METHODOLOGY

2025

ASSESSING NATURE-BASED SOLUTIONS FOR URBAN FOOD SECURITY AND CLIMATE ACTION

A METHODOLOGICAL FRAMEWORK

Orange fruit on tree with background of building, Joycestock.adobe.com, AI-generated

URBAN NATURE ACTION

UNECE

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INTRODUCTION

Urban food systems are grappling with unprecedented challenges. As cities expand, the strain on urban infrastructures, resources and governance systems intensifies. A critical challenge is ensuring equitable access to safe, nutritious, and affordable food for all residents, especially as rapid urbanization outpaces the capacity of many cities. Simultaneously, significant food loss and waste along the supply chain further burden municipal waste management. Moreover, disparities in access to sufficient and nutritious food persist, particularly for vulnerable populations. While many cities have launched innovative local initiatives to address these issues, efforts are often isolated, creating a rather fragmented cityscape of efforts.

While cities are at the forefront of the most pressing challenges, they also occupy a unique position as vital hubs for innovative solutions and driving action from local to global level. It is within cities that problems like food deserts, malnutrition, and food waste management are felt most acutely, demanding urgent and innovative solutions to ensure sustainable and equitable urban food systems.

This document is intended for city officials, experts and urban planners seeking to build more resilient and sustainable food systems. By implementing the strategies outlined in this framework, cities can enhance food security, reduce food waste and improve its management, while contributing to localized climate action through nature-based solutions and improved environmental footprint.

Building shock-proof sustainable and nature-inclusive production and consumption patterns incorporating nature-based and digital solutions can contribute to well-functioning, more resilient and circular ecosystems. A holistic approach is essential for ensuring resilience and supporting future preparedness and response.

There is an urgent need for integrated approaches that promote sustainable and resilient urban food systems, with potential solutions including nature-based solutions, data collection and baseline assessments to identify gaps, monitoring progress and informing decision-making.

BACKGROUND

A threefold approach to building resilient urban food systems

Addressing urban food security and resilience requires a **holistic strategy** to urban food systems. Challenges like food waste management and food insecurity highlight the importance of baseline assessments and data collection to inform decision-making and ensure the sustainability of interventions. Strengthening food systems, while integrating nature-based solutions in rural and urban areas requires coordinated efforts. This includes mapping food availability, identifying untapped food sources, tracking progress through technology, and foresting local and close-to-urban food production networks

Expired Organic bio waste: ArieStudio/stock.adobe.com

UNECE has been pioneering a threefold innovative, holistic approach that includes:

1. **Food availability mapping**
2. **Digital food management systems**
3. **Nature-based solutions** to enhance urban food security and climate resilience

This comprehensive approach is designed to foster more resilient and sustainable urban food systems for the future. It recognizes the importance of supportive policies and legal frameworks and offers flexible implementation. It encourages policymakers, citizens, businesses and experts to adopt an integrated strategy and intensify collaborative efforts to achieve long-term urban food security. The three components: (1) a methodology for food availability mapping, (2) the NeaturEaTown (NET) technical readiness guide, and (3) guidance on applying nature-based solutions in cities, can be used either collectively or independently, depending on a city's specific needs. Accordingly, this document focuses on presenting a methodology for developing an integrated and holistic resilience framework that supports both food availability and the implementation of nature-based solutions.

1. Assessing food availability

Food availability methodology:

The UNECE methodology offers a replicable framework that enables cities to map their urban food sources, resources, availability, and security, providing a foundational, holistic understanding of their food systems.

A comprehensive assessment of these systems is essential for designing sustainable and effective interventions. The methodology identifies existing food policies, strategies, initiatives and gaps, laying the groundwork for effective planning and targeted interventions. Such assessments are crucial, as the resilience of urban food system ultimately relies on supportive legislative and regulatory frameworks at both national and local levels.

2. Evaluating digital readiness for online food management

The NaturEaTown (NET) Platform:

Once food availability and resources have been assessed, cities should evaluate their readiness for digital food management. This step enables the data-driven analysis of food flows, losses, and impacts while aligning efforts with each city's technological and legislative capacities. Digital, collaborative platforms, like the NET platform, that connect producers, consumers, and distributors foster sustainable and waste-reducing practices. Harnessing technology for better urban food management and planning is essential for addressing the complexity of food systems. It should include:

- Better understanding of urban food management and planning, as well as policy and strategy development, informed by gap analysis to ensure effective implementation)
- Integration of local food initiatives, platforms and marketplaces to better manage surplus food and strengthen food system connectivity
- Checklist for NET platform adoption, usage and piloting, guided by the technical readiness guide
- Consideration of financial and human resources implications during the NET platform usage.

3. Explore nature-based food solutions in cities

Guidance on urban food trees to enhance food security and climate action:

Understanding food availability and integrating digital readiness paves the way for nature-based solutions, such as urban food trees. These solutions enhance food security while promoting environmental resilience, climate action and community engagement. This component includes:

- Comprehensive guidance on the role of productive urban trees in food systems.
- Urban resilience through nature: A quick guide to food-focused nature-based solutions
- Collaboration and knowledge sharing: facilitating collaboration, activities and sharing of experiences and best practices.

