



Nature-based Solutions: A New Urban Planning Process for Implementation

The Genk Experience



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Coordinated by Trinity College Dublin, Connecting Nature is a partnership of 31 organisations co-working with local authorities, communities, industry partners, NGOs and academics. Our partnership will work with 16 European countries, Brazil, China, Korea & The Caucasus (Georgia and Armenia) who are investing in a multi-million euro large scale implementation of nature-based projects in urban settings. We are measuring the impact of these initiatives on climate change adaptation, health and well-being, social cohesion and sustainable economic development in these cities. Innovative actions to foster the start-up and growth of commercial and social enterprises active in producing nature-based solutions and products is an integral part of our work.

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1 Introduction

Nature-based solutions can directly address urban challenges while providing co-benefits. Yet, the development and implementation of nature-based solutions has been slow and uneven. It is a complex task, requiring collaborations across different city departments, regional and national governance levels and diverse urban actors. **A collaborative approach to nature-based solutions through co-design and co-creation of ideas** can foster innovation, facilitate cross-sectoral input, support social cohesion and tackle the knowledge deficits that exist around nature-based solutions. **The city of Genk (Belgium) has been experimenting with novel processes to innovate nature-based solutions on a large scale** and the city's approach has already had an impact on the design, management and use of its urban areas. Through learning how Genk seized opportunities and overcame challenges, other cities can be inspired on their own path towards nature-based development.

What are nature-based solutions and how can they benefit cities?

The European Commission¹ defines nature-based solutions as solutions that are “inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience”.

¹ <https://ec.europa.eu/research/environment/index.cfm?pg=nbs>

Nature-based solutions provide multiple benefits for dealing with urban challenges and making cities greener and more resilient, including the sustainable management and restoration of ecosystems, flood protection, air quality improvement, social cohesion and local business opportunities. Nature-based solutions are quite a new concept and the phrase is not yet widely used. This is changing, however, as the need for interconnected approaches to environmental, social and economic issues is increasingly recognised. Effective examples of nature-based solutions provide co-benefits such as intercepting dust, toxins and noise, sheltering and cooling, capturing carbon and buffering flooding. They can produce energy, manage waste, generate business opportunities, provide spaces for recreation and ultimately lead to more resilient and sustainable urban living.

What can cities learn from the new planning processes in Genk?

Creating a visual identity for the Stierner Valley nature-based solution initiative was very helpful for the implementation and, in particular, increasing visibility. Working on a communication strategy was not a usual task of the team who worked on the programme, but they have been very satisfied with the successful collaboration with professionals, who, for example, designed the logo now used by the entrepreneurs in the valley to sell their products.

When beginning to work horizontally in cross-departmental collaborations, it is important to clearly define roles and tasks, to officially recognize the involved departments in mandates, and to discuss and evaluate together regularly. To foster a sense of ownership among different departments, responsibilities should be assigned that are based on project objectives whilst being clearly linked to existing objectives. Involving experts and colleagues from different departments with various types of knowledge and experience is not only valuable to enrich the strategies but also because by being involved they start to automatically link their own projects with the Stierner Valley programme.

External funding is an important leverage to form partnerships and speed up projects, lobbying on a political level can be powerful in relation to obtaining funding, while a strong dependency on public funding is a risk for the continuity of the programme.

It is hard to move from theory to practice, e.g. from creating a business model canvas to implementation. Strong partnership built on trust is a necessary starting point for co-producing business models.

Co-production can contribute in mobilizing internal and external actors for the implementation of a large-scale nature-based solutions. Although co-production is not always the easiest and fastest way, it enriches your project and makes the solution more sustainable. When the process is new to you, try it out with smaller projects and use the learning lessons of these experiments to take the next step to bigger projects

It is important to identify the right persons. A right person is motivated and can contribute to the project. Therefore you should not always look at the function or the level of hierarchy.

An explicit learning process requires a considerable effort in time. However, Genk believes this effort is worth the cost for such complex projects as the Stierner Valley programme. When doing so it is important to make sure to integrate the follow up actions from the reflexive monitoring process into your regular team meetings. The progress of these actions should be on the agenda of the regular team meeting to avoid completely parallel processes (reflexive monitoring meetings vs. regular 'project management' team meetings).

2 Genk: The Stiemer Valley and how it connects people, nature and entrepreneurship

The City of Genk is a relatively small city in Flanders (Belgium) with some 65.000 residents. It a former mining and motor vehicles production city. This industrial activity has meant that 54% of the city population is very diverse with about 85 nationalities represented in the city. With the decline in mining Genk was left with two legacies: the diverse population and post-mining environmental issues.

Why are nature-based solutions beneficial for Genk?

Nature-based solutions provide an answer for many challenges in Genk, in particular to restore the Stiemerbeek Valley, a neglected corridor of 8 kilometres running through the city and suffering from poor water quality into a multifunctional blue-green urban valley. They also provide an opportunity to deliver on several of the city's strategic objectives simultaneously, including health, biodiversity and liveability.



Image 1: The Stiemer Valley (2015) Source: Stad Genk

Nature-based solutions allow thinking about the city as a whole and addressing environmental, social and economic goals. The Stiemer Valley objectives to facilitate connections between sites, urban neighbourhoods and nature are fourfold. First, to connect nature with nature by boosting ecology and increase biodiversity in the valley. Second, to connect citizens with nature by recovering a climate resilient and natural water system in the urban valley to prepare the city for climate

change, enabling a sustainable use of the valley, and maximizing the social return on investment by fostering initiatives, educational activities and co-operation that add value to the valley. Third, to connect citizens with citizens by strengthening social cohesion across the multiple layers of diversity in the valley and creating a public culture in the valley that fuels people to embrace 'their' valley. Fourth, to connect nature with entrepreneurship by exploring, identifying and boosting economic opportunities linked to the valley.

For example the Gardens of Waterschei are designed to function as a green lung for the Waterschei district, in which nature development, integrated water management, recreational use and synergy between city and valley go hand in hand. In this pilot project more natural water system in the valley will be restored, the biodiversity and nature experience in the Waterschei area will be increased, the connection between Waterschei and other districts will improve, the possibilities for visiting and recreation in the valley will



Image 2: The Gardens of Waterschei, artist impression. Source: Masterplan Stiemervallei, 2019 (Tractebel, ADR Architects/Georges Descombes & IMDC)

increase and entrepreneurs of Stalenstraat organize activities in the valley, concentrated at certain locations.

The aim to create a large-scale nature-based solution through delivery of a suite of pilot projects in the Stiemer Valley

Genk seeks to create a linear large-scale nature-based solution by a suite of pilot projects in the Stiemer Valley (including the Gardens of Waterschei, Slagmolen, SUDS and SODA and the Valleyroute) that range from redeveloping a former mill as an arts and information centre and gateway to the Stiemer, to engaging with private landholders to develop sustainable urban drainage system (SUDS) features to attenuate rainwater across the Stiemer catchment. In this way a multifunctional, climate-robust valley park is created that crosses through the city of Genk. The co-production of the integrated vision brought many partners from various disciplines together, resulting in a rich, multi-layered vision. This process strengthened the city in its belief of the importance of multidisciplinary partnerships, participation and co-production.

