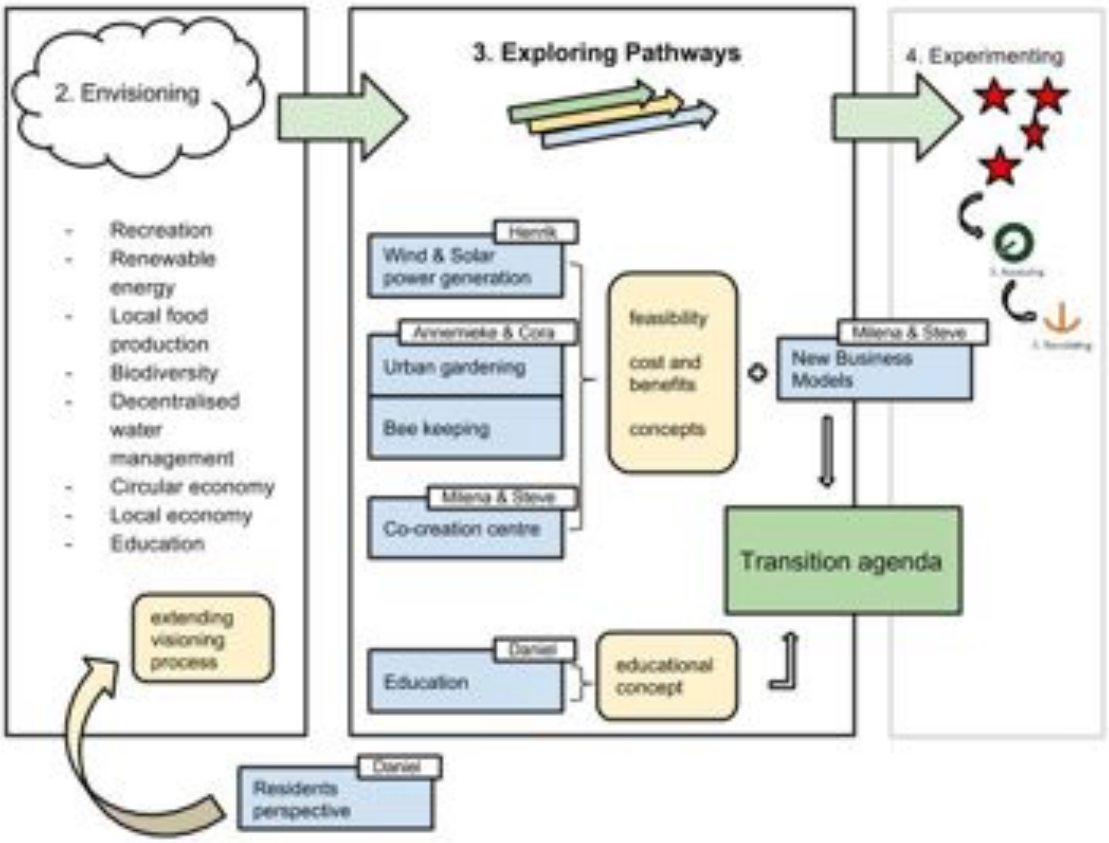

Figure 4: Flow diagram of individual work within the transitions management approach

CHAPTER 2: EXTENDING THE ENVISIONING PROCESS

[2]

[2] (photo retrieved from: http://www.amsterdo.com/outdoor-swimming-spots-beat-heat/)

2.1 LOCAL VIEWS ON THE OUDERKERKERPLAS (DANIEL HAYWARD)

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PROBLEM DESCRIPTION AND MOTIVATION

The transitions management approach calls for a public-private-people partnership to instigate the transformation of urban areas (Nevens et al., 2013). The first report informing the Ouderkerkerplas case was produced by government officials (Bestuurlijk Overleg Amstelscheg, 2011). The second report relates to meetings between a wider variety of stakeholders (Stijkel, 2014). Figure 5 accounts for these stakeholders, with participants predominantly originating from public and private fields. Overall the lack of a voice by civil society represents a knowledge gap. This gap must be filled to extend the envisioning process in the transitions approach (Nevens et al., 2013) and answer the first central sub-question on stakeholder demands. By including views of local residents and users of the Ouderkerkerplas, a balance of perspectives is gained, and can be integrated to highlight potential thematic and technical partnerships. This allows for more effective transformation in the area, as demanded in the central research question.

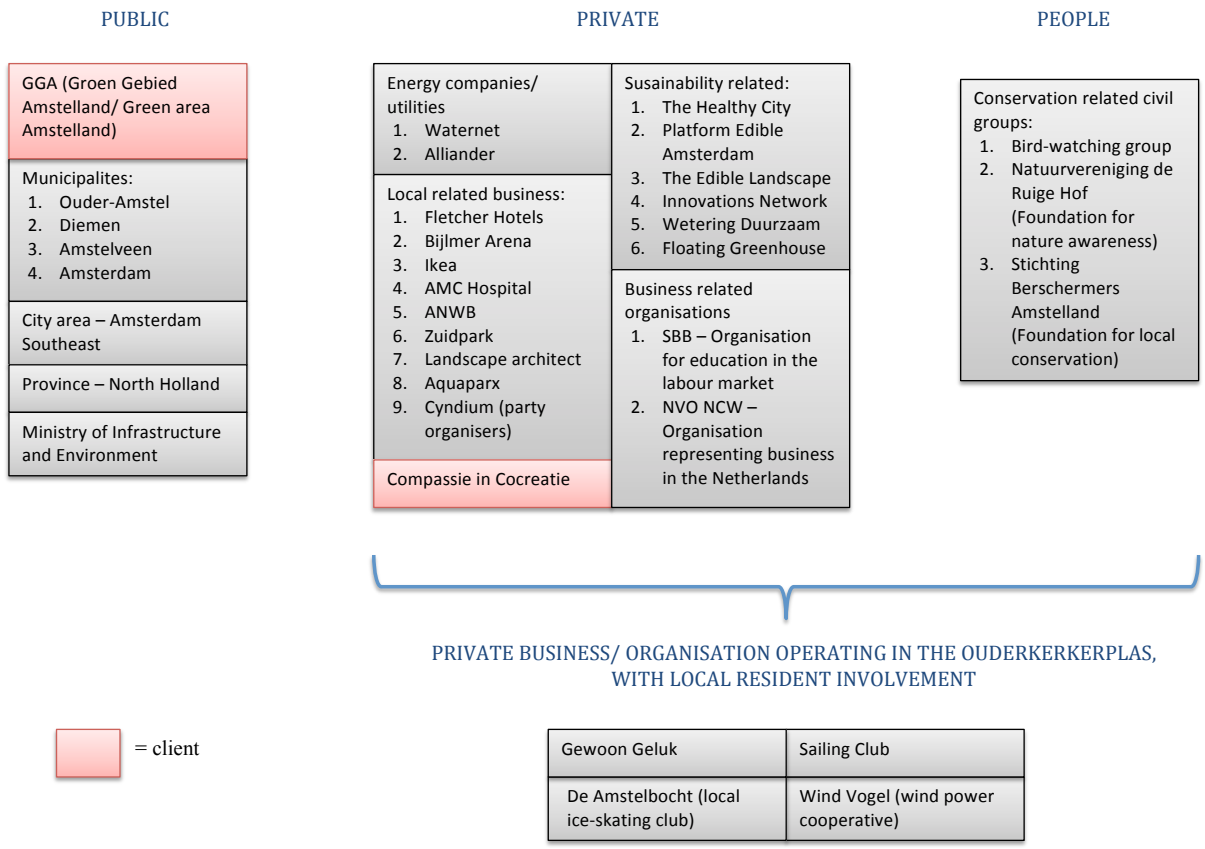

Figure 5: Stakeholder representation at the co-creation sessions April 10th and May 14th 2014

RESEARCH QUESTION

How do local residents around the Ouderkerkerplas view its present usage and potential for future developments?

RESEARCH METHODS

Engaging the views of civil society in relation to the Ouderkerkerplas involves consultation with:

1. Residents within and around the area
2. Individuals or social groups informally using the area
3. Formal societies using the area

In this context, civil society cannot be bound into a defined group to create a sample for quantitative significance. Therefore, within the time frame of the research, criteria for respondents entailed residency of Ouderkerk aan de Amstel and direct usage of the Ouderkerkerplas whether informally, in business or with a club. Surrounding residential areas include Amsterdam Southeast, Amstelveen and Gaasperdam, but Ouderkerk was selected as the closest settlement (figure 6), situated within the same municipality (Ouder-Amstel) as the Ouderkerkerplas. With a population of around 8000 people, the settlement consists of a historic village 200 years older than Amsterdam, surrounded by extensive new housing (Gemeente Ouder-Amstel, 2014).

Figure 6: Ouderkerk aan de Amstel (Apple maps)

Table 1: Interview log with individual residents

Name of Interviewee	Function of interviewee	Relation to the Ouderkerkerplas	Date and place of interview
1. Gisele Naber	Co-owner Gewoon Geluk mobile catering; resident of Ouderkerk	Catering business located within the recreational area	6/10/14; Amsterdam Bijlmer
2. Monique Stornebrink	Co-owner Gewoon Geluk mobile catering; resident in Amsterdam city	Catering business located within the recreational area	6/10/14; Amsterdam Bijlmer
3. Douwe Vonk	Retired; resident within the recreational area	Member of the working group town planning and traffic	17/10/14; Ouderkerk aan de Amstel
4. Pieter Roos	Retired academic; resident of Ouderkerk	Member of the Birdwatching Group and the Historical Society, Ouderkerk aan de Amstel	17/10/14; Ouderkerk aan de Amstel

Table 2: Interview log of focus groups with societies in Ouderkerk

Name of society	Size of group	Relation of society to the Ouderkerkerplas	Date and place of interview
1. Wielerclub WTC de Amstel	10	October – December: recreational area used for weekly training	16/10/14; Ouderkerkplas
2. VVO - Volleyball Club Ouderkerk	9	Outdoor court used in the summertime	22/10/14; Ouderkerk aan de Amstel

Interviews targeted both individuals and focus groups with local clubs. Contacts were obtained through an Internet search, and the adoption of a snowballing technique with known contacts. Tables 1 and 2 log the interviews showing the relationship of the interviewees with the recreational area. An open, structured set of questions cover area usage in the present day, envisioning for the future and opinions on stated projects. This questionnaire is included as appendix 1.

RESULTS

With the same questionnaire used for individual interviews and focus groups, certain results are directly comparable. This can be qualified by reference to individual experiences or the nature of a collective response to the question.

PRESENT USAGE OF THE OUDERKERKERPLAS

From information placed in table 3, the greatest usage of the Ouderkerkerkplas by respondents is recreation-social (for example walking, swimming or barbecues). Recreation-fitness is also important, reflecting the focus groups as sports societies who make use of the area. It can also be a place of work, has an important status as a nature-reserve, and in the case of one respondent is the site of his house.

Table 3: Usage of the Ouderkerkerplas

Interviewee	Recreational – social	Recreational – fitness	Nature-reserve	Work	Home
Gisele	✓	✓		✓	
Monique				✓	
Douwe	✓				✓
Pieter	✓		✓		
Group					
Wielerclub	✓	✓			
Volleybal club	✓	✓			

LOCAL PERCEPTIONS OF THE OUDERKERKERPLAS

Each interviewee (also in groups) was given the opportunity to provide a collection of single words describing the area. These were assimilated into a word cloud (figure 7). The words 'nature', 'recreational', 'birds' and 'blue-algae' are mentioned most frequently, giving a clear indication of two principle functions of the area and one major concern. Less-mentioned words refer to:

- Recreation (8 words: examples – 'cycling', 'running')
- Positive atmosphere (6 words: examples – 'fun', 'relaxing')
- Negative atmosphere (5 words: examples – 'forgotten', 'dangerous')
- Descriptive (6 words: examples – 'beach', 'highway', 'goose-shit')

Figure 7: Word cloud presenting local perceptions of the Ouderkerkerplas

IDEAS FOR CHANGE

The questionnaire provided room to suggest changes for the Ouderkerkerplas. Responses can be broken down into three forms:

1. Enthusiastic and plentiful
   Both focus groups and some individuals gave multiple answers. These pointed towards the improvement of existing facilities or creation of new ones. Mention was made of educational tours, catering, gardens, windmills, fitness facilities, and cleaning the lake. Recreational developments dominate here.

2. Modest and pointed
   In one case, a single improvement was proposed through better catering facilities. The intention was clearly to minimise developmental impact on the area.

3. Supporting the status quo
   In one case, the reaction was for no change, focusing on the role as a bird reserve. Many interviewees recognised that within the community there are those suspicious of all developments, prioritising the maintenance of the peaceful, natural environment. One email contact not directly interviewed gave a passionate rebuttal of any development plans along these lines.

REFLECTION ON THE SUSTAINABLE GOALS

Attention was drawn to the series of sustainable goals drawn up at stakeholder meetings (see page 6). Interest to each goal was collated, whether an individual response or a collective reaction from the focus groups:

Table 4: Resident interest for the eight sustainable goals

Interviewee	Energy efficiency & generation	Education	Local food production	Recreation	Biodiversity	Decentralised water management	Enforcing local economy	Circular economy
Gisele	✓	✓	✓✓	✓✓	✓		✓✓	
Monique	✓	✓	✓✓	✓✓	✓		✓✓	
Douwe	✓	✓✓		✓✓	✓			
Pieter	✓	✓✓		✓✓	✓✓			
Group								
Wielerclub			✓	✓✓				
Volleybal club		✓✓		✓✓	✓			

Legend	(empty) = no interest	✓ = minimal interest	✓ ✓ = significant interest

'Recreation' is a central concern for all, reflecting the core status of the area. 'Education' also scores highly, perceived as a tangible framework with which to instil new activities and raise the profile of the area. 'Biodiversity' also attracted interest. Certain members of the volleyball club highlighted the importance of recreational development not disturbing the use of the area as a nature reserve, an opinion that quickly garnered group consensus. 'Energy', 'local food production' and 'enforcing local economy' gathered occasional interest. In the cycling club, lone voices spoke up for food production against a general lack of interest. In the case of 'enforcing local economy' the interests of interviewees who work in the area were a clear determining

factor. Finally, 'decentralised water management' and 'circular economy' gathered no interest as specialised goals that were deemed not to relate to the concerns of local residents.

DISCUSSION OF RESULTS

In general, local residents perceive the Ouderkerkerplas to be well-used and accessible area. This contrasts sharply with non-resident respondents to other interviews (see chapter 3.1 on educational organisations) who had never heard of the locality or complained of problematic access points. Different perceptions clearly exist, making local views vital to add to those of stakeholders from the public and private arenas. Local views also vary, particularly as to intensity or very need for development in the area. Overall, recreational use was deemed the most important function for the Ouderkerkerplas. This must be tempered with concern for developmental impact upon its role as a bird reserve. The provision of permanent on-site catering facilities remains extremely popular, with informal discussions taking place between groups such as the mobile catering company, sailing and cycling clubs. There is much potential for partnerships to be created between local groups and public and private stakeholders to facilitate such developments. However, financial involvement in any partnerships remained a problematic subject, with little interest for direct input displayed by civil society.

Inevitably the results here must be treated with caution, arriving from a small collection of interviews. However, they serve as a useful starting point to be built upon by the client, and can be amalgamated with other stakeholder views within this research.

RECOMMENDATIONS FOR THE CLIENT

1. Maintain and deepen dialogue with local groups to disseminate information on, and allow for their input into potential developments in the Ouderkerkerplas. The 'planning and traffic' working group, as represented by Douwe Vonk, is a useful starting point.

2. Integrate local perspectives that prioritise recreational development yet are weary of disturbing the site's role as a bird reserve.

3. Conduct further research on visitors to the Ouderkerkerplas. This will help appreciate who travels from where and for what reasons.

4. Facilitate partnerships between local interest groups and public or private bodies to collaborate on development in the Ouderkerkerplas, including funding, construction, management and experience of projects.

LINKAGES TO OTHER DISCIPLINARY RESEARCH AND EXPECTED RESULTS

Local perspectives can add to existing reports and inform research fields into education, a co-creation centre, energy generation and local food production. It is hoped that the recommendations will lead to a rounder image of the Ouderkerkerplas with which to inform future developments. Partnerships between public, private and people can emerge, engaging new business models. Common interests can be united, yet still accounting for a variety of perceptions about the area.

CHAPTER 3: RESEARCH FIELDS FOR PATHWAYS TO DEVELOPMENT

[3]

[3] (photo retrieved from: http://www.innovatie.waternet.nl/projecten/koudewinning-en-waterkwaliteitsverbetering-in-de-ouderkerkerplas/)

3.1 EDUCATION (DANIEL HAYWARD)

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PROBLEM DESCRIPTION AND MOTIVATION

In transforming the Ouderkerkerplas into a more sustainable area (central research question), education has been highlighted as a priority goal (Stijkel, 2014) and generated interest in the views of local residents (section 2.1.4). Further research is needed into this theme, to see how it can act as transdisciplinary glue with which to link different projects. This links to the transitions management approach in highlighting a mechanism for active processes to transform both 'place' and 'society' operating within and around a specified space (Nevens et al., 2013).

A pathway for educational development in the area can be researched in the following ways:

- Look at the conceptual challenges to determine what form of education fits best within the context of sustainable urban nature.
- Look at the technical challenges, identifying existing networks to assist in the organisation of educational activities.

RESEARCH QUESTIONS

How can the Ouderkerkerplas be promoted as a facility of education along lines of sustainability?

Sub-questions:

1. *What educational approaches best fit to the promotion of sustainable urban nature in the Ouderkerkerplas?*
2. *Which networks assist the development of educational projects in the area?*

RESEARCH METHODS

The research methodology is qualitative, involving:

- Academic library research into conceptual constructions of education and how they link to sustainable urban nature.
- Review of national government policy on sustainability and education.
- Semi-structured interviews with members of regional environmental education organisations. Interviews involved fixed open-ended questions investigating activities undertaken by the organisation, network relationships, limitations of work, and potential connections to development in the Ouderkerkerplas.. Table 5 logs these interviews.