Strengthening urban food systems and supply chains

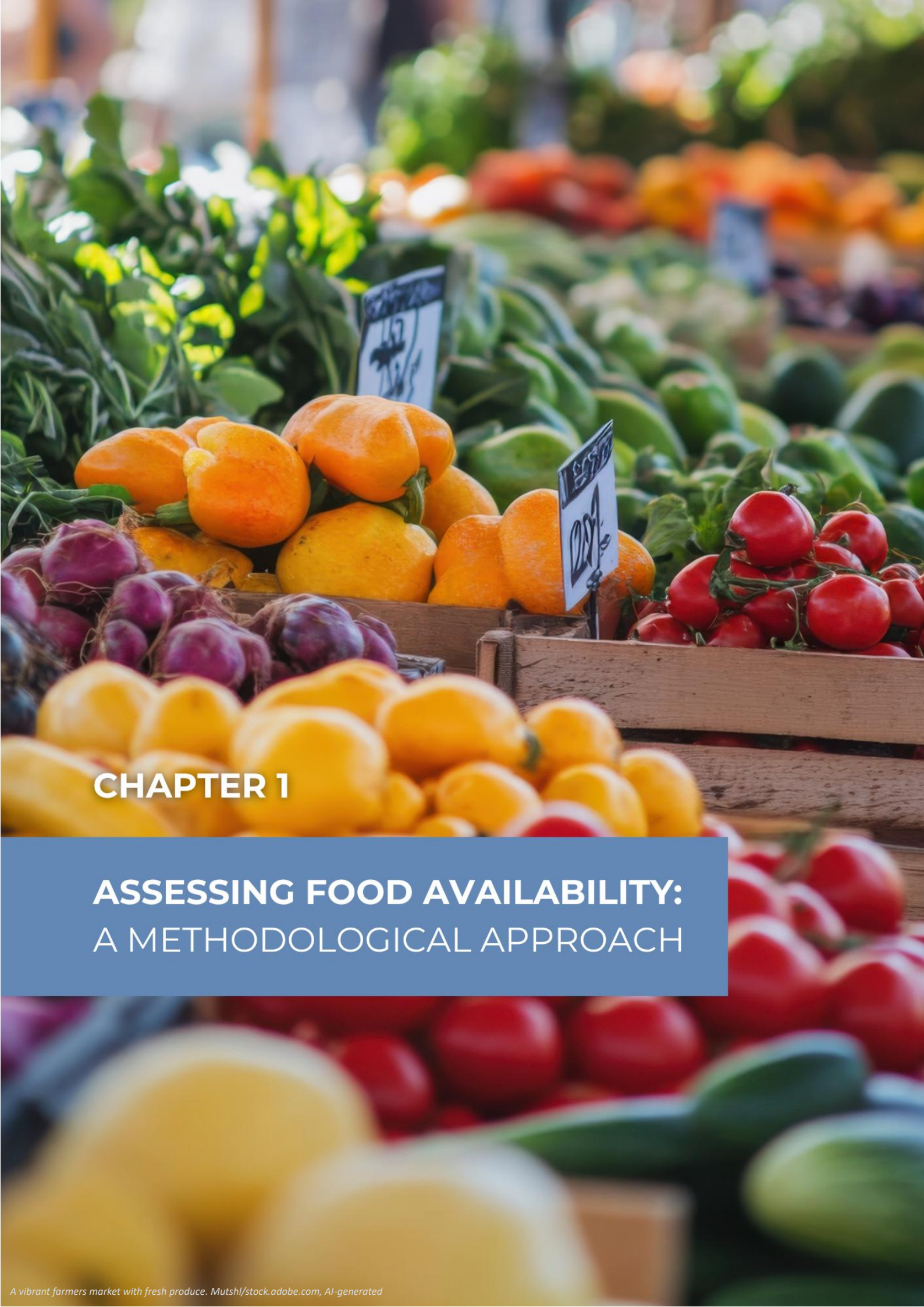
Consultations with cities and potential pilot partners have revealed significant legal, regulatory, and technical barriers that must be addressed to enable effective action. These challenges underscore the importance of understanding **local food systems** as a foundational step toward sustainable urban food planning.

This approach is grounded in five key pillars for sustainable and resilient urban food systems

- **Network**: Connecting diverse actors to foster collaboration and achieve shared objectives.
- **Sustainability**: Reducing food waste, conserving resources, and enhancing environmental outcomes.
- **Resilience**: Strengthening the ability of urban food systems to adapt to and recover from shocks.
- **Community Engagement**: Empowering cities and local authorities to drive change and foster ownership.
- **Innovation**: Leveraging technology and solutions to address systemic challenges.

By integrating these pillars, cities can reshape their food landscapes to be more equitable, sustainable and resilient.

Freshly picked apples ready for transport. AR99/stock.adobe.com, AI-generated



CHAPTER 1

ASSESSING FOOD AVAILABILITY: A METHODOLOGICAL APPROACH

A vibrant farmers market with fresh produce. Mutshl/stock.adobe.com, AI-generated

1.1 KEY ISSUES IN URBAN FOOD SYSTEMS

Urban food systems face significant challenges that impede their ability to ensure food availability and security. As many cities strive for sustainable and resilient urban food systems, it is necessary to align efforts and address systemic challenges, including:

- **Limited understanding of food availability**: many cities struggle with understanding their real food availability, lacking comprehensive data on food sources, supply chains, and waste management systems.
- **Long supply chains and food waste risks**: long and complex supply chains increase the risk of food loss and waste at multiple stages, from production to distribution. Inefficiencies and disruptions along these chains amplify food waste. Moving food production closer to urban areas can enable cities to create shorter supply chains where connections between local producers and urban consumers are enhanced, and handling time of produce is reduced.
- **Information gaps and legal framework:** Cities are different, and so are their national and local legal landscapes. Cities operate in diverse national and local regulatory environments, and a lack of alignment between local and national strategies often hinders the implementation of policies supporting food donation, redistribution and waste reduction.
- **Surplus food and waste and increasing food waste management issues:** Limited data on surplus sources and waste trends compound the problem. Cities do not know where still edible food might be available. They are faced with increasing waste streams – often hard to manage.
- **Technological challenges**: Digital illiteracy and infrastructure gaps often limit technological advancement for food management solutions, creating systemic barriers to reducing food waste.
- **Rapid urbanization**: growing urban populations exacerbate challenges in providing equitable access to nutritious food while addressing food security and availability.

