NATURVATION
cities – nature – innovation

Characterizing nature-based solutions from a business model and financing perspective

KEY POINTS

- **We lack a clear understanding of how the value of NBS can be captured within business models.**
- **Setting up cooperative arrangements between heterogeneous urban stakeholders is key for successful uptake of NBS.**
- **The tools to support specific types of NBS innovations and how to measure their performance and impact are currently missing.**
- **Our knowledge of how the risks and gains of innovation are shared between public and private actors remains vague.**

ABOUT THE PROJECT

NATure-based URban innoVATION is a 4-year project involving 14 institutions across Europe in the fields of urban development, geography, innovation studies and economics. We are creating a step-change in how we understand and use nature-based solutions for sustainable urbanisation.

Durham University
Lund University
eco logic
GRIMMA
Utrecht University
UAB Universitat Autònoma de Barcelona
ICLEI Local Governments for Sustainability
ent
Newcastle City Council
CEU Central European University
Gemeente Utrecht
Malmö stad
PBL Netherlands Environmental Assessment Agency
Leibniz-Institut für Länderkunde
ifl

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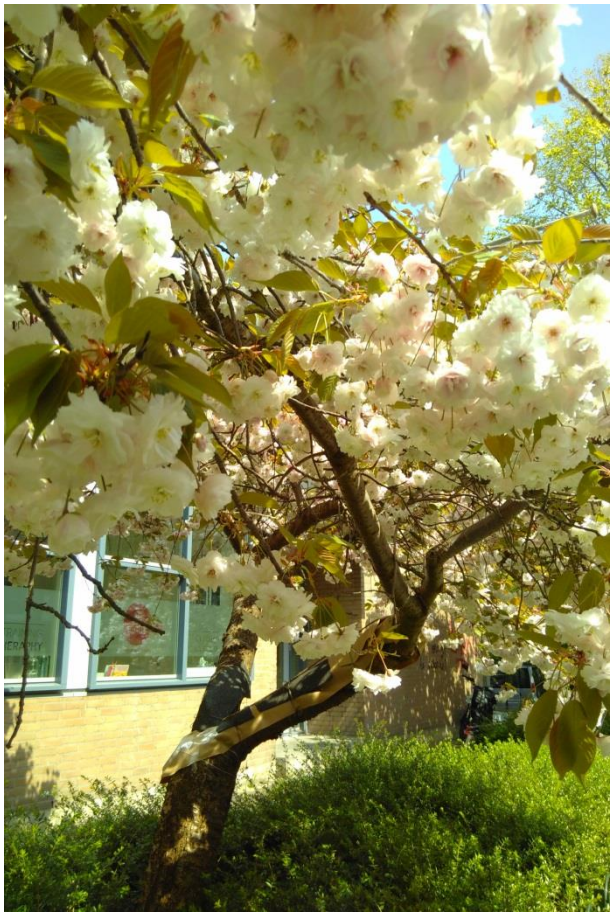
Reviewing the literature on business models and finance for urban nature-based solutions

Building and financing business models for urban transformation have been highlighted as a major challenge for the development of nature-based solutions. This briefing note summarises our review of current knowledge and highlights directions for future work.

Sustainable business models



Bocken et al.[1] describe archetypes of sustainable business models which we use to describe the value proposition, value delivery and value capture models for urban nature-based solutions (see Table 1). The business model archetype *substitute with renewables and natural processes* is widely used in urban NBS, delivering value by replacing grey infrastructure with green-blue infrastructure (e.g. green roofing and sustainable drainage systems). Value capture occurs from ecological/ physiological benefits such as insulation, roof longevity and reduced flood risk. *Adopting a stewardship role* is a business model archetype found in several NBS. This takes a social/ educational approach by creating opportunities for value capture from residents and tourists (e.g. education, recreation and self-harvesting). Finally, the business model archetype *develop scale-up solutions* is important for accelerating the uptake of NBS. Standardized urban farming concepts improve scale-up, as does structured access to subsidies to stimulate private investment in the case of green roofs. Finally, setting up an earmarked CO_2 market for urban emission abatement could structurally increase value capture of urban tree investment.

Sustainable finance models

Developing sustainable finance models for urban nature-based solutions requires that three issues are considered. First, the role of public vs private investors is critical. A lack of public funds makes the entry of private and citizen investors attractive for cities. Private investment is also considered to promote efficiency in resource use, e.g. in the form of user charges. Although long term cooperation between public and private parties are established to allow for risk, cost and benefit sharing, successful partnerships are often hampered

[1] Bocken, N.M.P., Short, S.W., Rana, P., Evans, S., 2014. A literature and practice review to develop sustainable business model archetypes. Journal of Cleaner Production 65, 42–56. doi:10.1016/j.jclepro.2013.11.039

by complexity, institutional factors and strategic choices of both public and private actors. Creating a diverse group of partners and financiers, from public finance to foundation grants and local bonds, is seen as a key enabler for growing a project from a pilot phase into a larger scale. Second, we find that there is a need for the adaptation of valuation and accounting methodologies to better account for sustainable urban innovation increases the ability to generate funds. This may require the adjustment of valuation procedures to include appraisal of factors such as quality of life and job creation.

