FOODCITY BOOST

100+ TRENDS CULTIVATING THE FUTURE OF URBAN AGRICULTURE

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100+ TRENDS CULTIVATING THE FUTURE OF URBAN AGRICULTURE

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FEEDING THE FUTURE: URBAN AGRICULTURE AS AN IMPULSE FOR LOCAL FOOD CIRCLES

Europe‘s cities are facing growing challenges, exacerbated by urbanization, climate change, biodiversity loss, unsustainable resource use and increasing alienation between urban and rural dwellers. These developments do not only threaten the sustainability of urban development, but also the stability and resilience of our food systems – two closely linked areas that are essential for a sustainable future.

The growing world population and the threat of food shortages highlight the urgency of dealing with the complex problems of urban spaces. Cities are not only physical, but also social structures whose challenges are intertwined on several levels. In order to understand these dynamics, physiognomic, functional and social indicators must be taken into account as well as economic, technical and political drivers. Only by taking a broad and multifunctional approach sustainable and effective solution strategies can be developed.

At the same time, cities have enormous potential to make key contributions to overcoming these challenges. Many European cities are already demonstrating how innovative approaches to sustainable food production can be implemented, for example through community gardens, edible cities, local food circles, rooftop gardens and vertical farming. A key approach for the future could lie in the scaling and wider dissemination of such measures. These concepts do not only have the potential to improve the quality of life locally, but also to achieve positive effects on a broader scale. This is not just about growing food on rooftops or windowsills, but about a fundamental reorientation of how societies perceive, shape and sustainably use urban spaces.

Through the targeted development and integration of such approaches, cities could not only become more resilient to the challenges posed by climate change and resource scarcity but also generate social, economic, and ecological benefits. To achieve this, it is essential to identify, combine, and promote trends from various fields early on, making them applicable to the urban context. Only in this way cities can foster sustainable food production while simultaneously enhancing their quality of life.

This brochure captures the essence of the future of urban agriculture through more than 100 carefully identified trends. From vertical farming and aquaponics to community gardening and policy innovations, each trend highlights a unique aspect of this evolving field. As the boundaries between urban and rural blur, urban agriculture will play a critical role in shaping resilient and sustainable urban ecosystems. With this in mind, the trends and signals we explored were chosen for their potential to impact urban agriculture over the coming decades.

We hope this collection serves as both a source of inspiration and a practical tool to reflect on your own strategies, inviting you to explore new perspectives and opportunities.

Enjoy reading, and have fun diving into the insights we have gathered!

THE EU PROJECT FOODCITYBOOST

Europe's rural and urban areas are facing increasing negative impacts from climate change, biodiversity loss, unsustainable resource use, and an increasing disconnect between citizens from urban and rural areas. These megatrends threaten the sustainability of urban development and associated food systems. Throughout Europe's cities, different types of urban farming, such as gardens, rooftop or vertical farming, have emerged, which could provide effective responses to these megatrends. Policy-makers and practitioners urgently need knowledge on the benefits, impacts and risks of urban farming, in order to design policy and legal frameworks that can foster benefits and mitigate risks of urban farming development.

FOODCITYBOOST will develop a knowledge based decision-support tool, consisting of evidence-based indicators of environmental, social and economic performance and impacts of urban farming at farm, regional and EU scale and providing guidance on policy instruments that foster the development of urban farming.

FOODCITYBOOST will collect data on the socio-economic and environmental impacts of different types of urban agricultural systems in various locations. This will contribute to assessing the sustainability of urban agriculture and its role in society by using tools that measure the synergies and trade-offs between different services provided by urban agriculture. By combining foresight analysis and workshops, we aim to design innovative urban agricultural systems that will be well-suited for future cities.

This will help evaluate the potential of urban agriculture in addressing future challenges and evolving urban contexts.

FOODCITYBOOST brings together 20 partners from across Europe and operates within six case studies, using a living lab approach where urban agriculture is leveraged to meet societal objectives and tackle key challenges. These locations include Almere (The Netherlands), Wroclaw (Poland), Flanders and Brussels (Belgium), Sofia (Bulgaria), Riga (Latvia), and Valladolid (Spain), where we collaborate closely with over 100 stakeholders engaged in urban and food systems.

By taking stock of ongoing developments in urban agriculture, we gain insights from regions across Europe where urban farming thrives and benefits from regional policies.

FOODCITYBOOST brings together expertise on social science and humanities, land use systems, urban farming and life cycle assessment, to expand the knowledge base on urban farming from an integrated perspective. We connect to multiple projects (European Forum on Urban Agriculture EFUA, New European Bauhaus (NEB)) to best take stock of recent insights, which allows us to stimulate the development of a varied landscape of urban farming that optimally meets the needs of communities and minimizes negative impacts and risks.

HOW TO: EXPLORING TRENDS AND INNOVATIONS IN URBAN FOOD SYSTEMS

When identifying trends within the FOODCITYBOOST project, great emphasis was placed on covering a broad spectrum of topics that reflect the diversity and complexity of urban food systems. These range from small-scale interventions to large-scale urban planning changes, from low-tech to high-tech innovations, and from local to global political frameworks. The goal was to do justice to the many facets of urban food production and to comprehensively capture relevant developments.

Another key objective was to break down existing silos of thinking and critically examine biases in future-oriented thinking. Managing uncertainties and recognizing that mega-trends alone often oversimplify the complexity of the world were central considerations. At this stage of the project, the findings were intentionally generalized to appeal to a wide audience. A more detailed analysis, incorporating the local nuances of the Living Labs involved in the project, is planned for the next phase.

From a wide range of identified trends, more than 100 were prioritized and assessed for relevance. These were curated for the project brochure and categorized according to the STEEP model (Social, Technological, Economic, Environmental, Political) to ensure comprehensive coverage. In addition, 15 trends deemed particularly relevant were explored in depth through »Deep Dives«. For each of these, expert assessments from the FOODCITYBOOST project provided insights into their potential opportunities and innovation readiness levels for urban agriculture.

You can find a complete overview of all trends on the next page. Enjoy exploring!

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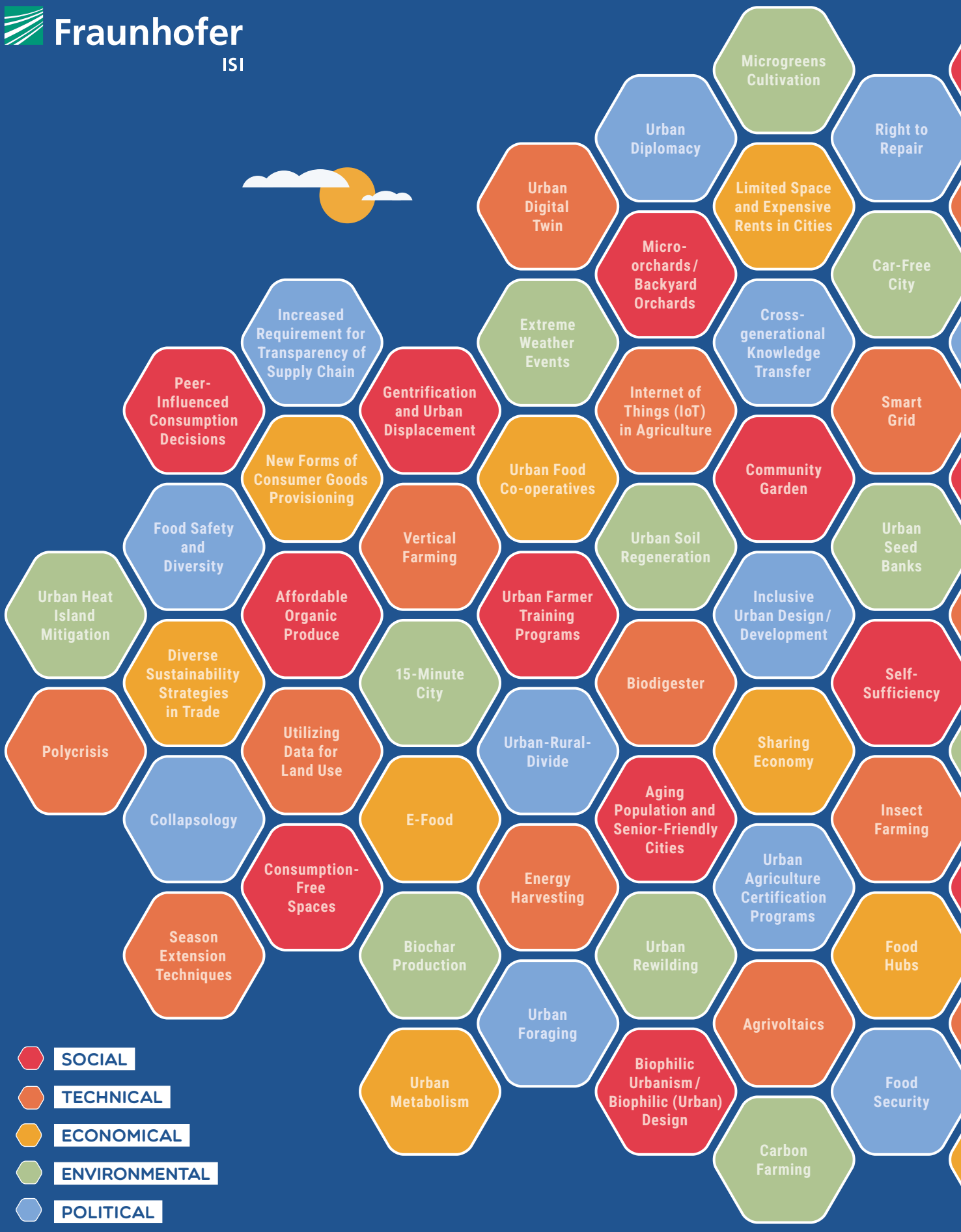

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Regional Value Creation
Crowd farming

METHODOLOGY – FINDING TRENDS IN THE URBAN JUNGLE

»Finding trends in the urban jungle« –, a combined horizon scanning approach was chosen with this goal in mind for the trend research as part of the EU funded project FOODCITYBOOST, which optimally combines the strengths of different methods. Automated and manual research techniques were used in parallel to conduct a comprehensive literature search that identified trends and topics in the areas of urbanism, agriculture and urban farming integrating findings from existing studies and project reports.

