

Innovative financing for nature-based solutions in cities in Flanders (Belgium)

an urban living lab approach

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Abstract

Internationally, there is a growing urge to promote nature-based solutions (NBS) for approaching climate change in an integrated, systemic and sustainable manner. However, NBS implementation into action remains slow due to several barriers, including the large gap between effective investments and needs. Given the limited resources available to public administrations and the increasing challenges they have to face, a stronger engagement and contribution of private partners is necessary. This research develops a transdisciplinary understanding of innovative financing of NBS through a process of co-creation with experts, non-academic practitioners and researchers from different disciplines in urban living labs in Flanders (Belgium). It elaborates concept notes and business cases as tools to facilitate the engagement of public and private stakeholders in setting out the long-term sustainable innovative financing of NBS. The urban living lab approach aims at providing a testing ground for similar NBS projects in other environments.

Keywords

Innovative financing, nature-based solutions, urban living lab, business case

1. Introduction

Cities are facing increasingly complex climate-related challenges. The combination with growing urbanisation and loss of ecosystems makes them less resilient or adapted to climate change, resulting in vulnerability and disasters. Globally, there is a growing urge to develop integrative and innovative strategies to reduce climate risks while at the same time enhancing biodiversity and ecosystem services (Intergovernmental Panel on Climate Change (IPCC), 2022). There is a strong European policy agenda to promote nature-based solutions (NBS) for approaching climate change in an integrated, systemic and sustainable manner (European Commission, 2013; European Commission, 2015; European Environment Agency, 2021; European Investment Bank, 2023). The European Commission defines NBS as a way to address societal challenges with 'solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions' (European Commission, 2016). NBS for climate resilience are viewed through a holistic lens, also valuing the other important benefits they provide beyond climate and disaster risk reduction, with ecosystem services such as the provisioning of food or drinking water, opportunities for recreation, and climate regulation (van Zanten B., 2023). A wealth of evidence highlights the social, health, ecological and economic benefits of investing in NBS (Jessup et al., 2021; Seddon et al., 2020; Wang et al., 2022).

As an umbrella concept, NBS distinctly focus on deployment of a variety of actions on the ground that address societal challenges effectively and adaptively, simultaneously benefiting people and nature (Pauleit et al., 2017; Seddon et al., 2020). However, studies show that NBS implementation into action remains slow due to several barriers, including a shortage of knowledge exchange on NBS performance, insufficient institutional capacities, barriers in legislation, regulations and governance and the unavailability of funding and markets (Deely et al., 2020; Dorst et al., 2022; Kabisch et al., 2016). The availability of funding is often the trigger for action especially when there are significant implementation costs (Wamsler, 2015).

According to the report 'Investing in Climate, Investing in growth' of the Organization for Economic Cooperation and Development investment in modern, smart and clean infrastructure in the next decade is a critical factor for sustainable economic growth, especially as infrastructure generally has suffered from chronic underinvestment since the financial crisis (Organization for Economic Cooperation and Development, 2017). Different approaches in the growth debate, like proponents of green growth, degrowth or post-growth all seek to expand universal public goods and services that people need in order to lead flourishing lives and to achieve rapid transition to renewable energy, restore soils and biodiversity, and reverse ecological breakdown by means of qualitative improvement and development (European Environment Agency, 2020; Global Governance Institute, 2022; Hickel, 2021; Hickel et al., 2021). Whereas investment in NBS for climate resilience is gradually increasing, globally, funding should triple by 2030 and increase fourfold by 2050 to effectively tackle the intertwined climate, nature, and land degradation challenges (van Zanten B., 2023). Likewise, Toxopeus and Polzin (2017) have stressed that securing investments is diagnosed as a key (and understudied) challenge for NBS and sustainable urban transformation in general.

While investments in NBS are proving to be very cost-effective in achieving environmental and societal goals, there is a large gap between effective investments and needs. NBS are perceived mostly as a governmental responsibility, predominantly relying on public funding while civil society and business engage and contribute to a limited extent (Bally and Coletti, 2023; Kampelmann, 2021). This is likely due to the central role of public administrations in policy making, and to the generic assumption that the environment is a public good (Haugh and Doherty, 2022). Moreover, given the low revenue potential and susceptibility to market failures NBS typically rely on public financing (den Heijer and Coppens, 2023). Over the last years, numerous national, intergovernmental and government-NGO commitments involving NBS have been made (Seddon et al., 2021). However, due to austerity policies, governments restrict their

budget allocation to investments in general and in NBS in particular (Kabisch et al., 2016; Mell, 2018; Mell, 2020). The investment gap is specifically high for green and blue infrastructure in cities, which are heavily dependent on city budgets (Mell, 2018; Merk, 2012).

Given the limited resources available to public administrations and the increasing challenges they have to face, a stronger engagement and contribution of other parties is necessary (Bally and Coletti, 2023). An increase in public funding would help to plug some of the gap. However another opportunity lies within private investments from companies or civilians flowing to NBS (European Commission, 2015; Polzin et al., 2017; Toxopeus and Polzin, 2021). Both business and civil society might play a role in the conservation, development and management of NBS. Appreciation of the critical importance of healthy, functioning ecosystems to human wellbeing and economic activity has grown in the private sector in recent years (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), 2019). Business leaders are increasingly realizing that climate change creates extensive risks for companies, including physical risks, legal risks or changing customer behaviour (ING, 2023). In recognition of this organisations encourage companies to commit to reversing nature loss and restoring vital natural systems on which economic activity depends, mainly through business partnerships. As well as these pro-nature commitments, there has been a sharp rise in major funding pledges for NBS from the private sector. However, while such commitments may indicate a shift in the private sector, the scale and nature of this funding remains problematic (Mayor et al., 2021; Seddon et al., 2021). Regarding civil society, advocates of civic crowdfunding assert it might act as a catalyst for citizens to improve their own neighbourhoods as opposed to waiting for governments or external philanthropic organisations to intervene (Brent and Lorah, 2019). Bottom-up collective action using sustainable (urban) crowdfunding strategies is pinpointed, but lacks academic analysis so far (Toxopeus and Polzin, 2017).