Table 5: Interview log with education-related organisations

Name of Interviewee	Function of Interviewee	Date & place of interview
1. Sytske Romain	Senior adviser, NME (Nature and Environmental Education) Amstelveen	24/9/14; Amstelveen
2. Dr Anne Stijkel	Compassie in Cocreatie (Compassion in Cocreation)	1/10/14; Amsterdam
3. Jan Heijns	Programmer City Development, Pakhuis de Zwijger Amsterdam	1/10/14; Amsterdam
4. Alexander van Dijk	Teamleader/coordinator school gardens & NME Amsterdam Southeast	7/10/14; Amsterdam Holendrecht
5. Conny van Kruysbergen	Environmental communications officer, NME de Ronde Venen	8/10/14; Wilnis
6. Brigit Kuypers	Senior consultant, ANMEC (Amsterdam Nature and Environmental Education)	21/10/14; Amsterdam
7. Linda Teunissen	Coordinator, Nature Society de Ruige Hof, Amsterdam Southeast	22/10/14; telephone interview

RESULTS

CONCEPTUAL APPROACHES TO EDUCATION

The promotion of educational activities in the Ouderkerkerplas as a piece of urban nature must acknowledge developments in post-normal science. This incorporates a systems approach, recognising issues of uncertainly and complexity within a transdisciplinary setting (Funtowicz and Ravetz 1993; 2003). Setting up a new paradigm (Sterling, 2001), education can take on these ideas and be 'placed' within the specified area of the Ouderkerkerplas, a process- rather than goal-driven exercise. These latter two points can be elaborated upon:

- ***'Placed' education***
  Incorporating a post-normal science perspective can be translated as 'nature reinvading the lab' (Funtowicz & Ravetz, 1993, p. 742). In this case, nature becomes the lab.

Therefore, it is vital to recognise the placing of a space (Cabe Space, 2005; Musacchio, 2009) within sustainable and educational parameters. This acknowledges the status of the Ouderkerkerplas as a singular ecosystem, but also as part of a larger urban landscape with recreational, aesthetic and cultural functions (Bolund & Hunhammar, 1999; Loures, Santos, & Panagopoulos, 2007; Wu, 2008).

- ***Education as process***

  Sustainability and post-normal science recognise a plurality of legitimate perspectives, where facts cannot be separated from values (Funtowicz and Ravetz 1993; 2003). A transdisciplinary democracy in sustainable science (Tress, Tress, and Fry 2005; 2009) lends itself well to notions of critical thinking (Hasslöf & Malmberg, 2014). Critical education includes all stakeholders as participants and empowers them towards 'transformative learning' (Diduck, 1999, p. 88). A co-constructive process can take place (Wals, 2007), which prioritises the collective production of meaning (practical intersubjectivity) over transference between individuals (Biesta, 1994).

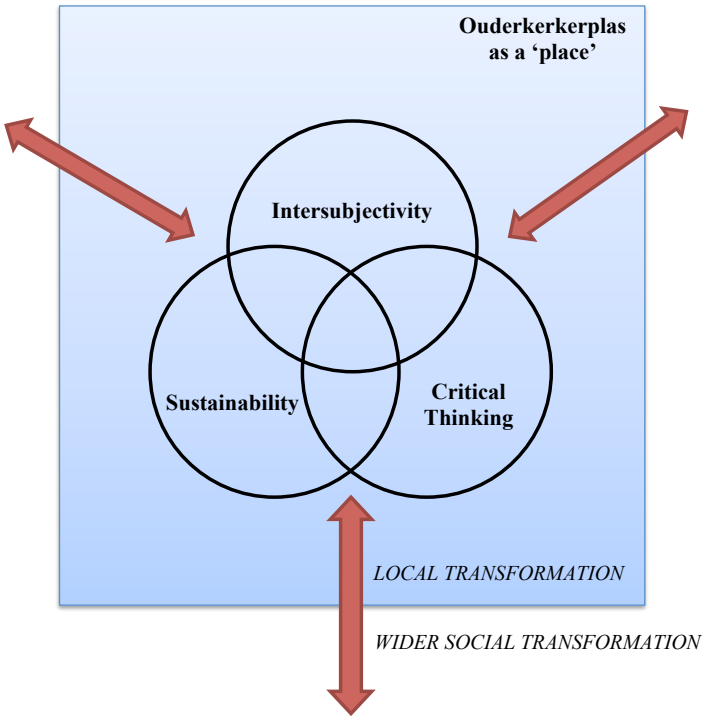

Figure 8: A conceptual framework of sustainable education placed in the Ouderkerkerplas

A conceptual framework (figure 8) links together the three factors of critical thinking (interrogation of meaning to create knowledge in preference to its passive transference), intersubjectivity (the collective production of meaning) and sustainability (how knowledge contributes to the active maintenance of an area of urban nature). This educational approach is concentrated within the placed locality of the Ouderkerkerplas, an on-going experimental process of development within the space but also a focus for social transformation around it. It

is an approach that links well to the transitions management approach whereby the locality becomes a 'living lab' of learning (Nevens et al., 2013). In practical terms, the area may become a focal point for school-based educational activities (discussed in the next section), but ideally all visitors of all ages may be engaged. On-site information boards and interactive cyber-links could create discussion points on some of the following subjects:

1. What is nature? The Ouderkerkerplas can stimulate debate as a constructed, synthetic landscape from the 1970s.
2. What does it mean to have a bird reserve within a synthetic landscape?
3. What is urban nature? Interest here concerns the balance of 'green' space next to major motorways and residential areas such as Ouderkerk aan de Amstel, and its role in proximity to Amsterdam.
4. What does it mean to sustain such an area? For who or what is it sustained?

ENVIRONMENTAL EDUCATIONAL AND ITS ORGANISATIONAL NETWORK

The Dutch government has no stated policy approach on environmental education, with the field split between two different ministries (Infrastructure and the Environment, and Education, Culture and Science). Instead, the Duurzaam Door (Sustainable Onwards) programme funds national organisations and local foundations, who then set out educational strategies (Staten-Generaal, 2013). The programme is structured in 4-year cycles, the latest lasting until 2016. Meanwhile, at the level of local government, municipalities fund their own NME branch (Natuur en Milieu Educatie – Nature and Environmental Education), which coordinates activities with schools and civil society.

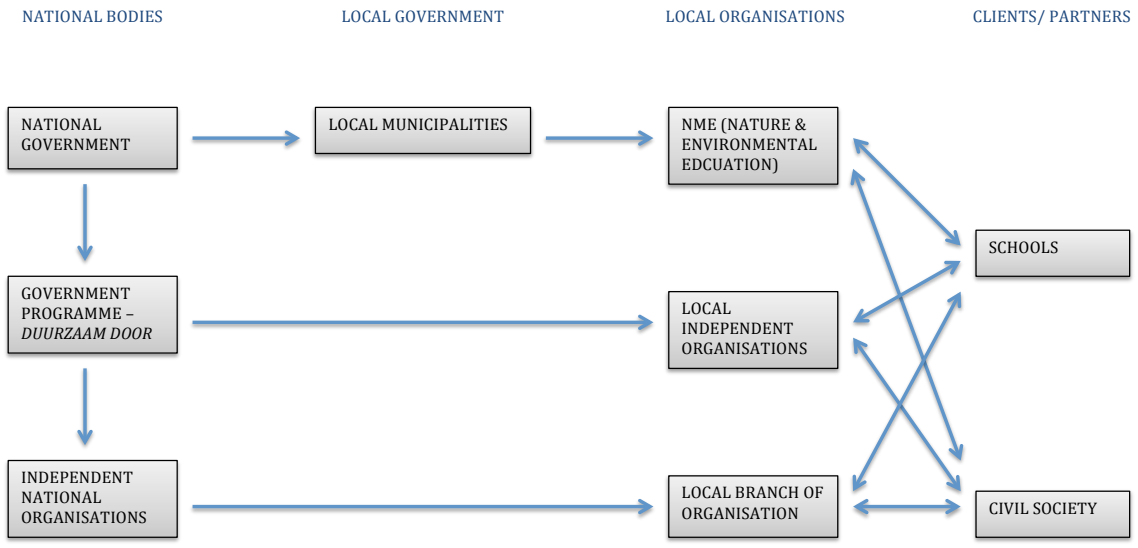

Figure 9: Organisational and funding structure for environmental education in the Netherlands

Figure 9 visualises this general structure and the direction of funding. Government is the most predominant (if not totally exclusive) funding body, while schools and civil society increasingly have to pay for the services of environmental education (demonstrated by double-ended arrows). Central results from interviews with educational organisations are shown in table 6, showing the activities conducted, the tier of education engaged, and interest to collaborate in the development of the Ouderkerkerplas. Focus was placed on NME groups, although smaller independently managed organisations do exist who could be contacted for knowledge exchange. Incorporating critical thinking, intersubjectivity and sustainability into educational programmes at the Ouderkerkerplas could easily fit with excursions to the locality and individually tailored projects. For schools unable to pay for travel, classroom materials could be provided which stimulates critical discussion. The primary level is the most used school tier, and would represent a suitable entry-point to carry out activities. Indeed the nearest residential area of Ouderkerk only has three primary schools and no secondary schools. Only later could activities expand to include secondary schools from outside Ouderkerk and wider civil society.

Table 6: Activity type, education level and interest in collaboration regarding environmental education, per organisation interviewed

Type of Activity	NME Amstelveen	NME Amsterdam Southeast	NME de Ronde Venen	ANMEC
Material for the classroom	✓		✓	
Excursions	✓	✓	✓	
School gardens		✓		
Individually-tailored projects	✓		✓	✓
Exhibitions			✓	
Children's parties			✓	
Level of Education				
Primary schools	✓	✓	✓	✓
Secondary schools	✓	(✓)	✓	(✓)
Adult	✓	(✓)	(✓)	(✓)
Interest in collaboration				
Knowledge exchange	✓	✓	✓	✓
Development of activities	✓			
Access to network	✓			✓

Legend	(empty) = no activity/ interest	(✓) = minimal contact	✓ = significant use/ contact/ interest

Interviews highlighted various limitations within the environmental education system. These include:

1. Financing of activities, with funding changes meaning that schools increasingly have to pay for involvement.
2. Short-term funding limits the possibility to build long-term relationships with schools and civil society.
3. Centralisation of organisations in Amsterdam and Utrecht takes attention of neighbouring NME groups away from the Ouderkerkerplas area.
4. Time needed to implement ideas.
5. Manpower – need for experts against financial structure demanding volunteers.

Within the context of such limitations, there is much space to form meaningful partnerships, pool resources, and share the various costs of setting up and implementing educational activities. As an aid, figure 10 reveals an organisational network within the field of environmental education, operating in the proximity of the Ouderkerkerplas.

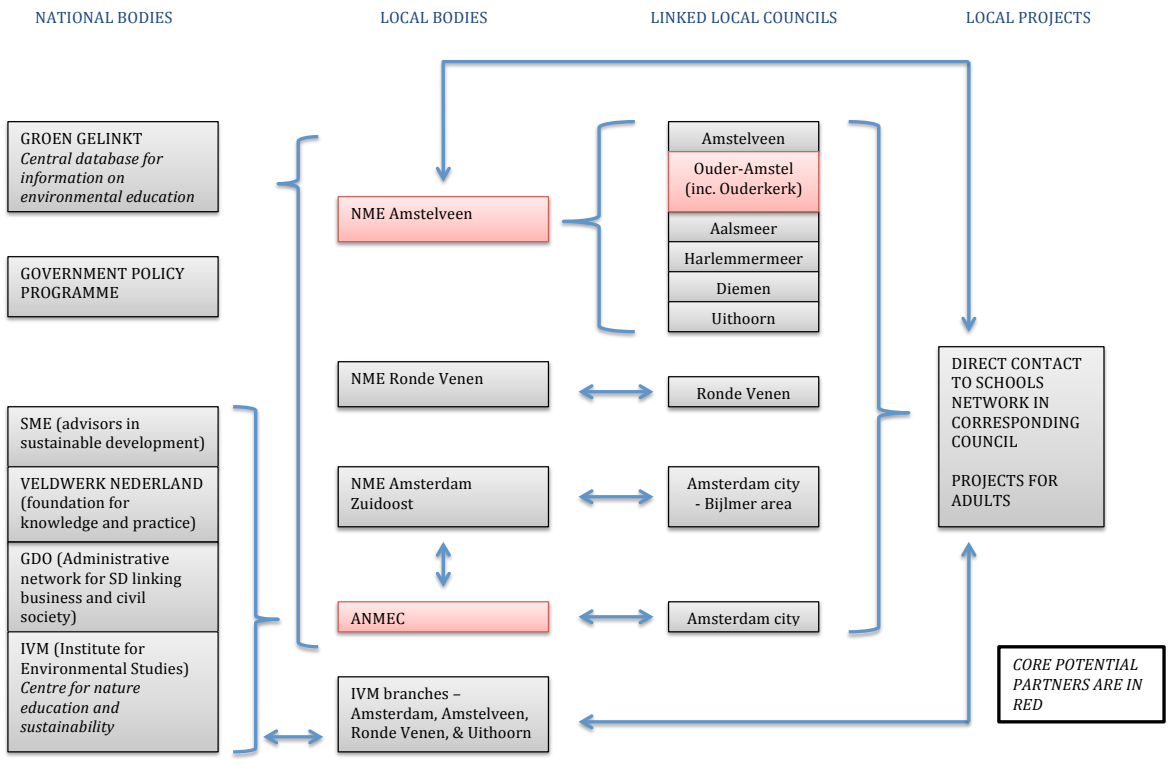

Figure 10: A tiered structure of environmental education linked to the Ouderkerkerplas

The following core potential partners can be highlighted for collaboration:

1. ANMEC (Amsterdam Nature & Environmental Education Centre) – This organisation varies from the traditional NME as an independent foundation. It can offer knowledge and expertise, and strong network support. Conceptual interests focus on sustainability, looking to build long-term learning partnerships with schools and civil society for effective social transformation. This fits in very well with ideas of sustainable education for the Ouderkerkerplas.

2. NME Amstelveen – Traditionally this branch of NME organises activities in the Ouder-Amstel municipality (including Ouderkerk and Duivendrecht) and could assist with the design of new projects in the Ouderkerkerplas, whilst offering access to a network of schools in five other municipalities. However, a partial decentralisation of tasks means that **Ouder-Amstel municipality** is also a vital partner in taking on more responsibility for its own educational practices.

Secondary partners include:

- NME Amsterdam Southeast – knowledge exchange but no direct participation.

- NME de Ronde Venen – although centrally organised in Utrecht, connections have recently been made with Uithoorn, Diemen and Ouder-Amstel municipalities. These could be utilised for knowledge exchange and possible participation in activities.

RECOMMENDATIONS FOR THE CLIENT

1. Install education as a point of focus for all developments in the Ouderkerkerplas, which can engage all users of all ages.

2. Link education to existing use of the area for recreation and as a bird reserve.

3. Take an approach to sustainable education demanding critical collective thinking that becomes part of a process of sustainable transformation within the area, but also relates to wider social transformations outside.

4. Engage potential partners, particularly NME Amstelveen, Ouder-Amstel municipality and ANMEC to help develop activities within the Ouderkerkerplas, and access knowledge pools, organisational and schools networks.

LINKAGES TO OTHER DISCIPLINARY RESEARCH AND EXPECTED RESULTS

The linkages to other research fields are clear in their potential contribution as subjects for observation and discussion in educational terms. Projects in urban gardens (which under the guise of permaculture has particular worth), bee-keeping and energy generation all have educational value in terms of sustainability. A co-creation centre acts as a hub from which to coordinate activities for adults and children. It is expected that by following the recommendations above and linking to other projects, a pathway can be set towards the transformation of the Ouderkerkerplas as a facility of learning. This creates a self-reinforcing identity whereby education produces a continuing discourse that informs further development of the area.

3.2 CO-CREATION CENTRE (STEVE CLARENBACH & MILENA PILLKAHN)

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PROBLEM DESCRIPTION

The problem is bridging the sustainability vision (eight sustainability goals mentioned in the introduction) to the current situstaion and and actions at the Ouderkerkerplas through multiple pathways as part of the transition process. Transition pathways are defined as “routes to a transition image via intermediate objectives, which, as they come closer, can be formulated more quantitavely. Different transition paths can lead to a single transition image, and conversely, a single transition path can lead to several transition images”(Loorbach, 2010, p. 172). They are tested in latter phases of transition management for practicality through the use of experimentation, learning and adaptation at the Ouderkerkerplas.

According to Loorbach (2007) we are at the tactical stage of the transition management cycle. “The change in perspective described by the visions and the accompanying transition images of the future, should be further translated to and find root within various networks, organizations and institutions.” Focus at the tactical level are structural (regime) barriers, which “include regulatory, institutional, and economic conditions but could also involve consumer routines, physical infrastructures, or specific technologies” (Loorbach 2010, p.175). The challenge is to build up innovation networks of frontrunners ambitious about reform, starting with concrete breakthrough projects that illuminate the long-term sustainability vision and to identify barriers (and enablers) for these. Transition management is an interaction between all three levels of the transition management cycle (also strategic level: long term vision development, operational level: experimentation, project building).

MOTIVATION

It is the demand of the client to develop above mentioned pathways to enhance the transition and build more concrete programs for initiatives (agenda building). One concrete breakthrough project to make the Ouderkerkerplas a more sustainable place is a Co-creation centre, its realization is a pathway to bridge the sustainability vision to the current situation at the Ouderkerkerplas. In the Co-creation meetings with different stakeholders of the Ouderkerkerplas area, the need for a place which facilitates the process of co-creation turned up. This place will facilitate meetings where different stakeholders can gather to brainstorm and think about pressing issues, with the emphasis on sustainability issues.

To bring a co-creation centre into existence does feed into the overall goal of stakeholders to make the area more beautiful and attractive for visitors and can contribute depending on its arrangement to sustainability. Our research goal is thus to fit a Co-creation centre with the demand of stakeholders and to reveal barriers and enablers for its realization. On these grounds recommendations can be developed that might help/convince stakeholders to take action.

Co-creation in transition management fosters self-organization through new types of interaction like cycles of learning and incentives for radical innovations offering sustainable benefits. Different levels of governance are coordinated and innovative bottom-up developments are

utilized more strategically. The co-creation process is defined as “a complex, value creating process involving multiple, multi- level stakeholders in order to bring about desirable socio-technical changes in multiple adaptation phases” (cp. Loorbach 2007, Loorbach/Rotmans 2010).