Automated processes such as AI and NLP enabled the efficient processing of large volumes of data. Here, the analysis process began with the selection of central documents from databases such as Scopus and Dimensions. NLP tools such as KeyBERT and Yake! were used to extract relevant keywords, which were then iteratively refined by experts. The unsupervised machine learning approach enabled patterns and structures to be recognized without labeled data and increased the efficiency of the analysis.

During the FOODCITYBOOST kick-off meeting, initial results were prioritized by the consortium. Building on this, the trends were validated with internal partners from the consortium and external experts from the Fraunhofer-Society and further developed in interdisciplinary discussions.

The resulting trend list is intended to support urban agriculture stakeholders, innovators and political decision-makers in recognizing opportunities and challenges in urban food systems at an early stage and to promote sustainable food production in cities.

In the Foresight department of the Fraunhofer Institute for Systems and Innovation Research ISI, we develop and support strategic foresight processes. Through customized activities, we strengthen the future viability and resilience of clients, stakeholders and society. Our scientifically sound methods promote the processing of uncertainties, question biases in future thinking and open up new design options for robust future strategies. Our approach is based on future-oriented thinking and innovation.

The Fraunhofer Institute for Systems and Innovation Research ISI is an independent thought leader in the fields of society, politics and business. Almost 400 employees from around 25 nations investigate the scientific, economic, ecological, social, organizational, legal and political conditions for innovations and their effects. To do so we use sound analysis, evaluation and foresight methods.

SOCIAL

TRENDS

001

Community Garden

Urban gardens are increasingly emerging in various European cities, and with that community gardening is becoming an important aspect of urban agriculture. These gardens serve as spaces where residents have the opportunity to design, create and maintain areas within their community. They can be located on squatted properties, private land or public spaces and are collectively managed by a group in accessible urban areas. Maintenance is carried out by the gardeners themselves, and the plots are monitored collectively. These gardens do not only produce healthy food, but also serve as social meeting points and spaces for knowledge sharing among gardeners. They also offer educational opportunities and promote biodiversity in cities.

002

Biophilic Urbanism / Biophilic (Urban) Design

Biophilic design integrates natural elements into architecture and urban planning to improve the connection between people and nature. The aim is to incorporate nature into cities, not only on streets and squares, but also in and around buildings. This approach promotes well-being through green spaces, water resources and natural light, while reducing stress and improving health. It also promotes sustainable practices such as rainwater management and CO_2 reduction through vegetation. In this context, urban agriculture can serve as a valuable addition to the concept of biophilic design by using emerging green spaces to grow fruit and vegetables.

003

Urban Farmer Training Programs

In order to attract more people to urban farming, training programs are increasingly offered to equip interested people with the skills and knowledge to successfully grow their own food in urban environments. A wide variety of target groups is addressed, such as urban farmers, community garden organizers, NGOs and interested individuals. The different course contents cover a wide range of topics from hands-on skills in urban agriculture and garden education to eco-friendly construction, innovative growing systems, circular principles, energy and water management and business models. These programs aim to promote sustainability and community engagement through urban farming and thus contribute to food security.

004

Seed-to-Table Dining

The seed-to-table concept creates a direct link between food production and consumption. In this approach, local gardens are used to grow herbs, vegetables and fruit, while ingredients that cannot be produced on site are sourced exclusively from local farmers. This shortens transportation routes and promotes the local economy. Dining options are based on seasonal and regional availability, which enables people to develop an awareness of the origin and value of food. They appreciate where their food comes from, how it was grown and how it ends up on their table. The increasing popularity of the seed-to-table concept is mainly due to a growing awareness of sustainability.

005

Self-Sufficiency

The concept aims to enable individuals to produce a large proportion of their basic daily needs such as food, clothing and energy themselves. This includes the cultivation, production and preservation of food as well as the manufacture of everyday objects. Self-sufficiency can be practiced with varying degrees of intensity. Popular approaches include small solar systems (such as balcony power plants) or growing fruit and vegetables in one's own garden. Self-suppliers become (partially) independent of markets and retailers, promote regionality, reduce transportation routes and packaging waste and reduce their ecological footprint. To a certain extent, the idea can also be applied to urban contexts, for example by striving for food autonomy establishing and supporting local food projects or energy supply initiatives.

006

Peer-Influenced Consumption Decisions

In the digital age, social media plays a central role: platforms such as Instagram, TikTok and YouTube offer consumers the opportunity to share their experiences with products or services in real time. Influencers can play an important role in sensitizing consumers to sustainable lifestyles and locally produced food. On platforms such as Instagram or TikTok, they share authentic recommendations that create trust and increase the visibility of sustainable products. For urban farming, social media and user-generated content offer an effective way to promote the acceptance of sustainable alternatives. Peer recommendations can not only influence consumer behavior, but also strengthen the sense of community around local food production and more sustainable diets.

007

Local Food Circles

A food circle is an innovative approach to redesign agriculture and food systems that unites all stakeholders in food production in a reciprocal, holistic way. It promotes the consumption of safe, locally produced food, supports sustainable agriculture and strengthens rural regions. An important aspect is the connection between urban and rural areas: urban centers secure the demand for regional products, while rural areas are strengthened by this impetus. Initiatives aimed at localized production and consumption chains and regional value chains are emerging around the world.

008

Socio-ecological Resilience

The widely used resilience term also includes social and ecological factors. Among other aspects, it describes the ability of social-ecological systems to cope with disruptions and maintain their structure and functions. Social and ecological resilience emphasize the interactions between human societies and the ecosystems on which they depend, and how they can jointly respond to shocks. Strategies such as resource diversification, the promotion of social cohesion and participatory decision-making, and the strengthening of ecological functions can create systems that sustain both human well-being and the integrity of the environment.

009

Micro-orchards / Backyard Orchards

Urban gardeners are also increasingly turning towards micro-orchards. These have a minimum of five trees and are adapted to the space available. The trees are planted closer together than is normally recommended and their size is reduced each year. This promotes light conditions and maximizes fruit diversity. Although yields per tree are lower due to the smaller canopy, the larger number of trees can balance the crop and produce more fruit per garden. Overall, the growing method requires less work than a larger orchard and can include a mix of fruit and nut trees, which contributes to biodiversity. The benefits of a diverse micro-orchard are numerous: it offers a greater variety of fruit in a small space, encourages cross-pollination through different tree species, extends the flowering and harvesting season through different varieties and provides smaller trees with protection from direct sunlight in hot summer months.

010

Increasing Urbanization

In 2022, the World Economic Forum predicted that 80% of the world's population will live in urban areas by 2050, even though cities make up less than 2% of the earth's surface. Currently, around 55% of the world's population – 4.3 billion people – live in cities. This rapid urbanization brings with it challenges such as the demand for affordable housing, infrastructure, basic services and jobs. Once built, cities have a long-term impact on land use and can lead to unsustainable growth. Already, urban land use is growing faster than the population, which could lead to 1.2 million km² of new urban area by 2030. In addition, cities consume two thirds of the world's energy and produce around 70% of global carbon dioxide emissions.

011

Nose to Tail / Leaf to Root Kitchen

»Nose to tail« means processing as many parts of a slaughtered animal as possible and not just using the sought-after fillet pieces. As far as possible, all parts of a slaughtered animal are used. The aim is to integrate as much of an animal as possible into the diet. Offal, which makes up around a fifth of the slaughter weight, is considered a slaughter by-product in parts of the EU and is usually processed into dog food or even thrown away. The reintroduction of these parts into the human diet contributes to a more sustainable consumption of meat. Analogous to the nose-to-tail concept, a »leaf-to-root« movement has also developed in recent years, which propagates the utilization of the whole plant in order to prevent food waste.

012

Functional Food / Super Food

New products that promise health-promoting effects are increasingly conquering the market. Although the term »functional food« is not clearly defined, these products usually offer properties that go beyond simply providing energy by supplying a variety of nutrients that our bodies need to function optimally. Ingredients such as vitamins, plant sterols, omega-3 fatty acids and folic acids are often added to positively impact consumer health. In addition to these fortified foods, super foods such as goji berries, chia seeds and Ulkenia algae are also gaining popularity. These also contain health-promoting properties but are not added artificially. In order to accommodate the trend towards modern foods such as superfoods and to ensure the safety of consumers in Europe, these products must be authorized. Successfully approved novel foods are included in the Novel Food Catalogue of the European Food Safety Authority (EFSA) and the EU Commission.

013

DIY-Food Culture

Many classic convenience products can be easily made at home with just a few ingredients. Do-it-yourself ideas for the kitchen help to reduce packaging waste, promote the utilization of leftovers and help to avoid food waste. DIY culture for food also enables the upcycling of kitchen waste, which can be utilized and upgraded instead of thrown away. While upcycling is already widespread for furniture and decoration, there are also numerous ways to use food resources responsibly in the kitchen.

014

Snackification

Modern working life, characterized by working from home and meetings, no longer allows many people to keep to traditional meal times, breaking up family eating routines and defined eating locations. The diet has evolved from three large meals a day to several small snacks consumed throughout the day, especially in urban centers. Main meals are more frequently »snackified« and converted into smaller portions. Experts see snackification as a change in eating culture that fits in well with the modern to-go lifestyle. Unlike fast food, mini meals are designed to be healthy and form part of a balanced diet.

015

Cultural Dimension of Diet

The cultural dimension of food is an important component for the future of our diet. Food is not just a source of nutrients – it connects people, promotes conviviality and preserves traditional practices. By protecting local and regional diversity, culinary identities can be kept alive. Knowledge and crafts-manship relating to food production and preparation are valuable cultural assets that are passed down from generation to generation. In addition, knowledge of raw materials and their origin do not only contribute to the quality of food, but also to its appreciation. Passing on knowledge about the production and preparation of food preserves a cultural heritage and also acts as a bridge between generations.

016

Consumption-Free Spaces

Consumer-free zones in city centers are becoming increasingly important. Surrounded by consumer offers, people's need for freely accessible, consumption-free and well-designed spaces is growing. Attractive public spaces Consumer-free zones in city centers support an increase in both the quality of stay and the length of time spent in city centers. They do not only offer the opportunity for a relaxing break for city visitors, professionals, parents and the elderly, but also make a significant contribution to improving the quality of stay and social interaction in city centers. Initiatives such as self-built seating or community gardens reflect this need.