According to the OECD, private financing could fill the funding gap for many urban green infrastructure projects, provided that reasonable conditions of profitability, risk and timeframes can be ensured (Merk, 2012). Toxopeus and Polzin (2017) highlight that private funding for sustainable innovation faces two fundamental challenges, namely that payoffs cannot easily be reaped by investors due to externalities and that payoffs are often long term and high risk. A factor hindering the financing of NBS by private partners is the incapacity of public accountancy praxis to account for natural assets as economically valuable (Matsler, 2019). NBS generate widespread public benefits but do not produce immediate revenue streams to support the high sunk costs they often entail (Mayor et al., 2021). Value created from NBS which provide material and marketable products that can be privately appropriated, like wood or food production can be more easily delivered through business models than NBS which deliver non-material benefits like social relations or human well-being (Cheng et al., 2019; Toxopeus and Polzin, 2021). In order to mobilize private investment for NBS and to combine both public and private funds there is a need for innovative revenue and financing models that can activate it and hence accelerate the transition.

A challenge lies in demonstrating investors how NBS create value and which financial models apply to ultimately translate this value into tangible cash flows (Kampelmann, 2021; Mayor et al., 2021; Toxopeus and Polzin, 2017). The InnoFiNS project develops, tests and evaluates new financing instruments and business models for NBS in the context of Flanders (Belgium, Europe) and its cities. Through strategic basic research - challenging and innovative research which may in the long term lead to innovative applications with economic and/or social added values for several stakeholders - it focuses on the following topics:

1. Analysing the interplay with and impact of innovative financing and business models on urban governance, planning and design, valuation methods, legal aspects and social-economic development;
2. Analysing possibilities and barriers for innovative financing, with a focus on private financing through business and citizens;

3. To improve understanding of how climate-related factors translate into financial risks and opportunities, and how this can be implemented in specific projects, business cases and actions.

2. Methodology

The introduction of innovative financing instruments in NBS infrastructure requires scientific breakthroughs in different disciplines. Moreover, these breakthroughs are deeply interrelated: new financial instruments cannot be analysed in isolation of their governance arrangements, the legal context, the economic consequences, planning and design approaches and the social impact. Several authors stress the need for more holistic approaches across science, policy and practice to maximize the potential benefits of NBS while balancing trade-offs (Kabisch et al., 2022; Liu et al., 2021). In particular there is a plea for co-design and co-implementation through an equitable participatory process involving local communities, other stakeholders and researchers using different forms of knowledge in a transdisciplinary and cross-sectoral approach (Kampelmann, 2021; Seddon et al., 2021). Moreover transfer of knowledge or application of research findings should better address issues that focus on practice-based solutions for problems associated with environmental quality, quality of life and sustainability (Escobedo et al., 2019).

Citizens and urban policy makers are experimenting with new collaborative approaches to tackle persistent urban issues, such as climate change adaptation, quality of life, and urban inequalities. As user-centred and open innovation ecosystems living labs integrate research and innovation processes in real life settings. Urban living labs are a particular form of spatially embedded sites for learning, as well as for the co-creation of knowledge, products, technologies, and service innovations in real life communities and settings. They are instruments for urban and territorial innovation, being able to offer space for adaptive and multi-actor learning environments. Within this real-world context, new practices of self-organization and (infra-) structures can be tested. Urban living labs are intended to confront different stakeholders with the actual and future challenges of a specific site, triggering discussions relating general understanding of the research theme in relation to policy issues. They allow different urban actors to design, test, and learn from innovations, hence working as a learning tool to enhance skill and advance research in several fields. (Martinez-Bello et al., 2021; Puerari et al., 2018)

The InnoFiNS-project develops an inter- and transdisciplinary understanding of innovative financing of NBS through a process of co-creation with experts, non-academic practitioners and researchers from different disciplines. The research develops five research lines, which ensures a multidisciplinary and holistic approach in developing innovative financing models (see figure 1). The multidisciplinary research feeds the method of the living lab, but also takes the urban living labs as its main source to collect and analyse data. Co-creation in four urban living labs enables a close interaction between the different disciplines resulting in an interdisciplinary understanding of and a shared framework on innovative financing for NBS. The urban living labs are central to the project both in terms of research methodology and as a utilisation strategy. Rooted in current, often complex challenges for specific regions and a particular local context, they bring researchers from different disciplines together with relevant stakeholders and potential users.