Based on these statements the following research questions have to be investigated, contributing to develop transition pathways.

RESEARCH QUESTIONS

- What are barriers and enablers for the realization of a Co-creation Centre at the Ouderkerkerplas?

- How can a co-creation centre fit the demands of the co-creation process and make the Ouderkerkerplas a more sustainable place?

RESEARCH METHODOLOGY

Constitutive has been the study of documents about the Co-creation sessions that were already held at the Ouderkerkerplas. These informed the whole research about the project Co-creation centre.

The methodology of the research is to carry out semi-structured interviews with stakeholders and community actors who were not incorporated in the co-creation meetings to broaden the sample of perspectives what a Co-creation centre can look like and how it can be realized (Appendix 2).

The information gained from interviews and documents about the transition lab Ouderkerkerplas are informed by and complemented with an analysis of already successful sustainable co-creation centres and their potential for Ouderkerkerplas. Findings from the field research reveal specific barriers and enablers for realizing a Co-creation Centre, combined with the case studies, recommendations how to enhance a co-creation centre related and fitted to the needs of Ouderkerkerplas are given.

First the case studies about Co-creation centres are introduced. In the second section the barriers of realizing a Co- creation centre are accounted, followed by a section about recommendations for the realization of a Co-creation centre at Ouderkerkerplas. After a discussion section we end the first part of the research with showing links to the other fields of research.

RESULTS

CASE STUDIE

Co-creation centres or sustainability centres how they are often called exist around the world in different forms. In this section 5 centres are investigated, concerning their potential for the co-creation centre in the Ouderkerkerplas region.

Case 1: Duurzaamheids Centrum Weizigt:

Weizigt is a sustainability centre in Dordrecht, the Netherlands and their mission is to stimulate acting and thinking in a sustainable manner. It consists out of a urban farm, a greenhouse, multiple gardens and a building to facilitate meetings and workshops concerning sustainable issues. The Weizigt is also focused on the education. The centre educates elementary- and secondary school students about nature, the environment and sustainability. It does this in an interactive, fun and accessible way (Weizigt, 2014).

Case 2: Creative City Lab:

The Creative City Lab in Amsterdam, the Netherlands engages in social theme, in which sustainability play an important role. The lab combines experts from businesses, the government, knowledge institutions and from the creative industry to develop feasible business cases, to tackle those social themes. These cases are developed through a co-creation process. Local residents and local businesses are consulted throughout the entire development of those cases and during the implementation (Creative City Lab, 2014).

Case 3: Pakhuis de Zwijger:

Pakhuis de Zwijger in Amsterdam, the Netherlands is especially a centre that focuses on the transformation of the city Amsterdam towards a more sustainable city. Pakhuis de Zwijger organizes events with inspiring speakers concerning the creative industry and urban development. They also organize network meetings, lectures, discussions and workshops with the emphasis on creation and innovation (Pakhuis de Zwijger, 2014). The Pakhuis acts as an facilitator in the urban development in Amsterdam. They connect the relevant stakeholders to create partnerships and they introduce bottom-up initiatives with top-down actors. (Interview Pakhuis de Zwijger).

Case 4: The Sustainability Centre:

The Sustainability Centre in Hampshire, England is a centre that has many sustainability projects, such as biomass boiler, compost toilet, permaculture and solar panels. Besides these projects they also provide courses for children and adults for learning on sustainability topics. They also facilitate workshops and presentations of environment experts, and they facilitate meetings and

discussions concerning the environment. There is also an biological restaurant on site and it is possible to spend the night at the centre in tipis or yurts (Sustainability Centre, 2014).

Case 5: Greenhub:

The Greenhub in Mount Nelson, Australia 'is an innovative and visionary, purpose-built educational facility which offers learning programs for students and the community' (Greenhub, 2014). This is also a place where local residents and businesses meet to think and talk about sustainability issues. Greenhub also organizes workshops and presentations from sustainability experts. The building itself is built from local and recycled materials and is heated by solar energy and recycled cooking oil (Greenhub, 2014).

One thing that could be derived from the different cases is that the co-creation process is often only one aspect of the centres. The different centres facilitate besides co-creation sessions, also education concerning sustainability, renewable energy, local food production, biological cafes and even accommodations. Those activities alongside the co-creation sessions are also means to earn revenue.

BARRIERS FOR A CENTRE AT THE OUDERKERKERPLAS

Composition of transition actors

In the co-creation meetings with stakeholders of the Ouderkerkerplas area (Envisioning phase) some ideas for a Co-creation centre turned up. Interviews with stakeholders from the business and municipality level (interviews Groengebied Amstelland, Pakhuis de Zwijger, Arena and AMC) revealed that there is in reality little demand for during the Co-creation meetings envisioned projects like Seats2Meet or a branch of Pakhuis de Zwijger at the Ouderkerkerplas, because meeting-places and cafés are given at the Pakhuis de Zwijger and the Arena. For example the AMC states that they are not able to invest money and will not initiate projects in the Ouderkerkerplas, but they can imagine being involved as consumers and volunteers e.g. for the garden when something is already in existence. According to our information business and public stakeholders do not contribute with ideas or financially to the realization of a Co-creation centre at this point of the co-creation process.

The initiators and users of a Co-creation centre turn out to be potential frontrunners of the local community (neighborhoods) that finance and maintain it. The first finding is that to bring about changes in the Ouderkerkerplas land area regarding a Co-creation centre, the already in the Envisioning involved public and corporate actors are not the key actors as they are not willing or able to invest in a Co-creation centre, more acquiring of frontrunners from the community and their interests in the transition process is vital, as the community will seemingly realize, finance and maintain a Co-creation centre.

Relevant Collaborations

At the moment some ideas of various groups from the community concerning a Co-creation centre exist, but the possible directions and persistent problems for a Co-creation centre have not been confronted and are not integrated. It is unclear if the community actors share the sustainability vision as many interviewees were not part of the Envisioning. Because of this there is need to go back to the process of Envisioning for the project Co-creation centre and bring together community frontrunners and their activities.

Funding

Another barrier for this project is the funding of the implementation and the operational maintenance of the centre. The centres that were investigated were financed with public money. The assistance of the governments is negligible. The maintenance of the centres in the cases are funded by donations of third parties, the revenues of the sale of produces, the revenues of workshops, the revenues of the programming and a small amount of subsidies. During the research it became clear that the stakeholders who have participated in the co-creation sessions are not willing or able to invest in the Co-creation centre project. So in order to finance the realization of the centre, other sources have to be addressed. One approach for this is the concept of New Business Models. This concept will be explained in the New Business Models section.

Policies

Beside the underrepresented community one barrier for the realization of a Co-creation centre at the Ouderkerkerplas are the policies. Regarding to the ecology policies the area is a bird meadow habitat and is confined by the 'Ecologische Hoogstructuur', so the bird habitat is protected and may not be disturbed. The zoning of the area as a ´nature area´ makes building difficult in the area surrounding the Ouderkerkerplas, especially in close proximity of the bird habitat.

The information of an interviewee from Groengebied Amstelland (GGA) that policies do not allow to build a permanent building at the Ouderkerkerplas is being contradicted. According to an interviewee (Beleidsmedewerker ruimtelijke ordening) from the municipality Ouder-Amstel it is possible to build in the area depending on the function and the location of the building. In the plan for the environment (Bestemmingsplan Buitengebied Noord) rules are given what is possible in the area. On the northern side of the Ouderkerkerplas is a restricted area (Recreatie) in which it is possible to build a restaurant of max. 150 m2, a clubhouse of max. 200 m2 and various buildings for maintenance of max 500 m2 and some small buildings of max. 72 m2 . Buildings can be max. 7 meters high. This also falls in line with the recreational policy 'Recreation om de Stad (RodS) which has appointed acres of land for the development and design of recreation in the Ouderkerkerplas area (Gebiedsperspectief Amstelscheg, 2011). In the rest of the area around the Ouderkerkerplas building is not possible (Buitengebied Noord: Regels). Furthermore it takes about 8 week to get a permit for building in line with the

environmental plans according to the interviewee, it takes more time for something that diverges from the plan but it is not possible to say on forehand how much time that will be. This opens a window of opportunity for the placement of a centre if it fits in the concept of recreation, if it is located in the appointed area and if it complies with the building regulations.

RECOMMENDATIONS

The Placement

Due to financial restrictions of the community actors mentioned in interviews the realization of small-scale projects that evolve to a Co-creation centre are more likely and by those incremental improvements can be reached towards integrated sustainability (cp. The Sustainability Centre, England; Duurzaamheids Centrum Weizigt, Netherlands). These can be distinguished from large-scale projects like building the additional windmill, which professionals from outside the area, rather than residents, design and execute and higher investments have to be made in order to realize them. To get small-scale projects like an evolving Co-creation centre going, residential stakeholders have to be better connected, the facilitation of networks is an enabling factor also with regard to financing the projects (see section New Business Models).

In every interview with residents the wish for a catering establishment is push forward. The seed for a Co-creation centre might be the desire of the mobile catering service ´Pippowagen´ currently operating in a caravan only in the warm seasons at Ouderkerkerplas to have a placement that allows them to run their business year-round. A more sophisticated placement for catering attracts visitors and can function as a meeting place for the local community in the area to facilitate the process of co-creation. It contributes to the attractiveness and recreational spirit of the area and can be combined with gardening projects (local food production, permaculture), education about the environment and sustainability. The installation of flower shaped solar panels outside the placement would look beautiful and unique, spend shade and of course deliver renewable energy for the centre. ´Pippowagen´ is interested to use produce of the garden and bee projects for their catering and thus the development of a biological restaurant at site should be aspired.

Figure 11: Flower shaped solar panels, Oakville, Ontario

Figure 12: Flower shaped solar panels, Parachute, Colorado

Beside the possibility of a new building (best built from local and recycled materials), yurts could be used. They are well known for their thermal property to stay cool in the summer and warm in the winter and are made of natural materials like wood, felt and canvas. The placement might be equipped with a biomass boiler and compost toilets and thus develop in the long-term to an eco-lodge. Therma-Q panels are another ecological, efficient and cost effective way for heating (http://therma-q.net/). Tipis/yurts could be available for hire at the campsite to generate revenue. Preferably it should be worked with what is already there- with synergies that represent the community. Especially skills from local individuals can contribute to the realization of a Co-creation centre as the functioning of individuals in a group process is decisive for the success (Loorbach,2009).

Figure 13: Yurts at the Sustainability Centre, Hampshire England

The idea from ´Pippowagen´ has been to repurpose the building of a riding school that has become insolvent a while ago. The interviewee from the municipality Ouder-Amstel believes that it will not be possible for the community to use this building: “on the Holdenrechterweg are two former transport companies and a riding school which is closed now. The owners want to break down the buildings and build houses on the ground”. The idea of the bird group to use a vacant farm building has to be investigated further, also the possibility to expand the toilet/shower facilities to build a centre.

Figure 14: Koetshuis, Duurzaamheids Centrum Weizigt

The co-creation process

The interviewed bird group has interest in building a ´visitors centre´, where they can incorporate education concerning birds and is interested in partnership. A starting point to facilitate a network for the realization of a Co-creation centre are the ideas of ´Pippowagen´ and the bird group which may use above mentioned inspirations on how to evolve a Co-creation centre in line with the sustainability vision. The bird group may consult the organizations Nature and Environmental Education Amsterdam and Amstelveen (interviews ID track).

The ROV (planning and traffic) workgroup consists out of residents of Ouderkerk and is actively stimulating and involving the local residents in different subjects that concern the

Ouderkerkerplas area. Originally contributing to partnering of the local community in the municipality management plan, the group now works separately of the municipality. The group is open to be partners in all kinds of projects. Even though up to know the interviewee believes that there is no demand for a Co-creation centre the group can function as a consultant. If convinced of initiatives of a Co-creation centre and its benefits to foster the development of the region the group could become an important active member of a network realizing a Co-creation centre.

An additional wind mill would generate about 20.000- 25.000 € income to the GGA that could in turn be used to finance projects at the Ouderkerkerplas area (community compensation). The combination of catering and education initiatives at the community level can be supported by sustainable investments in clean energy small-scale projects by GGA that can be used by the community (a good starting point for co-creation).

These frontrunners could be creative designers of the vision and initiate the diffusion in their own networks (organizational structure) realizing required changes in experimental and organic manner through broad engagement and inclusive processes (cp. Nevens et al, 2012).

Figure 15: Learning about the environment at the Green Hub, Australia

DISCUSSION

The case illustrates the generic as well as the context specific nature of the transition management approach, problems to reach envisioned future become clear during the research as every transition arena is unique in terms of context and participants (cp. Loorbach 2009).

Key problems of societal change have to be dealt with in transition management and become obvious during the research. Dissent occurred on the ranking for goals and means regarding a Co-creation centre. Various actors with different beliefs, interests and resources need to cooperate which calls for network management. Distributed control (power) seems to be a problem in the determination of short term goals even in the niche regime (stakeholders from co-creation meetings). In order to solve these problems there is constant demand of organizing a joint searching and learning process focused on long term sustainable solutions as the basis to co-create.

Within the scope of this course the research can only be a rather small contribution to reveal pathways to the realization of a Co-creation Centre. The possibilities to relate the rather abstract vision to the concrete project of a Co-creation Centre that partly shapes the visionary future needs further exploration.

LINKING THE CO-CREATION CENTRE TO THE OTHER PROJECTS

The A Co-creation centre is only sustainable when it uses renewable energy/eco-friendly technologies for heating and most of the electricity demand. Revenue that can be gained through renewable energy projects should be used prudential in the Co-creation process.

The gardening project can be incorporated into a Co-creation centre, contributing to sustainable education (e. on permaculture) and catering by its produce. Also a Co-creation centre can be the meeting place to facilitate gardening initiatives.

The International development track gathers residents´ perspectives of the Ouderkerkerplas and thereby contributes to the development of future pathways. Further education (facilitation of learning) is an important part to realize the sustainability vision and to make Ouderkerkerplas a pioneer in sustainability and generally guide the Ouderkerkerplas through a successful transition.

3.3 ELECTRICITY GENERATION FROM WIND AND SOLAR PHOTOVOLTAIC (PV) ENERGY (HENRIK SONTAG)

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SPECIFIC PROBLEM DEFINITION

The Ouderkerkerplas, situated in the sub-urban area of Amsterdam, provides space and the theoretical potential for the deployment of renewable power sites – especially with respect to wind power. However, at the same time the Ouderkerkerplas is located in a nature reserve. It serves as a recreational area and its preservation as such has priority.

The task now is to evaluate the possibilities for the integration of wind and solar photovoltaic power generation in the region. Thereby, special attention is given to not degrade the recreational value of the area.

SPECIFIC RESEARCH QUESTIONS

The research will focus on renewable power generation by wind and solar photovoltaic energy. The specific research questions are:

1. What are extra possibilities for wind power generation on the Ouderkerkerplas land area?
    a. What are the local conditions for the generation of wind power?
    b. What are possible technological solutions to generate electricity from wind?
    c. What are the costs and benefits for the proposed technological solutions?

2. What are extra possibilities for solar photovoltaic power generation on the Ouderkerkerplas land area?
    a. What are the local conditions for solar PV power generation?
    b. What are possible locations for PV power generation?
    c. What are the costs and benefits for PV power generation?

MOTIVATION

By introducing renewable energy on the Ouderkerkerplas, three of the eight goals that were put forward in the co-creation sessions will be covered:

1. The generation of renewable energy on the Ouderkerkerplas;
2. Building the foundation for a circular economy, for which the production of renewable energy is an imperative;
3. Enforcing the local economy by the possibility for forming local partnerships to finance renewable energy projects.

Additionally, renewable energy installations in the park raise awareness of alternative sustainable ways of electricity production. It makes sustainability visible and thus can contribute to the image of the Ouderkerkerplas serving as a showcase for sustainable urban development. At last there is the potential to generate revenues for the GGA as result of leasing out land. The money could in turn be used for the further development of the Ouderkerkerplas.

RESEARCH METHOD

1. Desk research of comparable cases and existing literature in combination with direct observation of the local environment of the area to find out about concrete ways of renewable power generation;
2. Desk research on information to conduct cost and benefit analysis for the respective cases;
3. Literature study and interviews with stakeholders and experts to investigate limitations and barriers for the introduction of renewable energy sites.

RESULTS

WIND POWER

LOCAL CONDITIONS

The Ouderkerkerplas covers an area of approximately 1.16 km^2 with approximately 0.75 km^2 being covered by the inner lake. Conditions for wind power generation on the Ouderkerkerplas can be categorized as good. Based on online data of the existing wind turbine "De Amstelvogel" on the area a capacity factor of 23.4% can be derived. The average capacity factor for on-land wind sites in the Netherlands was estimated to be 21.5% based on an observation period from 2003 to 2007 (Boccard, 2008). Thus, the Ouderkerkerplas is a valid location for the generation of wind power from large wind turbines.

SPATIAL CONSTRAINTS

As it can be derived from the maps presented in Chapter 1, space in the area for the development of wind power sites is limited. For on-land windmills similar the size of "De Amstelvogel" (2000kW; hub height: 85m, rotor diameter: 71m), the possible deployment area is further reduced due to noise and safety regulations, as well as the existing wind turbine. The latter requires a minimum distance to any other wind-mill equal its size of 568m downwind and 355m crosswind to prevent performance impairments (8 times the rotor diameter downwind and 5 times the rotor diameter in crosswind direction (Andrews, 2013)). The annual average sound level at noise sensitive buildings may not exceed 47dB during the day and 41 dB at night. As a rule of thumb, four times the height of the pole of a windmill is normally taken as the minimum distance required between windmills and other residential buildings (Agt, 2005).

Based on the mentioned parameters above, a preliminary possible disposable area for on-land windmill has been identified in figure 16.

Figure 16: Disposable area (in red) for the construction of a wind mill on the Ouderkerkerplas

For the further feasibility assessment, the preliminary area has to be assessed further with respect to air safety (distance to Schiphol Airport is only 8km), as well as local risks (e.g. minimum distance to highways, falling ice from rotor blades). Another aspect that needs to be taken into consideration for the spatial planning is resulting drop shadow from wind turbines that might disturb nearby located residential areas.