017

Third Places

The concept of the third place has its origins in urban planning and describes places that offer a balance between home (first place) and work (second place). Sociologist Ray Oldenburg defined third places as (semi-)public spaces such as cafés, parks or libraries that promote encounters, exchange and community. Such places should be neutral, easily accessible and inviting, without obliging people to interact. They are characterized by a relaxed atmosphere, regulars and a sense of familiarity, whereby the function of the place is more important than its appearance. Third places strengthen social interaction and offer a feel-good space for everyone.

018

Affordable Organic Produce

Organic products remain in demand as they promote sustainable nutrition and help to protect the environment. Although they are often considered expensive, organic products are cheaper in the long term: conventional agriculture causes considerable environmental damage every year, the costs of which are not included in the product price but are borne by the general public through taxes. Inclusive access to organic products for people in need can also be promoted through initiatives. An example from Paris shows how access to organic products can be improved for people on low incomes. A pilot project was launched which facilitates access to organic food by offering discounts. In addition, cooking courses and workshops promote the use of organic food and a healthy diet. Such initiatives combine environmental protection with social justice.

019

Aging Population and Senior-Friendly Cities

According to the WHO, the proportion of people over 60 will rise from 12% to 22% worldwide by 2050. The number of older people will then exceed the number of children under the age of 14. In order to meet the challenges of demographic change, it is important to adapt urban structures to the needs of an ageing population. Age(ing)-friendly cities and communities are health-promoting and designed for diversity, inclusion and cohesion. For example, they offer barrier-free transportation and infrastructure, safe access to buildings and public seating and sanitary facilities. Intergenerational solidarity should also be promoted to enable social connections between residents of different ages and strengthen community integration. In summary, such cities enable people to stay active, socialize and contribute to the economic, social and cultural life of their communities.

020

Planetary Health Diet

Eating a balanced diet and protecting the planet at the same time is the approach to the diet of the future. The aim is to feed the world's growing population healthily by 2050 and to promote sustainable food production in order to minimize environmental and climate impact. In its report published in 2019, the EAT-Lancet Commission presented the Planetary Health Diet, which focuses not only on human health but also on the health of the planet. It therefore proposes doubling the consumption of fruit, vegetables, pulses and nuts and halving the consumption of meat and sugar.

021

Gentrification and Urban Displacement

Gentrification and urban displacement describe urban change processes in which higher-income and often higher-educated people move into disadvantaged neighborhoods. This often leads to a gentrification of the area, rising rents and property prices as well as renovations or new buildings. This displaces poorer residents who can no longer afford the higher cost of living. In addition to the physical changes to the neighborhood, gentrification also affects the social and cultural identity of the neighborhood. Traditional networks and cultural characteristics can be lost, which threatens diversity and inclusivity in cities in the long term.

022

Pluralistic Lifestyles / Pluralistic Society

A »pluralistic society« is characterized by the fact that it recognizes diversity in terms of religion, social groups, values and political power. In such a society, different groups have the right to develop freely and participate in the political process. More pluralistic forms of democracy that actively include marginalized groups and the strengthening of civil society can help to make political decisions that meet the needs of different groups. In addition, lifelong learning, including outside of established educational structures, makes an important contribution to a functioning pluralistic community. These approaches can be particularly helpful in the context of climate change and help to shape the discussion of this topic constructively.

TECHNICAL

TRENDS

023

Vertical Farming

Vertical farming is an innovative cultivation method in which plants are grown vertically indoors under controlled conditions. This technique offers environmental and economic benefits, including high and standardized product quality, predictable yields and a lower environmental impact through reduced water and pesticide use. Closed systems prevent pollutants from entering the soil and groundwater, while computers control optimal growing conditions. LEDs play a key role in the lighting of such systems. They imitate sunlight, enable customized light spectra and thus increase the efficiency of photosynthesis, yield and plant quality. LEDs consume less energy than conventional light sources and promote environmentally friendly production when using green electricity.

024

Aquaponics

The combination of aquaculture and hydroponics, aquaponics, enables the simultaneous rearing of fish and plants in a closed cycle system. However, this sustainable method is not a modern invention but has its roots in ancient civilizations. One well-known example are the chinampas of the Aztecs, a system of floating gardens that combined fish farming and plant cultivation. Aquaponics offers an efficient use of resources but can be very energy intensive. Due to the effective use of space, this approach is ideal for urban agriculture projects.

025

Modular Farming Unit (MFU)

As an innovative agricultural approach, modular farming promises higher yields, efficient resource use, and lower environmental impact. The technology uses scalable, self-contained »smart modular« systems to adapt growing areas to crops and environmental needs. MFUs control light, temperature, humidity, and nutrients, ensuring optimal conditions regardless of external weather or climate. IoT devices and sensors monitor crops in real-time, while automation reduces labor. AI and data analytics optimize productivity and resource use. Compact units fit urban spaces like rooftops or warehouses. They can also be used in remote areas or disaster zones for food security. Many MFUs incorporate vertical farming to maximize space efficiency. Plants are stacked in layers, often with hydroponic, aeroponic, or aquaponic systems. This promotes food production in urban areas and remote regions where there is a shortage of agricultural land. It can thus tackle food deserts.

026

SPIN-Farming

SPIN »Small Plot INtensive« Farming describes an innovative method for efficiently growing high-quality vegetables on small plots of land. The method is based on standardized beds, fast cultivation systems with several harvests per season, a focus on high-yielding plants and efficient harvesting and sales strategies. SPIN farming shows its potential in cities in particular: urban farmers use small areas, such as gardens or backyards, and obtain nutrients from urban compost. There is no need for transportation as the produce is grown and sold directly on site. With minimal energy consumption, often using bicycles instead of vehicles, SPIN farming is a sustainable, flexible and lucrative method for urban agriculture.

027

Urban Mushroom Cultivation

Mushroom cultivation has developed into an efficient and sustainable method of food production in urban farming. Mushrooms require hardly any light and can be cultivated on urban waste such as coffee grounds or cardboard, which makes them particularly resource efficient. Old warehouses, abandoned buildings or even garages offer ideal conditions for supplying city dwellers' kitchens with fresh, locally produced mushrooms. They are not only a popular substitute for meat, as they are rich in nutrients and versatile, but are also increasingly being used to produce artificial leather. Mycelium-based materials offer a sustainable alternative for food, fashion, textile and construction industries.

028

Insect Farming

Edible insects are a sustainable solution for urban agriculture and the circular economy, efficiently converting organic waste into high-value biomass. With a significantly lower environmental footprint, they require minimal space, less water, and produce far fewer CO_2 emissions compared to traditional livestock. One kilogram of insects can be grown with just 1.1–1.2 kilograms of plants, whereas producing the same amount of beef requires around ten kilograms of feed. This efficiency makes insects ideal for urban farming, where space and resources are limited. By transforming low-grade organic waste into protein-rich food, insect farming not only reduces resource demands but also contributes to a more sustainable and resilient urban food system.

029

Nutrient Recycling

The recovery and reuse of nutrients such as phosphate and nitrogen from waste materials is crucial to closing nutrient cycles, reducing the use of synthetic fertilizers and minimizing environmental pollution. Phosphates, a scarce resource in Europe, and nitrogen pollute water bodies when they are released into the environment as fertilizers. To overcome these challenges, regional recycling strategies are needed to convert waste into usable products. Technologies need to be further developed so that nutrients are recovered efficiently while taking into account local conditions and agricultural needs. In addition, the recovered materials, such as recycled fertilizers, should meet legal requirements and be usable by farmers.

030

Internet of Things (IoT) in Agriculture

Farmers can use IoT devices to help monitor plants, animals, soil, weather and pests more closely. By using smart sensors, important factors for plant growth can be measured, while cameras and automated sensors recognize pests. Digital skills, financial support and data security are important for the successful implementation of smart farming. IoT enables farmers to better manage their operations and develop a better understanding of the living conditions of plants and animals. The technology improves the quality of products, reduces labor costs, increases farmers‘ income and modernizes agriculture.

031

Season Extension Techniques

Simple techniques can be used to extend the growing season. The aim is to extend the growing period of the plants by harvesting earlier in the spring and extending production into the fall and early winter. Measures such as the selection of early-maturing varieties or more complex methods such as hoop-houses, high and low tunnels, plant covers, cold frames and mulch offer great advantages, even for urban farmers in open fields. In addition, technical components such as heat lamps or other heating technologies can be integrated into the cultivation process or used in greenhouses. Growing in the »off-seasons« also has positive effects, as plants often suffer less from pests, diseases and drought in the cooler months.

032

3D Printing of Food

Originally developed as a NASA project, the food printer is now conquering experimental kitchens that play with printed flavors and textures. It is also being used in medical applications to help people with eating problems. This new technology can significantly improve the nutrition of elderly people in care homes, as pureed food resembles normal food and is consumed with more pleasure again. In addition, 3D printing could become a first-class method in the quest for greater sustainability, especially in meat production. Food from the 3D printer can be more sustainable than existing meat chains. In addition, decentralized food production allows fresh food to be produced locally, reducing the need for transportation and storage.

033

Agrivoltaics

The simultaneous use of agricultural land for food production and photovoltaic power generation makes agrivoltaics (agri-PV) an innovative solution to meet the increasing demand for food and renewable energy with limited land resources. This technology makes it possible to install PV systems on open spaces while the soil can still be used for cultivation. Targeted light management optimizes both PV yields and photosynthetic performance. For urban agriculture in particular, agri-PV opens up new, economically viable uses that harmoniously combine sustainable energy production and food cultivation.

034

Precision Farming

Precision agriculture, also known as satellite agriculture, site-specific crop management (SSCM) or computer-aided farming (CAF), uses the latest technologies and information – such as GPS, satellite imagery, drones, guidance systems, sensors, robots, diversified technologies, telematics and software – to optimize crops throughout their growth cycle: from tillage to seeding to harvest. The main goal of these technological applications in agriculture is to increase yields, shorten harvest times and minimize both costs and environmental impact. In the long term, it is conceivable that the farms of the future may be able to grow crops without any human intervention at all.