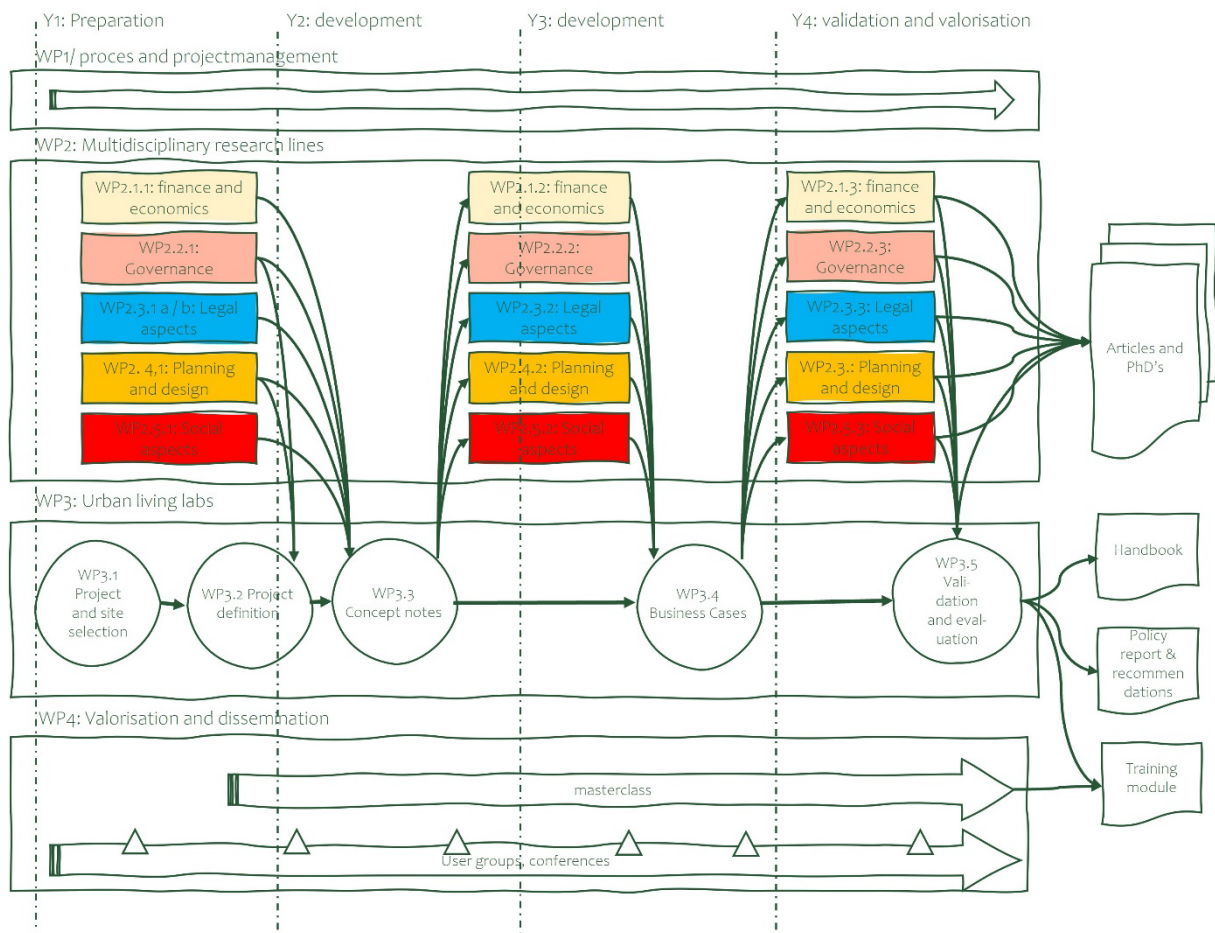


Figure 1: Flowchart of the InnoFiNS-project with the five research lines and the concept notes and business cases as valorisation products

Four types of environments were selected as test sites to develop models for innovative financing of NBS: a metropolitan city (Antwerp), two regional cities (Turnhout and Genk) and a rural region (south of West-Flanders) (see figure 2). Each living lab is connected to decided policies or visions regarding to NBS and oriented on existing projects or plans or projects that are in the pipeline, but currently lack funding. The variety in types of contexts, in rural-urban gradient, in functions, in scale and in governance structures improves the upscaling potential of the approach.