NATURE & ENVIRONMENT

The Ouderkerkerplas is part of the Ecologische Hoofdstructuur (EHS), a national initiative for the preservation and maintenance of natural reserves in the Netherlands (see figure 17) (Ecologische Hoofdstructuur, 2014). In terms of ecological value the area of and around the Ouderkerkerplas is especially relevant with respect to being a retreat for a diversity of birds. A large variety of species are attracted that use the area for the purpose of breeding or to repose after returning from their winter quartiers in Africa or southern Europe (Vogelkijkhut.nl, n.d.); Litjens, 2014). Concerns are therefore large that additional windmills will cause serious damage to birds, as the windmills are located too closely. The area is often referred to as an ecological 'sensitive' area and a region of particular natural value (Bestuurlijk Overleg Amstelscheg, 2011).

Fig 17: Nature reserves in the nearby area of the Ouderkerkerplas[4]

LOCAL POLICIES

While the general attitude towards wind energy in the Netherlands is very positive, the situation looks very different when it comes to local projects, where opposition can be much stronger. The visual/landscape factor (scenic value) is the most dominant factor in this respect, followed by annoyance by noise, light and flicker and the impact on birds and nature (Wolsink, 2007). The latter is definitely one of the main expressed concerns when it comes to wind developments in the Ouderkerkerplas.

The local policies are however responding on these issues, by emphasizing that the goal for the Amstelscheg area is to maintain its green and open character, hence nature and the visual/landscape factor area being addressed in local policies (Provincie Noord-Holland, 2014-b). However, there is nevertheless disagreement about the issue of building windmills in the area.

The main obstacle at present for any development concerning the construction of a second wind mill is the presence of new province wide regulations for the installation of new wind power sites. To reduce scattering, the province of Noord-Holland has specified certain areas for on-land wind power generation. New wind power sites must have a minimum number of six wind mills which must be set up in line (Provincie Noord-Holland, 2014-a; Jansen, 2014). The Ouderkerkerplas is not part of any of the specified areas and at the same time cannot comply

[4] Source: http://www.synbiosys.alterra.nl/natura2000/googlemapszoek.aspx

with the regulations due to the limited space available and the requirements to maintain the open space of the area.

SCENARIO 1: ONE ADDITIONAL WINDMILL

In this section, to quantify costs and benefits of wind power, the hypothetical case of the construction of an additional wind turbine is assumed. The parameters in height and rotor diameter of the existing windmill are taken as the maximum boundaries for wind turbine selection.

For the cost and benefit analysis (CBA) the current Enercon E-70 model was chosen as a sample model (table 7).

Table 7: Properties of sample wind turbine (Source: Enercon, 2010).

Enercon E-70	
Rated power	2300 kW
Rotor diameter	71 m
Hub height	85 m

The CBA shows that the construction of a turbine is economically viable, with a Net Present Value of 297,311€, and has a pay-back-period of less than 10 years. The expected annual output is a total of 4,417,560 kWh, which is equal to providing 1,134 households with electricity over the course of one year based on an average 3-person household[5]. The resulting GHG savings amount to 23,914t. Furthermore, the wind turbine construction creates direct revenue for the landowner GGA through land lease of about 25,000€. An overview of the CBA is given in table 8. Details about the underlying assumptions and calculation methods can be found in Appendix 3.

Table 8: Cost and benefits of an additional wind turbine.

Annual yield (expected)	4 707 537 kWh
Yearly revenue	376 603 €
Yearly GHG emission savings (in CO2 equivalent)	23 914 t
Net Present Value (NPV)	297 311 €
Payback Period (PBP)	9.22 years
Cost of electricity (COE)	0.074 €
Benefits from land lease	24 950 €

[5] http://www.nuon.nl/energie/energieprijzen-vergelijken/energiekosten-berekenen.jsp

SCENARIO 2: SMALL WIND TURBINES

Alternatively to an additional solitary wind turbine, which makes a big difference to the visual appearance of a landscape another idea to generate wind power, is from small wind turbines (SWTs). SWTs range from 50 kW to less than 1.5 kW and come in the design axis wind turbines (VAWTs) and horizontal axis wind turbines (HAWTs) (Pourrajabian et al., 2014). While HAWTs offer a greater power generation potential (Ishugah et al., 2014), VAWTs score better in almost every other category. They can handle much more turbulence as they need no adjustment to changing wind directions, they have lower maintenance and manufacturing costs, they need less space, produce less noise and have less impact on birds (Ishuga et al., 2014; de Santoli et al., 2014). The decisive influential factors that determine the overall performance of SWTs, are the roughness of the terrain and the effect of tall trees and buildings (Bahaj et al., 2007). As far as economics is concerned, many cases have shown that the payback period (PBP) can be within the lifetime of the device. The economic viability is however very dependent on the prevailing average wind speeds (Ishuga et al., 2014).

De Santoli et al. (2014) assessed the performance and environmental impact of a vertical axis micro wind turbine (VAWMT) (3.7 kW). The aim of the study was the development of an eco-friendly energy production system in a natural protected area and thus compares well to our case. The area where the case study took place is characterized by low but constant wind speeds during the year (5 m/s average wind speed). In their assessment environmental impacts were negligible and no impact on birds and bats were found. The yearly electricity output showed a potential of an average of 5400 kWh.

Considerations for the Ouderkerkerplas

The main advantage of SWTs is the potential to be integrated more elegantly within the area due to their smaller size. Especially VAWTs seem to be interesting for the area, due to their little impact on the environment. However, following the smaller size, the power output is far lower than the output of a large wind turbine. The average annual wind speed in the region at low attitudes (10 m) is between 3.5 – 5 m/s (Stepek and Wijnant, 2011). If we take the example of the VAWT prototype tested above this would result in a yearly output of 3780 – 5400 kWh, which is still a reasonable result.

However, the installation of SWTs would follow a different strategy for the Ouderkerkerplas with respect to generation of energy. Instead of commercial renewable energy production, the focus would be on local electricity supply for on-site electricity demand or local facilities. SWTs can thus contribute to making the Ouderkerkerplas a zero emission energy self-sufficient areal. This would increase awareness among people visiting the area about renewable energy production and thus has the potential to spur behavioural change (Bahaj et al., 2007).

Steps that need to be investigated further for the integration of SWTs in the Ouderkerkerplas:

- the actual local wind speed at low altitudes and the magnitude of turbulence in the area,
- the visual integration (the prototype VAWMT for example still has a size of 7m x 5.6m x 8 m),
- the electricity demand of the local facilities,
- how to deal with the intermittent nature of the power supply (e.g. combination with energy storage system?).

PHOTOVOLTAIC ENERGY (PV)

LOCAL SITUATION

The Ouderkerkerplas is a sky open area with the theoretical potential for the generation of solar electricity. For optimally inclined photovoltaic modules in the Amsterdam region, the yearly sum of irradiation amounts to 1200-1250 kWh/m^2, resulting in a yearly potential of solar electricity generated by a 1 kWp system of 850-900 kWh/kWp, assuming a system performance ratio of 75% (Huld and Pinedo-Pasqua, n.d.-a). For horizontally mounted modules the numbers are lower and result in 1000-1100 kWh/m^2 and 750 – 800 kWh/kWp respectively (Huld and Pinedo-Pasqua, n.d.-b).

POSSIBILITIES FOR PV

Since the land area in the Ouderkerkerplas is limited and serves for recreational purposes with the ambition to maintain the green and natural character, large scale land surface covering on-land PV power sites are not feasible as they are too land intensive. Given these circumstances, the focus will be on investigating the existing infrastructure on the Ouderkerkerplas for potential punctual implementations for solar PV power.

OPTION 1: NEW PV NOISE BARRIER

Rijkswaterstaat announced that within the next years the A9 will be under reconstruction (Jansen, 2014). This gives the opportunity to research the potential for a new modern PVNB along the A9. The yield can be expected to be considerably higher, since conversion efficiencies of solar module increased considerably within the last 12 years.

Learning experiences from the existing PVNB as well as an additional study on a PVNB carried out in Belgium (De Schepper et al., 2012) brought forward the following elements to consider for the design of a new PVNB:

- Road traffic dust (roughly reduces the annual energy production by 8%);
- Increase in module temperature (energy loss of 4.5%);

- Conversion efficiency can vary significantly (6%) at low power input values between inverter types;
- Tilted PV modules receive 5% more irradiance per m^2 than horizontally mounted ones;
- Orientation away from the motorway (no shading from passing trucks, no damage from stone chippings)

(De Schepper et al., 2012; van der Borg and Jansen, 2001).

Design, costs and benefits

Taking into account the factors outlined above, the PV modules should be mounted on the south side of the highway, in South direction at a tilted angle of 45°. Assuming the same length of 1650m for the new PVNB installation and using solar panels of 1m width and 1.64m length, which would result in a total of 1650 solar panels, an electricity output of 249,171 kWh per year could be realized. This amounts to 127 t of GHG savings. The electricity outcome is based on the assumption of a solar module efficiency of 15%.

The economic viability depends to a large extent on the expected price of electricity. For an electricity price of 0.08 €/kWh the payback period of the PVNB would be 22 years and the net present value would be -197,115 €. An electricity price of 0.2 €/kWh, however, would result in a PBP of 8 years and a NPV of 136,184€. An overview of the CBA is presented in table 9. Underlying assumptions and calculation calculation methods can be found in Appendix 3.

Table 9: Cost and benefits of the photovoltaic noise barrier along the A9.

Installed capacity	420.75 kWp
Annual yield (expected)	249 171 kWh
Yearly GHG emission savings (in CO2 equivalent)	127 t
Yearly revenue	
Electricity price of 0,08 €/kWh	19 934 €
Electricity price of 0,20 €/kWh	49 834 €
Net Present Value (NPV)	
Electricity price of 0,08 €/kWh	- 197 115 €
Electricity price of 0,20 €/kWh	136 184 €
Payback Period (PBP)	
Electricity price of 0,08 €/kWh	22 years
Electricity price of 0,20 €/kWh	8 years
Cost of electricity (COE)	0,15 €/kWh

Calculations on the economic feasibility are very sensitive to changes in the electricity prices, as well as changes to the discount rate and expected lifetime. Variations in electricity prices as a result of market developments or subsidies therefore can influence the economical viability of projects. The same goes to different assumptions on discount rate and technology lifetime (see also Soshinskaya et al., 2014; De Schepper, 2012). Therefore the results presented have to be seen together with the underlying assumptions.

OPTION 2: LOCAL FACILITIES

Additionally to the investigated PVNB possibility, solar PV panels could also be used to directly supply energy for local facilities. Next to the existing facilities (Gewoon Geluk, Sailing Club) it can be considered to install solar PV to supply electricity to the investigated development projects (see Chapter 3.2 and 3.4).

List of local facilities:

- 'Gewoon Geluk' (local gastronomy);
- Sailing club;
- Urban garden;
- Co-creation centre.

CONCLUSION & RECOMMENDATIONS

The objective of this part of the study was to investigate the possibilities of renewable electricity production from wind or solar PV energy. It was found that a second wind turbine on the Ouderkerkerplas is economically viable and technically possible to be set up. Of all options it provides the largest power supply and has the largest potential of GHG savings. However, apart from traceable concerns about the environment (bird reserves), it is the strategy of the province Noord-Holland that does not allow the construction of a second wind mill on the Ouderkerkerplas. The second largest potential for electricity production is a PVNB along the A9. The analysis has shown that the system can be cost effective, but is dependent on an electricity price of at least 0.15 €/kWh. While the latter, is definitely worthwhile for further investigation, the analysis showed that large-scale power production does not seem a feasible solution for the area. This however is no set back, since the greater goal for the development of the Ouderkerkerplas was not to generate large-scale electricity, but to become a place of sustainability. As a result, I therefore recommend to concentrating on small-scale renewable energy systems that are aimed at local power supply and to use the element of renewable energy production for awareness raising and to promote behavioral change.

LINKAGES TO OTHER RESEARCH PROJECTS

Renewable energy can be used to produce electricity for the envisioned co-creation centre by means of solar panels or SWTs. Also the Urban garden project, which presumably has only small demands of electricity could be powered by using such small scale devices (e.g. pumping water). With respect to education on the Ouderkerkerplas, the renewable power sites can be used to show cast sustainable practices. They can also be the starting point for school projects round the topic renewable smart energy production.

3.4 LOCAL FOOD PRODUCTION (ANNEMIEKE WIJNAKKER & CORA VERDIJK)

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PROBLEM DESCRIPTION AND MOTIVATION

Problem definition

THE OUDERKERKERPLAS

The main characteristics of the area are already described in the general introduction. In this part we will elaborate on biodiversity characteristics of the area that is surrounding the Ouderkerkerplas. Currently, the most prominent features are grasslands, taller trees and a bird sanctuary (figure 18). The larger part of the lake is only surrounded by a small strip of land (left and bottom figure 18) that belongs to GGA (figure 18). This is a footpath through a bird habitat that is closed for the public during the winter to allow birds to rest (GGA, 2014).

The larger part of the land surrounding the lake is in the upper right corner of figure 20. In this part there is a beach, a toilet building, some play equipment for kids, a parking lot and large grass areas for day camping purposes. This is the area where projects can be developed.

At the Ouderkerkerplas there are eight endangered species (Appendix 4). Most of them are birds, but also a few endangered frog and toad species and a freshwater fish species (Maps.Amsterdam, 2014a). The area is a part of the 'Ecologische Hoofdstructuur' this is a project of the Dutch government that triest to reconect larger nature areas with wildlife crossings to improve species migration (Ecologische Hoofdstructuur, 2014).There is a wildlife crossing underneath highway A9 (the one the bottom of figure 20) for amphibia and mammals (Maps.Amsterdam, 2014b).

STAKEHOLDERS WISHES

The Stakeholders in the co-creation group have expressed wishes to increase the biodiversity around the Ouderkerkerplas while honoring the historical and cultural heritage of the existing landscape and ecosystems. There were however no concrete ideas mentioned on how to increase biodiversity. Two specific projects that were proposed during the brainstorm sessions (that contribute to biodiversity according to the stakeholders) were: 1) urban agriculture and 2) introducing bees at the Ouderkerkerplas (Stijkel, 2014).

Figure 18: An overview of the Ouderkerkerplas. The area surrounding it is colored to indicate it's purpose: Urban area (blue), agriculture (green), highway (grey) and offices (red). Places within the area of special interest are indicated with a number. The beach (1), day camping sites (2), the sail association (3), toilets (4) and the windmill (5).

RESEARCH QUESTION

1. What type of urban agriculture can be implemented in this area?
    a. A vegetable, flower or mixed garden?
    b. Monoculture or permaculture garden?
    c. Does the realisation of a garden enhance the local biodiversity?
    d. What are the costs and benefits of implementing such a garden for stakeholders?

2. Can bees be introduced at the Ouderkerkerplas?
    a. What is needed in terms of vegetation at the Ouderkerkerplas to sustain a bee population?
    b. How appropriate is the surrounding area of the Ouderkerkerplas to sustain a bee population in term of food availability and pesticides?
    c. Does the introduction of bees enhance the local biodiversity?
    d. What are the costs and benefits of introducing bee hive(s) at the Ouderkerkerplas for stakeholders?

MOTIVATION

In the report of Stijkel (2014) several stakeholders expressed wishes for urban agriculture, such as a fruit and vegetables picking garden. The client, Groen Gebied Amstelland, also expressed a general wish to increase biodiversity in the area. To combine these wishes we will review

different type of gardens that combine urban agriculture element with elements that possibly benefit birds and insects. Introducing bees can also be a biodiversity enhancement.
The co-creation concept is based on the fact that stakeholders should be able to benefit from their own investments, this is a goal that should be met by the each project in this research (Stijkel, 2014). This aim is not necessarily compatible with the wish of the stakeholders for projects that increase biodiversity. For example, increasing connectivity with wildlife crossings is not something that stakeholders can easily benefit from, although investments would be necessary.
For this reason we choose not to start our research from the general wish to increase biodiversity. Projects with biodiversity as main goal would not fit into the co-creation concept as we argued above and therefore probably lack means to put them into action. This means that the research originates from the stakeholder point of view and not from the desire to enhance biodiversity. We believe this will maximise the chances of projects to be realised.

We will continue the envisioning of the stakeholders by exploring pathways with two of their proposed projects (Stijkel, 2014).
We selected introducing bees and a urban agriculture because:

- They are implementable without major changes to the landscape. This was mentioned as a criteria by the stakeholders, the no regret concept (Stijkel, 2014).
- They have potential to generate benefits for the stakeholders, a criteria for the co-creation process as mentioned above. It seems possible to finance them by crowdfunding.
- More than one stakeholders was interested which increases the chances of actually executing the projects.
- They have the potential to meet several of the 8 goals aspired by the stakeholders (table 10).
- Enhanced happiness of the visitors could be attributing to Recreation, one of the 8 goals that were set by the stakeholders. Fuller et al. (2007) indicates that the well being of green space visitors enhances with increasing biodiversity. Their research was done in an urban environment that translates well to the Ouderkerkerplas (Fuller, 2007).

Table 10: An indication how the two projects can contribute to achieving several of the 8 goals proposed by the stakeholders. Goal number 3 (bold) will be our main goal.

	The 8 goals	**Urban agriculture**	**Bee hives**
1	Energy efficiency and generating energy	• Pumping up water with solar panels to water the plants • Local food production saves energy by eliminating transport to consumers , and reducing waste.	