035

Utilizing Data for Land Use

The use of data for land use planning makes it possible to optimize crop yields and resource use. By using geographic information systems (GIS), planners can visualize and analyze spatial data to better incorporate existing infrastructure, environmental conditions and population density into planning processes. This facilitates the efficient allocation of resources and supports sustainable development. For example, settlement in flood zones can be prevented by identifying risks at an early stage and identifying more suited areas. In addition, modeling and simulation enable the combination of existing data with economic and social theories to predict future land use scenarios and enable knowledge-based decision making.

036

Biodigester

Through microbiological decomposition processes, a bio-digester generates heat that is used to heat water for heating or hot water requirements. Biomass such as organic waste, hedge cuttings or wood is used, which is composted in the system. The temperatures in the bio-digester reach 50–60 degrees and provide usable energy for up to one year. At the end of its useful life, valuable compost remains, which can be used as humus. This system combines the effective use of organic waste with environmentally friendly energy generation.

037

Precision Fermentation

Precision fermentation is an innovative process in which microorganisms are specifically programmed to produce complex organic molecules. Specific genes are inserted into the DNA scaffold of unicellular organisms to efficiently produce valuable compounds such as insulin or rennet. Microbial engineering improves the ability to produce desired substances such as proteins or fats and offers a sustainable alternative to animal products. This can significantly reduce the environmental impact of traditional agriculture. Applications of precision fermentation are diverse, ranging from improving the taste and texture of existing products to developing new ingredients for clean label foods, producing healthier products and converting food waste into edible products.

038

Cobot

The use of collaborative robots (cobots) increases flexibility in production and reduces employees' workload. Cobots work hand in hand with humans and take on physically demanding tasks such as lifting heavy parts or overhead work. These machines can have direct contact with employees and can also be implemented as mobile service robots in various environments. In addition to robotic arms, exoskeletons and e-bikes can also be counted as cobots, as they assist humans in everyday life and reduce the risk of exhaustion or illness. Although humans and machines need to adapt, the use of cobots offers numerous advantages through collaboration.

039

Smart Grid

Smart grids are essential for linking urban agriculture with sustainable energy systems. These smart grids manage the fluctuating supply of renewable energy from sources such as wind and solar and ensure a stable power supply. This is particularly beneficial for urban agriculture technologies such as hydroponics, vertical farms and automatic irrigation systems that rely on constant energy. By optimizing energy distribution and usage, smart grids enable urban agriculture to operate efficiently while reducing its environmental footprint. This integration supports sustainable food production in cities and is in line with the overall goals of resilience and resource optimization in urban environments.

040

Energy Harvesting

Energy harvesting technologies can significantly enhance urban agriculture by providing sustainable power solutions for farming systems. By capturing energy from environmental sources such as sunlight, wind, or vibrations from nearby urban activity, energy harvesting can power wireless sensor networks used in vertical farms, hydroponics, and automated irrigation systems. These sensors monitor critical parameters like soil moisture, temperature, and air quality without relying on traditional power grids or batteries. This low-maintenance, self-sustaining approach enables efficient resource management, reduces operational costs, and supports continuous operation, making energy harvesting a vital component of modern, sustainable urban agriculture systems.

041

Urban Digital Twin

Digital twins are a promising tool for cities to master their challenges. They help to create »what-if« scenarios and make decisions which are based on data. The digitalization of cities and rural areas is important to create modern, efficient and sustainable places. Urban Digital Twins make it possible to see and analyze municipal data in real time, leading to better decisions. With digital twins, different options can be played through and simply explained so that even people without specialist knowledge can understand them. As a result, resources can be better utilized, citizen participation improved and sustainable development promoted.

042

Smart Cities

A smart city is a city that makes use of the possibilities of digitalization to become more modern and livable. The focus is on topics such as ecology, social coexistence and citizen participation. Digitalization is increasingly changing urban administration and aims to maximize the quality of life, resource efficiency and sustainability. To achieve this, technologies are increasingly used to optimize various urban processes. Important aspects are the reduction of emissions through intelligent energy systems, the provision of user-oriented services based on real-time information, the integration of technologies in intelligent systems (IoT) for a sharing economy and the data-based optimization of city management.

043

AI

Artificial intelligence (AI) will also play an increasingly important role in urban agriculture as it automates processes and thereby increases efficiency. By using AI-supported sensors and data analysis, environmental conditions such as light, temperature, humidity and nutrient content can be monitored and optimized in real time. This enables precise resource management and minimizes the use of water, fertilizers and energy. AI-based systems can also predict growth cycles, detect pest infestations at an early stage and maximize crop yields. AI can improve productivity and sustainability particularly in vertical farms and hydroponic systems.

044

Bio hacked Food

Biotechnologically modified foods, i.e. bio hacked foods, are products that have been improved using biotechnological methods in order to increase their nutritional value, flavor or sustainability. One example of this is the enrichment of fruit and vegetables with higher levels of vitamins, minerals or other health-promoting compounds. By using genetic engineering techniques such as CRISPR, desirable traits such as pest resistance or improved growth rates can be introduced.

045

Human Excrement as Fertilizer

Some fields are fertilized with animal manure, but human excrement can also be used for this purpose, as it contains many important nutrients such as nitrogen, phosphorus and potassium, which plants need to grow. Urine in particular is easy to process into fertilizer. In addition, human excrement is available in large quantities, which makes its use as a fertilizer particularly interesting. Utilizing excrement helps to reduce organic waste going to landfills and makes waste management more environmentally friendly. Using methods such as anaerobic digestion or hot composting, excrement can be safely processed for agricultural use. However, the technology is heavily dependent on public acceptance.

ECONOMICAL

TRENDS

046

Blockchain in Agriculture

Blockchain technology offers numerous benefits to agriculture, particularly by improving transparency, efficiency and sustainability in complex agricultural supply chains. It enables seamless traceability of food »from field to fork«, which strengthens both food safety and consumer confidence. In addition, sustainability problems such as environmental degradation, social inequality or human rights violations can be identified and tackled more easily. Automated smart contracts, for example for insurance or green bonds, create additional efficiency by automatically triggering payments in the event of crop failures. Blockchain technology can help to make agriculture more innovative, sustainable and profitable opening up new perspectives for the industry.

047

Food Tech Incubators

The food industry is undergoing a profound transformation with the aim of making food more accessible, healthier, more sustainable and reducing food waste. Start-ups play a central role in this by driving innovation in the industry. Foodtech incubators, which promote early-stage start-ups in food technology, offer crucial support. They provide workspaces, seed capital, mentoring and training to turn promising ideas into successful business concepts. Such programs are essential for transforming innovative concepts into marketable products and strengthening the innovative power of an industry that is increasingly characterized by young companies.

048

E-Food

Online grocery shopping in the EU is growing steadily and is particularly popular with young people and city dwellers. Advantages such as convenience, time savings and a wide range of products are winning over more and more consumers. Young women in particular also appreciate the convenience and the ability to order at any time. The main obstacles remain concerns about freshness, quality and the lack of control of products before purchase. Start-ups and established providers are driving development with innovative models. The e-food market has great potential but requires improvements in logistics and quality assurance in order to gain the trust of customers. Local producers have an advantage here, yet their challenges lie in offering a wide range of products and transport organization.

049

Urban Agritourism

In recent years, urban agriculture has become increasingly important as cities seek innovative solutions for food security and sustainability. Linked to this, a new form of tourism is emerging in some cities, urban agritourism, which combines sustainable living with experiential tourism, offering visitors insights into food production and culinary experiences in collaboration with local restaurants and markets in urban settings. Agritourism strengthens the local economy by generating income through entrance fees, workshops and product sales. It creates jobs and fosters partnerships with local businesses.

050

Food Hubs

Food hubs are flexible models strengthen local and regional food systems. They connect producers, such as small farmers, with consumers or distribution partners and organize steps such as production, processing and distribution. Food hubs close gaps in the food infrastructure, promote sustainably produced products and provide space for education and community action. They can be used in urban, suburban and rural areas to make food supply more sustainable and equitable.

051

Urban Food Co-operatives

Urban food co-operatives are voluntary associations of people who provide access to healthy, seasonal and locally produced food. They are in direct contact with regional producers. Without middlemen, members save costs and at the same time support local farmers and ecologically sustainable farming methods. Fair trade is at the heart of this, with fair contracts based on solidarity and sustainability rather than pure profit maximization. In such cooperatives, part of the savings is often reinvested in community education and social projects to raise awareness of sustainable nutrition and regional value creation. The aim is to create a community that is characterized by shared values such as ecological responsibility and local solidarity.

052

Limited Space and Expensive Rents in Cities

Cities in Europe are struggling with a worsening housing crisis caused by a lack of affordable housing and rising living costs. Low and middle-income families are particularly affected, spending more than 40% of their income on housing costs, according to Eurofound. Urbanization has further increased the demand for good, affordable housing. A study by the WEF shows that 90% of the 200 cities surveyed worldwide are considered unaffordable, based on the widely accepted standard that average house prices are more than three times the median income. The problem also affects urban agriculture, which competes with affordable housing and the availability of land.

053

Farming-as-a-Service

Farming as a Service (FaaS) is a model that integrates technology into traditional agriculture and offers a range of services to make farming more efficient, sustainable and profitable. It is based on the »as a service« models widely used in the IT industry, such as Software as a Service (SaaS). At its core, FaaS uses technology to support agricultural activities, including data analysis, IoT devices and artificial intelligence to optimize processes. FaaS services can be divided into three segments: Farm Management Solutions, which offers precision agriculture with technologies such as sensors, irrigation systems, and Production Assistance, including equipment rental and labor. The third segment facilitates access to profitable markets for smallholder farmers by connecting them with suppliers and consumers through digital platforms.

054

Diverse Sustainability Strategies in Trade

Sustainable trade combines economic development with ecological responsibility and social justice. In order to achieve this goal, a variety of strategies must be pursued simultaneously. For example, strengthening local production reduces dependence on imports and promotes regional economic cycles. Environmentally friendly methods such as crop rotation and agroforestry help to protect natural resources and strengthen the resilience of agriculture. At the same time, trade must be organized fairly to support small producers, while transparent supply chains build trust. Educational programs help farmers to implement sustainable practices and raise awareness among the general public. In addition, clear regulations for companies and climate protection in trade policy are needed to achieve sustainable economic practices.