1.2 MEASURING AND MANAGING URBAN FOOD AVAILABILITY

To address these challenges, cities must first understand the baseline conditions of their food systems through a systemic food availability assessment, which provides the foundation for:

- Guiding municipal strategies and aligning local efforts with national, regional and global goals.
- Identifying gaps and opportunities to foster collaboration and to direct funding and resources effectively.
- Improving food availability, waste reduction, and system resilience through data-driven decision-making.

The food availability assessment serves as a crucial first step to explore new ways of managing food resources in cities. It helps mobilize resources, encourages community participation, guides municipal policies, and supports progress toward sustainable urban food systems at local, regional, and global levels.

The UNECE methodology adopts food systems and other integrated approaches which include a systematic assessment of resources, baseline conditions and innovative technologies related to food management and availability in cities.

1.3 THE UNECE METHODOLOGY FOR FOOD AVAILABILITY ASSESSMENTS

UNECE has developed a replicable methodology for mapping urban food availability, production and consumption which has been piloted in Tirana and Tbilisi. These pilots have identified gaps and opportunities for improving urban food systems, including the need for integrating nature-based solutions (e.g. urban food trees) and technology-based tools (e.g. digital platforms), and provided insights into urban food systems by mapping resources, actors and vulnerabilities, enabling targeted interventions and resource mobilization. UNECE has developed training materials and workshops to connect stakeholders and enhance their capacities.

UNECE's methodology for food availability assessments has been based on this work and on feedback received from stakeholders at capacity-building workshops. Mapping resources and food availability, and understanding waste points and opportunities, will enable the creation of collaborative models and platforms connecting urban actors with surplus food sources, promoting waste valorization and circular practices, ultimately building more resilient and sustainable urban food systems.

Moreover, the data and analyses generated from these pilot initiatives could serve as a foundation for developing online platforms for improved food management. These platforms would leverage insights into trends and current conditions, enabling cities to optimize resource allocation, track food movements, and identify key opportunities for reducing waste and improving redistribution efforts.

1.4 STEP-BY-STEP GUIDE TO THE UNECE ASSESSMENT FRAMEWORK

Step 1: Local overview and urban food system mapping:

- Brief overview of the local food context, including key data and trends related to food availability, security and affordability.
- Conduct a preliminary assessment on the nutritional quality of the local food supply, particularly for vulnerable populations.
- Map the urban food system by analysing food supply chains, including, including data on food loss and waste, redistribution efforts (e.g. food banks and commercial actors), hidden costs and key stakeholders in the food ecosystem.

Step 2: Assessing food supply chains and integrated solutions

- Evaluate existing food sources, local production, distribution centres and involved actors to identify opportunities for developing short supply chains and enhancing urban food production.
- Map and assess urban-rural food value chains, analysing how agricultural and rural production integrates into local supply systems. Identify opportunities to apply nature-based solutions, such as agroforestry, to strengthen sustainability.

Step 3: Understanding food waste

- Provide an overview of food loss and waste, identifying surplus food sources, key drivers of food waste, and systemic challenges in waste management.
- Identify and assess the role of food banks and other initiatives to explore opportunities for reducing food waste.
- Where possible, include relevant case studies to illustrate waste trends and emphasize the importance of consumer education and behavior change.

Step 4: Policy and regulation analysis

- Review existing legislation and regulatory frameworks related to food management, distribution, donation, and waste.
- Identify legal gaps and opportunities, including incentives (e.g. tax benefits) that support food redistribution and donation.