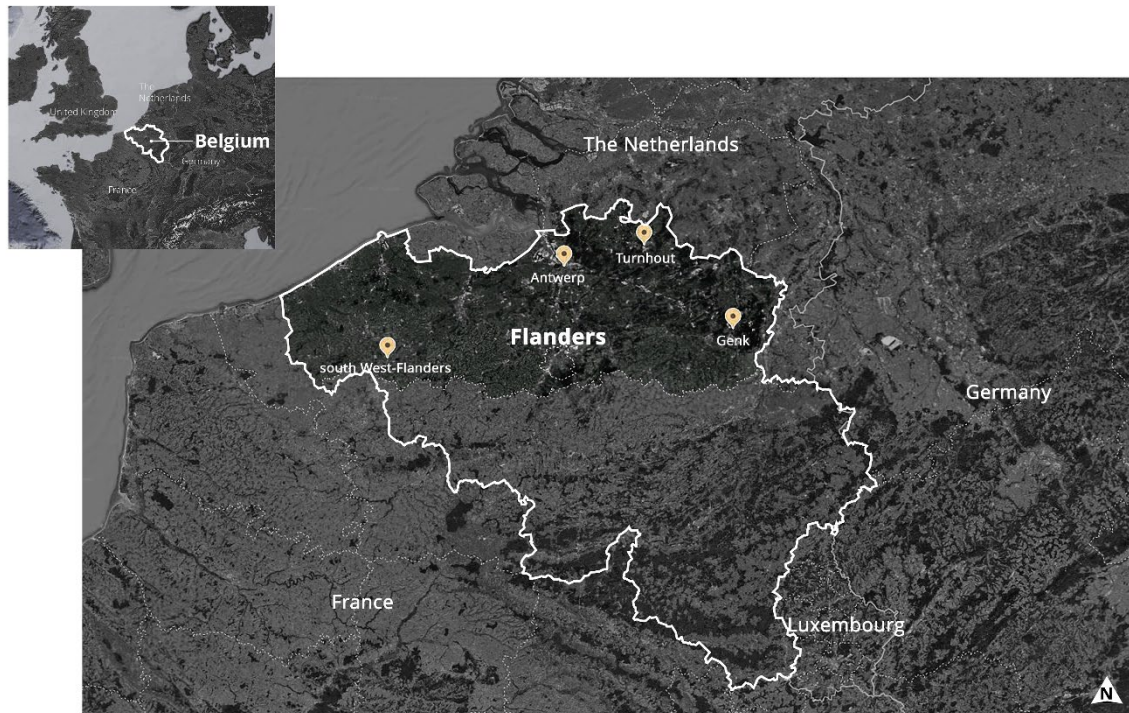


Figure 2: Situation of the Urban Living Labs in Flanders (Belgium)

The urban living lab approach is both a scientific method and a valorisation tool. It is a source of knowledge innovation for research and a strategy for cocreation, dissemination and long term implementation with the stakeholders. The InnoFiNS urban living labs have multiple purposes: (1) they allow for experimentation in “protected” real life socio-political environments, (2) they are oriented at technological and social innovation, and the development and generation of new knowledge, (3) they provide opportunities for a variety of (new) stakeholders and users to participate in a process of co-creation, (4) they aim to maximise a process of social learning, (5) they have a strong dissemination potential.

The urban living labs are designed, tested and run during the InnoFiNS-project and as a result, an evidence-based urban living lab trajectory for financing and implementing NBS is a deliverable in itself. This method and deliverable will meet the need of a model to improve participation between investors, planners, governments and civil organizations. In terms of valorisation, urban living labs have a potential to embed new and innovative practices, to translate innovative practices to other contexts and to upscale innovative practices to a wider area or government structure.

3. Results

Through an intense two-way interaction between the InnoFiNS-consortium and 6 main groups of stakeholders - local and supra-local governments, investors, consultants for NBS-projects, civil society organisations and associations, real estate developers and infrastructure providers - four urban living labs are being elaborated.

Living lab Turnhout

This living lab investigates taxes and fees in order to finance green deficits and help realize a shift in land-use, based on the EU goals of achieving no net land take by 2050. This principle can be described as the set of instruments that can capture all possible increases in land value and buildings, regardless of whether they qualify as taxation. It focuses primarily on capturing unearned benefits arising from actions other than those of the landowner. There will be investigated if the resulting income can be earmarked for specific purposes. Aiming at strengthening and protecting green infrastructures in the city as planned by the Turnhout Climate Plan this living lab researches how different types of taxes and fees to capture capital gains can generate income for the implementation of NBS, for plan compensation to prevent further urban sprawl or for the purchase of land by the city. (figure 3)