Third, innovative private and public funding solutions for urban regeneration are suggested. Capturing land value uplift could occur directly through lease charges or indirectly using tax schemes. Crowdfunding, bitcoin or Social Impact Bond (SIB) schemes could potentially play a role in creating sound public-private partnerships. More generally, extensive information harvesting is suggested for better risk analytics and valuation purposes.

Identifying opportunities and challenges

The opportunities and challenges for developing business and finance models depend on the specific types of nature-based solutions involved – green roofs face different challenges than urban agriculture. Our initial assessment suggests that there are multiple forms of value capture and financing arrangements that are being developed across different nature-based solutions in cities. As our work continues, we will audit the range of models being applied in cities in Europe and develop the knowledge and tools through which they can be more widely disseminated.

Table 1: Plotting urban nature-based solutions to sustainable business model (SBM) archetypes

SBM archetypes	Value proposition	Value creation & delivery	Value capture
Maximize material and energy efficiency	• Green roofs prolong life span of roof and reduce building energy need • Urban agriculture reduces 'food miles' for urban food demand	• Adapting gardening & agricultural expertise to rooftop environments (commercial and private). • Commercial or social enterprises delivering roofing and maintenance or running entire farms. Expertise for agricultural yield level increase.	• Green roof longevity plus subsidies make this a for-profit investment in the long term. • More planning /cash flow certainty if NBS is integrated with building lifespan.
Create value from waste	• Use of building waste (water, heat, organic) by rooftop and building-integrated agriculture • Unused brownfield, set aside for development, can temporarily be used for urban agriculture	• Building-integrated farming saves farmland from agricultural production by reusing resources from buildings. • New material and technologies needed (innovation) for building-integrated agriculture.	• Building-integrated agriculture provides planning certainty due to building integration but face high investment costs. • Brownfields are associated with high decontamination costs.
Substitute with renewables and natural processes	• Green roofs decreasing rainwater run-off • Tree cover and green roofs improve air quality • Green urban spaces reducing heat island effect • Various NBS reduce flood risk (green roofs, tree cover, sustainable drainage systems)	• (Social) businesses applying green roof expertise • Delivery through tree care firms • Delivery is challenged by output measurement • Sustainable drainage systems set up through cooperation / partnerships	• Reduced storm water tax rate in some urban municipalities for green roof owners for flood risk reduction.
Deliver functionality rather than ownership	• Reducing environmental cost and improving health by access to unbottled clean water in countries with low quality public water.	• Delivering drinkable water as a service (unbottled) at a local level and providing pick-up points. A filtering facility is placed in local communities	• Fee for water service at local filtering and pick up points. Cost of water is lower than bottled water for citizens and higher quality than public water supply.
Adopt a stewardship role	• Involving local residents in urban community farming educates them about the food chain. • Native plant landscaping in tourist facilities provides environmental education • Tree cover in residential areas leading to health, aesthetic and biodiversity benefits	• Organic farmers sublet plots of land to residents of the urban surrounding area. • Landscaping of tourist attractions and urban surrounding with native plants • Tree cover provide by residents, real estate developers and municipalities. Public hearings can be part of the municipal forestry planning process	• Farmer receives rents from renting out plots • Residents obtain produce from the land, social and educational benefits. • Enhanced visitor experience can lead to higher tourist income for cities or attractions • Higher property values due to tree cover
Encourage sufficiency	• Family/local agriculture to combat poverty and social exclusion; provide recreational green space	• Development of community garden networks in marginalized communities on vacant lots	• Increased resident / family nutrition
Repurpose for society / environment	• Social enterprises set up to facilitate self-sustaining urban agricultural initiatives	• Cooperative, business and network structures used	• Willingness to pay (in-kind) and volunteer embedded in networks
Develop scale-up solutions	• Urban farmers coordinating and facilitating involvement of local residents • Providing green roof subsidies to encourage private investment in green roofs • Specific markets for urban CO_2 abatement	• Creating a standardized approach for subletting plots of organic farmland helps scale up residential urban farming • Municipal subsidies based on green roofs • Selling urban CO2 certificates for urban tree cover	• Better farmer/customer relationships and land rent; resident nutrition, recreation, education • Green roof owners can recoup their investments over the roof lifetime. Lower storm water costs for municipalities • Increased value of urban tree cover