The nature-based solutions implementation strategy of the Stiemer programme is based on 3 pillars:

1. *Spatial transformation strategy*: pilot projects
2. *Socio-economic transformation strategy*: Stiemerdeals
3. *Supporting strategies*: Communication and participation

The Stiemer Valley programme became an ambitious, opportunity-driven approach that is geographically and thematically spread to an amalgam of small and large projects and visions. This strong, organic growth posed an organizational challenge on the small Environment & Sustainable Development department, which since the start has taken on project leadership within the city of Genk. The department is part of the spatial department that consists of 11 other departments. Besides the spatial department on a strategic city level there are 4 other departments involved in the Stiemer Valley programme: economy and tourism, social, sports and culture, policy coordination and innovation.

3 Nature-Based Solutions Framework

A new approach for innovating nature-based solutions in cities

The Nature-Based Solutions Framework is a new urban planning process for facilitating the multiple innovations needed for nature-based solutions in cities. The aim of the framework is to enable technological innovations in the design of ecologically sound solutions, but also governance innovations to collaboratively design and learn about solutions that address local needs, new relationships between different urban actors and market innovation for novel financing opportunities. **The Nature-Based Solutions Framework consists of seven building blocks that provide a 360° picture to support urban planning and policy practice.** It encompasses the holistic technical design, financing, monitoring and governance steps and processes for the collaborative, multi-functional and fit-to-context design of nature-based solutions in cities.

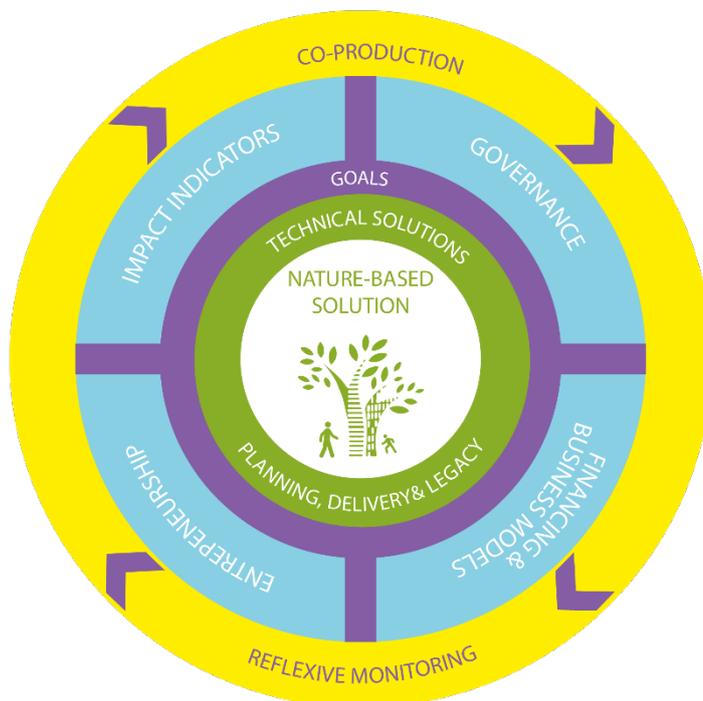


Image 3: Nature-Based Solutions Framework

4 Realising nature-based solutions on city-scale

The city of Genk aims to create a linear large-scale nature-based solution by an implementation strategy that aims to connect nature with nature, citizens with nature, citizens with citizens, and nature with entrepreneurship by facilitating connections between sites, urban neighbourhoods and nature. Until now, the city a spatial masterplan that includes multiple pilot projects who are planned to be implemented as of 2020. In parallel to this spatial transformation strategy the implementation of a socio-economic transformation strategy 'Stiemerdeals' started in 2019 combined with supporting strategies of communication and participation.

Timeline

2010-2019

The first concrete steps in the Stiemer valley 2010

Under impulse of the Flemish Land Agency 2 areas in the valley were developed: Schansbroek, the source area of the Stiemer and Slagmolen, at the other end of the city. These developments boosted the development and revealed the need for an integrated vision of the entire area.

2016-2019

The development of the Spatial masterplan

In the period 2016-2019 a spatial masterplan with a long term integrated vision was composed in collaboration with the consortium Tractebel, ADR Architects/Descombes and IMDC. This plan is a strategic toolbox for a step-by-step, spatial transformation of the area in which climate adaptation, biodiversity, recreation, social cohesion and sustainable mobility are important themes.

Ongoing since 2017 *Supporting strategies: Communication and participation*

The city is strongly committed to communication and participation. In view of the strategic importance, these elements were included as a separate action track in the implementation strategy. The communication strategy is divided into three phases that are deployed simultaneously:

- 1) The cognitive phase aims to create visibility and pride in the target group;
- 2) In the affective phase, involvement is sought through education and co-production, and
- 3) The goal for the conversion phase is active participation.

In order to fully develop the potential of the Stiemer Valley, the involvement and coordination of and with the people of Genk are essential. Two examples of this strategy are:

May 2017

Example communication and participation: *Stiemersafari*



Image 4: *Stiemersafari*. Source: Stad Genk

people told stories from the past, a geocaching route was laid, etc. The city focused on motivating, connecting actors and logistically supporting the activities. After the safari all volunteers were thanked via a barbecue in the valley. A number of volunteers became Friends of the Stiemer in 2018.

May 2018

Example communication and participation: *Stiemerquiz*

During the preparation of the spatial master plan Stiemer Valley, the city experimented with various forms of citizen participation. To appeal to more different target groups, a quiz was organized in which the content of the master plan was communicated in a playful, accessible way. However, Genk also failed to reach more non-usual suspects through this new concept. Involving all ages and cultures remains a major challenge in the further development of the project.

From 2019

Socio-economic transformation strategy: Stiemerdeals

The 'Stiemerdeal' concept is a solution to stimulate social innovation in the Stiemer Valley and a way to allow multiple & diverse actors to take ownership within the programme. A Stiemerdeal is a voluntary agreement between the Stiemer programme (city of Genk) and a partner (other city services, citizens, organizations, companies) in which both parties help each other to achieve their objectives (or dream) so that this agreement is a win-win situation. Of course, within the framework of the objectives of the Stiemer Valley. In this tailor-made agreement, clear agreements are made about the objective of the deal, the mutual expectations, the division of roles, the mutual commitment and contribution, the results to be pursued and the related actions.

