

# Innovating in Urban Green and Blue Infrastructure to Improve the Food-Water-Energy Nexus A Guide for Communities and Subnational Governments

**Innovative Governance of Food-Water-Energy Nexus in Cities**  
**An IFWEN Training Program**

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# Innovating in Urban Green and Blue Infrastructure to Improve the Food-Water-Energy Nexus

## About this guide

- **What is it:** This step-by-step guide is a tool to help you identify and/or adopt *green and blue infrastructure (GBI)* innovations to improve the Food-Water-Energy Nexus (FWEN) in your community.
- **Who is it for:** public managers, leaders and concerned citizens committed to sustainable development.
- **Who developed it:** scientists and practitioners gathered in the 3-year project IFWEN – Understanding Innovative Initiatives in Food Water Energy Nexus in Cities.
- **How to use it:** Read. Understand. Ask questions. Interact with peers. **Apply.**
- **At the end of each section** - interactive opportunity to assess progress.



# Innovating in Urban Green and Blue Infrastructure to Improve the Food-Water-Energy Nexus

## Introduction

- Context: rapid unplanned urbanization, climate change, biodiversity loss, food, water and energy insecurity.
- Principles and concepts

**Urban Green and Blue Infrastructure (GBI)** is an **interconnected network** of natural and semi-natural (urban) areas, **including vegetation and water elements**, as well as other environmental features, **integrated with the built environment... its key aspects are connectivity and multifunctionality to benefit urban populations.**

**Ecosystem services (ES)** are "the benefits people obtain from ecosystems"(MEA 2006).

**Innovations** are interventions that promote transformation when adopted in new or different contexts.



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## Urban Green and Blue Infrastructure Typology

Vegetation	Water bodies
Green infrastructure (GI)	Blue infrastructure (BI)
Urban forest	Urban wetlands
Green space	Lakes/Ponds
Urban/Community gardens	Urban river
Street/Urban trees	Constructed wetlands
Urban greening/Greenery	Creeks and streams
Green belt	Coastal ecosystems (mangrove, saltmarsh)
Urban agriculture/Farming	Forested wetland
Peri-urban agriculture/Forest	Streams
Sponge city	Rain gardens
Green roofs	Detention/Stormwater ponds
Living/Green walls	Permeable pavement
Green/Smart buildings	Bioswales
Conservation units (adm)	Urban drainage system

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## Ecosystem services provided by GBI

Category	Ecosystem services	GBI examples
<b>Provisioning</b>	Fresh water, food, medicinal resources, raw materials	Urban agriculture, community gardens, green roofs.
<b>Regulating</b>	Local temperature and air quality, Carbon sequestration and storage, moderation of extreme events, wastewater treatment	Urban forest, green space, urban trees, green belt, living wall, wetlands, detention ponds, permeable pavement, bioswales, rain gardens.
<b>Cultural</b>	Recreation, health, spiritual experience, sense of place, aesthetics	Urban park, urban forest, streams, forested wetland.
<b>Supporting</b>	Habitat for species and maintenance of genetic diversity	Urban forest, green space, urban trees, green belt, living wall, wetlands, urban river, streams, mangroves.

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## 1. Getting started: *Where are we?*

- Setting up a steering group.
- Identifying the issues and defining the problem statement.
- Framing the problem and engaging stakeholders.
- Identifying and analyzing impacts and affected people.
- Setting the basis for action.

**Key inputs: committed staff and leadership.**



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## **2. Visioning:** *Where do we want to go and who will get us there?*

- Identifying stakeholders and beneficiaries of change.
- Co-defining the vision and setting long-term goals.
- Engaging collaborators.
- Engaging political support.

**Key inputs: capacity and collaboration**



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## 3. Planning: *How to get there and when?*

- Establishing the core team.
- Identifying sources and resources.
- Setting priorities, intermediary goals and objectives.
- Defining activities, roles, and timeframe.
- Establishing strategies and scenarios.
- Assessing risks, threats, and alternative pathways.
- Identifying tools and indicators.