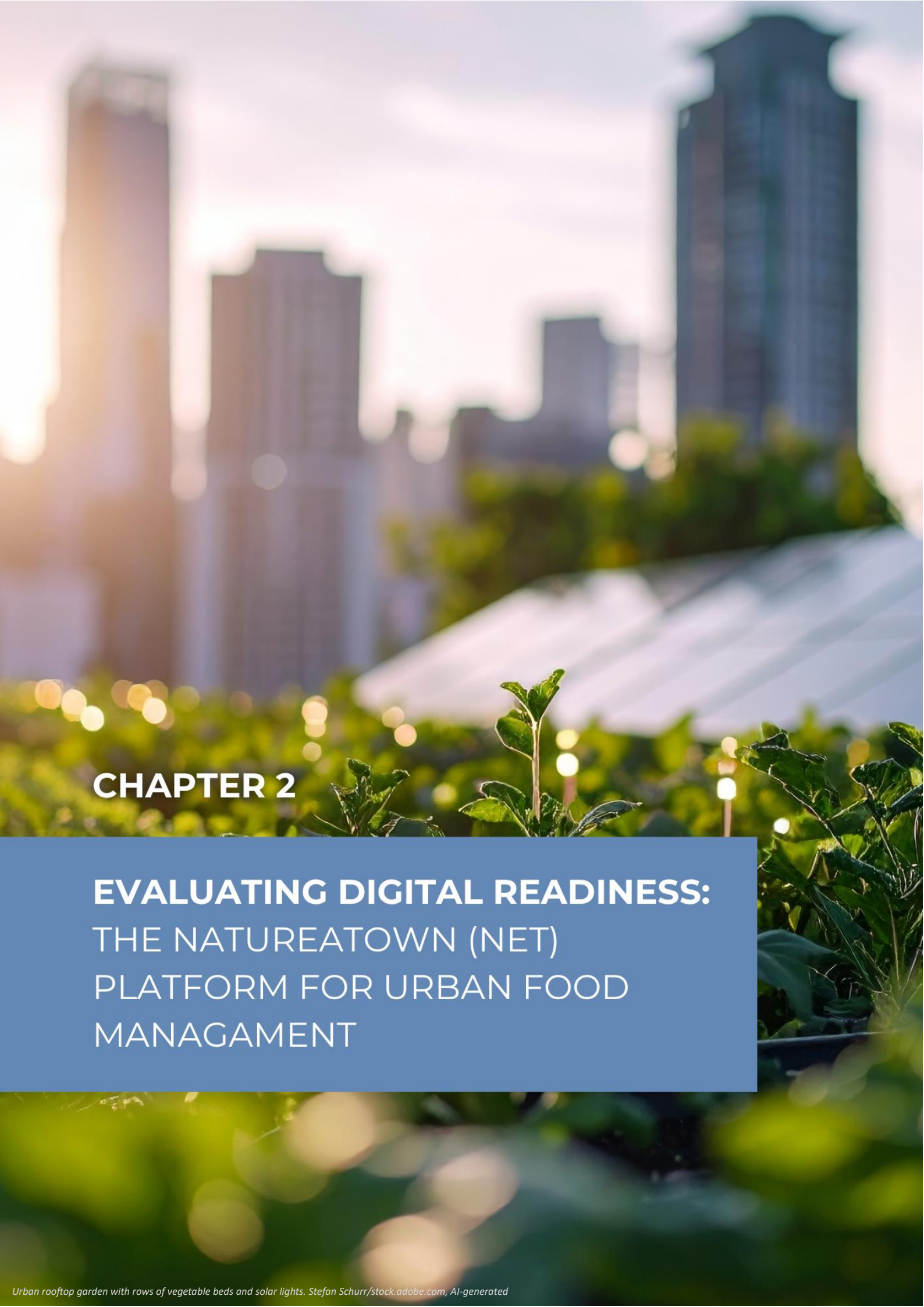
Step 5: Assessing digitalization

- Analyze the current state of digital tools and infrastructure used for food distribution and waste management.
- Compile and evaluate existing digital platforms, marketplaces, and apps, and explore the potential for introducing new tools that improve data collection, coordination, and information sharing among stakeholders.

1.5 TAILORING OPPORTUNITIES

The UNECE methodology offers cities a comprehensive tool to understand urban food systems, gaining clarity on food resources, vulnerabilities and opportunities. This allows cities to connect stakeholders, promoting shared sustainability objectives and collaboration to build resilience and align with local, regional and global sustainability agendas. UNECE's replicable framework empowers cities in the ECE region and beyond to implement tailored strategies and mobilize resources to improve urban food availability, drive policy and technological innovation and develop sustainable urban food systems through identified best practices and ways for improvement.

A vibrant rooftop garden filled with lush plants. Thanarat/stock.adobe.com. AI-generated



CHAPTER 2

EVALUATING DIGITAL READINESS: THE NATUREATOWN (NET) PLATFORM FOR URBAN FOOD MANAGAMENT

Urban rooftop garden with rows of vegetable beds and solar lights. Stefan Schurr/stock.adobe.com, AI-generated

2.1 CHALLENGES IN URBAN FOOD MANAGEMENT

Urban food systems face a range of interconnected challenges that hinder cities' ability to effectively manage food resources, prevent waste, and ensure equitable access. Some of the most pressing challenges include:

- **Finding food in time and matching supply and demand:** identifying and making visible food before it is wasted and efficiently matching supply and demand across the value chain take time, resources, and coordination that many cities currently lack.
- **Lack of traceability and transparency:** data on food origin is often lost as food moves through value chains. Without sufficient data on surplus food sources, redistribution patterns, , and management, and in the absence policies supporting food donation and redistribution, cities often face systemic barriers to effective food recovery and redistribution.
- **Fragmentation of efforts:** local efforts are often siloed and poorly coordinated, resulting in fragments actions, duplication of efforts, and missed opportunity for impact. A lack of integration across actors and sectors prevents the formation of cohesive city-wide food strategies.
- **Environmental impact:** food loss and waste squander valuable resources, including water, land and energy. The production, transport and disposal of wasted food also contribute significantly to greenhouse gas emissions, exacerbating climate change and placing further stress on ecosystems.
- **Economic losses:** wasted food translated into waste money. The financial costs incurred in the production, transportation, storage, and disposal of food place a heavy financial burden on cities, businesses and households. Reducing food waste can free up financial resources that can be redirected to other urban priorities.

These challenges highlight the need for an integrated, technology-driven approaches to urban food system management, leveraging technology, innovation, and governance reform to build more sustainable and resilient urban food systems

2.2 CITIES AT THE CORE OF SUSTAINABLE FOOD SYSTEMS

With rapid urbanization, it is within cities that food-related challenges like food deserts, malnutrition and food waste management are felt more acutely. Yet cities also offer the greatest potential for transformative solutions. In response, UNECE, in collaboration with the United Nations Office of Information and Communications Technology (OICT), launched NaturEaTown (NET), a platform designed to support cities build more sustainable urban food systems. Food policies and strategies, legislation and reporting systems based on resource assessments play a vital role in advancing local efforts. By leveraging digital solutions, cities can address inefficiencies in food management, improve food security, reduce food waste and improve environmental outcomes.