Implementation to be decided from 2020 *Spatial transformation strategy: pilot projects*

a) Gardens of Waterschei

Creating a green lung for the Waterschei district, in which nature development, integrated water management, recreational use and synergy between city and valley go hand in hand.

b) The Valley Route

This route functions as a spatial connection between city and valley providing an intense relationship with nature, water and people. The general objective is the development of a continuous cycle route connecting the city both spatially and mentally. A connection that which invites to a variety of experiences and that contributes to a switch in mobility culture.

c) Slagmolen

A protected watermill was selected as a social catalyst and gateway to a unique pond landscape. The general objective is to preserve and enhance the ecological, hydrological, landscape, social, recreational and heritage value of the Slagmolen site by redesigning the building and redesigning the environment.

d) Suds and Soda

The implementation of sustainable urban drainage systems (SUDS) are presented as a driver for a vital and climate-robust city district on the flanks of the Stiemer Valley. This project demonstrates and tests natural solutions for local water reuse and decentralized rainwater infiltration in Waterschei-Noord as a strategy for sustainable water management, climate-proof neighbourhoods and as a solution for the overflow problem on the Stiemer.

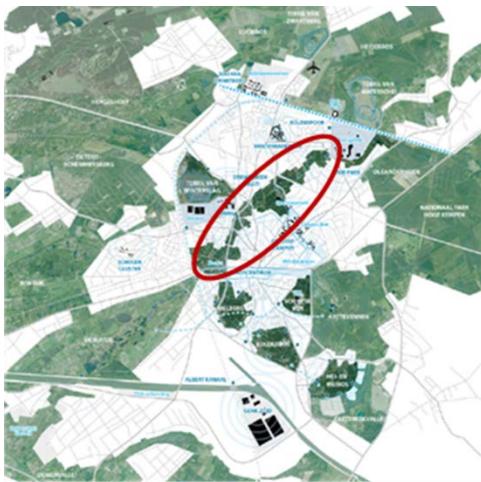
5 The Nature-Based Solutions Framework Building Blocks – how Genk realised their solution step by step

5.1 Technical solutions

What is the nature-based solution design?

The technical design of a nature-based solution needs to ensure that the desired outcomes are achieved and sustained in the long-term, and that trade-offs are avoided where possible. This includes both the practical construction aspects in relation to questions such as: ‘What kind? Where? How big? Which plants? What additional infrastructure is needed?’, and the broader contextualisation in relation to the character and needs of the locality, region, and landscape into which it is being introduced.

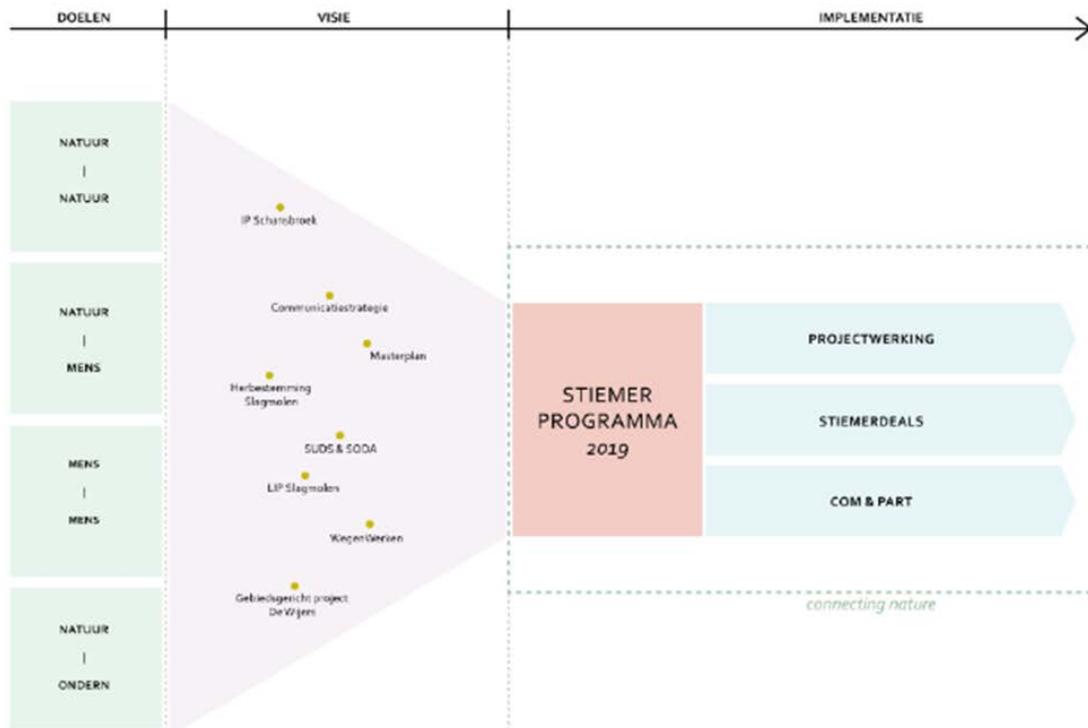
How Stiemer Valley programme connects different visions and goals into nature-based solutions



*Image 5: Map of Genk and its surroundings.
Source: Genk, network city (Jori De Bruyn, Public Space)*

Besides infrastructure and fabric, landscape is considered as an important layer of the network city. The city of Genk is the greenest city in Belgium. And yet the landscape of Genk is thoroughly artificial. Each new wave of development has left its stamp on the landscape. This unique landscape is also one of Genk’s greatest asset: if the future of the city depends on new economic development and housing quality, then it is precisely in its landscape that many answers could be found. Nature-based solutions are therefore considered an important part of the city’s future. The green open space is to be reinforced as a functional and ecological network that is closely interwoven with the city. The Stiemer Valley, today for a large part out of sight and underground, will become a central blue-green corridor for leisure and slow traffic and plays a vital role in preparing the city for climate change.

The nature-based solution strategy for the redevelopment of the Stiemer Valley is captured in the implementation strategy of the Stiemer Valley programme. The programme can be seen as the vehicle that governs all initiatives and actions related to the redevelopment of the area and resulting in the implementation of nature-based solutions.



What are the multiple benefits of the Stiemer Valley programme spatial transformation strategy: pilot projects?

Main Goal: As part of the development strategy of the city of Genk.

Develop a multifunctional blue – green urban valley that increases the quality of life and the resilience of Genk.

What?

1. **Connect Nature with Nature:**
Boost ecology and increases biodiversity in the valley
2. **Connect Nature with People:**
Recover a climate resilient and natural water system in the urban valley
Enable a sustainable use of the valley
 - The valley as connector: Create spatial connections along and across the valley to connect city sites and neighbourhoods, and as a connection for soft mobility and slow tourism.
 - The Valley as destination: Provide recreational opportunities for people. Maximise the social return on investment by fostering initiatives, educational activities and cooperation that add value to the valley.
3. **Connect People with People:**
Strengthen social cohesion across the multiple layers of diversity in the valley
Create a public culture in the valley that fuels people to “embrace” their valley
4. **Connect Entrepreneurship with Nature:**
Explore, identify and boost economic opportunities linked to the valley

How?