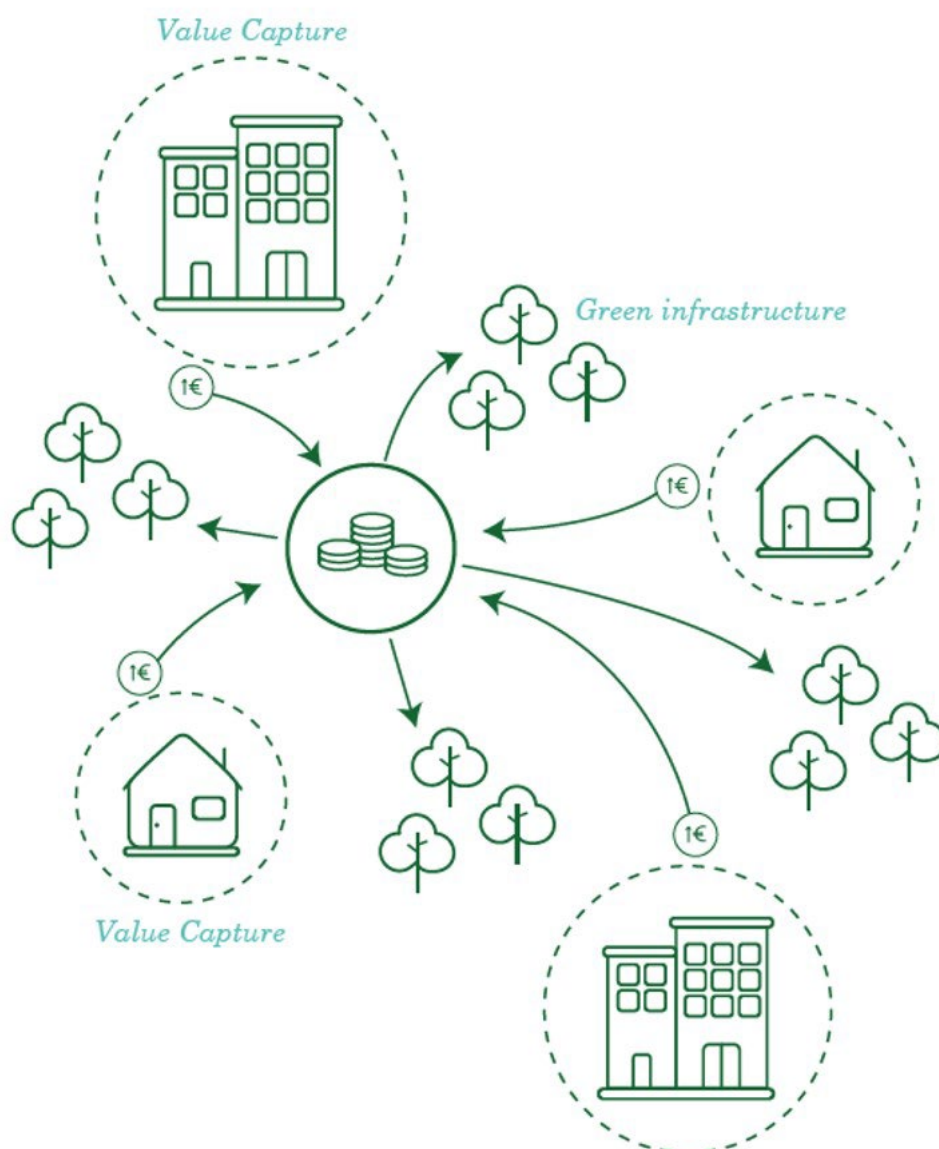


Figure 3: Diagram of the Living lab Turnhout

Living lab Antwerp

This living lab investigates how private financing through corporate social responsibility budgets of companies based in Antwerp can facilitate NBS. This track is explored, given the high density of (large) companies localised in Antwerp and its port and the challenges that the city of Antwerp faces with regard to climate adaptation, including water and green strategies included in the green, water and climate plan. In doing so, it is assumed that interventions should not only take place in the public domain, but that important achievements are also possible in the private domain. The focus lies on investigating the possibilities of a platform based on distributed ledger technology combined with smart contracts, artificial intelligence and internet of things. This technology offers a lot of possibilities in terms of transparency and scalability. Moreover, blockchain has recently been more widely proposed and used as a technology for sustainability projects and financing. The business case being developed in this living lab uses a new technology that offers advantages for bringing corporate funding to private and public nature-based initiatives. It responds to the needs of private financing combined with urges for efficiency and transparency. (figure 4)