- **Cities have the power to drive change:** As unique hubs for innovation, cities can drive sustainable food system solutions.
- **Cities can take the lead in advancing sustainable food systems**: urban areas are hotspots for scalable innovation. Digital tools and platforms can unlock new possibilities for tracking, distributing, and managing surplus food, fostering collaboration and data sharing, and ultimately enhancing efficiency and sustainability.

- **Cities play a crucial role in connecting rural, peri-urban and urban food systems:** By connecting diverse actors, including small-scale producers, and promoting the recovery and redistribution of surplus food, cities can build more resilient and equitable food systems.
- **Cities are on the front lines of managing solid waste**: Urban areas bear the responsibility of handling vast volumes of (solid) food waste, often straining municipal waste management systems. These growing waste streams pose significant logistical, environmental, and financial challenges, making it critical for cities to adopt innovative approaches that reduce waste at the source and promote circular practices.

2.3 INTRODUCING THE NET PLATFORM

A. WHAT IS NET?

The NET platform is **a blockchain-powered resource management tool** designed to enable effective local action across cities. It allows cities to map, identify and trace food surplus sources. Furthermore, it can generate transparent and consistent data to support policies and regulations for the redistribution of food.

NaturEaTown

B. KEY FEATURES AND FUNCTIONS

- ✓ **NET convenes all actors** across local food value chains in a single virtual place.
- ✓ **NET is a non-commercial platform that consolidates urban food initiatives and marketplaces** to foster connectivity among urban food actors.
- ✓ **NET improves transparency**, collaboration and resource utilization across urban food systems.
- ✓ **NET localizes, quantifies and traces available food** in and around a city
- ✓ **NET generates real-time data, analytics and resources tracking** for cities to monitor and address vulnerabilities in their food systems.
- ✓ **NET allows cities to avoid and reduce food solid waste streams**
- ✓ **NET aligns with long-term strategies** for resilience, inclusivity, and food security.
- ✓ **NET** unlocks potential for new products and innovative solutions for cities

C. CHECKLIST FOR USING NET

PLATFORM COMPONENTS: The NET platform provides a digital exchange and ledger that can help actors in local food systems collaborate at scale. The NET platform is composed of:

- A **customizable landing page** where users log in and find links to marketplaces, programs, and education initiatives.
- A **user-driven platform** featuring an exchange where available food is offered.
- A **data port** to access the data generated by the platform.
- A **data analytics** tool and dashboard.

D. HOW DOES NET WORK?

- NET tracks the “what”, “how much”, “who”, “when” and “where” of food moving through the platform.
- NET is not a commercial marketplace and does not process financial transactions. Financial transactions take place off-the NET platform.

- Through Application Programming Interface (API), NET can connect with existing marketplaces and distribution apps.
- NET supports exchanges of products by platform users and captures data from these exchanges.
- Where compatible and possible, NET can pull data from external sources so that the blockchain is complete.

In more detail:

- Users post products for sale or donation to a single exchange.
- This food can be claimed or pushed to external marketplaces.
- Data from these transactions is recorded in a blockchain ledger and can be used to calculate impacts and generate reports.

E. HOW IS DATA VERIFICATION MANAGED?

- NET receives the entry as a claim and the input is immutable, with the system preventing changes to entries once made.
- The entry can be reviewed with local approaches to managing data verification to be developed by pilot partners.

F. PILOTING THE PLATFORM

Piloting NET

- **Pilot partners** pilot the NET platform and test its functionality.
- **Pilot partners** will have admin-level access and full data management and reporting capabilities, and other users will have viewer-level access.
- **Pilot stakeholders** will contribute to mapping resources, providing inputs and insights, and confirm readiness for digital transformation.

- For each pilot, NET will be a standalone platform configured to local data objectives and requirements.
- Pilot partners will co-create the platform to ensure usability and alignment with local needs.
- The platform will be tailored to fit the pilot partner's regulatory and technological landscape.

- Data requirements will be identified and agreed upon for each pilot.
- Data backup and restoration procedures can be implemented through cloud-managed services provided by the pilot partner.
- Data collection fields can be configured, and non-essential data can be masked to users and/or removed.

- The NET team supports and follows developments of pilot collecting feedback from users.
- The NET team offers technical support during the piloting phase.
- The NET team cannot provide financial and human resources to manage and pilot the platform.

Post-pilot use

- Pilot partners decide whether to keep and maintain the platform with own resources.
- Long-term management of the platform by city authorities.

G. INTENDED USERS OF NET

NET connects a wide range of actors on one unique platform and for different reasons. Built for collaboration, it links city authorities, producers, distributors, sellers, HORECA sector NGOs, food banks, charitable initiatives, food distribution and commercial marketplaces to avoid the fragmentation of urban food efforts.

Cities and other pilot partners can configure NET based on their specific goals and target users. For example:

- A city aiming to integrate small producers into local food systems might target those producers and potential buyers.
- An organization focused on circular food systems may prioritize social enterprises and wholesalers that can use surplus food.

During the pilot configuration process, each partner identifies key stakeholders and initiatives to be integrated. The platform is then adapted accordingly, including assigning different user types and access levels.

To support this flexibility, the NET platform recognizes a variety of stakeholders grouped into **four roles: core group, working group, user group** and **supporter**. These roles apply during both pilot and post-pilot phases of implementation).