2	Education	Gardening together creates the opportunity of interaction and a learning environment	Opportunity to educate how to prevent bee extinction
3	**Local food production**	Generates healthy vegetables and fruits	Generates honey
4	Recreation	• Enhance well-being of the stakeholders, relaxation • Is a healthy way of spending free time (exercise in outdoor)	
5	Biodiversity	Increase food and habitats for local species.	Increase of an endangered species in the Netherlands
6	Decentralized water management		
7	Enforcing local economy	• Selling fruit and vegetables	• Selling honey • Advertisement on hives
8	Circular economy		
-	Additional benefits	Food source for bees	Pollination services for crops

AN ENVISIONING OF LOCAL FOOD PRODUCTION:

A part of the grassland around the Ouderkerkerplas can be changed into a multi-species garden: with fruits and vegetables to pick for the visitors, flowers for bees and insects and bushes for birds. In the first place the natural ecosystems of the area need to be considered in order to use the species that are native to the area in the garden. Space can be reserved for flowers, to support bees and create a colourful place for relaxation. Furthermore, it can be a place where people with different backgrounds meet. It could fulfill an educational purpose by demonstrating that food can also be grown sustainable. Energywise, consuming locally grown vegetables from urban agriculture saves CO2 that would otherwise be emitted during transportation (Halweil, 2002) and local organic waste from the nearby citizens can be recycled as a resource for the community garden. Both projects are also mutually beneficial: Vegetation that bears flower (this includes vegetables and flowers as well) are needed to sustain a bee population. Bees in their turn are needed for pollination of the garden.

In this paper the overarching term 'Local Food Production' (LPF) will be used to indicate both urban agriculture and bees. The result of this research will be a concrete concept of what the sustainable garden and bee colony could look like.

RESEARCH METHODOLOGY

The type of research needed to answer the research question is not ecosystem related research, which would be expected from or track. However, ecosystem research would not provide the information that is useful for the client in this case. For this reason we accepted to deviate from our expertise field in order to answer questions that are in the first place relevant for the client. Instead we will use our expertise in the area of biodiversity and ecosystems to advise how to proceed and what the possible benefits and downsides of introducing bees and a garden can be.
Answering the research questions needs multiple research techniques such as: case studies, literature research and interviewing stakeholders. Table 11 indicates the research approaches for the research (sub)questions.

LITERATURE REVIEW

A literature review will be done to research what type of gardens improve the wellness of people as well as the habitat for species. The suitability of a garden type will be judged on basis of the preferences the stakeholders and background knowledge gained from the reviewed literature.
Also a literature review to assess what is needed to sustain a healthy bee population is in order.

CASE STUDIES

Different projects need to be investigated to selected the most suitable approach for a garden in this area. The central questions in the case study will be: what type of garden is easy to maintain with volunteers, a vegetable, flower or mixed garden. What are reasons to choose a monoculture or permaculture garden and what management structure is desirable in the co-creation context?
For the bee project an expert opinion is needed to determine if the Ouderkerkerplas is a suitable environment and how the garden can supply for the needs of a bee population.
For both projects a case study can shed light on what the cost and benefits are for stakeholders.

STAKEHOLDER INTERVIEWS

Stakeholders will be interviewed to further investigate possibilities and restriction for the projects. Emphasis will lie on finding stakeholders that are interested to invest in these projects.

Table 11: An indication what type of research methods can be used to answer the research question.Case study (C), Literature research (L) and Stakeholder interview (S)

RQ	**1 What type of urban agriculture can best be implemented in this area?**		**2 Can bees be introduced at the Ouderkerkerplas**?	
a	A vegetable, flower or mixed garden?	C	What is needed in terms of vegetation at the Ouderkerkerplas to sustain a bee population?	C L

b	Monoculture or permaculture garden?	C L	How appropriate is the surrounding area of the Ouderkerkerplas to sustain a bee population in term of food availability and pesticides?	S C L
c	What management structure will work best in the co-creation context	C	Does the introduction of bees enhance the local biodiversity?	L
d	Does the realisation of a garden enhance the local biodiversity?	L	What are the costs and benefits of introducing bee hive(s) at the Ouderkerkerplas for stakeholders?	C S
e	What are the costs and benefits of implementing such a garden for stakeholders?	C S		

RESULTS

LITERATURE REVIEW

LOCAL FOOD PRODUCTION

Ackerman et al. (2014) argues that LFP is the sustainable food system for future cities. Not only does it increase the local economy and health, it also helps to create a social and cultural identity in the neighborhood (van Averbeke, 2007; Nugent, 2002; Ernwein et al., 2014). If food is produced locally it travels shorter distances and therefore it can reduce greenhouse gas emissions (Peters et al., 2009; Halweil, 2002). This shorter supply chain also increases the profit of farmers instead of stimulating the transport sector. It increases awareness of environmental problems since the consumer and the farmer can communicate directly (Peters et al., 2009). When transported smaller distances (or not at all) food waste reduces, this reduces the urban footprint and saves energy (Ackerman et al. 2012). Local recycling done in LFP improves nutrient cycling (de Zeeuw et al., 1999).

URBAN AGRICULTURE

The negative impacts of industrial agriculture on the environment initiated a debate on how to make a transition towards more sustainable ways of food cultivation. Permaculture farming has been proposed as an alternative to the common monoculture technique (Ferguson et al., 2014).

The permaculture garden is based on sustainability concepts. It was given the name Permaculture (derived from 'permanent agriculture') by David Holmgren and Bill Mollison in the early 1970's. They shared environmental concerns and seeked for a solution by combining

ecology and landscape architecture with agriculture (Ferguson et al., 2014; Holmgren, 2012). David Holmgren defined it as a "Consciously designed landscapes which mimic the patterns and relationships found in nature, while yielding an abundance of food, fibre and energy for provision of local needs" (2004, p.xix). Permaculture goes beyond a gardening technique, it is based on its own ethical values and seeks the best practises to 'empower us to provide for our needs, while increasing the natural capital for future generations' (Holmgren, 2012 p.3). It is a design system for sustainable land use and a sustainable way of living (Holmgren Design, 2014). The main idea is that a farmer should establish an ecosystem that produces yield for humans through self-organisation, this increases output while minimizing input (Ferguson et al., 2014). Permaculture includes a large proportion of perennial species, this is a distinctly different approach than industrial agriculture that is mainly focused on annual species. Although the technique sounds promising and is used worldwide (The Permaculture research institute, 2014), it is little researched (Ferguson et al., 2014).

BEES

Bees are very important in ecosystems as pollinators for plants. About 90% of the plants in the world need animals for pollination (Linder, 1998 / Bawa, 1990) and bees are the main pollinator's in most ecosystems (Neff et al. 1993) . Bees are not only largely responsible for pollinating wild plants, but also 75% of agricultural crops need their pollination (Free, 1993), and therefore they are very important for food production. It was monitored that 37-65% of bee species in European countries are on the list of conservation concern (Mohra et al., 2004/ Patiny et al., 2009 / FitzPartick et al., 2006). In the area around the Ouderkerkerplas unexplained honey bee losses are above average (Van der Zee & Pisa, 2013) this is remarkable because urban areas overall seem to have lower honey bee losses than average according to a GIS research on honey bee loss causes (de Vlieger, 2014). The reason for this is important to know in order to successfully improve bee colonies.

Winfree (2010) lists 5 different threats to conservation of bees: Habitat loss and fragmentation, climate change, nonnative species, pesticides and genetically modified crops. He also the following suggests strategies for conservation.

THE CONSERVATION AND RESTORATION OF WILD BEES

Insects in general are underrepresented in protection programs, in order to improve this, the economic reasons for conservation should be taken into account to highlight the value of bee conservation in policy decisions (Winfree, 2010).

For conservation first off all it is important to know what the limiting factors are for bee conservation in an area. This can be for instance food limitation, nesting limitation (Winfree, 2010). This is necessary to know what needs improvement which can be different for all situations.

As agriculture intensification is one reason for bee decline, floral restaurations within agricultural context are important (Winfree, 2010). The type of flowers should be preferably long blooming flowers that serve a diverse combination of species to most effectively use the

floral restoration areas for bees. Restoration of habitats that are prefered by bees for nesting is the second type of conservation that could possibly be done, although there is still little research on how nesting of bees is exactly done. Organic farming could be a last method for restoring bees (Winfree, 2010). A decrease of pesticide use indicates that this will be better for bee populations. On the other hand there are also organic pesticides that are toxic for bees and also and underground nesting sites are more endangered due to increased tillage. Because there is no absolute definition of organic farming, a right type of organic farming needs to be considered for bee conservation.

HUMANS, BEES, AND POLLINATION SERVICES IN THE CITY: THE CASE OF CHICAGO AND NEW YORK CITY (USA)

A research was performed in chicago to find the relation between bee population and human population densities in Chicago (Lowenstein et al., 2014). This research pointed out that with higher population densities, more bees are present. The increasing urban gardens with increased population densities, plays a large role. However, Matteson et al. (2013) proved the opposite in New York. Here the population density was negatively related to bee populations. It was argued that the cause for this difference in research outcomes was that the measured population densities in New York were much higher because areas with high flats were included in the research.

NESTING PLACES FOR SOLITARY BEES.

Solitary bees and wasps do not live in hives, some live in burrows in the ground other in holes in the trees.

Gaston et al. (2003) investigates the effectiveness of the implementation of artificial nests in domestic gardens in Sheffield, South Yorkshire (UK). Although many of the experiments did not have a significant increasing effect on the abundance of the species, some artificial nests proved to be effective. The nests that proved to be effective were the ones for solitary bees and wasps and a second element improving biodiversity was dead wood to support fungi. Nests for solitary bees and wasps with 4mm holes in red pine, were found to be most effective. Another effective way of nest building were sections of bamboo in a piece of drainage pipe. Generally the nests that were located in the sunlight were significantly more occupied that those in the shade. Also, paired blocks were more effective than single blocks (so it is better to focus nesting places in one place, than to divide them all over the place).

Unfortunately the nesting places for bumblebees and butterflies that were tested in the experiment did not seem to attract those species.

CASE STUDIES

CASE 1: ANNEMIEKE'S PLUKTUIN (ANNEMIEKE DE HAAN):

Annemieke's pluktuin (2014) is a flower picking garden owned by Annemieke (Appendix 5). She works full time to maintain the garden and the related activities. Young adults with psychological problems who (want to) reintegrate in society are helping in the garden. One purpose of the garden is that visitors can pick flowers for their bouquet themselves. This is an element that would be nice to introduce in the Ouderkerkerplas. However, Annemieke states that growing a flower garden that is blooming multiple months is very difficult. A strict planning, adequate knowledge and full time care is necessary in order to have a functional garden. The right species need to be put together in order to make this a colorful garden throughout the whole spring/summer/autumn. This concept is not profitable if not in combination with other practises.

Annemieke suggest that a vegetable garden is more suitable for a community garden because this gives quicker and easier results. It is more applicable if a garden needs to be run with inexperienced volunteers.

Annemieke's Pluktuin

CASE 2: DE GROEN(S)TE TUIN (MIRIAM GEURST)

De groen(s)te tuin (2014) is a mixed garden with vegetables, fruit bushes and flowers (Appendix 5). The garden is growing solely due to a group of volunteers of which Miriam (the initiator of the project) is in charge. In return for their work, volunteers can bring home some of the yield and visitors can buy vegetables from the garden.The garden does not return large profits, it cannot provide for a paid job.

A project like this is a good example for the initial face in a garden at the Ouderkerkerplas. The only obstacle is that at least one person with knowledge is necessary to take on a leading role in the garden. Someone is needed to manage both the agricultural activities and the volunteers. This leading and organising role is a fulltime job. If no volunteers can be found that are willing to do this, than it will be necessary to pay one person.

De Groen(s)te Tuin

CASE 2: ZOMERBLOEMEN PLUKTUIN

The 'Zomerbloemen Pluktuin' (2014) is a flower garden with greenhouse (Appendix 5) in Nes aan de Amstel. The restaurant and the organised workshops in the garden are critical in order to make a living out of it. The garden is maintained with the help of volunteers and the owners themselves put seven days a week in the garden. The owners expressed concerns for the plans at the Ouderkerkerplas since they fear that a garden that close to theirs will be a competition.

Zomerbloemen pluktuin

An insect hotel in De Groen(s)te Tuin

STAKEHOLDER INTERVIEWS

GROENGEBIED AMSTELLAND (MARK SCHOOTS, GGA)

GGA can provide land for a garden, but will not invest in a garden. Conditions are that there are no trees planted. Only in the area where trees are currently growing new trees can be planted to replace ones that decrease. Orchards are thought of as disturbing the open landscape. Build many sheds/buildings is also not desired. An allotment garden is therefore no option.

AMSTERDAM MEDISCH CENTRUM (SUZANNE OUDMAIJER, AMC)

AMC has no money for a garden and can only play a role as a consumer. AMC is possibly interested in using vegetables from the garden in their kitchen. The psychiatric department could maybe be a place to find volunteers for the garden.

BEELEASE (DIRK DEKKER)

Beelease is a foundation that finds sponsors for the conservation of bee populations (Appendix 5). With gifts of companies they train new beekeepers to take care of beehives that are placed at the site of a sponsoring company. The company will receive benefits from this in the form of advertisement and honey and most of all by doing a good act. Other projects that beelease is involved in are related to inserting flower bands in neighborhoods to improve bee habitat and overall insect biodiversity. Introducing bees to the Ouderkerkerplas would include asking local stakeholders to give 500 euro's for a beehive. In order to introduce flower beds, a consultation with the city ecologist needs to be done in order to indicate the specific locations that are suitable.

IMKERIJ DE RONDE HOEP (BEEKEEPER HERMAN GROEN)

Herman Groen (Appendix 5) is a beekeeper in Ouderkerk aan de Amstel who has many beehives in the area (including a.o. in Duivendrecht, Amstelveen, Abcoude and three localities in Ouderkerk aan de Amstel). His most important concern is the food availability in the area. In june there are not enough nectar providing flowers, therefore he has to feed the bees himself. In august is a second decrease in nectar availability. He provided a list with flowers and their blooming period to use when choosing what flowers to plant (Appendix 5). This list is also used for a bee park in Amstelveen. It would be very helpful to introduce more flowers that provide nectar in the periods of scarcity.

The second contribution Herman can make is to place beehives near the Ouderkerkerplas for free. This will be beneficial for him (more distribution of the beehives) and for the project. He stated that he is already involved in education, he educates on bees a schools, this fits in nicely with our projects, but involving schools in education on bees at the Ouderkerkerplas is redundant. The bees and the honey they produce will all remain property of Herman Groen on the location of the Ouderkerkerplas.

STICHTING BESCHERMERS AMSTELLAND (RENSKE PETERS, SBA)

SBA has no objections for local food production. They only stress that projects need to be innovative, and in harmony with the landscape in purpose as well as aesthetically. They underline the need to involve the local community. It can be possible to engage the local (farmers) community in selling their products at the Ouderkerkerplas to enhance the place as LFP area.

DISCUSSION

URBAN AGRICULTURE:

The case studies pointed out that vegetable gardens show easiest results and are easier to maintain for volunteers that are no gardening experts. Vegetable gardens are also very much appreciated and volunteers are easily motivated if they receive food in return for hard work. In between the vegetable perks it is desirable to have flowers as part of the vegetable garden in order to support bees. Although blooming vegetable plants also provide nectar, flower types can be selected that are most preferred by bees. Flower beds are usually more dense with flowers and can be selected on blooming season. The case study showed that the bees in the vegetable garden were mainly found around the flowers.

The case studies show that a garden needs some level of management and expertise, but can perfectly be sustained by aa group of willing volunteers if there is interest among the local citizens. 'The groenste tuin' was the most favorable project as an example for a garden in the Ouderkerkerplas area. The way in which all volunteers benefit equally and work together enhances the interactivity between people in the garden. However, there is still need for at least one person with gardening and managing skills to teach the volunteers and plan the necessary activities.

This work opportunity for at least one person will affect the costs of the garden. 'De groenste tuin' is an example of a garden in which costs and benefits are around equal. With the necessity to pay one person it will result in higher costs than benefits. The other case studies show that a combination of activities is necessary in order to benefit from the garden. The garden could possibly be profitable when used in the right combination with other projects. A community supported agriculture model that is mentioned in section 4.1 in the form of the farm 'de Nieuwe Ronde'will provide an outcome.

A permaculture garden is a concept that can be used to ensure that the garden at the Ouderkerkerplas will have a holistic sustainability concept at its core. To design the garden in such a way that it creates self-sustaining ecosystems requires a lot of knowledge but will be easier to maintain. A permaculture garden at the Ouderkerkerplas can be used to educate on, and as an example of, a transition to sustainable agriculture.

At the moment it is still questionable if the difference in biodiversity enhancement between the different garden types that were investigated is very large. More research is needed in order to answer this question. The outcome will likely not have a significant influence on the type of garden that will be implemented for the reason that no direct returns will benefit the stakeholders that invest in the garden.

BEES:

From literature reviews and the expertise from beekeepers around Amsterdam it seems that introducing bees is a possible in this area. Although the Ouderkerkerplas area itself is not yet productive for nectar, bees will be able to look for food in a circle of 3 km around the beehive and this will provide enough possibilities. Two types of stakeholders that were interviewed can

help with the placements of beehives. With respect to the co-creation project, the bees of local beekeeper Herman Groen will be best in the context of local involvement and new business models. He will place his bees on the Ouderkerkerplas ground for free and possibly a deal can be made in which he can sell the honey received from these hives directly to the co-creation centre. In this way he will be ensured of the centre as a customer and the centre will have the possibility to sell locally produced honey. When bees would be introduced with the help of beelease an extra interpolated stakeholder would need to be found to provide the money. This would be a detour and is less comparable to the examples of new business models described later in this report.

In order to improve the habitat for bees and also improve local biodiversity all researched literature and stakeholders agree that it is necessary to introduce more nectar providing plants in this area. This might be an even more important task to focus on that on the introduction of more beefolks. Currently most nectar for bees is found in Ouderkerk aan de Amstel due to the existence of many gardens. There is nothing to get for the bees in the surrounding agricultural area. Introducing flower beds all around the Ouderkerkerplas would be an effective strategy to help the bees in the area.

Both the beekeeper from Ouderkerkerplas and literature mention to also consider the solitary bees and provide nesting places in the form of wooden blocks with holes. They also lose their habitats and therefore this is an important element to include in the project in order to improve biodiversity.

OVERVIEW SUGGESTED ACTIONS FOR LFP:

URBAN AGRICULTURE:

Steps that need to be taken in order to realize the garden:

- Find (a) stakeholder(s) that has/have an interest in supporting a garden for a bigger purpose than only producing vegetables.
- Decide on the exact location for the garden based on the stakeholder's interest and the type of combined activities that will take place.
- Take into account that one shed at maximum can be implemented.
- No trees can be introduced on currently treeless places, only replaced.
- Inform locals about the development plans of the garden and create interest in volunteerism.