Propelling a co-creative city making project building upon the ownership, engagement and activation of a variety of usual and non-usual stakeholders

How to ensure socio-economic benefits of the Stiemer Valley programme by the Stiemerdeals?

The Stiemerdeals were created to ensure the creation of socio-economic benefits of the Stiemer Valley programme. The socio-economic goals in the Stiemer programme are described as 'bringing the valley to life through initiatives and activities', 'stimulating economic opportunities' and 'strengthening social cohesion 'under the name of connecting' people with nature 'and' nature with entrepreneurship '. This offers opportunities for social innovation in the valley area. To this end, a solution strategy for social innovation has been elaborated around the Stiemerdeals concept.

How to communicate about the Stiemer Valley programme and how to ensure participation?

Support, involvement and ownership are central principles in the process approach to the development of the Stiemer Valley. To this end, Genk focuses on a solid network with enthusiastic, driven people. Creativity is regarded as, inspiration and a positive atmosphere as important ingredients for constructive cooperation. A professional communication strategy and recognizable visual language are important elements to reach and involve stakeholders. For example, the logo that was designed for the Stiemer Valley is used by the entrepreneur who is selling Stiemer Ice-creams which is contributing to the visibility of the Valley. The overarching objectives of the strategy are to position development strategically, to raise awareness of the valley, to create support among and to activate stakeholders.

5.2 Indicators

Assessing the baseline and the transformation achieved

Nature-based solutions have the potential to simultaneously provide social, environmental and economic benefits. However, the evidence for their multiple benefits is rather scarce and highly fragmented, and more robust frameworks for the monitoring and assessment of their impacts are needed to guide urban policy-making. The development of a robust impact evaluation framework for nature-based solutions entails the choice of appropriate indicators to capture impacts across multiple categories, and robust, flexible and cost-effective methods for their monitoring and evaluation. Choosing and/or developing robust indicators to assess impacts of nature-based solutions allows cities to assess the strengths and weaknesses of specific interventions in achieving strategic city goals and provide an essential tool to make adaptations in real time, thus increasing their performance. Robust indicators also support cities in building the case for investments in nature-based solutions, by providing evidence regarding the types of impacts they are able to deliver. Finally, evaluation is necessary for a change in mainstream ways of planning for urban resilience and regeneration, still dominated by silo-thinking and the understanding of ecological, social and economic objectives as separate.

Why to use indicators to monitor the impact of the Stiemer Valley?

Assessing the impacts of the nature-based solutions in Genk through the use of indicators can evaluate the effectiveness of the interventions' contribution to Genk's strategic city goals and provide the means to adapt design and implementation features in real time, thus improving their performance. The gathering of evidence over time can inform decision-making and choices when designing and implementing interventions for urban regeneration and resilience, as well as building the case for investments in nature-based solutions. It helps to convince investors that nature-based solutions can deliver on the multiple objectives and interests their stakeholders have. Finally, the evaluation process helps to innovate how to plan for urban resilience and regeneration by presenting ecological, social

and economic objectives in an integrative way and linking it to the different departments that can benefit from the intervention(s) in Genk.

How will the indicators be used?

The processes of co-creation, implementation and maintenance of Genk will be monitored and evaluated in order to understand and capture those elements that contribute to their success, and build the evidence-base regarding benefits, synergies between these, as well as trade-offs, and thus inform knowledge-based practice in the future.

A first step was to select indicators for different impact categories – health and wellbeing, social cohesion, environmental, economic. It was important to identify indicators that are already used as well as indicators that could be used for evaluating the impact on the objectives of the Stiemer Valley. Based on this information, the first preliminary set of most important indicators were selected. After the final selection of indicators is made, existing data gathering methods were defined and possible data gaps where new data collection would be needed were identified.

Linking city strategic objectives to expected outcomes of the Stiemer Valley

The table below provides an example of how, in the process of selecting indicators, Genk linked the strategic city objectives to how this objective is addressed by projects that are related to nature-based solutions and to expected outcomes.

Project	Strategic city objective	Objective addressed by exemplar	Expected outcomes
Stiemer Valley	Genk establishes its function as an economic hub by setting up strong sites that realize sustainable employment, for the highly skilled and the low-skilled, in future-oriented sectors and to develop a strong cross-fertilization between themselves.	The Stiemer Valley as connector: Create spatial connections along and across the valley to connect city sites and neighbourhoods, and to make connections for soft mobility and slow tourism.	Potential co-benefits: Sustainable mobility for climate mitigation and improved physical-mental health conditions.

Table 1: Project objectives Stiemer Valley

Experiences of Genk in identifying and prioritising indicators

The process of linking the outcomes of the Stiemer programme to the strategic objectives of the city and beyond was a feasible task. The potential of the Stiemer Valley is recognised for a long time on both the level of the policy makers and the public administration. As such, the link between the potential of the Stiemer and various other programmes was not hard to identify. However, explicating the link did contribute to engage stakeholders such as other city departments.

Challenges in working with indicators for Genk

Due to Genk's limited experience with indicators and monitoring, developing an elaborate monitoring strategy is a challenging task, especially given the wide spectrum of objectives. There clearly is a

knowledge or experience gap in selecting suitable indicators and metrics, and in monitoring them. This certainly is the case for a smaller sized city as Genk where limited capacity – in terms of experience, knowledge, tools, instruments, budget, – on indicators is available.

5.3 Governance

Creating conditions for collaboration and coordination for multifunctional nature-based solutions

Because of the multifunctional benefits that can be achieved from nature-based solutions, their delivery is often aligned with broader social, political and business priorities and goals of a city and of city-regions. This requires cross-sectoral, multi-scale and inclusive approaches in terms of who is best placed to ensure development, delivery and ongoing sustainability of the nature-based solution and thus the creation of new conditions for how effective coordination and collaboration can be fostered.

Which collaborations and partnerships were put in place for the Stiemer programme?

In the beginning of the process there was one project manager of the Stiemer Valley: the manager of the environmental department. Together with a small working group with colleagues from the spatial development and social department the master planning process was managed. To supplement the expertise of the team, internal and external experts from government administration and NGOs were involved to strengthen the strategies on ecology, trajectories, water and public culture. The organisation of this collaboration was found unsustainable in the long-term and certainly in the implementation phase. Therefore, a novel governance structure was set up.

In this novel structure, the city of Genk positions itself as driving force behind a new and innovative development trajectory in which citizens, companies and organizations can take the lead. The governance model that was created is based on the quintuple helix model. For the development of the Stiemer valley, the following actors play an important role: Experts from regional administrations (city, province, and region), experts from universities, experts and volunteers from nature conservation NGO, citizens brought together in the co-production platform 'Friends of the Stiemer', Citizens, NGOs, entrepreneurs and others. Representatives of the following four strategic departments of the City of Genk will take up a role in the Stiemer Valley programme: Spatial Department, Social Department, Economy and Tourism Department, and the Sports and Culture Department. The strategic objectives of these departments are closely linked to the objectives of the Stiemer Valley programme. These objectives are related to urban planning, soft mobility, recreation and tourism, nature conservation, climate change/adaptation, social cohesion, economic development and others.