NET stakeholders' roles overview

Stakeholder group	Role	Examples	Pilot phase responsibilities	Post-pilot involvement
Core Group	Decision-makers and platform managers	City authorities, lead NGOs, tech partners	Configure platform, oversee implementation, manage data	Oversee long-term management, maintain platform, update policies
Working Group	Key collaborators providing input and support	Food rescue orgs, waste authorities, logistics providers	Contribute to mapping, data entry, and process feedback	Continue operational support and stakeholder engagement
User group	Direct users interacting with the platform	Farmers, food businesses, food banks, social enterprises	Use the platform to post, claim, or track food	Active users in daily operations, continued engagement
Supporters	External advisors, funders, advocacy organizations	Researchers, donors, regional networks	Provide strategic input, promote platform use	Sustain advocacy, funding, or research partnerships

H. REQUIREMENTS AND PRECONDITIONS

Assessing conditions, assessment-based approach

To tailor the platform to the pilot partner's regulatory and technological landscape, a resource, regulatory and technological assessment is crucial to adapt the platform to local needs and address food system vulnerabilities.
By enabling digital platforms to bridge the gap between food surplus and food insecurity, we can track, manage and redistribute surplus food, aligning with local regulations and technical capacities, and ultimately building more resilient and sustainable food systems.

Technical requirements

- Cloud subscriptions
- NET Portal deployment
- NET API deployment - Instead, through API, NET can connect with existing marketplaces and distribution apps. Financial transactions take place off the NET platform.
- NET blockchain deployment.

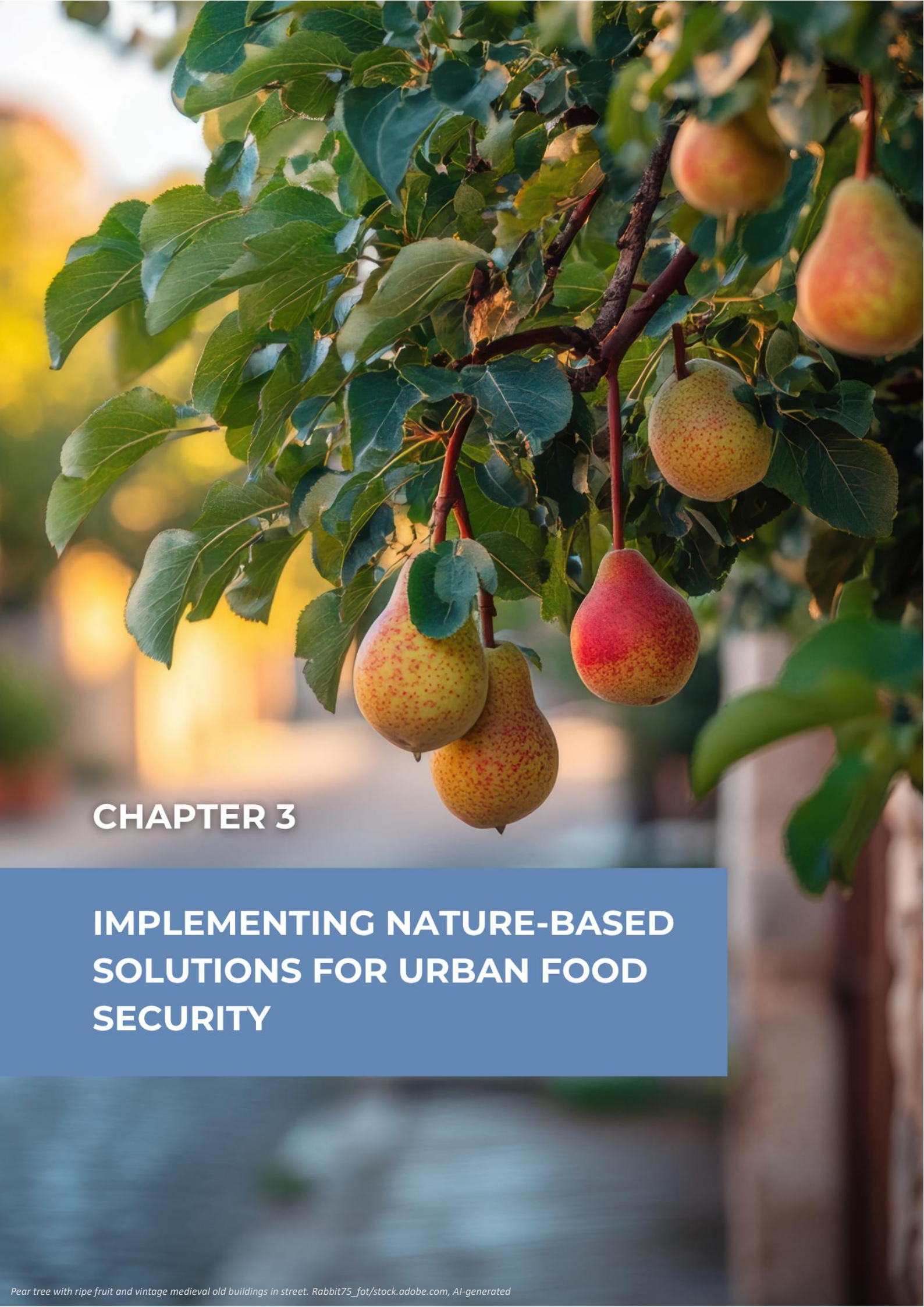
2.4 RESOURCE REQUIREMENTS: FINANCIAL AND HUMAN CAPITAL

The management of the platform, including administration and data propriety, depends on resources decided during the piloting phase. While the NET team provides a ready-to-use platform and technical assistance during the piloting phase, additional human and financial resources are required from the pilot partners. As NET is not a commercial marketplace and does not process financial transactions, there is no financial revenue for pilot partners or the NET team. Incomes are only generated on the connected commercial platforms for commercial operators.

- **Human Resources:** Personnel resources, including staff time, software management, and communication efforts, needed to support and manage the platform and pilot rollout.
- **Financial Resources:** Monetary resources required to fund the development, deployment, and ongoing operation of the platform.