After taking these first steps to define the garden, one or more people can be hired for organisation and management of the garden. They will take over from this point.

BEES:

Steps that need to be taken to introduce bees:

- Consult a city ecologist to decide where suitable locations for flower beds.
- Introduce flowers from Appendix 6 that bloom in the period of nectar scarcity.
- Contact Herman Groen about the placement of beehives.

EXPECTED RESULTS

URBAN AGRICULTURE:

It is expected that the garden will be a place for the community where people can enjoy gardening together. It will improve the well-being of people by providing a relaxing environment and social interactive work. It is expected that the main reason for people to go to the garden is for recreation (hobby gardening) and relaxation, but also education is an important element because inexperienced volunteers will learn by doing and teach each other. This project would be more of a recreational interest in combination with catering in the co-creation centre. The co-creation centre can use the produced food: in this way the garden also contributes to recreation for guests that want to enjoy the taste of locally produced food. Locally produced food adds to the sustainability value of the catering be eliminating the supply chain. If the garden is managed according to permaculture principles, this will mean minimum input of energy and have a maximal sustainability potential. The ways of permaculture can be shared through workshops in the centre, this will increase the awareness of a sustainable way of living. The small amount of energy that is needed, to pump up water for example, can be produced by solar panels or small wind turbines (section 3.3). The biggest problem of maintaining a garden appeared to be financing it and in particular financing the job of one skilled gardener. The new business models discussed in the chapter '*new business models*' can be used to solve this problem.

BEES:

By introducing beehives, the bee population will increase in the area. Although this is only one species, it is an important (for pollination) and unfortunately endangered species. Therefore it is an important project for biodiversity improvement. It is also expected that when more flower beds are planted in the area many insects, including bees, will benefit from it. If flowers are selected that bloom in periods of nectar scarcity, beekeepers do not have to feed extra to the bees during these periods. Beehives and selling (organic) honey can contribute to the Ouderkerkerplas as recreational area, aesthetically and by attracting consumers. More flowerbeds increase the well-being of people with the elevated diversity of the environment and will enhance the Ouderkerkerplas that has currently grass as dominant scenic value. There will be an educational value to it when the beehives are complemented with information about the state of the art of the bees, increasing awareness of the bee situation to visitors.
Locally produced honey is the not the most important project for environmental improvements, but it will attract consumers to the Ouderkerkerplas. Honey could be sold in the centre and the direct contact with the beekeeper can get the public involved in the bee problematic and thereby raise awareness for bees.

Although both projects still need to be narrowed down further, especially the urban garden, pathways that will lead to the completion of the pathways become apparent.

Urban agriculture and bees at the Ouderkerkerplas will not directly increase the recreational value of the area. But if they are combined with the co-creation centre, educational projects and backed up by renewable energy, it can become a powerful part of the sustainability experience.
A place where people can relax in the garden, buy or eat locally grown vegetables, fruit and honey in the co-creation centre. Where they can experience and learn about sustainable food production. Where they can get educated on gardening, bees, the bird reserve and the beautiful cultural heritage landscape surrounding it. A place to make friends and reconnect with nature.

LINKING LOCAL FOOD PRODUCTION WITH THE OTHER PROJECTS:

The garden urban garden needs renewable electricity for example to pump up water (3.3). The Permaculture is a strong link between education (3.1) and the urban garden since it has its own philosophy and sustainable lifestyle. The nature invading the lab (3.1) will also be a great link between education and the garden. Here local schools that do not have their own garden can get involved in gardening and sustainable growing food. Centrum Weizigt and The Sustainability Centre (TSC) are concepts of centres that integrate education and gardening already, the TSC is even an example of a centre that promotes permaculture (3.2). A co-creation centre as proposed in section 3.2 can enable workshops about (permaculture) gardening and the bee keeping/extinction. Selling the products in a shop inside the centre would stimulate local consumption and therefore sustainability. As New business model 'De Nieuwe Ronde' sounds suitable to use for our urban garden project (4.1)

Although the urban garden and bee keeping are projects that can be explored and experimented on as individual pathways, all projects integrated towards one pathway will certainly enhance their potential.




CHAPTER 4: ENABLING FACTORS

6

[6] (photo retrieved from: https://www.flickr.com/photos/genf/5187007336/)

4.1 NEW BUSINESS MODELS (STEVE CLARENBACH & MILENA PILLKAHN)

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PROBLEM DESCRIBTION AND MOTIVATION

As already mentioned in the problem description of the first part of research the focus at the tactical level are structural (regime) barriers, which "include regulatory, institutional, and economic conditions (but could also involve consumer routines, physical infrastructures, or specific technologies)" (Loorbach 2010). Regarding economic conditions (and consumer routines, physical infrastructure) an important enabling factor to actually design and conduct projects are New Business Models (NBM). Taking the perspective of the local community there is a lack of financial means to realize objectives. Thus NBM adhering the community structure have to be reviewed and linked to the community projects. The second part of our research is to answer the research question:

The accomplishment of a New Business Model within the community might add to convincing commercial and public stakeholders to contribute financially or in another form of value creation. NBM can help to start/structure and finance bottom-up innovation of the residential community using the broad network of stakeholders.

RESEARCH QUESTION

- *What are New Business Models for the realization of a co-creation centre, a gardening project and small scale energy projects?*

METHODOLOGY

To answer the research question a literature research on NBM is complemented with insight from an expert interview with the case coordinator, who is developing and researching on NBM. The interdisciplinary task is to link NBM also to a gardening project.

In the first section we are going to explain what NBM are and try to define them and thus make clear their relevance for developing pathways at the Ouderkerkerplas. The second section gives more detailed insight into the ´co-creational´ process how NBM are developed. The section about some successful examples of NBM is followed by recommendations how NBMs could assist in the Ouderkerkerplas case. The final section shows the links with the other fields of research.

WHAT ARE NEW BUSINESS MODELS

NBMs are business models who are, in contradiction to conventional business models, based on multiple value creation. Conventional business models focus on monetary value creation. NBMs creates multiple value, such as monetary, social, environmental. NBMs are also based on sharing knowledge and working together in a collective. Competitors help each other instead of antagonizing (Jonker, 2013).

According to Stijkel (interview) NBMs work in community based networks as they are closer to a social contract than a ´commercial´ model. People come together around shared ideas and engage. Instead of giving money to a bank, clients support entrepreneurs/projects they are in direct contact with and want to support targeting value creation (like sustainability and a prospering surrounding). NBM are not crowdfunding, because the client gets more back than he invests by e.g. a voucher, or contributes with work and other non-monetary values.

As the catering might be able to use what is growing in the garden a network should be installed around these actors. Further insight about the network (from interviews etc.) will be integrated from all tracks to elaborate on constellations in which a NBM could work and what it could look like.

HOW ARE NEW BUSINESS MODELS DEVELOPED?

Traditional business models are created solely for the purpose to earn money and to maximize their profits. Those traditional business models are thus not suitable for sustainability projects. Sustainability projects are often characterized as having high investment costs and low monetary benefits (Porter & Kramer, 2011). Business models are designed around the concept of value creation, the output of the processes within the businesses have to have a greater value than the input, in order for a business to be successful.

NBMs are designed around three core principles of value creation, namely multiple, shared and collective. These three principles form the framework to design, develop and implement NBMs (Interview Anne Stijkel, 17th September). In the traditional sense business models create monetary value. NBMs aim to create multiple kinds of value. For example social, recreational, environmental and monetary value. NBMs also aim to share their created value. Businesses with a NBM share their networks and know-how, as well as their costs and benefits. This value creation is also been executed in a collective manner. The activities that follow from the NBMs are created and implemented together with other parties (Jonker, 2011).

Jan Jonker (2012) found in his explorative research on NBMs in the Netherlands other characteristics of NBMs, besides the three core principles. In NBMs money is not the only medium of exchange, also time, energy and healthcare could be used to facilitate the exchange of goods and services. Another characteristic of NBMs is the transition from the focus on the ownership of products towards a focus on the access to those products. Consumers do not ‘pay’ for the ownership of a product but for its use. Also partners have to express a long term commitment in NBMs. In conducting business with other mediums of exchange, such as healthcare it is possible that a partner ‘earns’ care that the partners do not require for the next ten years. NBMs create an economy that is based on needs and use, on short and long terms. As a result businesses will work with credit on for example food, energy and health. The last characteristic that Jan Jonker (2012) came across during his research is the use of ‘alternative money’. Where a local community installs a local currency, instead of the traditional currency.

Besides these characteristics there are also some points developed that could assist in the development of NBMs. These point are the result from the interview with Anne Strijkel.

- Guide yourself by your own belief. When taking this into account with the development of a business concept, it is possible incorporate personal dreams and ambitions and to start from personal motivations and values.
- Do what works, towards a common goal. This point recommends a step-by-step approach for the development of a NBM. In this approach it is important to envision a goal. By taking a step-by-step approach it is possible to adapt to external changes and to incorporate new personal input.
- Work integral. It is important to work together and to share results and expertise. It is also important to make complexity part of entrepreneurship, instead of the idea that everything is controllable.
- Take ownership, personal leadership is essential in the development of NBMs. Not in the sense of taking control and bossing people around, but to collectively steer the process in the wanted direction.
- Co-create. Co-creation is the active and social process, where value creation takes place between the initiative-takers and other stakeholders, such as consumers, policymakers and neighboring residents. The co-creation process has the potential to touch upon unexplored territory, and this stimulates creativity.
- Work with what is available, in the here and now. Use local social and natural resources, and utilize them.
- Work creatively on your big dream. Developing NBM, is difficult because of the multiple value creation. This is a new way of thinking and developing NBMs thus the development needs all available creativity and intelligence. When this is not available within the organization, it is important to include these aspects for external sources.

These points are not a concrete framework how to develop a new business model, but they do assist in the development and are essential aspects of NBMs. The NBMs that will be developed for the small-scale projects around the Ouderkerkerplas will also be developed concerning the previously mentioned characteristics and points of NBMs (Interview Anne Strijkel).

EXAMPLES OF SUCCESSFUL NEW BUSINESS MODELS

In this paragraph some examples of NBM, that have been developed and implemented in real-life businesses, are given. These examples of business models show that there are already NBM in place in the business world in the Netherlands. It also illustrates that these models can be used as alternatives for the conventional models. These examples of business models can be used for the development of business models for the specific projects around the Ouderkerkerplas. They can provide inspiration and assist in the envisioning process for the to be developed NBMs.

One example of a successful NBM is 'BoerZoektBuur'. In this model a group of farmers who wanted to reduce their electricity bills, seek investors for the purchase of solar panels. They developed this model to attract investors. The neighbor invested € 250,- for the purchase of those panels, in exchange they received vouchers worth € 300,- for products or services of the

participating farmers. This creates multiple value, lower electricity bills for the farmers, fresh vegetables for the investors and it is beneficial for the environment. The experiences of this projects were shared, which led to other similar projects, such as the financing of solar panels on other businesses and the greening of local small businesses (BoerZoektBuur, 2012).

Another NBM is a model that is been used by Turntoo. This company focuses mainly on furbishing offices, all the products are designed so that the resources that are used are recyclable. These products remain property of Turntoo and their partnering companies. Turntoo only facilitates the use of the products. Because the products are recyclable and the companies do not lose ownership, the offices function as a resource depot, so the price of the resources are not included in to 'usage' price (Turntoo, 2013). This results in value creation for the clients, Turntoo and their partnering businesses and for the environment. Turntoo also shares this knowledge, through workshops and lectures and they work together with other actors, such as the government, businesses, universities and civil society organizations (Turntoo, 2013).

A different business model that also is focused in the transition from ownership to usage is the model of Seats2Meet. This company facilitates the meeting between entrepreneurs, through the provision of meeting rooms. And they facilitate networks between them, the central work lounge is a place to work and network. Everyone is welcome there under the condition that they are share their knowledge. Entrepreneurs pay for the use of the meeting rooms in Euro's, but the central work lounge is paid with social capital. The entrepreneurs collectively fulfill the PR function, Marketing function, Sales function and the cleaning of the rooms. This eliminates the costs of these functions. In this way Seats2Meet can provide convention rooms and operate with low costs (Seats2Meet, 2014). This business model creates monetary value for Seats2Meet and social and knowledge value for the entrepreneurs.

A NBM in an agricultural setting is the 'De Nieuwe Ronde' which is a community supported agriculture (CSA) company. Members pay an annual contribution for the cultivation of vegetables, herbs and flowers on the farm. So they cover the production costs of the farm. Professional farmers and gardeners cultivate and maintain the 3 ha of arable land, they work in a biological and sustainable manner. The members of the self-harvest garden 'De Nieuwe Ronde' are allowed to harvest by themselves, every day, as much as they need for personal consumption throughout the year. The members are also encouraged to assist in the cultivation technical, financial and organizational aspects of the farm (De Nieuwe Ronde, 2014). This model creates value for the farm itself and for the members, the farm also shares their knowledge on cultivation with their members.

RECOMMENDATIONS

In order for the garden and bee projects to be realized it is necessary to develop a NBM to finance these projects. A model that suits these projects good are a community supported agriculture model. Like in the example of the farm 'de Nieuwe Ronde', it then would be possible for the members who pay their contribution to self-harvest the vegetables and flowers that will

be cultivated in the garden, of course it is the self-harvest principle will not be applicable for the bees, but the honey could also be part of the membership. This CSA model will eliminate the production costs of the garden, and when the members also assist as volunteers, this model could finance most of the costs of the garden and the bee hives.

The co-creation centre could also be realized with the assistance of a NBM. This is especially the case with a temporarily building, such as an tipi or a yurt, which are less expensive than the construction of a fixed building. Following the example of Seats2Meets where client can rent convention rooms with money, and fulfill the PR-, Marketing-, Sales- and Cleaning functions for the entire co-creation centre. This will cover a large proportion of the costs for the centre. A different NBM for the financing of the furniture and other materials is a NBM along the lines of the Turntoo model. Where the ownership of the materials remain with the manufacturer, for a sustainable centre this materials and products have to be fully recyclable. Because they are recyclable and the ownership remains with the manufacturers the centre will function as a resource depot. Because of this the price of the resources are not included into the 'usage' price, and thus the costs for the use of the products and materials will be lower than normal.

For the financing of small scale renewable energy projects, such as, PV panels for the generation of electricity for the 'Pippowagen' and for the co-creation centre, or the instalment of TermaQ panels for heating purposes in the 'Pippowagen' and the centre it is recommended to followed the NBM of BoerZoektbuur. Interested residents who want to invest in these projects, will receive vouchers which exceed the value of the investment. These vouchers can be exchanged for, for example products like food and drinks or services like attendance to a workshop or access to a conference room.

The NBM of BoerZoektbuur could also be followed for the financing of the garden and the co-creation centre buildings. But these projects need larger investments, or a larger amount of investors. But that could, in the end, proof to be unprofitable, because of the large amount of vouchers that could be redeemed. The larger investments are not easy to finance through NBM. These investments could be financed by nearby situated businesses, by the government or by the revenue of the different projects, such as the additional windmill.

LINKING THE NEW BUSINESS MODELS WITH THE OTHER PROJECTS

It is obvious how this section links with the garden and bee project, the co-creation centre and the renewable energy project. This section tries to connect different successful examples of NBMs with these projects of the Ouderkerkerplas. The NBMs that are recommended for the different projects have the ability to facilitate the next step of the projects. The projects are first elaborated in their own section, the section on NBMs elaborates on possibilities to finance and eventually realize the projects around the Ouderkerkerplas.

The link between education and NBMs is only an indirect link. The education in the area of the Ouderkerkerplas will probably be facilitated through the co-creation centre. And that centre will be realized/financed through NBMs.

There is also a link between the perspectives of the residents and the NBMs, because these models focus on the local residents. By investigating their perspective and their attitude towards the different projects preliminary conclusions could be made if the local residents would be interested in participating in those NBMs.

CHAPTER 5: INTEGRATION OF RESULTS

[7]

[7] (photo retrieved from: http://www.monumentenouderamstel.nl/ouderkerkerplas)

OVERVIEW OF DISCIPLINARY WORK

INTERNATIONAL DEVELOPMENT TRACK - LOCAL VIEWS AND EDUCATION

Objective: Investigate the views of local residents on present and future use of the Ouderkerkerplas, and explore its promotion as an educational facility.

Results: Local views prioritise recreational needs whilst acknowledging the maintenance of the area as a bird reserve. All future developments can be brought under a banner of sustainable learning, engaging schools networks and adult visitors.

ENVIRONMENTAL GOVERNANCE TRACK - CO-CREATION CENTRE AND NEW BUSINESS MODELS

Objective: Investigate the production of a co-creation centre, and provide New Business Models to facilitate the realisation of small-scale projects.

Results: Explanation of realisable New Business Models for the co-creation centre, gardening and energy projects, and the barriers and possible development of a co-creation centre utilising a network of local residents.

ENERGY TRACK - ENERGY GENERATION

Objective: Investigate multiple scenarios for the extension of PV and wind power, including potential barriers and limitations.

Results: With commercial production of electricity limited, the focus should lie in the supply to local facilities and the showcasing of sustainable practices. A larger scale project could investigate an integrated photovoltaic-noise-barrier along the A9.

GLOBAL CHANGE & ECOSYSTEM TRACK - LOCAL FOOD PRODUCTION

Objective: Provide information on garden designs and beekeeping.

Results: Promotion of gardens producing vegetables, flowers and fruit bushes, managed by at least one paid employee, assisted by volunteers from around the area. The garden can enhance recreation and biodiversity as a habitat for birds and insects. It is expected that bees can be introduced, living in or next to the garden and providing honey.

EMERGENCE OF CORE QUALITIES AND LINKING RESULTS

Research on the Ouderkerkerplas has focussed on extending an envisioning process with the views of local residents, and exploring potential pathways to development through different research fields, to be enabled through new business models. An overview of the individual research is provided above. Whilst each pathway carries its own individual legitimacy for realisation, a stronger, broader agenda for transformation, as requested by the central research question, can be produced through the integration of results. The flow diagram from the introduction can be repeated here, showing how the disciplinary work fits in the transitions management process (figure 19).