055

Polycrisis

The term polycrises describes a complex reality in which multiple global crises such as the pandemic, climate change and the Russian attack on Ukraine are interlinked. These crises lead to systemic risks that threaten not only security but also trust in political systems. The challenges are manifold: decisions that offer short-term solutions can have long-term negative effects, such as the energy crisis, which could simultaneously exacerbate the climate crisis. In this complex situation, innovative approaches and interdisciplinary cooperation are crucial. Political and business decision-makers need to think outside the box and understand the interactions of the crises in order to act effectively.

056

Crowd farming

Crowd farming is a concept that brings farmers and consumers closer together. Consumers can adopt fruit trees, vines or even farm animals and receive the yields delivered directly to their homes by the farmer. Apps such as crowd farming facilitate this process and provide a platform on which farmers can offer their products directly – without intermediaries. This model creates transparency and allows consumers to see exactly where and how their food was produced. Farmers benefit by being able to set their own prices and better plan their production. Crowd farming thus strengthens sustainable production and conscious consumption while avoiding long supply chains.

057

Prosumption

Consumers who are also producers are referred to as prosumers. The term is made up of »producer« and »consumer«. Examples of prosumption include feeding surplus electricity from photovoltaic systems into the public grid and simultaneously drawing energy when self-generation is insufficient. Activities such as knitting one´s own pullovers, taking part in urban gardening projects or using self-service checkouts at the supermarket are also included. If implemented correctly, prosumption can offer great potential for sustainability.

058

Reconfiguration of Large Properties

City centers are undergoing change. New concepts for vacant large properties can play an important role in counteracting the decline of city centers. Vacant large properties offer the opportunity to create innovative and multifunctional places that revitalize both the building and its surroundings. Vacancies could be filled with sustainable services that promote conscious consumption, such as repair workshops or small carpentry shops. An attractive mix of commercial and non-commercial offers could unite the interests of the city, the economy and the population and contribute to the diversity of urban society. Urban Agriculture could also play a role in such reconfigurations.

059

Regional Value Creation

Today, the production, processing and marketing of food is predominantly carried out on an industrial scale and is associated with long transportation routes. Although production costs can be minimized in this way, these production methods are not sustainable. In order to reduce the ecological footprint of food production, the aim is to strengthen regional value creation for agricultural products. Regional value chains enable short distances and offer numerous advantages: they secure jobs, preserve traditional craft techniques and minimize transport routes, which benefit the environment and reduce animal suffering caused by long journeys. In addition, regional value creation reduces dependence on international supply and processing chains and helps to strengthen resilience to global crises such as pandemics or wars.

060

Urban Metabolism

Urban Metabolism is an analytical and assessment framework that quantifies the inflows, outflows and accumulation of resources such as materials and energy in a city. It examines the flow of energy and resources, how they enter the city, how they are used and how they ultimately leave the city as waste. This model provides insights into resource use and opportunities to reduce negative environmental impacts by linking natural and socio-economic systems and enabling a holistic analysis of resource use, transformation and waste production. With the further development of technological possibilities, Urban Metabolism today provides comprehensive insights into the functioning of cities. This knowledge can support urban planners and decision-makers in making cities more resource-efficient, climate-friendly, resilient and equitable.

061

Sharing Economy

The sharing economy is a socio-economic system that promotes the shared use of resources and services. Instead of buying goods, people borrow them, which is more sustainable and cost-effective. This principle promotes a sustainable and resource-conserving economy. Examples of the sharing economy include borrowing or exchanging items and sharing licenses, vehicles or spaces. Sharing can also play an important role in urban agriculture, where tools and machinery can be shared collectively instead of being purchased individually.

062

Crowd funding

Crowd funding is a method of financing projects and ideas via internet platforms. Projects such as start-up ideas, creative or social projects are presented in order to find supporters and donors. The idea is that many small backers, the »crowd«, jointly finance a project. The platform operators select the projects and bring borrowers together with backers. Crowd funding is not primarily about profit, but about supporting creative ideas.

063

New Forms of Consumer Goods Provisioning

New ways of providing consumer goods focus on innovative, sustainable and efficient approaches such as subscription services, product rental, sharing platforms and refill systems. These models promote conscious consumption, reduce waste and resource consumption and offer flexible, cost-effective access to products. For example, food delivery services can contribute to more sustainable shopping practices, while deposit systems enable the reuse or recycling of packaging. Another example from Norway is the »climate voucher«, which shows the carbon footprint of purchases to provide transparency.

ENVIRONMENTAL

TRENDS

064

Urban Beekeeping

Urban beekeeping is growing alongside urban gardening, promoting biodiversity and raising awareness about the role of bees in pollination. Bees help maintain urban flower diversity and adapt to new habitats, while encouraging the planting of bee-friendly vegetation. As semi-wild animals, honeybee colonies in cities should be placed in quiet areas to minimize disturbances. However, care must be taken to maintain a balance with wild bee populations, as excessive honeybee densities can threaten native species. Responsible urban beekeeping ensures coexistence and supports healthy ecosystems.

065

Agroforestry

Urban agroforestry includes traditional farming practices, for example growing trees and other agricultural products such as crops, medicinal and aromatic herbs, fruit plants etc., and livestock (incl. marine products) within and around a residential district. Urban agroforestry can become a progressive form of urban agriculture, if the woody species are well integrated with other elements. Integrating city parks and public spaces into this system with productive trees and shrubs has several benefits, namely improving the microclimate in urban areas and adapting to climate change, ensuring the effective use of land and water, contributing to deforested lands rehabilitation and existing forests protection, among other benefits.

066

Permaculture Principles

Permaculture combines the terms »permanent« and »agriculture« and describes a method that enables a life in harmony with nature. The focus is on the functions of individual elements and closed cycles. The principles of permaculture include a responsible approach to the earth (earth care) and people (people care) as well as limited consumption and the sharing of surpluses. Synthetic pesticides and artificial fertilizers are excluded; instead, natural, biodegradable materials are used. Local resources are utilized, and resource-efficient, site-adapted production is promoted. The aim of permaculture is to create long-term sustainable, resilient and productive systems that protect the environment and improve people‘s quality of life.

067

Urban Seed Banks

Community seed banks are usually small, local and informal institutions with the aim of conserving seeds for local use. The farmers who run these banks cover a wide range of crops and store from small quantities of a few hundred grams to several hundred kilograms per variety. Seeds in the banks are kept inactive until they are exposed to favorable germination conditions with suitable light, moisture and temperature conditions. These seed banks can be seen as the ecological memory of their locations and are decisive for future composition. The challenge for urban seed banks is the availability of native seed sources.

068

Urban Livestock Farming

Urban livestock farming, i.e. the keeping of livestock such as chickens, bees or goats in urban areas, is becoming increasingly popular in Europe as more and more people prefer sustainably and locally produced food. Fresh products such as eggs or honey from one's own garden or community projects reduce dependence on long supply chains and promote the use of organic waste as fertilizer or feed. However, there are challenges: Strict regulations on hygiene, animal welfare and environmental impact often lead to bureaucratic hurdles. In addition, urban animal husbandry can trigger conflicts with residents, for example due to noise or odors. Nevertheless, the trend reflects the desire for environmentally friendly food and shorter transportation routes.

069

Climate-Resilient Crops

Climate-resilient plants are essential for adapting agriculture to climate change, as they withstand both biotic stresses like extreme weather and abiotic factors such as pollution and high greenhouse gas emissions. These plants are particularly advantageous in urban agriculture, where soils are often poor or polluted, due to their ability to thrive in marginal conditions. Examples of climate-resilient crops suitable for European urban agriculture include pearl millet, rye, sorghum, amaranth, quinoa, and chickpeas. While these crops are already widely grown in other regions globally, they offer great potential for enhancing food security and fostering sustainable, adaptable agriculture in European urban and rural settings alike.

070

Microgreens Cultivation

Microgreens are young, edible seedlings that are easy to grow and can be harvested after just a few days. They are inexpensive and require low maintenance and can easily be cultivated indoors or outdoors in trays or small containers with soil or other growing media. Due to their small space requirements, they are ideal for growing in urban areas or even at home on the windowsill.

071

Carbon Farming

The management of carbon pools and greenhouse gas streams on farms with the aim of mitigating climate change is referred to as carbon farming. Urban agriculture, based on the principles of agroforestry and mixed cropping, is one of the strategies for more sustainable food production, alongside other factors such as reforestation or improving fertilizer use efficiency. Through the careful selection of plants or animal species, the cultivation approach (high or low technology) and the application of agronomic practices, urban agriculture has the potential to reduce its carbon footprint and capture carbon in the soil.

072

Urban Soil Regeneration

Urban soils serve various functions, including nutrient cycling, water storage, and promoting biodiversity. They contain essential nutrients like nitrogen, phosphorus, and potassium, and help regulate ecosystems by influencing water and carbon cycles while promoting rainwater infiltration. These functions mitigate flood risks and urban heat islands. However, urban expansion and land use changes degrade soil quality, harm organisms, and introduce pollutants like heavy metals. Artificial sealing reduces rainwater infiltration and increases flooding risks, while a lack of green spaces worsens air quality. Despite their importance, urban soils face significant degradation and contamination. Effective management is crucial for urban development and human-environment health, with approximately 12 million hectares of natural soils lost to urbanization each year.

073

Biochar Production

Biochar, created through the incomplete combustion of plant materials like pruning waste, is a valuable resource for both carbon sequestration and soil health. Its porous structure enables it to store water and nutrients, bind pollutants, reduce heavy metal availability, and support root growth. Additionally, biochar enhances humus formation and loosens compacted soil, improving overall soil quality and productivity. For biochar to reach its full potential as a sustainable solution, energy-efficient production is essential. This ensures minimal energy use and emissions, reinforcing biochar's role in reducing CO_2 levels while contributing to resilient and healthy agricultural systems.

074

Sponge City

A sponge city is an urban planning concept that aims to improve a city's ability to naturally absorb, store and reuse rainwater, similar to the behavior of a sponge. This promotes the infiltration of rainwater, which is stored locally instead of being channeled and drained away. Instead, retention areas such as green spaces and wetlands absorb the water. The approach not only helps to tackle challenges such as urban flooding, water scarcity and climate change, but also improves the urban climate as the evaporation of water cools the air. Plants are also integrated into the cityscape and their canopy is used to achieve high evaporation in a small area. In addition, ponds, swales, technical wetlands and underground rainwater reservoirs increase the city's storage capacity, making it better prepared for heavy rainfall events.