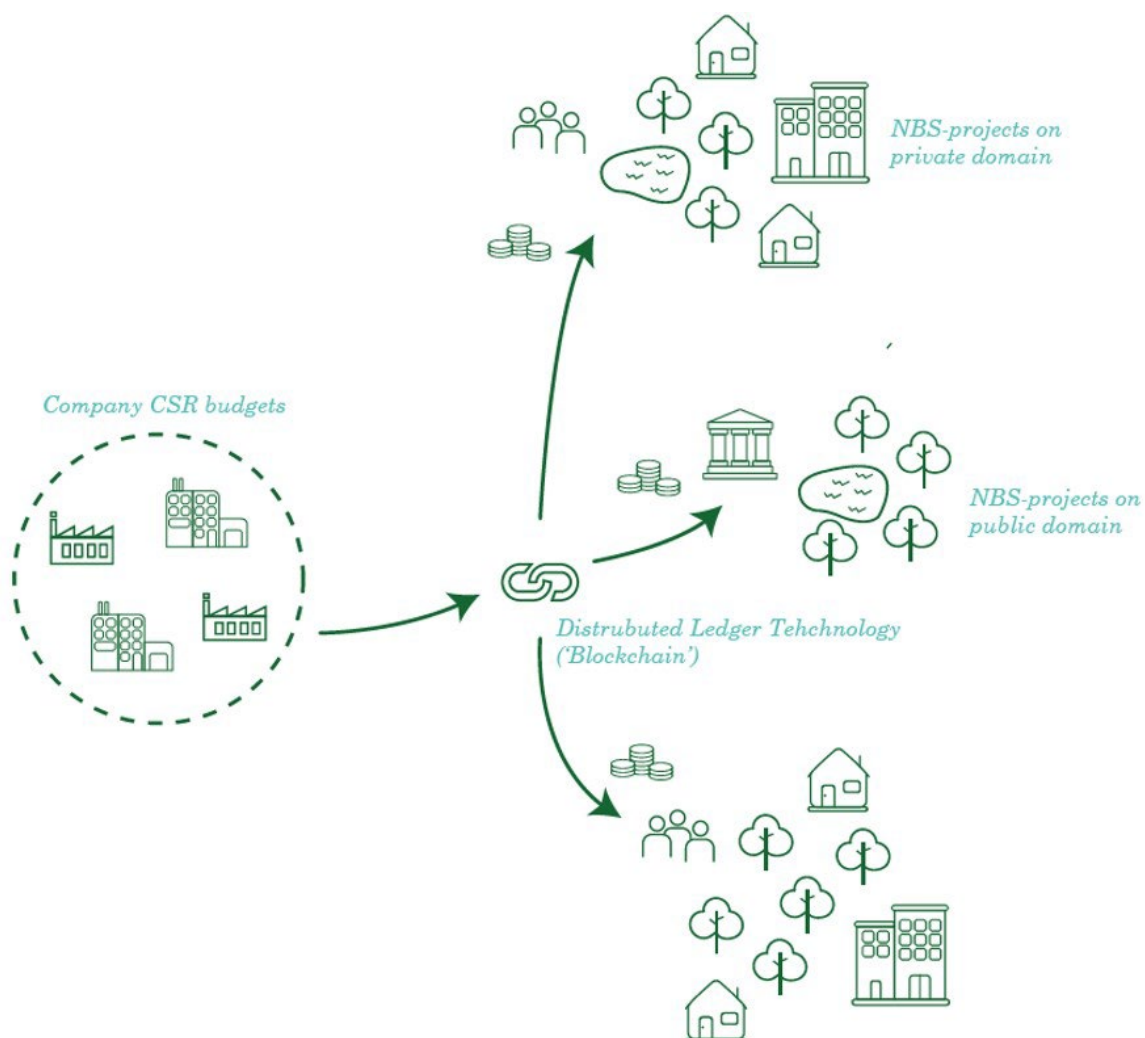


Figure 4: Diagram of the Living lab Antwerp

Living lab Genk

This living lab works with a 'Stiemer fund' that is made up of two financing concepts: structural co-financing by the (semi-)public partners involved and impact-based crowd lending involving local citizens and companies. This financial arrangement attempts to formulate a layered response to the problems in the Stiemer valley. The Stiemer river is a green-blue artery flowing through the centre of Genk, but is not living up to its full potential due to frequent stormwater overflows. This has led to the perception of citizens that the Stiemer valley is 'dirty' and is currently not present on citizens 'mental map' of natural spaces. That is why Genk has started the transformation of the valley into an attractive green-blue artery, a place of connection, tranquillity, recreation and nature. This is complex as multiple actors need to be involved (multi-governance) and multiple strategies and solutions that touch on different disciplines need to be deployed (multi-dimensional) at multiple scales (multi-scalar). Also measures should be taken both in the valley (e.g. through reconstructing meanders and introducing wetlands) and on the flanks (e.g. through the retention of rainwater in the residential areas). The business case looks for innovative forms of financing that offer a layered answer to the complexity of the valley, to accelerate the implementation of the Stiemer project in an integrated way. (figure 5)

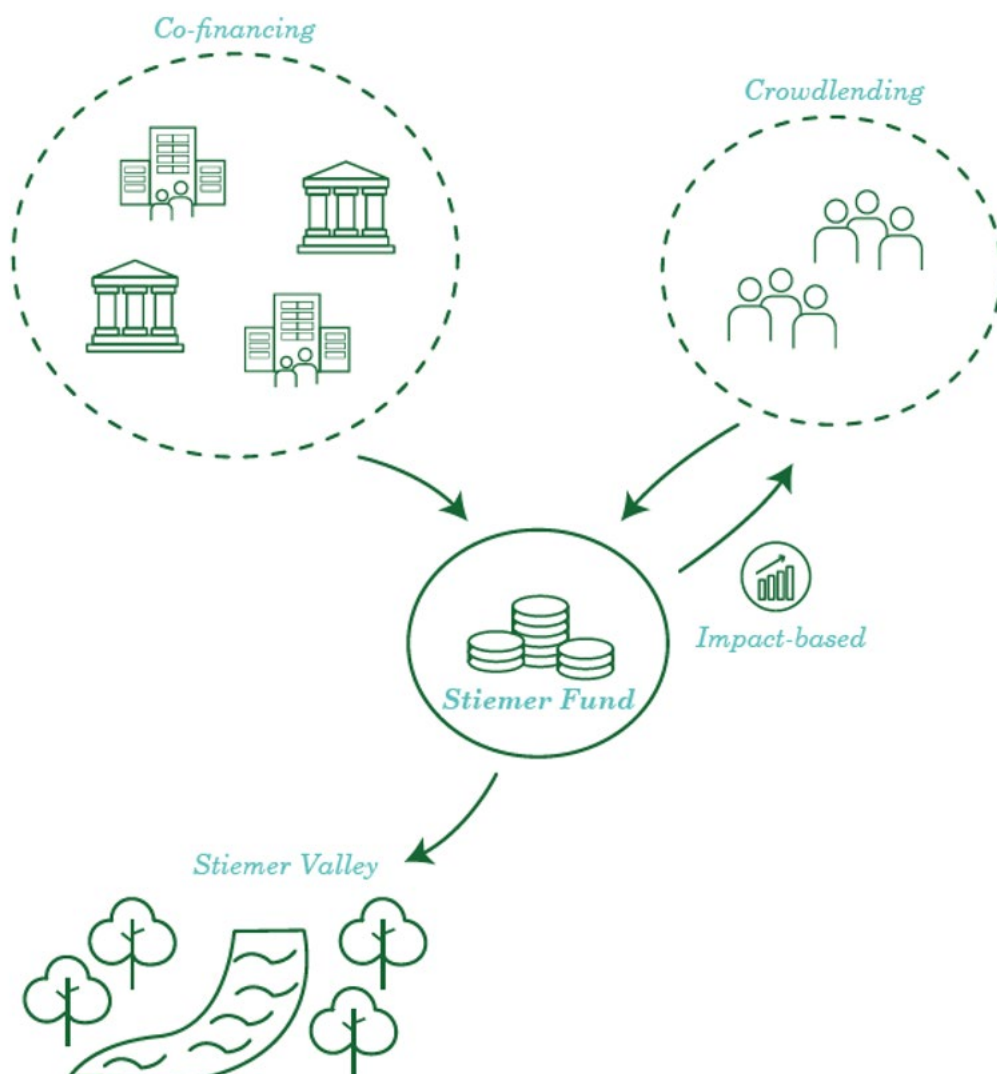


Figure 5: Diagram of the Living lab Genk

Living lab south West -Flanders

This urban living lab aims at the development of an innovative financing system through payment-for-ecosystem services (PES). Based on a spatial vision to make the rural area between the rivers Scheldt and Leys (the interfluvium) more climate-resilient, area-specific measures based on a number of biophysical characteristics (soil composition, hydrological system,...) of the landscape, were proposed. Today, the landscape of the interfluvium is characterized as an intensive agricultural landscape where various challenges play a role: water scarcity, erosion, lack of nature,... This business case investigates to what degree a PES-system could support the transformation towards a more climate-resilient agricultural landscape. , exploring whether a PES-system can motivate farmers and other landowners to voluntarily adapt their business operations to additionally provide the ecosystem services, such as 'water storage'. The financing system is realized by linking beneficiaries belonging to local food supply-chain (supermarkets, food processing companies, other farmers, citizens,...) to the providers of the ecosystem service (often farmers). The research compares the financing system of existing agri-environmental schemes, provided by the Flemish government, to a more privately funded PES financing system. (figure 6)