The Stiemer programme is managed by the environmental department and steered at the strategic level by the city. The city will mainly focus on the realization of a number of large, integrated projects in the valley. In addition, the city will actively inspire other stakeholders through communication and participation. To effectively activate these stakeholders, the city will use the Stiemerdeal concept to forge new alliances as a driver for a social, cultural and economic upgrading of the valley.

Which strategic city goals does the nature-based solution help to deliver?

In December 2017, the city of Genk signed the Covenant of Mayors for Climate and Energy. Through this, the city of Genk commits to reducing CO2 emissions and also adapting to the effects of climate change by increasing resilience by 2030. A city-wide climate adaptation strategy is being developed for this. The Stiemer Valley programme can be seen as the flagship project within the adaptation policy of the city of Genk: a programme in which new strategies can be tested and demonstrated. Additionally in February 2017, the city of Genk endorsed the United Nations Sustainable Development

Goals (SDG). The SDGs form a guiding framework for drawing up the Genk 2020-2025 policy plan. Due to the broad scope of objectives, the Stiemer Valley programme can be seen as a horizontal and integral project that contributes to various SDGs.



Image 6: Graphical interpretation of the implementation strategy. Source: Masterplan Stiemervallei, 2019 (Tractabel, ADR Architects/Georges Descombes & IMDC)

How to facilitate collaboration across different city departments?

In order to realise integrated urban projects in the valley, the city sets up a clear, workable project structure. The need for integrated and broadly thematic work is taken as the starting point. Consequently, experts in ecological, social, hydrological, economic aspects, and colleagues from different departments etc. are involved. The **City of Genk** is the **initiator** and actively involves partners who bring in experience, knowledge and potentially financing.

The structure is characterized by a **working**, **advisory** and **steering** body. The daily project management is in the hands of two city employees who form a strong duo. These two people are the **working body**, who take on an equal, active role and strongly believe in their project. The two employees come from different departments in light of horizontal project operation. An **advisory group** composed of internal and external thematic experts, enriches and strengthens the project. They are consulted by the project managers whenever relevant. Finally, a **steering committee** ensures the monitoring of milestones in the project and strategic management. This steering group is composed of representatives from the policy, management team and external, thematic experts.

How to facilitate collaboration beyond the city hall?

Through city Stiemerdeals, other actors - citizens, organizations, knowledge institutions, companies, project developers – are invited to play an active role in the development of the Stiemer Valley. Stiemerdeals are used for a social, cultural and economic upgrading of the valley. For example Crème Le Lis & Nostalgie, an ice cream company from the Stiemer Valley developed a Stiemer-ice-cream inspired by a Friend of the Stiemer. A great success for the ice-cream entrepreneur, who became an ambassador for the Stiemer programme. Stiemerdeals can also contribute to the spatial transformation of the valley through thematic interventions in terms of experience, use, ecology and hydrology. In this way, besides the urban projects, other projects are also started by stakeholders. For example, Aquafin optimizes the sewerage infrastructure. The role and task distribution between city and stakeholders is made explicit in the deal. A light and flexible project structure is custom designed and depending on the deal, this can be a facilitating, inspiring, connecting or supervising role.

Stiernerdeals are a new concept within the city that is being experimented within the Stiemer programme. It required additional resources and capacity for this experiment. The active search for deals is done by the **social innovation project leader** for deals with citizens, associations, civil society etc. by the **business development consultant** for deals with companies, governments, investment companies, etc. These 'deal makers' work closely with the Neighbourhood Development and Economic Department. If the experiment is successful, the aim is to anchor this approach in these city services

5.4 Financing and business models

Mobilising resources for implementation and long-term sustainability

Planning for up-front financing of nature-based solutions and long-term sustainability are a critical element of nature-based solution implementation. Rather than relying on public sector funding alone, there are several support tools to help cities put together a long-term business model for their nature-based solution, which includes assessing the potential of alternative sources of financing such as philanthropic or crowd-funding.

Identifying new financing and business model opportunities

From a financing, governance and business model point of view, the concept of Stiernerdeals can be considered as innovative. A Stiernerdeal has a collaborative governance structure between the public sector and external actors. Currently it is a bottom-up stakeholder led innovation. The City of Genk is able to experiment with this concept due to the opportunity to hire a project manager for social innovation, funded by the European project Connecting Nature.

Examples of (potential) Stiernerdeals with a financing component:

- For the development of the urban valley edges, a deal could be concluded with a project developer to realize a higher housing density on condition of investment in public space.
- Citizen science project Stiemerlab: researchers of Luca School of Arts took the initiative to draw up a proposal for receiving funding for setting up a citizen science project on water quality. City of Genk is partner in this project but is not contributing financially.

The 'Slagmolen' is the oldest building in the city and strategically located in the urban fabric of Genk, at the end of the Stiemer valley. Genk wants to develop the watermill as a unique, educational attraction - paying attention to heritage, art and nature. In a supra-local context, the site will become a welcome point for the De Wijers, a unique pond area of 700 ha around the cities of Hasselt and Genk. From the perspective of innovative financial, governance and business models, the site has a lot of potential as shown in the business model canvas.

The Business Model Canvas: stimulating innovative financing and business models

Working through the Business Model Canvas (BMC) tool¹ has allowed the City of Genk to elaborate the wider value proposition of their nature-based solution and to clarify how this will be delivered through key activities and key partners. Image 7 presents the BMC for Slagmolen, one of the 4 pilot projects of the Stiemer Valley NBS.

¹ <https://connectingnature.eu/financing-and-business-models>



Genk, Slagmolen: Nature-based Solutions Business Model Canvas

<p>Key activities</p> <ul style="list-style-type: none"> Hospitality Nature access & experience Welcoming & informing Milling Providing meeting space Guiding Art experience Craftmanship activities 	<p>Key resources</p> <p>People: entrepreneur, miller, nature guide</p> <p>Finances: mill maintenance, info point</p> <p>Nature management</p>	<p>Value proposition</p> <p>End-user value proposition</p> <ul style="list-style-type: none"> Natural quiet surroundings Access to De Maten, De Wijers, De Stiemer Nostalgia, Craftmanship Hospitality Swimming Pond (recreation) Community meeting place <p>Social value proposition</p> <p>Community meeting place</p> <ul style="list-style-type: none"> Education & awareness Art(s) and heritage preservation <p>Environment value proposition</p> <ul style="list-style-type: none"> Screening Environmental Quality Blue green infrastructure <p>Economic Development</p> <ul style="list-style-type: none"> Tourism Creativity Craftmanship (preserving skills) Employment 	<p>Key Partners</p> <ul style="list-style-type: none"> Natuurpunt De Wijers (province Limburg) VLM The entrepreneur(s) Stad Genk: tourism, economy Local Millers Horeca Genk Socio-Cultural organisations Citizens ANB Emile Van Doren Museum C-Mine 	<p>Key Beneficiaries</p> <ul style="list-style-type: none"> Neighbourhood Natuurpunt Socio-cultural organisations The entrepreneur Stad Genk De Wijers Hasseltweg Craft-industry
<p>Cost Structure</p> <ul style="list-style-type: none"> Personnel hospitality Building Maintenance Green management Marketing 	<p>Cost Reduction</p> <p>Volunteering (mill, guides) for experience value</p>	<p>Capturing value</p> <ul style="list-style-type: none"> # visitors, # clients # overnight stays # mill hours # school/orgs visits # bookings of guides, community space 	<p>Governance</p> <p>Public private partnership</p>	

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Image 7: The Business Model Canvas for the Slagmolen.