075

Car-Free City

A car-free policy restricts or bans car traffic in certain urban areas, focusing on pedestrian zones, public transport, and cycling as key elements of sustainable mobility. These measures improve air quality by reducing emissions and tire wear, which lowers the release of microplastics into the environment. They also reduce noise pollution, create safer streets, and free up space for green areas within the city. By prioritizing public transport and active mobility, car-free cities enhance residents' quality of life, promote physical activity, and minimize traffic congestion while fostering a healthier and more sustainable urban environment.

076

Zero-Waste Farming

The zero-waste agriculture model is based on natural biogeochemical processes and simulates them on a small scale to minimize unsustainable inputs and ensure high sustainability. It combines different sustainable technologies into a closed cycle in which the output of one process serves as the input for another. This model promotes the restoration of natural cycles, reduces the consumption of non-renewable resources and improves the living environment. In addition, it provides healthier food options and produces more nutritious food by focusing on soil health and reducing chemicals.

077

Urban Rewilding

The restoration of natural habitats in urban areas to promote the harmonious coexistence of people and nature is known as urban rewilding. The concept aims to integrate networks of connected green and blue spaces as important elements in urban planning. This includes restoring natural areas, reducing pollution and promoting biodiversity to connect city dwellers more closely with nature and create a sense of responsibility for the environment, offering numerous benefits including the creation of biodiverse ecosystems, mitigating climate impacts and improving human health.

078

Urban Heat Island Mitigation

Cities form urban heat islands due to their construction, density and terrain. The concept of urban heat islands describes the temperature difference between urban centers and their surroundings. Especially at night, the city remains warmer due to the heat stored in the building materials. To counteract the effects of these heat islands, various measures can be taken, such as reducing solar absorption through light-colored surfaces, increasing tree canopy and vegetative cover, and creating air corridors for cooling. In addition, other passive cooling strategies can be implemented in architecture and urban planning. These approaches taken together can help to create cooler microclimates in parks, public spaces and buildings and foster an improved urban climate.

079

Extreme Weather Events

Unusual events which rarely occur such as heat waves, cold spells, heavy rainfall, drought, tornadoes and tropical cyclones are referred to as extreme weather events. An increase in these phenomena has been observed in recent years, with extreme temperatures of over 40 °C and even 50 °C on the rise worldwide. According to the WMO, limiting global warming to 1.5 °C could significantly reduce these events and the number of people affected by extreme weather. According to the WHO, every degree of global warming is expected to lead to a 7% increase in extreme daily rainfall. Man-made climate change has led to more frequent and intense extreme events that have negative impacts on nature and people. These impacts are exacerbated by increasing intensity, duration and spatial extent.

080

Microplastic

Microplastics are tiny plastic particles of less than five millimeters that are produced directly, such as in cosmetics, or indirectly through the decomposition of larger plastic objects. They enter the environment via wastewater, industrial waste and tire abrasion and are detected in soil, water and air. These particles damage ecosystems and can enter the food chain, posing risks to animals and humans. Measures such as stricter regulations, more sustainable materials and awareness-raising are needed to reduce negative impacts on the environment.

081

15-Minute City

The vision of the 15-minute city is that residents can get to work, shops, doctors or school in just 15 minutes without a car. This concept requires cities to be redesigned so that all everyday journeys can be made in less than 15 minutes using sustainable modes of transport such as walking, cycling or public transport. To achieve this, urban and transport planning must be combined to make daily destinations within a radius of 3 to 4 kilometers accessible by bike or 1 to 1.5 kilometers on foot. A fundamental change in urban planning is required in order to abandon the separation of residential and commercial areas in favor of mixed urban areas.

082

Preserving Urban Biodiversity and Ecosystems

Promoting biodiversity in urban areas is essential as cities support a wide range of species, including endangered ones. At the same time, conservation efforts face social and environmental challenges that can compromise their effectiveness. Urban environmental managers play a key role in protecting urban biodiversity but are often faced with limited resources and a lack of guidance. Successful implementation requires interdisciplinary approaches that combine science and practice and strengthen the co-operation between stakeholders. Through targeted measures, cities can not only create habitats for numerous species, but also contribute to resilience to environmental change and improve the quality of life of their inhabitants.

POLITICAL

TRENDS

083

Green Infrastructure

Green infrastructure is a strategically planned network of natural and semi-natural areas that provides a variety of ecosystem services and promotes biodiversity. These ecosystem services offer numerous benefits to people, which can be divided into three categories: Provision of food, clean air and water; regulation of water, climate and pollination; and cultural aspects such as recreational opportunities. The benefits of green infrastructure include improving environmental quality, citizen health, job creation and supporting a green economy. Examples of such infrastructure include mixed forests that absorb water, provide soil protection and create habitats, urban green spaces that support biodiversity conservation and health promotion, and the restoration of wetlands as cost-effective flood protection.

084

Urban Agriculture Policies

The EU promotes short food supply chains to strengthen local economies and improve the link between producers and consumers. Urban agriculture plays an important role in this but needs more political recognition to incentivize and clearly regulate it. Currently, support is inconsistent: allotment gardens are subsidized, while community gardens and controlled environment agriculture (CEA) are often disadvantaged. A combination of bottom-up local initiatives and a top-down EU approach could help to develop a harmonized policy that enables local decision-makers to take action according to local needs.

085

Right to Repair

According to the Commission, 261 million tons of CO_2 equivalent are generated in the EU every year through the premature disposal of consumer goods that are still usable, resulting in the unnecessary consumption of 30 million tons of resources and 35 million tons of waste. Consumers who make new purchases instead of repairs suffer annual losses of around 12 billion euros. The right to repair is intended to promote a culture of repair by providing more repair offers, available spare parts and understandable, clearly worded instructions, which often make simple repairs possible in the first place. Repairing conserves resources, reduces waste and strengthens local value creation.

086

Urban Agriculture Certification Programs

The terms »organic« and »eco« are protected terms that may only be used for food products with the appropriate certification. Farmers who wish to market organic products require organic certification, which stipulates that no synthetic chemical pesticides are used, that the animals are kept in an animal-friendly manner, that genetic engineering is prohibited and that the use of additives is kept to a minimum. Although urban farms produce organically valuable food, the established organic standards can only be applied to urban farms to a limited extent. New certification programs are therefore needed to certify the organic quality of products and increase public confidence in sustainably produced food.

087

Stricter Waste Regulations

According to the EU, around 2.1 billion tons of waste are produced in Europe every year – an alarming amount that underlines the urgent need to avoid waste. In order to establish a circular economy in Europe by 2050, the amount of waste must be drastically reduced. Any form of waste treatment, recycling or disposal inevitably leads to the consumption or loss of raw materials and energy. To effectively avoid waste, legal requirements, packaging laws and a ban on single-use plastics are necessary. These should be supplemented by economic incentives such as environmental taxes, deposit systems and educational campaigns. Further savings can be achieved by promoting reuse and sharing models.

088

One Health Approach

The One Health approach recognizes the interconnectedness of human, animal and environmental health and addresses the increasing risks posed by zoonoses – infectious diseases that are transmitted between animals and humans. As more than two-thirds of human infectious diseases are transmitted by animals, One Health promotes preventive measures such as protective measures to reduce the transmission of zoonoses, surveillance of wildlife and trade chains to prevent epidemics, and the coordination of health, conservation and climate policies. By promoting interdisciplinary collaboration between medicine, veterinary and environmental sciences, the approach aims to mitigate the socio-economic costs of pandemics and improve the resilience of global health.

089

Label Accuracy and Transparency

Consumers are increasingly paying attention to health aspects, sustainability and ethical standards such as fair working conditions and animal welfare. They prefer brands that implement responsible sourcing and environmentally friendly production methods. Label Accuracy and Transparency promote consumer trust and contribute to sustainable action along the entire value chain. The focus here is on transparency and traceability. Transparency includes the disclosure of production processes, ingredients and social and environmental impacts. Traceability enables traceability along the entire supply chain to ensure food safety and quality.

090

Increased Requirement for Transparency of Supply Chain

Many consumers are increasingly demanding transparency and control over often complex and opaque supply chains as the origin of products plays a greater role in their purchasing decisions. Legislative changes and new regulations have been introduced to promote transparent supply chains. Transparency means that companies communicate clearly about their supply chains, including product quality and safety standards, raw material sourcing, labor practices, and environmental protection and sustainability. The Corporate Sustainability Due Diligence Directive introduced by the European Union makes tier-n transparency the new standard, taking into account the entire supply chain from the origin of raw materials to the consumer.

091

Urban-Rural-Divide

The divide between urban and rural areas includes differences in education, healthcare, infrastructure, and economic prospects. This long-standing issue impacts societal cohesion, economic development, and polarization. Cities benefit from innovation and jobs, while rural regions face out-migration and lower quality of life. Urban society's understanding of modern agriculture is increasingly questioned. Key drivers include globalization, urbanization, technological advancements, and uneven policy investments. Topics like alienation from agriculture, animal welfare, and insect mortality are discussed in agricultural media. Urbanization and detachment from agriculture hinder acceptance of modern practices and widen the urban-rural gap. Bridging this divide requires investment in infrastructure, digital access, and education, alongside fostering urban-rural collaboration and supporting rural economies through sustainable agriculture, ecotourism, and entrepreneurship.

092

Water Allocation Priorities

Water is a vital resource for humans and nature, but rising population figures, urbanization and climate change are putting increasing pressure on global water resources. Without sustainable management, there is a risk of water scarcity, pollution and the loss of important ecosystems. Sustainable water use ensures clean drinking water and long-term availability for agriculture, industry and energy production, protects biodiversity and prevents social conflicts caused by unequal distribution. Effective allocation of water resources is crucial to managing risks of scarcity and balancing competing demands. To achieve this, the water use strategy must be robust and adaptable in order to cope with both typical and extreme conditions.

093

Public Land Use for Urban Farming

The temporary use of urban areas offers great potential for urban farming and sustainable urban development. Temporarily available unused land can be transformed into green spaces for people and habitats for flora and fauna, while at the same time enabling local food production. Through simplified bureaucracy, infrastructure and funding, the public sector could provide greater support for such projects. Interim uses also promote innovation and citizen participation by creating space for experimentation and active participation in shaping urban spaces.