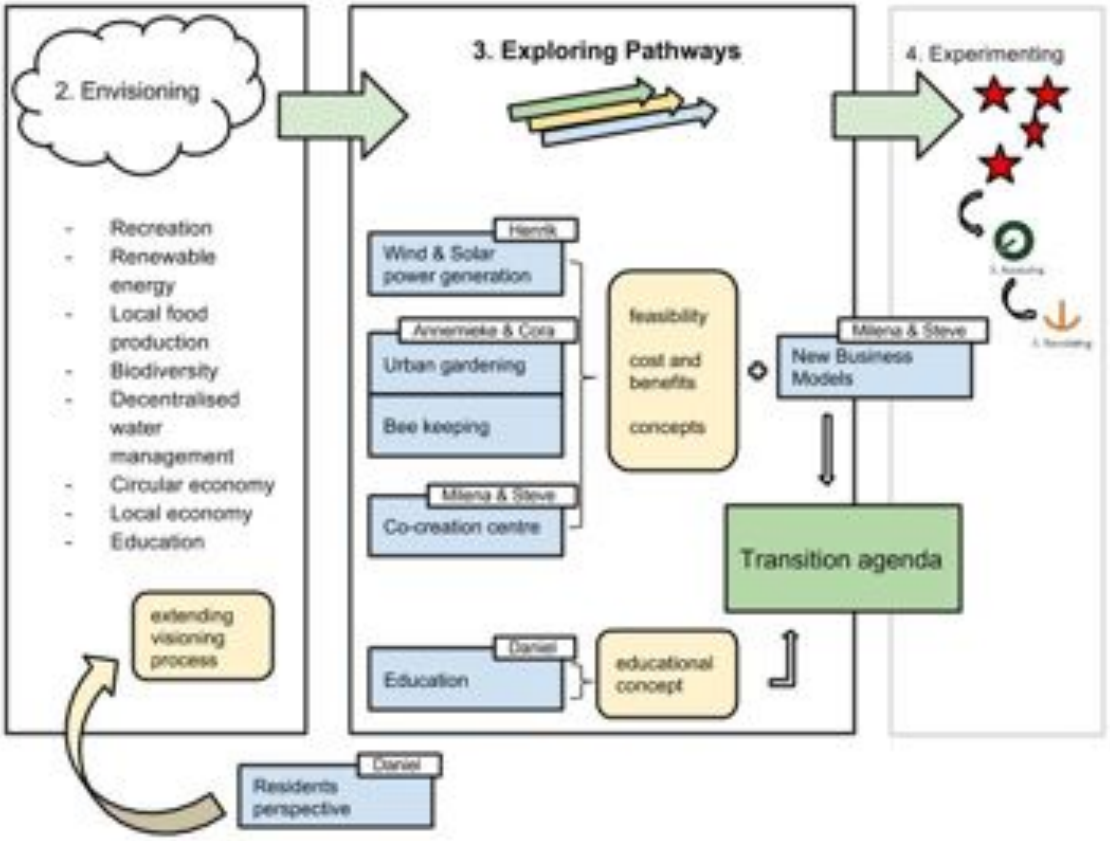

Figure 19: Flow diagram of disciplinary work within the transitions management approach

Linking the individual track results allows further recommendations to be made to the client for transforming the Ouderkerkerplas into a more sustainable place. In terms of the transitions management approach, this represents the integration of multiple developmental pathways into a transition agenda. According to Loorbach (2010, p. 175) " a transition agenda contains a number of joint objectives, action points, projects, and instruments". The agenda forms a compass for the client to engage with stakeholders during further research and the formation of action plans. It can be viewed through the emergence of a set of Core Qualities within individual studies, which embrace linkages between different disciplines. These can be viewed in table 12.

Table 12: The emergence of Core Qualities

Core Quality	Principle source	Brief description of Core Quality
A facility of learning	Chapter 3.1	All activities and projects can be vetted for their potential contribution to educational programmes and to stimulate collective discussion.
A centre of co-creation	Chapter 3.2	Through the building of a co-creation centre, partners can continue to reimagine the Ouderkerkerplas and form action plans for development as an ongoing process.
A source of value creation	Chapter 4.1	Linking projects can monopolise social, economic, recreational and environmental capital, created on-site and shared by all.
A recreational attraction	Chapter 2.1	Developments in energy, food production, co-creation and education have recreational value conforming to a core status of the area.
A landscape in process	Application of the transitions management approach	The Ouderkerkerplas becomes a site of process-based transformation rather than product-based.

These five Core Qualities represent a foundation for the reimagining of the Ouderkerkerplas. Within each quality, a series of specific linkages between different research fields can be placed, as touched upon in the individual disciplinary sections. (table 13).

Table 13: Disciplinary linkages within the frame of Core Qualities for the development of the Ouderkerkerplas

Core Quality	Related linkages between disciplinary results
An educational facility	● Educational activities offer an interactive platform to raise awareness and critically discuss issues of sustainable energy, urban gardening, beekeeping, food production, the role of urban nature, and the Ouderkerkerplas as a synthetic landscape.
	● A co-creation centre acts as a hub for the design and implementation of educational activities.
	● Interactive PV sites as a learning experience on sustainable energy.
	● Existing wind turbine can be integrated into educational activities.
	● Ideas of permaculture emphasises educative aspect of urban gardening.
	● Urban garden could available to schools for use.
	● Use of bird reserve in educational work looks at issues of nature conservation.
A centre of co-creation	● A hub of organisation including partner meetings, educational and recreational activities, and catering facilities.
	● A site of process-based dialogue continues co-creation in the Ouderkerkerplas.
	● A strengthening of community ties, relating to the public and private fields.
	● Symbolically boosts the profile of the area as a site of sustainable innovation.
	● The site of permanent catering facilities.
	● The centre could include a garden on its site.
	● Inclusion of PV sites for self-sufficient energy generation, linking to urban garden and other facilities.
	● Products from gardens and beekeeping can be used in catering facilities.
	● Solar power to pump up water for a garden.

A source of value creation	● Heightened profile and increased use of the Ouderkerkerplas.
	● High priority given to maintain tranquil quality of the area as a bird reserve and piece of urban nature.
	● Emphasis on partnership-formation and co-creation located within the area encourages network extension and increases in social capital.
	● Setting up of permanent catering facilities can act as a springboard to stimulate the local economy and business innovation.
	● Products from gardens and beekeeping can be sold in the centre.
	● Energy provision within and beyond the park.
	● Promotion of local food production and its environmental benefits.
A recreational attraction	● The site of permanent catering facilities, linking to educational facilities, food production and energy generation.
	● Artfully shaped solar panels can charge electronic devices.
	● Centre can sell picnic baskets with seasonal food from the garden.
	● Centre of co-creation acts as hub for further recreational developments (e.g. lockers and storage for fitness activities/ local societies).
A landscape in process	● A site of process-based and not product-based development.
	● Work must coordinate how to interface with an existing environment without disturbing the ecosystem or how people believe it should be managed.

What can now be seen is how a collection of separate pathways leading to development in the Ouderkerkerplas can link and fortify a reimagining of the area. Figure 20 visualises this process.

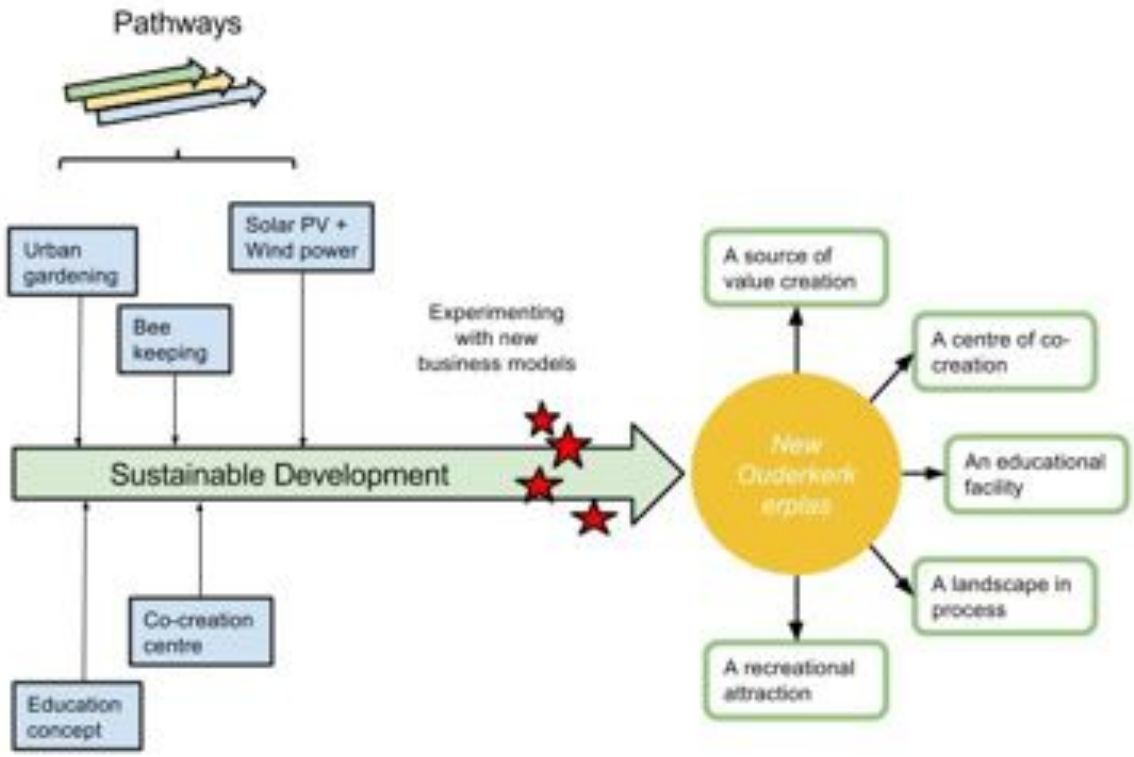

Figure 20: An integration of pathways for the transformation of the Ouderkerkerplas along lines of sustainability

DISCUSSION

The central research question is:

"How can the Ouderkerkerplas land area be transformed into a more sustainable place?"

Integrating the research results allows for a series of Core Qualities to be proposed that frame a process of transformation. These are supported with specific concrete linkages between various development pathways. A conceptual banner of education engages projects in energy generation, urban gardens and beekeeping, which promote the area as a facility of learning on sustainability for all ages. The co-creation centre acts as a hub, running on PV power, coordinating educational and permaculture activities, and acting as a recreational meeting point with year-round catering facilities. It can embody developmental success in the present, and set a platform for future plans of action. This interfaces with and enhances the central status of the area as a recreational zone, yet it can also monitor and mediate its preservation as an important bird reserve and tranquil setting for urban nature.

With the views of local residents reflected in the research findings, it is now important that civil society is given equal status alongside government and business. There is much scope for the formation of partnerships to realise, monitor and maintain concrete projects. The importance of new business models cannot be understated here in appreciating that success lies beyond simple economic measures towards multiple forms of value creation on social, recreational and environmental platforms. The funding issue remains problematic. This affects initial investment needed to construct a co-creation centre or new energy systems, or fund staff to run a garden. But it is hoped that encouraging exchange between different stakeholders from public, private and people can inspire innovative partnerships that call upon the kinds of new business models mentioned in this report. As one resident of Ouderkerk put it, if nothing else 'it is important that something happens'.

Where do we go from here? The whole point of presenting these research fields as potential pathways to development is that there is flexibility in their eventual realisation. They can act as stand-alone projects and be treated as so. However, most productive is that their realisation allows for an integration of development ideals along the lines of the stated set of Core Qualities. Does this mean that there is a particular chronology for tangible action? With so many variables and uncertainties over issues of partnership-structure, sources of finance, or changes to state policy, it would be foolhardy to define a line to success. The co-creation centre certainly represents a central feature, but this does not in itself infer a priority status for realisation. Therefore, instead of presenting a concise action plan, it is hoped that the research results and their integration represent further steps towards transformation. The transitions management approach assumes no singular pathway and a phase of experimentation will be needed to move beyond social, economic and political barriers towards the implementation of concrete sustainable projects. This report offers possible lines of development with concrete examples. It is now up to client and partners to use these results and decide on a transition agenda for the Ouderkerkerplas. There is much potential to implant sustainability into the Ouderkerkerplas that can benefit its own profile and inspire discussions on sustainable living beyond its own boundaries. In this sense, it has an important role to inspire the formation of sustainable cities of the future.

CHAPTER 6: CONCLUSION

The use of the recreational area Ouderkerkerplas, situated in southeast Amsterdam, has been described as 'suboptimal' by area manager and client Groengebied Amstelland. This led to demands for development and the resulting research question:

"How can the Ouderkerkerplas land area be transformed into a more sustainable area?"

It was found that there was much potential for the realisation of small-scale projects, namely the construction of a co-creation centre, wind and solar energy generation, urban gardening and bee keeping. Practical suggestions have been made as to the realisation of projects in all these areas. Interest has been identified through different stakeholder groups, with the views of local residents added to those of government and business. However, financing of projects remains problematic. New Business Models have been explored for innovate ways to garner investment. It is hoped that facilitating networks, bringing interest groups together, and incorporating such models can facilitate further discussion and stimulate the commencement of concrete action plans.

Although projects can be realised as stand-alone enterprises, by linking them an integration of potential developmental pathways takes place. This results in a strong reimagining of the Ouderkerkerplas around the following **Core Qualities**:

1. **An educational facility** – all projects contribute to educational activities for all ages, making the Ouderkerkerplas a centre of learning about sustainability.
2. **A centre of co-creation** – can act as a hub to instigate partnerships between public, private and people; interface with educational activities, urban gardening and bee-keeping; use renewable energy sources; provide year-round catering facilities.
3. **A source of value creation** – using New Business Models this looks beyond economic to include social, recreational and environmental value.
4. **A recreational facility** – projects enhance the core recreational status of the area whilst acknowledging the need to carefully maintain a bird reserve.
5. **A landscape in process** – all work is not product-based but contributes towards a continuing dialogue on sustainable urban nature and its relationship to surrounding city areas.

Placing these pathways together offers a transitions agenda that instigates the transformation of the Ouderkerkerplas into an optimised, sustainable piece of urban nature. It is hoped that this reimagining can encourage a commitment between public, private and people to actively participate in the realisation of a sustainable future.

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APPENDICES

APPENDIX 1: QUESTIONNAIRE TO ASSESS LOCAL PERSPECTIVES (CHAPTER 2.1 – DANIEL HAYWARD)

QUESTIONNAIRE FOR LOCAL RESIDENTS – OUDERKERKERPLAS

Utrecht University

Introduction text:

Hello. My name is …… and I am a student researcher from Utrecht University undertaking a Masters in Sustainable Development. A group of us are presently conducting a project concerning the development of Ouderkerkerplas in terms of sustainability. This short questionnaire will assess views of residents from Ouderkerk aan de Amstel. It will last a maximum of 30 minutes. The identity of each respondent will be kept anonymous, and any information provided will be used with total confidentiality. Do not feel obligated to answer any question that you are not comfortable with and do not hesitate to ask me for clarification if you think that a question is a bit difficult or unclear.

Let's get started!

Preliminary notes to make:

- Date of interview
- Location of interview
- Name of interviewer
- Name of interviewee (or society interviewed and number of participants)
- Contact telephone number/ email of interviewee/ society
- Describe job of interviewee or function of society interviewed

QUESTIONS:

1. **How do you use the park in the present time?**

2. **What word would you use to describe the park (if interviewing an individual or two people, ask for 3 words)**

3. **If you could change anything in Ouderkerkerplas, what would you change?**

4. *Show a written list of eight named sustainable goals for the area*
   How do you relate to this set of sustainable goals named as core ideas for the development of the park?

5. *Show a written list of five specified projects for study*

How do you relate to specified projects as possible developments in the park?

6. Do you see yourself or your society as contributing to the realisation of such projects? How?

END TEXT TO READ

Thank you for taking the time to answer this questionnaire. We will publishing a report of our research and taking part in a co-creation session at Pakhuis de Zwijger on Monday 10th November, 2014. If you are interested in more information on either of these products, do let us know.

APPENDIX 2: INTERVIEWS (CHPATER 3.2 AND 4.1 STEVE CLARENBACH & MILENA PILLKAHN)

Table of interviews and central statements regarding a Co-creation centre at the Ouderkerkerplas:

Interview	Central statements regarding a Co-creation centre
Groengebied Amstelland (Marketing Adviseur)- 19.Sep.2014/8.Oct.2014	• For building a centre or a restaurant a contract with GGA and a permit (omgevingsvergunning) from Ouder-Amstel are needed • In the past years it took several years to get such a permit from the municipality, maybe the tide has changed and it can go faster now
Municipality Ouder_Amstel (Beleidsmedewerker ruimtelijke ordening) 20. Oct. 2014	• Building is possible but it depends on the location and function of the building, plan for the environment (Bestemmingsplan Buitengebied Noord- www.ruimtelijkeplannen.nl) • Building is possible in the northern restricted area (Recreatie) of Ouderkerkerplas
Pakhuis de Zwijger (Programmamaker Stedelijke Ontwikkeling) 01.Oct. 2014	• The Pakhuis the Zwijger is open to help facilitating networks and to give expertise for the sustainable development of Ouderkerkerplas, e.g. a co-creation session will take place at the Pakhuis de Zwijger
Catering ´Pippowagen´ 7.Oct. 2014	• Very interested to combine their catering with a Co-creation centre and other activities • They cannot invest money to build facilities
Bicycle group 16.Oct. 2014	• See potential partnership with the sail club in further developments in the area, esp. for catering
Vogelgroep 17.Oct. 2014	• Had the idea to build a visitor centre with education concerning birds, using a vacant farm building at Ouderkerkerplas • Interested in partnerships
Workgroup ROV (traffic and planning) 17.Oct. 2014	• Would like to have a catering with a terrace for summer and winter at the Ouderkerkerplas • The area is too small for a visitor centre, they are focused on recreation

APPENDIX 3: CALCULATION METHODS (CHAPTER 3.3 HENRIK SONTAG)

Scenario 1: One additional windmill

Annual yield = Rated power output per year * capacity factor

Capacity factor = rated power output per year / average annual yield

The expected annual yield is estimated by adopting the capacity factor of the existing wind turbine on site – "De Amstelvogel". The capacity factor was calculated from data that was made publicly available by the operator *De Windvogel*. Data accessible at: http://www.windvogel.nl/molens/molen_amstelvogel/.