Which model is best to finance the Stiemer Valley programme?

In the 2020-2025 policy period, the focus will be on implementing 4 pilot projects as catalysts for the spatial transformation of the valley. The city will play a leading role in these projects and the city will draw up an investment plan. The 2020-2025 pilot projects are estimated at a total budget of €13.8 million. For every project a tailor-made financing strategy is being determined.

Example Slagmolen:

For the Slagmolen pilot project, potential financing has been identified from a number of sources including a Flemish subsidy for land development (€ 400,000) which could be used to finance parts of the landscaping. For the restoration / renovation of the mill and a small part of the mill building, which are protected structures, there are also Flemish heritage subsidies available. Finally, a number of third-parties have approached the city with an interest in investing in Slagmolen. These include national NGOs concerned with nature conservation and local businesses interested in food service provision. The city has made the purchase of the mill building conditional on the identification of a sustainable long-term business model with other partners.

Diversifying financing sources, lobbying and critical thinking about the role of the city

All of the City of Genk's pilot projects are included in the draft policy plan and budget of 2020-2025. The budget will be decided at the end of 2019. The financing part by the City of Genk is split between

a capital investment budget and operational budget within the spatial department (nature management, bicycle connections, roads and water-related investments). Given the limited investment capacity of the city, attracting external financing will certainly be a priority. There are various small grants at provincial and regional level channels for nature, water, recreational infrastructure, etc. It is important to tap into various subsidy channels in integrated projects.

As a number of government agencies have been closely involved with the Stiemer Valley for many years, these partners regularly identify potential channels and also help with lobbying. These grants often require co-financing from the city. E.g. a subsidy of 50% was obtained for the construction of a treehouse and associated upgrading of the environment for a total investment cost of € 50,000. These are limited amounts but often provide a major incentive for carrying out concrete actions in collaboration with various partners.

In addition, critical thinking about the role of the city versus other actors is crucial to arrive at innovative, hybrid business models. After all, other actors can also play a role in the development of the valley and help to invest. In order to move forward with this ambition a business consultant was attracted to the Stiemer programme team.

What are the most important services or activities which need to happen to deliver the environmental, social, economic value?

The City of Genk aims to create value in the Stiemer Valley through spatial transformation and Stiemer deals. This value will be delivered by a broad range of projects, actions and services related to the objectives of development of the valley (water, ecology, public culture, etc.).

For the specific case of the Slagmolen pilot project, the city wants to create environmental, social and economic value through realising the following key activities on site:

- Hospitality: create an open house for all neighbours, citizens and visitors;
- Nature access & experience: develop a welcome, information and education point;
- Heritage preservation: restore milling and stimulate craftsmanship;

The city is pursuing collaborations with entrepreneurs and organisations that could take up a role in these activities. The city is looking for different partners with complementary experience and knowledge e.g. nature conservation NGO, a social entrepreneur, milling association. The city wants to connect these partners in order to create a sustainable exploitation of the site. The partners are considered as co-investors for upfront investments and will ideally carry full financial responsibility in the exploitation phase. This approach strongly reduces the dependency on public financing. The long term preservation of the oldest heritage building is an important driver for a long term involvement of the city who is prepared to partly co-invest.

5.5 Nature-based Entrepreneurship (NBE)

Engaging community and commercial enterprises in the design, implementation and long-term delivery of nature-based solutions

Nature-based solutions can provide opportunities to support nature-based enterprises. Nature-based enterprises can leverage nature-based solutions directly in their product/service offering e.g. green wall/roof providers, allotment garden food producer/markets, eco-tourism provider. Nature-based enterprises may also indirectly contribute to the planning, design, financing and sustainability of nature-based solutions e.g. landscape architects, specialist nature-based solutions equipment

manufacturers, Community Interest Companies (CICs) managing nature-based solutions, crowdfunding platforms for nature-based solutions.

Identifying and prioritising innovation and entrepreneurship opportunities

When the development of nature-based solutions is integrated with the economic priorities of the city new opportunities for entrepreneurship are created. For example, Genk identified the following priority economic sectors: logistics, energy & technology, retail, craftsmanship, healthcare, manufacturing 2.0, tourism, creativity and healthcare. The Stiemer Valley pilot projects can each be connected to these economic priorities.

- The Gardens of Waterschei are relevant for the retail, craftsmanship and tourism sectors. They also contribute to the social and environmental strategic priorities of the city.
- SUDS&SODA are relevant to the technology and creativity sectors. SUDS&SODA contributes primarily to environmental goals which may lead to social co-benefits and potentially economic co-benefits from reduced risk of flooding.
- The Valley Route is relevant to the logistics and tourism sectors. It contributes primarily to the city's environmental priorities but also to social and economic priorities.
- The Slagmolen pilot project is relevant to the energy, tourism and creativity sectors. It contributes to addressing environmental goals primarily but also social and economic priorities.

Linking to Innovation Ecosystem Actors to create opportunities for nature-based entrepreneurship

The innovation ecosystem in Genk is composed of many different actors with services provided grouped under 5 main sectors of expertise: knowledge, finance, creativity, connectivity and capacity building. For example, the overflow problem in the Stiemer is a complex problem where a role can also be played by entrepreneurs. The 'solution' here is a decentralized, multifunctional water management system (SuDS) which offers many opportunities for new entrepreneurship in the region. The implementation of SuDS requires integrated planning, cost-efficient solutions for reuse and infiltration, specific maintenance, etc. Moreover, this transition is not only necessary in the Stiemer Valley but also on a wider scale in Flanders. The City of Genk wants to actively explore and encourage entrepreneurship related to SuDS in the Stiemer program.