2.5 LONG-TERM VISION AND POTENTIAL IMPACT

The platform's success depends on more than just technology—it requires supportive policies. Therefore, the strategy also involves advocating for food donation and waste reduction policies at the city level. Policy development may include tax incentives for food donations, policies to encourage food surplus tracking. By emphasizing assessment and real-time data collection directly from the system, the application fosters sustainable and resilient food ecosystems. By leveraging insights from food availability assessments, the platform can be populated with baseline data, reflecting local food system realities. Additionally, it can be used to track the productivity of food trees, connect tree care volunteers and communities with local communities and promote the distribution of harvested food, ultimately contributing to more sustainable and resilient urban food systems.



CHAPTER 3

IMPLEMENTING NATURE-BASED SOLUTIONS FOR URBAN FOOD SECURITY

Pear tree with ripe fruit and vintage medieval old buildings in street. Rabbit75_fot/stock.adobe.com, AI-generated

3.1 KEY CHALLENGES IN URBAN FOOD AND CLIMATE RESILIENCE

Our cities are grappling with a complex web of challenges, including environmental degradation, climate change, biodiversity loss, unsustainable agriculture, resource depletion, densification, poverty, food insecurity, and rising health risks, exacerbated by urban food deserts and unequal access to healthy food. These issues demand comprehensive solutions that address multiple problems simultaneously. Urban food trees offer a promising nature-based approach but are often overlooked in urban planning and forestry strategies, despite their significant potential to address critical challenges such as food insecurity, environmental degradation and climate resilience.

There remains a significant gap in practical guidance for integrating these elements into urban environments. Additionally, supportive policy frameworks are often lacking, hindering the successful implementation of such interventions. While urban forestry and greening initiatives often focus on environmental, social, and economic benefits, the full potential of productive trees in urban spaces is frequently overlooked. These trees are often seen as more of a challenge than a solution, and this perception is reflected in urban planning and policies.

For more detailed information, see The Edible City: Why Food Trees Matter

3.2 NATURE-BASED SOLUTIONS FOR SUSTAINABLE AND RESILIENT CITIES

The COVID-19 pandemic highlighted the interconnectedness of these challenges and the critical role that cities play in providing essential services like food, water, energy, and raw materials. It exposed vulnerabilities in food supply chains and underscored the need for more resilient and sustainable food systems. By strategically incorporating food trees as nature-based solutions into urban landscapes, we can create more sustainable, resilient, and equitable cities for all. Urban food trees can contribute to:

- **Food security**: Providing a source of nutritious food, especially during crises and strengthening urban food supply chains, reducing dependency on external sources.
- **Climate resilience**: Helping to mitigate the impacts of climate change through carbon sequestration and improved water management, as well as enhancing green spaces for the mitigation of heat island effects.
- **Biodiversity:** Enhancing urban biodiversity by providing habitat for pollinators and other wildlife.
- **Community health**: Promoting physical activity and improving mental well-being, as well as improving community engagement and educational programs on food systems.
- **Economic development**: Supporting local food economies and creating jobs, including the creation of partnerships and increased connection among food stakeholders.

3.3 THE EDIBLE CITY

UNECE's guide "The Edible City: why food trees matter. More than just shade: the benefits of nature-based solutions for more resilient cities" offers comprehensive guidance on integrating urban food trees into urban forestry strategies for enhanced food security, addressing challenges related to technical aspects, governance, policy, space, maintenance and costs. The guide is also designed to support collaboration and panning efforts to help local and national officials implement integrated nature-based solutions for enhanced food resilience in urban areas. It focuses on the strategic use of fruit-bearing trees ("food trees") as a key component of sustainable and resilient urban ecosystems. Insights from existing case studies demonstrate the significant contributions urban food trees make to urban food security.

The guide includes:

- **Policy frameworks** for integrating food trees into urban strategies
- **Technical guidelines** for selecting species, planting, and maintaining urban food trees
- **Case studies** showing real-world benefits in pilot cities
- **Capacity-building** tools including workshops, expert networks, and training modules

Ripe oranges hanging on the trees bathed in natural sunlight. DreamFrame/stock.adobe.com, AI-generated

3.4 INTEGRATING NATURE-BASED SOLUTIONS IN URBAN FOOD SYSTEMS

Step 1: Policy and Planning Integration

- Develop frameworks for integrating urban food trees into urban food security and forestry strategies.
- Advocate for policy incentives such as tax benefits to encourage private and community participation.

Step 2: Technical Guidance

- Offer species selection guidelines suited to local ecosystems and urban contexts.
- Provide practical planting and maintenance strategies to ensure sustainability.

Step 3: Community Engagement

- Design participatory urban food trees projects to involve local stakeholders in planning and implementation.
- Educate communities on the benefits of urban food trees, fostering stewardship and long-term care.

Step 4: Cross-Sectoral Collaboration

- Establish partnerships between urban forestry departments, food security organizations, and community groups.

- Create expert networks to share best practices and support capacity-building initiatives.

Step 5: Monitoring and Evaluation

- Implement tools to measure the impact of urban food trees on food security, environmental resilience, and social cohesion.
- Use data to refine strategies and enhance scalability.

3.5 MAXIMIZING THE IMPACT OF URBAN FOOD TREES

Collaborative Activities

- Establish a network of experts and practitioners to facilitate knowledge sharing and best practice exchange through workshops, webinars, and forums.
- Collaborate with urban planners and experts to develop training materials and capacity-building resources.

How this supports the broader food availability methodology

- Insights from urban food trees guidance documents will serve as a foundational component of the food availability assessment methodology.
- Data on urban food trees, their productivity, and distribution can be incorporated into the online platform for urban food management, informing decision-making and policy development.
- Highlighting the benefits of integrated urban policies that link food security, climate resilience, and urban forestry.