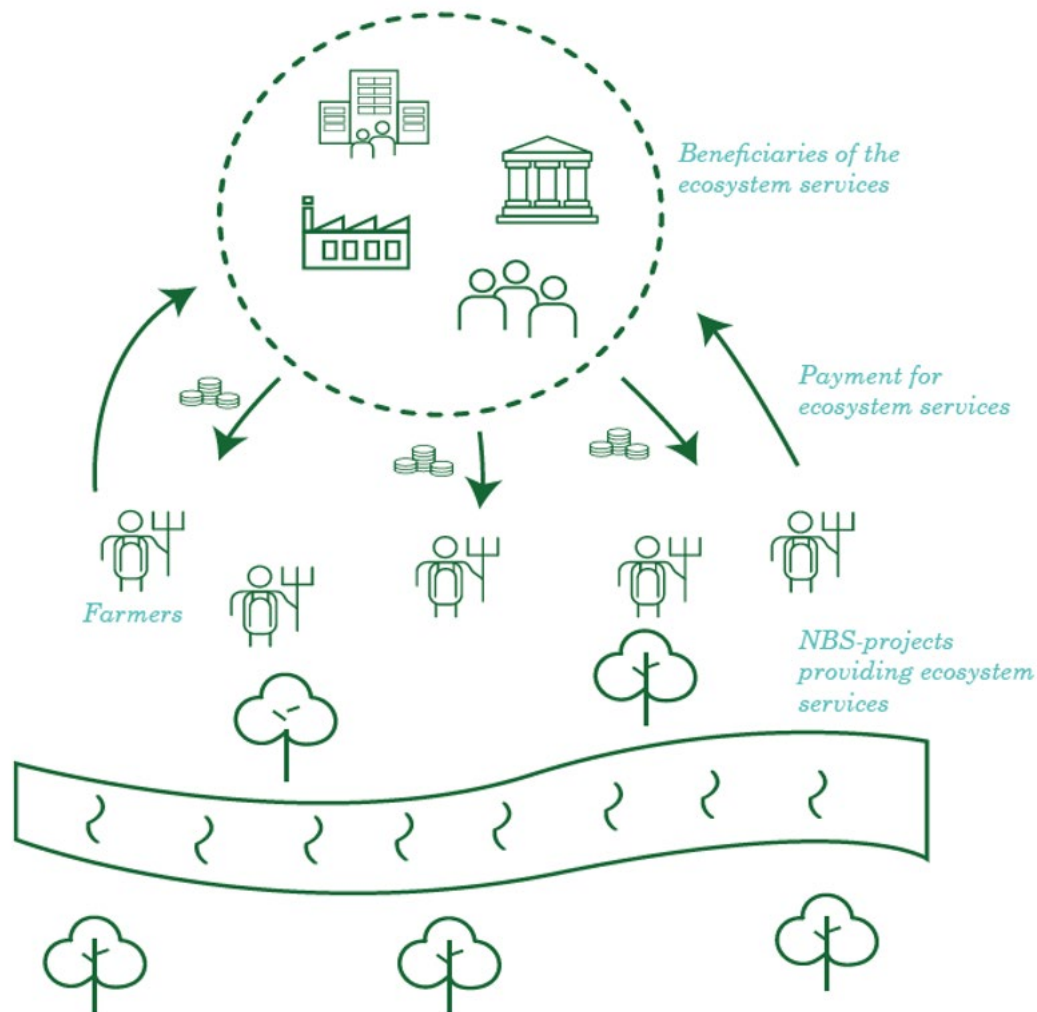


Figure 6: Diagram of the Living lab south West-Flanders

From concept note to business case

Based on interaction and debate, a concept note has been developed for each living lab. This note includes a broad description of the planned NBS, the tangible and intangible social benefits that result from it, and mechanisms to capture these benefits in cash flows through innovative financing instruments. It is the result of site visits and workshops with the members of the project team and internal and external stakeholders. In the follow-up process, these concept notes are re-evaluated and validated by specific stakeholders and external experts. They are then further developed into business cases that evaluate the spatial, legal, policy, economic and social impact of the proposed financing instruments.

Though further interaction and debate in the living labs, the business cases are now being developed as integrative tools to facilitate the engagement of public, private and community stakeholders in setting out a consensual roadmap for the long-term sustainable financing of a particular NBS project. These business cases should describe specific governance, institutional and legal arrangements that make it possible to capture the co-benefits of the NBS infrastructure in revenue streams. They are developed open-ended and in iteration through literature study, a study of international practice and the already known success

and fail-factors, field work and consultation and scientific research regarding their spatial, economic, societal, governmental and juridical feasibility and potential impact. Intensive workshops allow stakeholders to help define the final format and guarantee long term utilisation and impact, and to tailor research in the multidisciplinary research lines to their specific needs. By aiming at business cases that are able to generate a return on investment, the aim is to attract additional private money. The success of the project to initiate pilot cases in other cities will be largely dependent on the risks and return on investment profiles and the market acceptance of the particular NBS projects. When the return on investment of the business cases proves not to be viable, gap funding from public bodies might be considered in order to achieve sustainability goals, or blended instruments.