Yearly revenu = price per kWh * expected annual yield

Yearly GHG emission savings = expected annual yield * GHG intensity of the Dutch electricity mix

The fuel mix for electricity generation in the Netherlands consists to about 80% of fossil fuels (mainly gas and coal). Renewables make up about 12%, the rest is covered by nuclear and others.

Current average GHG emissions (in CO2 equivalents) per produced kWh in the Netherlands equals to 508 g CO2eq (based on CBS data on electricity production in the Netherlands for the year 2013; own calculations) (CBS - Statistics Netherlands, 2014).

$$\text{NPV} = -Investment\ costs + \frac{Benefits\ per\ year - Operation\ \&\ Maintenance\ costs\ per\ year}{capital\ recovery\ factor}$$

$$\text{Capital recovery factor} = \frac{discount\ factor}{1-(1+discount\ factor)^{-Lifetime}}$$

$$\text{PBP} = \frac{Initial\ investment\ costs}{Benefits\ per\ year - Costs\ per\ year}$$

$$\text{COE} = = \frac{capital\ recovery\ factor * Investment\ costs + Operation\ \&\ Maintenance\ costs}{expected\ annual\ yield}$$

Benefits from land lease = expected annual yield * 5.30 €/MWh (Rijntalder and Vogelaar, 2013).

Table 1: Assumptions for cost and benefit calculations (Source: Morthorst et al., 2009).

Investment costs (€/kW)	1227 €/kWh
Operation & Maintenance	0,015 €/kWh
Life time	20 years
Discount rate	7,5 % (own assumption)
Electricity price	0,08 €/kWh

Option 1: New PV noise barrier

Table 2: Assumptions for cost and benefit analysis (Source: Soshinskaya et al., 2014).

Investment costs (€/kW)	952 €/kWh
Operation & Maintenance (per year)	4 €/kWh
Life time	25 years
Discount rate	7,5 % (own assumption)

APPENDIX 4: BIODIVERSITY (CHAPTER 3.4 ANNEMIEKE WIJNAKKER & CORA VERDIJK)

Table A4: Protected species around the Ouderkerkerplas (Maps.Amsterdam, 2014)

	Soort/Hok nr	282	283	263	264
1	Rietgors	x	x	x	x
2	Rivierdonderpad	x			
3	Huismus	x	x	x	x
4	Kleine modderkruiper		x	x	
5	Rugstreeppad				x
6	Blauwborst		x		x
7	Grutto		x		x
8	Tureluur		x		x

APPENDIX 5: INTERVIEWS (CHAPTER 3.4 ANNEMIEKE WIJNAKKER & CORA VERDIJK)

Case studies:

Case 1 Annemieke's pluktuin (Annemieke de Haan):

Garden description: 'Annemieke's pluktuin' (2014) is a garden in 'de bollenstreek' which is an professional flower farming region in the Netherlands. The flowers are grown in mixed or monotype rows. Annemieke has one of only few organic flower gardens in the Netherlands. Annemieke is the caretaker of the flowers but she also provides work for young people with psychological problems who (want to) reintegrate in society. Working in the garden helps these young adults in their process to get better according to Annemieke.

Bees: Many bees flying around, they definitely have preferences for some flowers. No special bee houses present.

Workload: Taking care of the flowers is intensive work. It also requires a professional to put together the flowers in such way that flowers are blooming multiple months in the year, for crop rotation and to prevent insects from harming the crop without pesticides. At least one person with the proper knowledge is necessary to maintain and manage the garden, additional work can be done by volunteers.

Annemieke states that a vegetable garden is easier than a flower garden: Quicker and easier to generate results especially if one works with volunteers, people that do not have sufficient gardening knowledge and experience. Her advice is to develop a vegetable garden with flower borders and fruit bushes. This will increase the possibility of successful harvests with a large group of inexperienced gardeners.

Management: Annemieke runs the garden and young adults are working in the garden to reintegrate. This has probably to do with the management structure, there is an obvious boss who instructs the employees.

Cost-benefit: The garden provides money by flower picking visitors, selling flowers at local markets, visitors that let canoes provided by the garden and other requests such as funeral arrangements. The flower picking garden itself does not generate enough money for a living and is only possible with the support of the professional plant nursery of Annemieke's husband.

Case 2: DeGroen(s)teTuin (Miriam Geurst):

Garden Description: 'DeGroen(s)teTuin' (2014) is a garden with mainly vegetables and some flowers. It was created last april and has grown to be a worthy garden since the beginning. The garden is 4103 m2 and plants of the same species/ type are grouped in lots divided by grass strokes. The vegetable beds are mainly monocultures but the flower beds are mixed.The garden beds vary in size and shape (some are squared, some are flower shaped).There are herb spirals and other thematic parts such as the insect buffet for the insect hotel and a shallow pool for amfibia. There is one shed for garden equipment.

On the edge of the garden there are a few garden beds reserved for children that they can maintain with their parents.

The main goal of Miriam is sustainable gardening: no large instruments are allowed, everything is done by hand. It is a biological garden therefore no pesticides are used, this requires special skills to protect the plants from diseases and insect. Irrigation is done by hand from the surrounding ditches and garden waste is recycled into compost that is used as fertilizer.

The garden is maintained by Miriam, who holds a degree in biological agriculture, together with volunteers. In return for their work, volunteers may take home some of the yield. It is also possible for locals to buy products from the garden.

Bees: Many flowers available for bees, most of them are surrounding the garden. Since gardening is done organically there are no pesticides to threaten the bees.
Workload: Miriam works full time on the garden. She experienced that the 12 volunteers that she started out with were not enough to help her maintain the garden. At the moment about 28 volunteers are active in the garden, this is sufficient for maintenance. In the winter the land will be kept covered with winter-hard plants to prevent erosion. Therefore the garden also requires dedication from volunteers during wintertime.
Management: Miriam, the creator of the garden, is respected as the decisionmaker in the garden and she plans the necessary gardening activities. The volunteers generally do not have basic garden knowledge and they learn by doing, therefore they need to get instructions from Miriam. A newsletter is sent every week to keep the volunteers updates and there are field trips to visit similar projects and learn from them. Additionally there is an idea to give a general introduction in gardening practices to make the work that is done more efficient.
Apart from this, the project is based on honesty, trusting that volunteers feel the responsibility for to put work into the garden and take responsibility for the amount of vegetables they take home in relation of worked hours. In practise, problems arise when no one takes responsibility to work in the garden in busier times. Another management issue is that people that work least take most and the ones that work must take least. There will be need for some rules in order to be able to always have enough volunteers and equalize the profits for the volunteers. An administrative organisator behind the garden could be a solution to have the volunteers more organised.
The experience on the children's garden is that this is not intensely used and therefore either needs management changes or should become part of the commonly used garden. The second option is favourable to prevent that land stays unused due to temporarily disinterest of singular owners.
Cost-benefit: The garden was brought into existence with money that Miriam won in a 'sustainable idea contest'. With the contest she earned 20.000 euro to create the garden and she received 6.000 euro's by crowd funding. Many companies sponsored her by providing cheap seeds, manure and order necessities. The garden produces enough to pay for the rent of the terrain (1000 euro/year). Money is made by selling food to people that visit the garden, but also with tasting sessions and by selling the products on markets. There are no profits made and the garden can only exist on basis of volunteers. A lot of work is put in order to sustain the garden and for Miriam this is a fulltime job for which she does not receive any payment

Case 3: Zomerbloementuin Pluktuin:
Garden description: The 'Zomerbloemen Pluktuin' (2014) is a flower picking garden combined with a place that serves as a little cafe/store and a place for workshops, children parties and other related activities. The flower picking garden exists of mixed flower perks and grassfields.
Bees: Bees were seen around the flower perks of the garden, but there was no specific interest.
Cost-Benefit: The flower picking garden alone is not profitable. The restaurant and the organised activities are critical in order to make a living out of the garden. The garden is made possible with the help of volunteers. The couple reacted concerned about a new flower picking garden in the area and interpreted this a competitor, because they are located near the Ouderkerkerplas.
Work-load: The couple stated that they work seven days a week in order to make a living out of the garden in combination with the restaurant, workshops and other activities.
Management: A couple owns the flower picking farm together and they hire employees to help with activities and accept help in the garden from motivated volunteers.

Beelease

What does beelease do? Beelease is a foundation with the aim to help bees in the Netherlands. Beelease gained the ANBI status in 2013 which means that it is of such utility that it does not have to pay taxes over the sponsor gifts they receive. Beelease trains new beekeepers and with money from sponsors they buy a bee folk for the trained beekeeper to take care of. In return the sponsor will be referenced on the website and in the bee magazine of the NBV (Dutch bee union), they will get a bee hive with their logo, they will get honey from their bees, a status report every quarter of the year and a lecture of the beekeeper trainee that take cares of the bees owned by the sponsor.

Another thing that Beelease takes care of is improving the environment by adding flower beds in areas.

Why do they do it? Year after year there are large bee losses; this is becoming a serious problem. Bees are dying because of different reasons of which one is the use of pesticides by farmers, another one is a problem with mites that are invading all bee folks. Although there are techniques to remedy this mite problem there are many beekeepers that do not use these strategies. These affected bee folks will easily pass the mites over to a mite free bee folk. Unambiguity between beekeepers is necessary to solve this problem, but as beekeeping and saving bees become more popular there are also more people that are trained in the wrong ways. Beelease trains new beekeepers in the best possible way to help bee folks. By having more qualified beekeepers, more beehives, more beefolks and more flower beds yearly, the loss of bees can be counteracted. With newspaper reports, more people can be informed about the problem and more attention can be asked.

Ouderkerkerplas area suitable for bees? The ouderkerkerplas is mostly surrounded by grass and the surrounding environment consists of farms with livestock for which they also consist of grasslands. Grasslands are not interesting for bees and this makes the ouderkerkerplas not directly a convenient place for beekeeping. However, bees will search for nectar in a circle of three km around their beehive and so it also depends on the surroundings further away from the ouderkerkerplas.

When introducing bees you have to keep in mind that four bee hives per hectare is the maximum (because bees need a lot of food), but also the minimum (because you always want to have a couple of bee hives in case one folk will die).

Flower bands for bees and many other reasons: One project to make this place and the surroundings better for the bees is to introduce bands of flowers in alongside ouderkerkerplas and the surrounding area. Flower bands have been introduced in the North of Amsterdam in order to help the bees and this had a very positive effect on all other insects as well. An explosive increase in insects was seen in the area, so this directly serves an increase in biodiversity. The same thing was done in a farming area in Groningen and the increase of insects caused an extreme decrease of pest occurrence in the area and the farmers did not even need to use pesticides any more. For the best results to increase multiple types of insects, flower bands should be placed every 200 meters. Most insects do not fly as far as bees, therefore populations get isolated if the flower bands are too far apart, which will result in insects and weakened populations. When flower bands are placed within a maximum of 200 meter distance apart there will be an exchange of individuals between the bands and keep the populations healthy.

Seeds that are used by beelease are mixed seeds with about 20 different flower seeds. The seeds all have different requirements to grow (different types of soil / shade loving or sun loving). Due to the different growing requirements there is no need to investigate which seeds

are suitable for which area. They can be implemented any place that is available and different flowers will come up depending on the context of the area, but all will be good for bees. This investment only needs to be done one time, if flowers have flourished one year, they will automatically take care of seeds for next year.
Another positive thing that has shown to be a result of the flower bands in the north of Amsterdam is that it improves connectedness to the neighborhood of the people: It showed that people living near flower beds started to take care of the flower beds like they were their own. People paused on their way to pick some flowers to bring home. This actively participating to the direct environment increases the wellness of the people. It also helped raising awareness by creating an opportunity to inform people about the purpose of the flower beds.
In order to decide on the introduction of flower bands in the Ouderkerkerplas area, the South East of Amsterdam and Ouderkerk aan de Amstel the city ecologists of these areas have to be consulted.
Costs and Benefits of Introducing bees in the Ouderkerkerplas area: If a company wants to have a beehive they become sponsors of beelease. This will cost 500 euro's to get a complete bee folk. After this initial costs the maintenance costs and benefits (honey) will be around equal. The benefits are high when expressed in value for bee populations (and indirect the pollination of plants).
For a company it is a concrete way to start doing something good for the environment by becoming a sponsor, which can be a valuable motive.
Education: In a learning environment with a sustainable message bees fit very well to teach people of all ages about their importance as a link in the food industry by their task as pollinators and to inform people about the current losses and the weight of the problem.

Imkerij de Ronde Hoep (Herman Groen, ouderkerk aan de Amstel)

How is the situation for bees in Ouderkerk aan de Amstel? There are three beekeepers in Ouderkerk aan de Amstel, The beekeeper from Imkerij de Ronde Hoep has 35 production folks and 50 breed folks. They are divided around the area in a.o. Ouderkerk aan de Amstel, Amstelveen, Abcoude, Amsterdamse Bos and Duivendrecht. Recently he also placed bees in the garden of Drakenstein Castle. In order to have the best bee folks he let's his queens breed on the island Marken. Because this island is isolated there are only good drones here. 1300-1500 queens yearly from within the Netherlands, but also Germany and France are transported to the island Marken because of the quality of the drones.
Ouderkerk aan de Amstel provides most food in comparison to the surroundings (there is not so much food on the agriculture grasslands). In the end of spring and after August food is limited for bees and extra feeding is necessary during these periods. This is because not enough plants are blooming during these periods, therefore it would be helpful if more plants are selected that provide nectar. Around the area of the ouderkerkerplas plants like 'distel' and 'wilgenroos' are good nectar providers for bees, but other than that there is not so much to get here.
What can be done for bees near the Ouderkerkerplas? A first focus should be introducing more plants for nectar around the Ouderkerkerplas. As bees will search for food in three km around their beehive the bees living in Ouderkerk aan de Amstel will benefit from this. This beekeeper is interested in putting beehives in the Ouderkerkerplas area, because he likes to have his hives spread around the area, this is also a nice opportunity for him.
Other things that are important to consider is taking care of solitary bees, by making holes in wooden blocks nesting places are provided that they can use. They can easily live closely next to honey bees.

Education on bees near Ouderkerkerplas? There is already a lot of attention for bees on schools around this area. There is a children's farm (Elsehoeve) where they have workshops on bees for schools and also the bee park in Amstelveen is doing a lot on informing people on the bee situation. However, a sign with information that would accompany a bee hive in the ouderkerkerplas area is always good to make people aware.
Introduction of a garden? There are many allotment gardens around ouderkerkerplas and most of them are not even fully occupied, so it is questionable if there is need for an extra garden for the people from Ouderkerk aan de Amstel. It is quite far and hard to get to for people that live in Amsterdam South-East.
View on the project: It would be nice to keep the area quiet and peaceful, the quality of the swimming water is a big problem. He is positive about small scale projects that promote sustainability, but not about a large scale catering/hotel/conference centre.

Stichting Beschermers Amstelland (Renske Peters)
The SBA object large windmill, solar panel projects around the Ouderkerkerplas. They want to preserve the cultural historical value of the nature area. They do not mind horeca, a garden or bees. They are pressing the need to go for projects that are innovative and that aesthetically fit in the surrounding nature. They agree with the sustainable view of making the horeca energy neutral with (for example) solar panels. They urge the need to increase the connectivity to the surrounding area with additional signs etc. They underline the importance to involve the local community and see possibilities for local farmers/residents to contribute with their products to a possible shop/market.

APPENDIX 6: BLOOMING PERIODS OF FLOWERS THAT CAN BE PLANTED FOR BEES. (CHAPTER 3.4 ANNEMIEKE WIJNAKKER & CORA VERDIJK)

Yellow: blooms in a.o. in june (period of nectar scarcity).
Green: blooms in a.o. in august (period of nectar scarcity).
Orange: blooms during both june and august.

vak	lat. naam	ned. naam	kleur	bloeitijd
1	Hedera helix arboressens	Bolklimop	wit	sep-okt
2	Pulmonaria officinalis	Longkruid	paars/rose	mrt-mei
3	Centaurea dealbata		rose	mei-sept
	Centaurea montana	Korenbloem	blauw	mei-sept
4	Geranium magnificum		blauw	mei-juni
5	Teucrium chamaedrys	Gamander	purperrose	juni-sept
6	Mahonia aquifolium	Mahonia	geel	mrt-april
7	Geranium phaeum	Donkere ooievaarsbek	purperrood	apr-juni
8	Cotoneaster horizontalis		wit	
9	Cytisus praecox	Brem	geel	mei-jun
10	Veronica	Ereprijs	rose	jun-jul
11	Nepeta faassenii Senior	Kattekruid	lila	jun-sep
12	Campanula	Klokje	blauw	jun-jul
	Asclepias			
13	Salvia nemerosa	Salie	roselila	mei-sep
	Salvia officinalis		paars	mei-sep
14	Chaenomeles japonica	Japanse kwee	rood	mei
15	Helenium aut. Pumilum Magnificum		geel	
16	Echinops bannaticus	Kogeldistel	blauwpaars	jul-sept
17	Salvia nemerosa	Salie	blauw	jun-jul
	Calamintha			

18	Rosa rubiginosa	Eglantier	rose	jun-jul
19	Lupinus	Lupine		jul
20	Sedum spectabile	Vetkruid	rose	aug-sep
21	Aster n.b. Patricia Ballard	Aster		aug-sep
22	Veronica aus. Knallblau	Ereprijs	blauw	jun
	Leonorus	Hartgespan		
23	Calluna vulgaris	Heide	lila	jul-sep
	Erica carnea	Dopheide	rose en wit	
24	Campanula latifolia macranta	Klokje	blauw	jun-jul
25	Hypericum perforatum	Hertshooi	geel	jun-jul
26	Anchusa azurea Dropmore	Ossetong	lichtblauw	jun-aug
27	Rudbeckia speciosa ?		geel/bruin	jul-sep
28	Lavendula angustifolia	Lavendel	paars	jul-aug
29	Potentilla fruticosa		geel	jun-jul