The Stiemerdeals as a strategy to create local market opportunities for nature-based enterprises

There are a number of barriers facing the start-up and growth of local nature-based enterprises (NBE). For example, there is a lack of local knowledge and consequently market demand for nature-based solutions. Indeed there is resistance from some local residents to increased entrepreneurial activity of any kind in the Stiemer Valley. An opportunity to address these barriers was the development of a programme to support nature-based enterprises, centred around a clear narrative for the Stiemer Valley. The idea of the "Stiemerdeals" can be explained as follows: *"Stiemerdeals is a concept that bundles and connects all our efforts with regard to social innovation and entrepreneurship. Through this approach, we aim to engage 'underused capacity' (schools, citizens, organisations, companies, etc.) to fulfil 'unmet needs' (Stiemer objectives and needs). We will try to do this by closing deals with various actors."* Potential impact indicators to assess the effectiveness of a nature-based entrepreneurship strategy include the number of new Nature-Based Enterprises created, new services

provided, new jobs, a change in the dynamics of the area (e.g. improved business sentiment) and finally an improved financial flow.

Example: Stiemer ice-cream

Crème Le Lis & Nostalgie is a social enterprise employing people with autism in the development of innovative new ice-cream flavours for sale in their café and ice-cream parlour close to the Stiemer Valley walkway. Owner, Caat was one of the first local business owners to sign a Stiemerdeal to develop a developed a traditional ice cream based on yogurt, caramelized oatmeal and honey sourced directly from the Stiemer Valley. The redevelopment of the Stiemer Valley route and increased footfall from local people and tourists will bring new customers to this local business creating sustainable social and economic benefits.



Image 8: Newspaper article about Stiemer ice-cream.(Source: 'De Weekkrant' 18/06/2019)

5.6 Co-production

Engaging and mobilising diverse actors in searching for and implementing joint solutions

Co-production facilitates collaborative knowledge sharing between diverse actors in cities – such as local policymakers, researchers, citizens, entrepreneurs. In this way, co-production generates shared problem definitions, visions or solutions fit to local needs, fosters new relationships, and mobilises and empowers actors to actively engage in creating better, and greener cities.

Why co-produce pilot projects in the Stiemer Valley?

Co-production processes can be slower and more intense than other, more top-down-approaches because you need to come to a common understanding. On the other hand, co-production processes create more involvement of stakeholders, partners and citizens. The result of these processes is in many cases richer and more sustainable because of the involvement of the stakeholders. With regard to the goals of the Stiemer Valley programme, the role of the city of Genk is a *driving force behind a process in which citizens, companies and organizations can take the lead*. This implies that participation and co-production are important principles of the programme in all action tracks, both at strategic and operational level.

Genk aims at the co-production of urban projects that build on ownership, engagement and activation of the usual and unusual stakeholders. The process is at least as important as the end result. With this co-production approach Genk aims for:

- Creating support and involvement of stakeholders
- Collecting relevant information and knowledge
- Exploring together the possibilities from the various perspectives of stakeholders with the objective to connect and unite these different views and interests.
- Activating stakeholders in shaping the valley park in terms of financing, development, management, etc.
- Creating buzz with the people of Genk

How to structure the co-production process?

In every action, project or step in the Stiemer Valley programme Genk takes time to plan the process to guarantee co-production. They look out for important and interesting stakeholders to involve to enrich the project. These actors can be professional or academic partners, citizens, colleagues in the city administration. In fact all the actors of the quintuple helix model are considered as possible partners.

Genk uses of a whole range of activities and tools, depending on the objective, the phase of the process and the target audience. For example, they use brainstorm-moments, neighbourhood-dialogues, lectures, bike tours, a quiz, and communication campaigns.

Inclusiveness and openness as starting point to connect different types of knowledge and capacities

It is important to identify the right people. The right kind of person is motivated and can contribute to the project. Therefore you should not always look at the function or the level of hierarchy. It is a challenge to design co-production activities in which all stakeholders can contribute on an equal basis and in an atmosphere that feels safe. Experts and citizens are often kept apart. It is a challenge to experiment with this combination. It is important to explicitly define the division of roles. Otherwise, you run the risk that someone takes an advisory role instead of the role of an equal participant.

Shared ownership of all involved actors is a necessary condition to make co-production happen. This is a challenge in a siloed city administration. Genk learned that it is important to have the right persons involved and to make the roles and engagement of each partner explicit at the start of the process. By involving different actors, both internal and external, Genk include and connect different types of knowledge, sources and capacities and the Stiemer programme team can help break open pillars. In the design of the co-production activities Genk strives for open and horizontal cooperation in a creative, inspiring and positive atmosphere. These different actors are identified via a thorough stakeholder mapping in which the leading question is “Who can influence the topic or who is influenced by the topic?” They remain alert to always involving new actors and new types of knowledge and thus enriching the process. The knowledge produced in the Stiemer programme is actively shared with the actors involved in the various co-production activities and with the public in communication about the Stiemer programme, such as the website.

Shared ownership and legitimate knowledge to ensure the faith of all partners in the project

Ensuring the faith of all the partners in the project is an important aspect of the co-production process. By involving different actors around different themes, from different domains, from the concrete context Genk ensures that the knowledge that is introduced into the co-production process is legitimate and reliable. The involvement of these experts and visions at the same time makes an important contribution to the legitimacy of the outcome, as it results from thorough exercises and discussions based on different and sometimes opposing opinions. It is important to start with explicit definition of the roles and responsibilities of everyone involved. Co-production is not always the easiest and fastest way, but it enriches your project and makes the solution more sustainable. Try it out with smaller projects and use the learning lessons of these experiments to take the next step to bigger projects.

The importance of applicable and meaningful knowledge outcomes

Striving for applicable knowledge is important to make progress. In co-production activities activating work forms are important as well as to ask the 'right questions'. Therefore it helps to picture the desired outcome during the preparation of these activities. Currently Genk uses the momentum of policy planning to include the knowledge from the Stiemer Valley programme. It is important to generate an outcome that is valuable to all actors involved to allow them to translate the co-production outcomes into actions. Partners use the knowledge created in the co-production activities, both in terms of content and process.

Example of a co-production process with 'unusual suspects': Junior team



The junior team is an annual trajectory at the youth department of the city of Genk. A number of pupils of the sixth grade consider the question of making a certain aspect in the city more child-friendly for a few months. In 2018, the Junior team thought about creating opportunities to make the Stiemer Valley more accessible to children. Out of the ten proposals formulated by the Junior Team, three were selected for implementation. The

implementation of these proposals also takes place in co-production with the Stiemer programme team, the youth department of the city and with the cooperation of the children of the Junior Team (and other stakeholders if possible).

The co-production process of the Junior team was designed by the Participatory Design department of the Luca School of Arts in Genk. Various methods were used in this process. These activities can be arranged according to the intended objectives:



- Explore local dynamics: hiking in the Stiemervalley with a guide
- Developing ideas: making collages of ideas
- Promote team spirit and collaboration: fun, informal activities
- Mobilizing actors and networks: proposing ideas to other children in Genk during holiday activities



Images 9, 10 & 11: Impressions of the Junior Teams Activities Source: Stad Genk

In this co-production process, the target group (children) themselves were one of the partners, so that the result and the accumulated knowledge is relevant, usable and adjusted and the impact thereof is greater. Lessons from this process include the importance of shared ownership and the possibility for both partners to pursue their own goals. This learning lesson was inspirational, among other things, for the development of the Stiemerdeals concept.