4. Discussion

At this stage in the InnoFiNS-project the business cases are being elaborated as vital tools in the arsenal of NBS project promoters, facilitating the engagement of public, private, and community stakeholders in setting out the long-term sustainable financing of NBS (Mayor et al., 2021). In general, the stronger the business case, the smaller the risk of path dependence on public funding and associated funding requirements (Kampelmann, 2021). However, creating business cases for particular NBS projects is challenging, particularly when it involves private financing.

‘Business model’ and ‘business case’ are terms commonly associated with business entities worldwide to explain how the different elements of an enterprise work together to deliver value to a customer and how enterprises make money from this value proposition (Magretta, 2002). According to Mayor et al. (2021) definitions state that ‘business models describe the rationale of how an organisation creates, delivers, and captures value’. In the corporate world, ‘value’ is traditionally conceptualised as economic/financial performance. Yet NBS are not enterprises but rather public goods or common-pool resources that do not lend themselves easily to private sector ‘pay-per-use’ or similar revenue-generating models. Another concern is that urban nature could/should not be profitable or be expressed in economic valuation. Moreover, combining private financing with NBS offering public ecosystem services raises several concerns about greenwashing, gentrification risks, the equitable distribution of NBS and the potential loss of public access to green space (den Heijer and Coppens, 2023). Underlying is the entrenched pattern that nature and ecosystem services are under threat by economic activities that are exploiting or disrespecting the environment and by public policies that do not protect them enough. On the other side, nature conservation is often perceived to be an obstacle to economic development. (Bally and Coletti, 2023). Nevertheless it is clear that investment in the conservation, development and management of universal public goods and services is essential to accelerate the transition.

Mayor et al. (2021) assert that the ‘business model’ terminology should be considered carefully and contextualised appropriately when applied to the case of NBS, suggesting further theoretical reflection on the appropriateness of the business model concept in the context of sustainable interventions, such as NBS. Recent research projects focus on the development of frameworks, models and tools to support the elaboration of business cases for NBS, with guidebooks like the Nature Based Solutions Business Model Canvas Guidebook (McQuaid, 2019), Investing in nature: financing conservation and nature-based solutions: a practical guide for Europe (European Investment Bank, 2023) or the Green Book 5-Case business case model (HM Treasury, 2022).

These guidebooks, canvases and the literature linked to it are an interesting starting point for the elaboration of the business cases of the InnoFiNS-project. However international best practices, the living labs and the interaction with the stakeholders reveal that further nuance and specific emphasis will be needed. First, there is the challenge to reflect the complexity of systemic aspects like the multi-dimensional, multifunctional, multi-actor, multi-scalar and multi-governance characteristics of the particular NBS in the business cases. The aim is to bridge silo gaps and offer a holistic view with attention

for relations and trade offs characteristic for the implementation of the particular NBS project. Second there is the aim to broaden the value proposition beyond economic or financial performance. The question rises how and to what extent specific quantitative or qualitative shared values should be involved and – possibly even more important - can be demonstrated. And how this can prove the feasibility and viability of the project. This combines with the identification of knowledge gaps, recognizing that certain values are extremely difficult to demonstrate and finding out how they can be approached in the most appropriate manner. Third the interaction - both formal and non-formal - with the local stakeholders, policies and visions and the particular planning and policy context should be stressed in the business case as this real-life connection offers opportunities for effective implementation. Fourth there is the challenge to incorporate the aspect of the process of co-creation through the living lab in the business case. And fifth there is the challenge to map the risks and challenges, coupled with the possibilities for upscaling.

At this moment the research team is elaborating further on the business cases anchored in the four living labs through working at three parallel lines: on the one hand research is being conducted on specific sub-aspects, like tracking down the willingness-to-pay for ecosystem services in the case of south West-Flanders or for corporate funding for private and public nature-based initiatives in the case of Antwerp or enquiries on the legal possibilities of taxes for the case of Turnhout. On the other hand data on both the particular NBS, the financing possibilities and the involvement of stakeholders are being collected to complement the particular business cases. In the case of Genk for instance this involves several focus group discussions with specific stakeholders in order to decipher the way they can and would be willing to be involved in the innovative financing system. And last but not least there is the attempt to agree on a framework for a business case that is suitable for each of the cases.

5. Conclusion

The InnoFiNS research specifically focuses on Flanders (Belgium), on some specific cities and regions, on particular living labs and on well-defined innovative financing instruments. It is clear that this only merely reveals a tip of the veil of the multitude of instruments and complex challenges that exist regarding innovative financing for NBS. On the other hand the profound elaboration of very specific cases in a transdisciplinary setting offers the advantage that specific hands-on problems are addressed, and that real-life struggles are drawn into the research context. According to our stakeholders the InnoFiNS project is highly relevant and needed to close the gap between actual funding and actual needs of NBS infrastructure in Flanders. Some of them are experimenting on a small scale with innovative funding but they express the need to develop a more integrated and consolidated approach and the need to upscale innovative financing instruments.

First the exemplary research products - the concept notes and business cases – will hopefully inspire the stakeholders involved to bring these innovative financing systems for NBS into practice. Second through a learning and capacity building network between project leaders from cities, municipalities and governmental organisations that are in charge of developing business cases for NBS these innovative financing and business models might be transposed into other regions and contexts. And last but not least the urban living lab approach might provide a leverage effect for similar projects in other environments as it reveals how governments and private stakeholders look at NBS projects and experience specific challenges and possibilities in order to work together towards implementation of NBS on the ground.

Acknowledgments and references

Funding

The project is a cooperation between the University of Antwerp and the University of Hasselt and is funded by the Research Foundation Flanders (FWO).

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