094

Collapsology

The confrontation with the possible collapse of our industrial civilization forms the core of Collapsology. It is based on the assumption that human activity has a long-term negative impact on the environment, particularly through climate change and the loss of biodiversity. It goes beyond purely ecological issues and also considers economic, geopolitical, democratic and social crises as possible drivers of collapse. As a transdisciplinary approach, Collapsology integrates perspectives from ecology, economics, anthropology, sociology, psychology, and other disciplines to analyze the complex interactions between humans, society, and the environment. Its goal is to emphasize the urgency of the current crisis and to identify sustainable strategies to mitigate or prevent the impacts of a potential collapse.

095

Participatory Urban Governance / Decision Making

Participatory urban governance refers to the active involvement of citizens and interest groups in decision-making processes in order to promote cooperation and inclusion. This form of governance can take place at different levels and involves a wide range of actors. One example is inclusive urban planning, where citizens are involved in the planning process. These formats are designed to promote dialog and strengthen social cohesion. By involving residents, local knowledge can be used to align political decisions with the needs of citizens. Participatory governance can help shape cities into more sustainable and equitable urban environments.

096

Urban Diplomacy

Cities have become important actors in international cooperation, directly affected by challenges such as climate change and social tensions and often finding innovative solutions. Urban Diplomacy promotes exchange between cities on best practice models, joint project planning and negotiation on international platforms. The aim is to strengthen the role of cities as drivers of innovation, sustainability and resilience, as cities play a central role in the implementation of the United Nations Sustainable Development Goals and the Paris Agreement. In a complex world, urban diplomacy can be an effective tool to complement national policies and tackle global challenges locally.

097

Inclusive Urban Design / Development

Inclusive urban development relies on an integrated approach to overcome the challenges faced by disadvantaged and low-income groups. Targeted investments improve their access to services and infrastructure. This includes breaking down barriers and promoting participatory decision-making so that diverse perspectives – especially those of disadvantaged communities – are heard and included in equitable urban solutions.

098

Food Security

Global food security is a key goal of the 2030 Agenda for Sustainable Development but remains a huge challenge. According to the UN report, 713 to 757 million people suffered from hunger in 2023, a figure that has risen by 120 million since 2019 – exacerbated by the COVID-19 pandemic, poverty, inequality, conflict and the consequences of climate change. A sustainable transformation of agriculture and food systems is essential to ensure equitable distribution, increased production and access to nutritious food. This includes locally adapted food, income protection, sustainable agriculture and the consideration of gender-specific aspects.

099

Urban Foraging

In urban foraging, people collect biological resources such as wild foods, herbs and mushrooms that are not grown commercially in urban areas. This activity promotes interaction between people and nature and creates an awareness of how fruit, nuts, berries and flowers grow. Urban foraging does not only provide cultural and recreational value, but also contributes to the sustainable use and management of urban green spaces. Urban foraging can be supported through biodiversity- and wilderness-friendly management of green spaces. This requires the establishment of access to foraging locations, clear foraging regulations and codes of conduct, as well as comprehensive information about contamination.

100

Food Safety and Diversity

In the EU, more than 59 million tons of food waste (132 kg per inhabitant) with a market value of 132 billion euros is generated every year (Eurostat 2024). At the same time, over 42 million people cannot afford a high-quality meal every two days (Eurostat, 2023). Food security requires a sustainable transformation of agricultural and food systems that takes into account both increased production and equitable distribution and quality of nutrition. The main causes of hunger are poverty, conflicts and the consequences of the climate crisis and the COVID-19 pandemic. At the same time, malnutrition is on the rise and the number of overweight adults has almost doubled to 675.8 million. Improving global nutrition therefore requires a holistic approach that focuses on food diversity.

101

Cross-generational Knowledge Transfer

The intergenerational transfer of knowledge plays a central role in shaping a sustainable and resilient food system. Traditional knowledge about growing, preparing and storing food that has been passed down through generations offers valuable approaches for dealing with current challenges such as climate change and resource scarcity. At the same time, the exchange with younger generations makes it possible to incorporate innovative technologies and modern approaches to promote efficiency and sustainability along the entire food chain. Education and community initiatives that bring generations together not only create a deeper awareness of the value of food, but also strengthen local food systems and promote a responsible and sustainable consumer culture.

102

CO_2-Pricing

Carbon pricing is a key approach to reducing greenhouse gas emissions by creating a financial incentive to avoid emissions and switch to more climate-friendly technologies. Companies pay for every ton of CO_2 emitted, making climate-damaging production methods more expensive and promoting climate-friendly alternatives. The European Union's Carbon Border Adjustment Mechanism (CBAM) complements these measures by ensuring that imported products are subject to the same climate protection requirements as goods produced in the EU. This prevents carbon leakage, i.e. the relocation of emissions to countries with lower environmental standards, and at the same time protects the competitiveness of European industry.

103

Expropriation for Sustainable Urban Development

Land is a scarce resource that is essential for sustainable urban development. Cities need land for social housing, social infrastructure and measures to adapt to climate change. To ensure that they remain capable of acting in the medium and long term and are able to meet the challenges of climate change, the use of land must be strongly aligned with the requirements of the public interest. Expropriation can be used here as a last resort to remove derelict land and unused buildings and utilize them in the public interest. This requires political will and legal frameworks.

104

Global Spread of Pests and Diseases

The spread of pests and diseases is increasing due to globalization, trade and climate change. This has tangible economic, environmental and social consequences and poses a challenge to global food security. Plant diseases and pests do not stop at borders, which can lead to considerable damage to crops and grazing land. They spread via trade routes, environmental factors such as weather and wind, and insects or other vectors. These developments require coordinated cross-border action and international co-operation to contain their impact and protect food security.

DEEP DIVE

15 TRENDS

Social

- PEER-INFLUENCED CONSUMPTION DECISIONS
- LOCAL FOOD CIRCLES
- THIRD PLACES

Technical

- COBOT
- SMART CITIES
- HUMAN EXCREMENT AS FERTILISER

Economical

- LIMITED SPACE AND EXPENSIVE RENTS IN CITIES
- FARMING-AS-A-SERVICE
- NEW FORMS OF CONSUMER GOODS PROVISIONING

Environmental

- 15-MINUTE CITY
- EXTREME WEATHER EVENTS
- PRESERVING URBAN BIODIVERSITY AND ECOSYSTEMS

Political

- LABEL ACCURACY AND TRANSPARENCY
- WATER ALLOCATION PRIORITIES
- PARTICIPATORY URBAN GOVERNANCE/DECISION MAKING

PEER-INFLUENCED CONSUMPTION DECISIONS

In the digital age, social media exponentially shapes consumer behavior, particularly among younger generations. Platforms such as Instagram, TikTok, and YouTube enable consumers to share their experiences and opinions about products and services instantly, creating powerful networks of peer influence. Surveys reveal that approximately 70% of Gen Z consumers rely heavily on social media when making purchasing decisions, highlighting the substantial influence peer-driven recommendations exert on market trends and individual behavior.[1]

Influencers, trusted by millions due to their perceived authenticity, significantly shape consumer attitudes toward sustainability and locally sourced products. Nearly half (49%) of consumers express trust in influencer recommendations, notably higher than the mere 33% who trust traditional brand advertising.[2] Urban farming initiatives and sustainable food systems, therefore, find substantial opportunities on these platforms to engage broader audiences and foster the acceptance of eco-friendly alternatives.

On TikTok alone, hashtags such as #UrbanFarming and #SustainableLiving have attracted billions of views, demonstrating widespread interest in sustainable food practices.[3] Research further indicates that 66% of global consumers are willing to pay premium prices for sustainably produced goods, a tendency amplified by social media through compelling storytelling, practical demonstrations, and authentic testimonials shared by peers.[4]

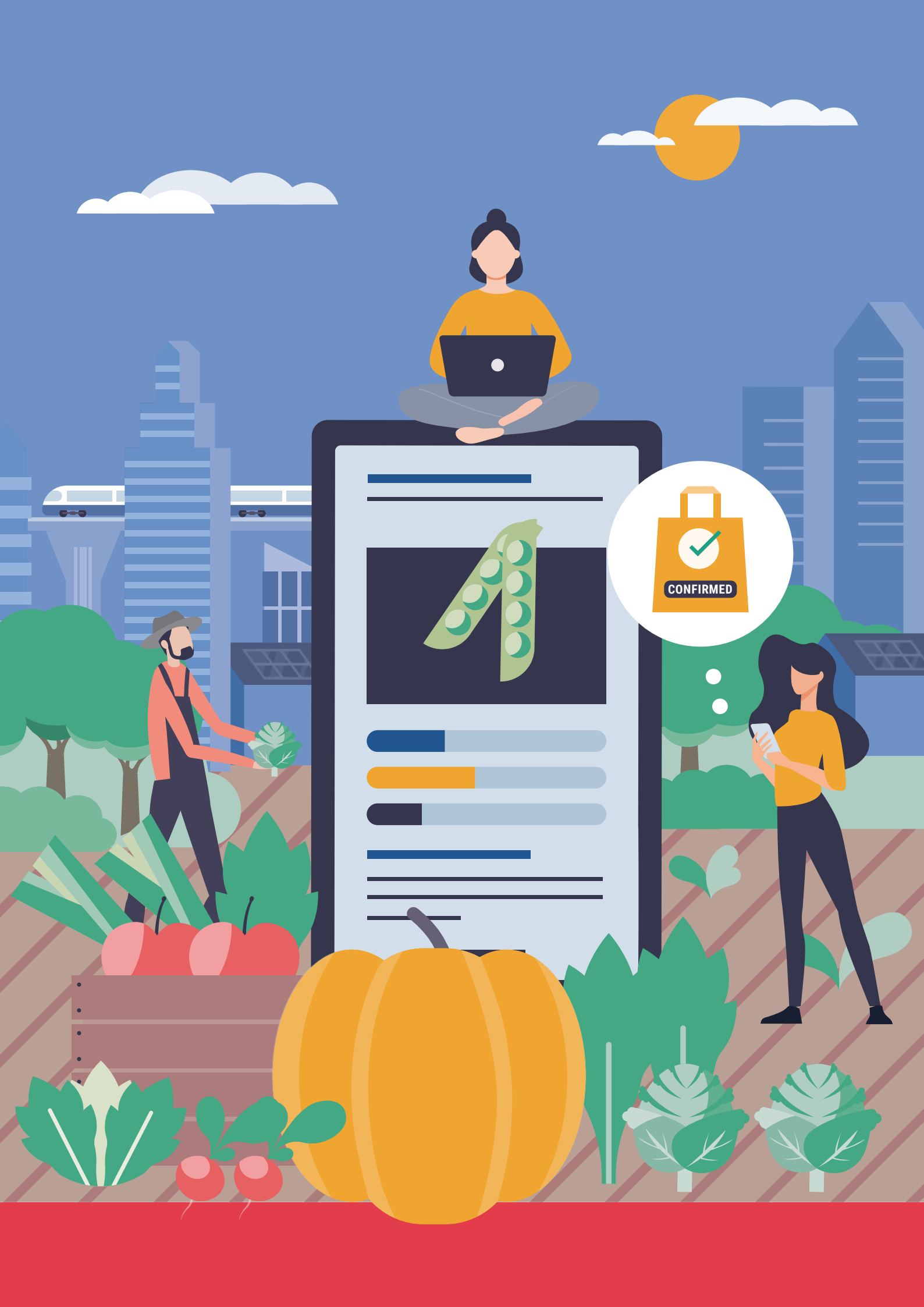
Moreover, peer recommendations foster more than individual behavioral shifts – they actively cultivate community engagement around sustainability. Recent studies suggest that 56% of individuals engaging with online content focused on local food production report heightened feelings of community belonging and collective responsibility.[5] Furthermore, digital peer networks drive educational outreach, spreading awareness on complex sustainability issues through easily accessible, visually appealing formats, thus empowering individuals to make informed decisions.