**Key inputs: clear assignment of tasks and timeframe**





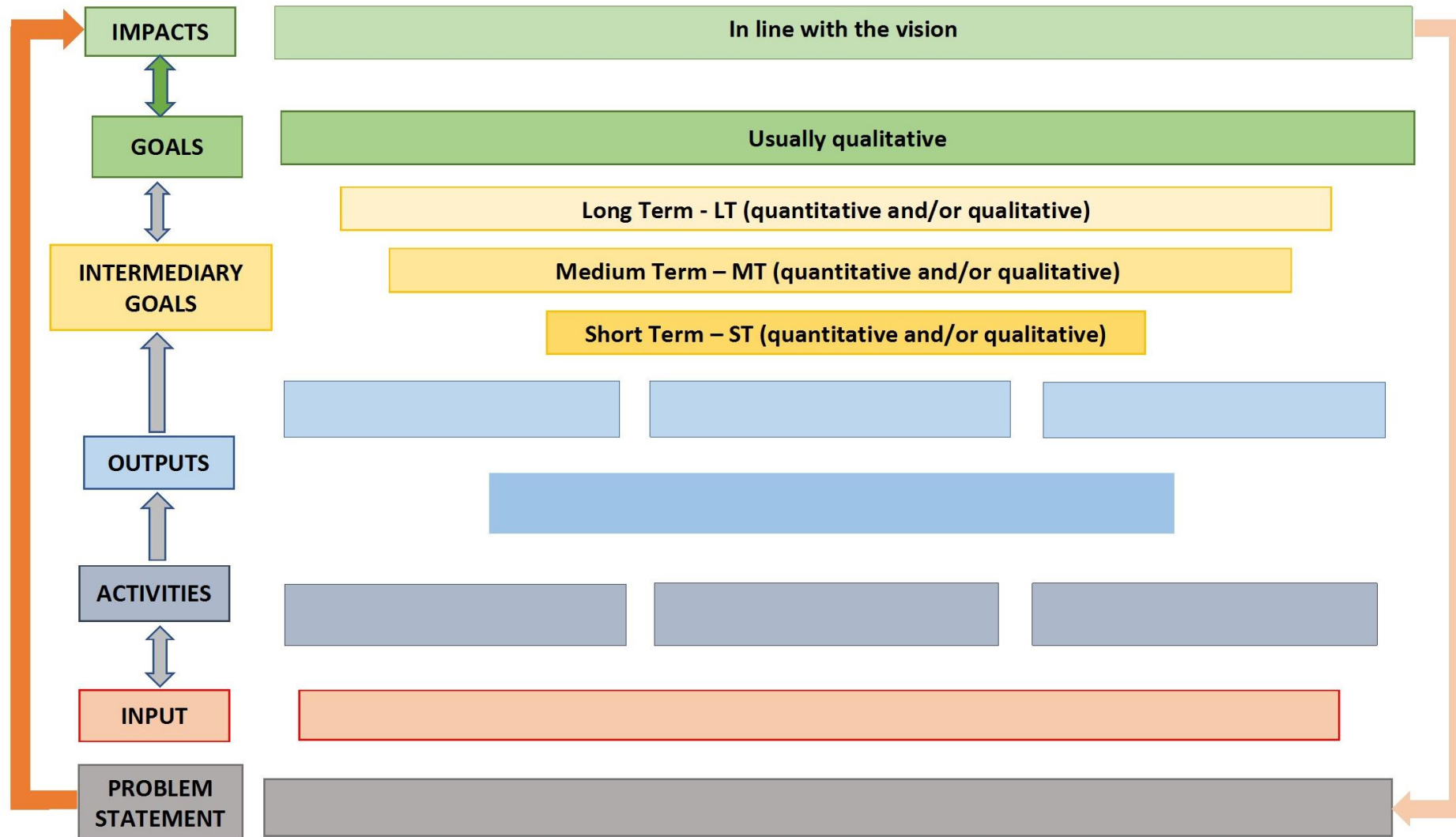
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## *Simplified Logic Model*

Inputs	Activities	Outputs	Intermediate outcome 1	Intermediate outcome 2	Intermediate outcome N	Goals

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## *Logic Model – Results-oriented*



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## 4. Implementing: *Getting there!*

- Communicating plans and engaging public support.
- Applying solutions on the ground.
- Testing alternatives.
- Registering progress and results at each step.

**Key aspects: communications and follow-up.**



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## 5. Monitoring and evaluation: *Now what? Assessing results step by step and adjusting course.*

- Establishing a monitoring team and/or department internally.
- Establishing third party verification.
- Undertaking midline assessments.
- Reporting progress, results and impacts to stakeholders.
- Registering and communicating progress and results to the general public.
- Feeding back results of M&E into the planning process.
- Revising plans and adjusting course of action.
- **Key aspects: transparency and communication.**

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## Additional features

### Appendix A

Working tables and exercises per section

### Appendix B

Resources and tools

### Appendix C

Supplementary information per section

### Appendix D

Glossary



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## Appendix A

**Table 3. Examples of urban challenges and solutions**

Urban Challenges	Conventional or “grey” solution	Urban GBI solution	Ecosystem services (ES)	Benefits and goods
Food insecurity	Centralized food distribution	Urban agriculture (UA)	Provisioning	Food (fish, game, vegetables, fruit), medicinal plants
			Regulating	
			Cultural/ spiritual	
			Supporting (habitat)	



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**Antananrivo,  
Madagascar**

Antananarivo  
Food Market,  
2021.

Source:

ICLEI Case Study  
Series – IFWEN  
project



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**Dodoma, Tanzania**

Nyerere Square,  
2020.

Source:

ICLEI InterAct–Bio Project  
website





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## Florianópolis, Brazil

Medicinal plants garden in the  
Ribeirão da Ilha Community health  
center, 2021.

Source: City of Florianópolis, Cultiva  
Floripa program.

<http://cultivafloripa.pmf.sc.gov.br>



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**Gangtok, India**

**Organic Waste Compost  
Machine.**

Photo Source: ICLEI IFWEN Case  
Study, 2021



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**Johannesburg, South Africa**  
School Greening Project, 2016.

Photo Source: Kumba Energy Report on  
School Greening Project (2016)

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**Lilongwe, Malawi**

Lingazi River greening,  
2020

Source: UNA Rivers Project,  
ICLEI AFRICA





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**Nagpur, India**

Wastewater  
treatment plant for  
reuse

Source: Ministry of  
Power, Government of  
India, 2020. In ICLEI  
IFWEN Case studies  
series



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**São José dos Campos,  
Brazil**

Alluvial plain protected  
area.

Source: L.Macedo personal  
archive, 2019





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**São Paulo, Brazil**

Connecting the Dots: peri-urban farming and sustainable agriculture project

Source: São Paulo, Urban Development Municipal Secretariat, 2019

[https://ligueospontos.prefeitura.sp.gov.br/midia\\_\\_trashed/galeria-2/](https://ligueospontos.prefeitura.sp.gov.br/midia__trashed/galeria-2/)





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## Taipei, Taiwan

Paddy field in primary school using harvested rainwater, 2020

Source: Erich Hellmer, in IFWEN case studies series, 2021



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**THANK YOU!**

**To all of you attending this session.**

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**To the participating cities and their dedicated staff.**

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