Urban food trees offer cities a unique opportunity to:

- **Advance integrated food system and climate action policies:** Urban food trees can bridge the gaps between urban food security, climate resilience, and forestry strategies, fostering cohesive urban policies such as urban agriculture plans and climate action plans.
- **Promote sustainability**: By reducing reliance on external food sources and improving air quality, urban food trees contribute to resource conservation and environmental stewardship.
- **Enhance urban livability**: Greener cities with thriving urban food trees projects offer improved quality of life through aesthetic, cultural, and social benefits.
- **Support regional goals:** Urban food trees strengthen urban-rural linkages, aligning with broader regional and global sustainability objectives.

Through UNECE's guidance and the **Edible City** framework, cities can unlock the full potential of urban food trees, transforming their landscapes into resilient, productive, and inclusive spaces.

3.6 FOOD-FOCUSED NATURE-BASED SOLUTIONS FOR URBAN FOOD SYSTEMS: CORE CONCEPTS AND BENEFITS

Food-Focused Nature-based Solutions

Cities worldwide face complex challenges including climate change impacts, food insecurity, biodiversity loss, and social inequality. Traditional, centralized food systems are often fragile and contribute to carbon emissions. **Food-focused Nature-Based Solutions offer a transformative approach by integrating food production directly within city landscapes.**

Building on the broader definition of NBS, food-focused NBS specifically emphasize "the provisioning of food as a core benefit" alongside other environmental, social, and economic advantages. Examples include Edible landscapes, community gardens, urban farms (rooftop, vertical), and green roofs with food-producing plants.

Key characteristics:

- **Integration of food production:** Cultivating edible plants, food trees and forests, or supporting small-scale animal farming in urban or peri-urban areas.
- **Multi-functionality and co-benefits:** Designed to deliver multiple advantages simultaneously.
- **Local context and participation:** Adapted to specific ecological, social, and cultural contexts, involving strong participatory processes.
- **Contribution to urban resilience:** Diversifying food sources, strengthening local food systems, mitigating climate impacts, and boosting social capital.

Food-focused NBS are "strategic investments in urban resilience, sustainability, and equity". Their successful implementation relies on Participatory Design, Multi-Stakeholder Collaboration, Integrated Policy Frameworks, and Long-term Financial and Maintenance Planning. Urban leaders are called to engage in policy innovation, investment mobilization, capacity building, knowledge sharing, and adaptive governance to scale up and mainstream these solutions for equitable benefits.

Multifaceted Benefits

Food-focused NBS provide comprehensive benefits across several dimensions:

Environmental Benefits:

- **Climate change mitigation** (carbon sequestration, reduced energy consumption).
- **Climate change adaptation** (urban cooling, stormwater management, improved air quality).
- **Biodiversity enhancement** (creating habitats for pollinators and wildlife).
- **Reduced food loss and waste** (shortened supply chains, mindful consumption, organic waste management).

Social Benefits:

- **Food security and nutrition** (direct access to fresh food, addressing food deserts).
- **Health and well-being** (green spaces for recreation, stress reduction, physical activity, filtering pollutants).
- **Community cohesion** (fostering social interaction and shared purpose).

Economic Benefits:

- **Green job creation** (urban farming, landscaping, food processing).
- **Local economic development** (support for local food economies).
- **Resource efficiency** (reduced energy consumption for cooling, minimized transportation costs).
- **Property value enhancement**.

Policy Alignment: Directly contribute to **Sustainable Development Goals (SDGs)** such as Zero Hunger (SDG 2), Good Health and Well-being (SDG 3), Sustainable Cities and Communities (SDG 11), Climate Action (SDG 13), and Life on Land (SDG 15). They also align with the **three Rio Conventions**.

3.6 KEY-TAKEAWAYS FOR AN EFFECTIVE URBAN FOOD-FOCUSED NBS METHODOLOGY, DESIGN AND IMPLEMENTATION

Successful implementation relies on key design principles and a systematic methodological process.

Key Principles:

- **Co-benefits:** Design for multiple environmental, social, and economic benefits.
- **Local context:** Tailor solutions to specific conditions.
- **Participatory approaches:** Ensure meaningful involvement of all stakeholders, especially local communities.
- **Long-term sustainability:** Plan for ongoing maintenance and financial viability.
- **Integrated policy frameworks:** Embed NBS into existing urban planning and policies.
- **Multi-level governance:** Foster collaboration across government bodies, civil society, and the private sector.

Cherries in the city, AI-generated, Liliana Annovazzi-Jakab

Planning and Implementation Process:

Involves needs assessment, visioning and goal setting, design and site selection (considering biodiversity and climate-resilient species), project management (permitting, resource mobilization, sustainable soil/water practices), and continuous community engagement and capacity building.

Monitoring, Evaluation, and Learning

Continuous monitoring and evaluation are crucial for effectiveness, focusing on Key Performance Indicators (KPIs) like food produced, temperature reduction, community participation, and job creation. Regular review and feedback mechanisms are essential for **adaptive management**.

Common challenges and their solutions include:

- **Land access and tenure:** Addressed through temporary agreements, community land trusts, or integrating into public spaces.
- **Funding and financial viability:** Solutions include public-private partnerships, crowdfunding, and revenue from sales.
- **Community buy-in:** Emphasizing co-design, capacity building, and strong governance structures.
- **Regulatory hurdles:** Requiring policy reforms and clear guidelines for urban agriculture.
- **Technical expertise:** Providing accessible training, mentorship, and demonstration sites.