5.7 Reflexive monitoring

Systematic and real time learning about and for effectively implementing nature-based solutions

Reflexive monitoring is a novel monitoring and evaluation methodology that gives insight into the progress and direction of the nature-based solution implementation process in real time. Reflexive monitoring activities stimulate learning, allow to identify barriers and opportunities and enable flexible responses to changing circumstances and objectives. Reflexive monitoring therefore enables recognising and influencing the context in which nature-based solutions are implemented, and the emergence of innovations that might steer away from previous goals and plans when they are not fit anymore.

How does reflexive monitoring contribute to the implementation of the Stiemer Valley?

Innovative urban development projects such as the Stiemer Valley programme are characterized by a high degree of complexity at different levels. The Stiemer programme is a transdisciplinary project with a wide range of objectives (multi-issue), in collaboration with a multiple stakeholder (multi-actor), and comprising various scales and policy levels (multi-level). The complexity is closely related to the urban development *process*. It is not just about *what* happens, but also about *how* things happen and *why*.

One of the most important challenges in such projects, if not the most important, is getting grip on the complexity. This can be split into two levels.

1. System analysis: the need for insight into the complexity and understanding the system
2. Influencing the system: based on these insight, one aims to be able to influence the system and accelerate towards the desired impact.

For this, reflexive monitoring helps to structure the learning process. A learning process based on *reflection* for analysing the system, and based on *reflexivity* in order to able to contribute to the systemic change. In complex projects, reflection and reflexivity are often done implicitly and intuitively, without further attention. Within the Stiemer programme, Genk integrates reflection and reflexivity explicitly by adopting it as an integral aspect of the programme. Genk believes this contributes to more efficient processes and more effective results.

How to set up and do reflexive monitoring?

Once a month there is a joint reflection session in which the diaries are put together. One of the team members takes the role of *monitor*. He or she leads the meeting, facilitates the discussion and takes notes. During the reflection session, the following steps are taken:

- The dialogue: In an open dialogue, the different team members share what they have written that month. We question each other about this and check whether we have made similar observations.
- The reflection: Based on the resulting conversation we try to come to reflection. We discuss why we have written things down, we discuss the importance of certain events and how they can be linked to other patterns that we observed earlier, ...
- Critical Turning Points: Based on the reflection, we arrive at 1 common diary in which we only record the 'critical turning points'. These are certain 'tipping points' that have taken place in the last month, or events whose relevance we can put in a certain perspective (despite the fact that the event may seem trivial in itself)
- Drawing up the Dynamic Learning Agenda: Based on the above elements, we are updating the so-called 'Dynamic Learning Agenda'. We try to find out what the learning questions are behind the critical turning points. We reflect on this and ultimately formulate a number of learning questions.
- Follow-up actions: Based on the learning questions, we examine what actions or strategies we can follow to provide an answer to the formulated learning questions. We discuss together what we can do and how we will tackle this in concrete terms. We also note these promotions.

Table 2: The steps of the reflection sessions in Genk.

Critical turning points	Learning questions	Follow up actions
SUDS site trip to Waterschei with various partners: exploration of feasibility. General perception: more barriers than opportunities (17-12-2018)	How to have dreamers and do-ers co-operate successfully starting from their own capacity and strengths?	Creating a new governance structure in which 1) different profiles can reach their full potential, 2) the vision can be realised in an effective and flexible way --> how this question can be linked to reflexive monitoring process?
	How to convert planning fatigue into new dynamics?	Further exploration of the need for an 'intermediate study' (between Masterplan & implementation plan) as e.g. articulated for SUDS Waterschei. After site trip to Waterschei: new steps for further convincing the partners of opportunities.
	How to reduce the stretch between vision and implementation, and accelerate the step towards realisation?	
	How to find the right balance between and more technical expert approach (from 'professionals') and a more emotional approach based on concerns (e.g. from Natuurpunt, citizens)?	
	How to find the right balance between hearts (emotion - intuition) and minds (ratio)?	

Table 3: Example from the dynamic learning agenda

Semi-annual eye-opener workshop to integrate learning outcomes into the city organization

Every 6 months Genk hold a feedback session with the internal clients or 'project sponsors' of the Stiemer Valley programme, namely the mayor, the alderman and the director. In this eye-opener workshop, they bundle the most important learning lessons or conclusions from the past months, and discuss these in an open and informal way. This is an effective way to broadly examining to what extent the project meets the expectations, and whether we are actually achieving and/or pursuing the intended impact. This is also a forum that makes it possible to embed learning lessons from the Stiemer Valley programme that have implications for the wider city organization on a larger scale.

Embracing reflexivity as a new working principle: The Stiemer Conclave

Reflexive monitoring can be seen as a way to switch between the strategic level and the operational level, between thinking and doing. The chosen methodology forces you to switch between these levels almost continuously in the process. Genk found that this continuous switching after a while can lead to a lack of sharpness. Sometimes there is a need to zoom out longer and to consider the strategy

more thoroughly. To this end, they have a conclave every 6 months within the Stiemer Valley programme: one in the winter and one in the summer. During this conclave Genk focusses with the Stiemer programme team in the Stiemer loft (a physical space they created to work on the Stiemer Valley) for 2 days full time on the Stiemer programme.

The agenda is determined in advance focussing on a number of fundamental aspects of the Stiemer programme that need specific attention. For example, the governance model, the Stiemer deals from or the goals of the Stiemer Valley programme presented in this report, all find their origin in one of the Stiemer conclaves. In that sense, the conclave can be seen as a milestone in which the strategy is refocused for a period of 6 months. This format of a 2-day conclave is very effective and efficient. So far Genk succeeded in making substantial progress at every conclave in a number of crucial areas, which has always given new energy and courage.

The importance of integrating reflexive monitoring into your daily activities

An explicit learning process requires a considerable effort in time. However, Genk believes this effort is worth the cost for such complex projects as the Stiemer Valley programme.

It requires an intense dialogue on what happened the past months and what is needed to come to common reflection. Participants should question each other: 'why do you think so', 'what do you think about this'? After this process new and worthwhile insights will come up that can be translated into concrete next steps.

When working on the dynamic learning agenda it is necessary to zoom out a bit and try to see which 'events' are linked to a similar pattern to be able to define the critical turning points. It can help to first articulate the learning question that is behind this pattern.

When defining the follow-up actions make sure to integrate the follow up actions from the reflexive monitoring process into your regular team meetings. The progress of these actions should be on the agenda of the regular team meeting to avoid completely parallel processes (reflexive monitoring meetings vs. regular 'project management' team meetings). Bullet journaling: we learned that it depends on personal preference whether you make a daily habit of completing the bullet journal, or whether you do it on weekly or monthly interval.