Looking forward, urban farming initiatives that strategically leverage peer-influenced consumption behaviors on social media stand to benefit from increased consumer loyalty, broader public acceptance, and stronger, community-driven advocacy for sustainable urban lifestyles.

Impact and Opportunities on Urban Agriculture

The trend of peer-influenced consumption decisions presents significant opportunities for urban agriculture. Social media can amplify awareness and acceptance of locally grown food, leveraging influencers and community advocates to shape consumer preferences. Urban farms can engage audiences through storytelling, interactive content, and transparent production insights, fostering trust and demand. Subscription models, farm-to-table partnerships, and hands-on experiences, like workshops or tours, offer new ways to engage consumers. Viral challenges and educational campaigns can further raise awareness and encourage sustainable practices. This movement helps urban farmers build strong community ties, increase their reach, and establish themselves as leaders in sustainable food production.

1 Deloitte Digital Media Survey, 2023.
2 Edelman Trust Barometer, 2023.
3 TikTok platform statistics, 2024.
4 Nielsen Sustainability Report, 2022.
5 Pew Research Study on Local Food Production, 2024.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LOCAL FOOD CIRCLES

Local Food Circles represent an innovative and holistic model for transforming agriculture and food systems by integrating various stakeholders – farmers, consumers, local businesses, policymakers, and communities — into cohesive, mutually supportive networks. This model emphasizes not only the sustainable production and consumption of safe, locally sourced food but also fosters socio-economic resilience, environmental stewardship, and regional identity.

Crucially, Food Circles enhance symbiotic relationships between urban centers and rural regions. Urban populations provide steady demand for local agricultural products, while rural areas benefit from strengthened economic and social cohesion. This reciprocal connection helps mitigate global challenges such as food security, urban sprawl, and climate change. Research demonstrates that localized supply chains substantially reduce greenhouse gas emissions, with short-chain food systems generating up to 50% fewer emissions compared to conventional agricultural models.[1]

Consumer preferences are increasingly aligned with this sustainability-driven approach. According to a Nielsen survey, 73% of global consumers prefer locally produced goods, aiming to support their communities and reduce their environmental footprint.[2] Economically, the local food market has demonstrated considerable growth potential, exemplified by the U.S. local food sector achieving $20 billion in sales in 2022, with anticipated annual growth of around 6%.[3] This trend is echoed globally, as direct-to-consumer sales and farmers' markets expand, invigorating local economies.

In Germany, more than half of small-scale farmers now actively participate in regional food networks, fostering greater agricultural resilience and stability within local ecosystems.[4] Furthermore, Food Circles encourage educational initiatives, raise awareness of sustainable consumption practices, and provide critical infrastructure for small producers. Emerging technological solutions, such as blockchain-based traceability and decentralized logistics enhance transparency, consumer trust, and efficiency within these circles.

Ultimately, Local Food Circles exemplify a strategic approach to promoting ecological sustainability, economic prosperity, and social well-being, reconnecting individuals to the source of their food and reinforcing a collective commitment to regional and environmental responsibility.

Impact and Opportunities on Urban Agriculture

The »Local Food Circles« trend provides a strong framework for urban agriculture to enhance local food systems and community ties. By connecting urban consumers with regional producers, urban farms can improve food security, lower carbon footprints, and promote sustainable consumption. Integrating into regional supply chains, collaborating with peri-urban and rural farmers, and expanding farm-to-table initiatives further strengthen this approach. Digital platforms facilitate direct sales, CSA models, and educational outreach, fostering city self-sufficiency, biodiversity, and circular economies while building resilient networks that benefit both urban and rural communities.

1 World Resources Institute, »Reducing Greenhouse Gas Emissions in Food Systems«, 2023.

2 Nielsen, »Local and Sustainable Consumer Trends«, 2022.

3 USDA, »Local Food Market Overview«, 2022.

4 FAO, »Strengthening Regional Food Systems«, 2023.

THIRD PLACES

The concept of Third Places, originating from urban sociologist Ray Oldenburg, identifies spaces distinct from home (first place) and work (second place), serving as crucial venues for community engagement and social interaction. Typically comprising accessible, neutral, and inclusive environments such as cafés, parks, libraries, and community gardens, these spaces encourage spontaneous encounters, informal interactions, and a sense of collective belonging without obliging active participation.

Third Places are characterized by their relaxed atmosphere, ease of access, and ability to foster social bonds among diverse groups of regular visitors. As global urbanization accelerates, with projections indicating that nearly 70% of the world's population will reside in urban centers by 2050, the demand for community-centered spaces is expected to grow significantly.[1] Studies highlight that frequent visitors to Third Places report improved mental health, increased happiness, and up to a 20% higher sense of social connectedness, underscoring their crucial role in enhancing urban residents' well-being.[2]

Economically, Third Places contribute considerably to local development and urban vitality. Cafés, community spaces, and coworking environments generate substantial revenue and employment opportunities, with the global coworking sector alone anticipated to reach a market size of $26 billion by 2030, driven by the increasing preference for flexible and socially engaging work environments.[3] Moreover, public libraries continue to play a pivotal societal role; for example, 55% of U.S. adults visited libraries in 2022, demonstrating their enduring value in fostering community connectivity and lifelong learning.[4]

Crucially, Third Places also advance social inclusion, offering safe, neutral spaces for marginalized or isolated community members to participate freely. Initiatives such as Little Free Libraries, urban community gardens, and neighborhood parks have shown significant success in reducing isolation and facilitating diverse interactions.[5] Integrating urban farming elements within these Third Places further amplifies their role in environmental education, food sovereignty, and sustainability, positioning them as essential components of resilient, inclusive, and socially vibrant urban ecosystems.

Impact and Opportunities on Urban Agriculture

The »Third Places« trend presents an unique opportunity for urban agriculture to create vibrant, community-centered spaces that blend food production with social interaction. Urban farms, community gardens, and rooftop green spaces can serve as third places, offering residents a welcoming environment for relaxation, learning, and engagement. These spaces foster social inclusion, environmental awareness, and mental well-being while strengthening local food networks. Urban farm cafés, educational workshops, and farm-to-table events create connections to sustainable agriculture. Integration of urban farming into shared community spaces strengthens green infrastructure, supports local food resilience, and fosters more engaged, interconnected communities.

1 United Nations, »World Urbanization Prospects«, 2023.

2 American Journal of Community Psychology, »Third Places and Well-Being«, 2022.

3 Allied Market Research, »Global Coworking Space Market Report«, 2023.

4 Pew Research Center, »Public Library Usage in the U.S.«, 2023.

5 Free Little Libraries Organization, »Community Impact Report«, 2022.

COBOT

Collaborative robots, known as cobots, are progressively revolutionizing multiple sectors, including the growing field of urban farming. Unlike traditional robots designed for isolated, repetitive tasks, cobots are specifically engineered to work alongside humans, enhancing productivity while ensuring safety and comfort. In urban farming, cobots provide critical support by handling physically demanding and repetitive tasks such as planting, harvesting, watering, and precise crop monitoring, enabling farmers to focus more on strategic planning, crop health assessment, and innovation.

The global market for cobots has seen substantial growth, valued at approximately $1.9 billion in 2022 and expected to expand dramatically with an estimated compound annual growth rate (CAGR) of 32%, reaching $9.2 billion by 2030.[1] Their cost-effectiveness and adaptability contribute significantly to this rapid adoption, often allowing urban farming businesses to realize a return on investment (ROI) within less than one year.[2]

Beyond traditional robotic arms, cobots include innovative assistive devices such as exoskeletons and mobility-enhancing tools like electric cargo bikes (e-bikes), which support urban farmers in daily tasks while minimizing the risk of physical exhaustion or injury. Industrial exoskeletons, for example, have proven effective in reducing muscular strain by up to 60%, thereby improving worker safety and efficiency, critical in physically intensive urban agricultural environments.[3]

Moreover, integrating cobots into urban agriculture facilitates the implementation of precision farming techniques, significantly reducing resource waste and optimizing yield. Studies indicate that human-robot collaborative teams can achieve productivity improvements of up to 85% compared to purely human-operated farming systems.[4] Additionally, cobots equipped with advanced sensor technology can provide real-time data analytics on soil health, moisture levels, and plant conditions, supporting data-driven decision-making and sustainable agricultural practices.

As urban farming expands to meet increasing demands for localized, sustainable food production, cobots represent a transformative solution, merging human ingenuity with robotic precision, and paving the way for efficient, sustainable, and innovative urban agricultural practices.

Impact and Opportunities on Urban Agriculture

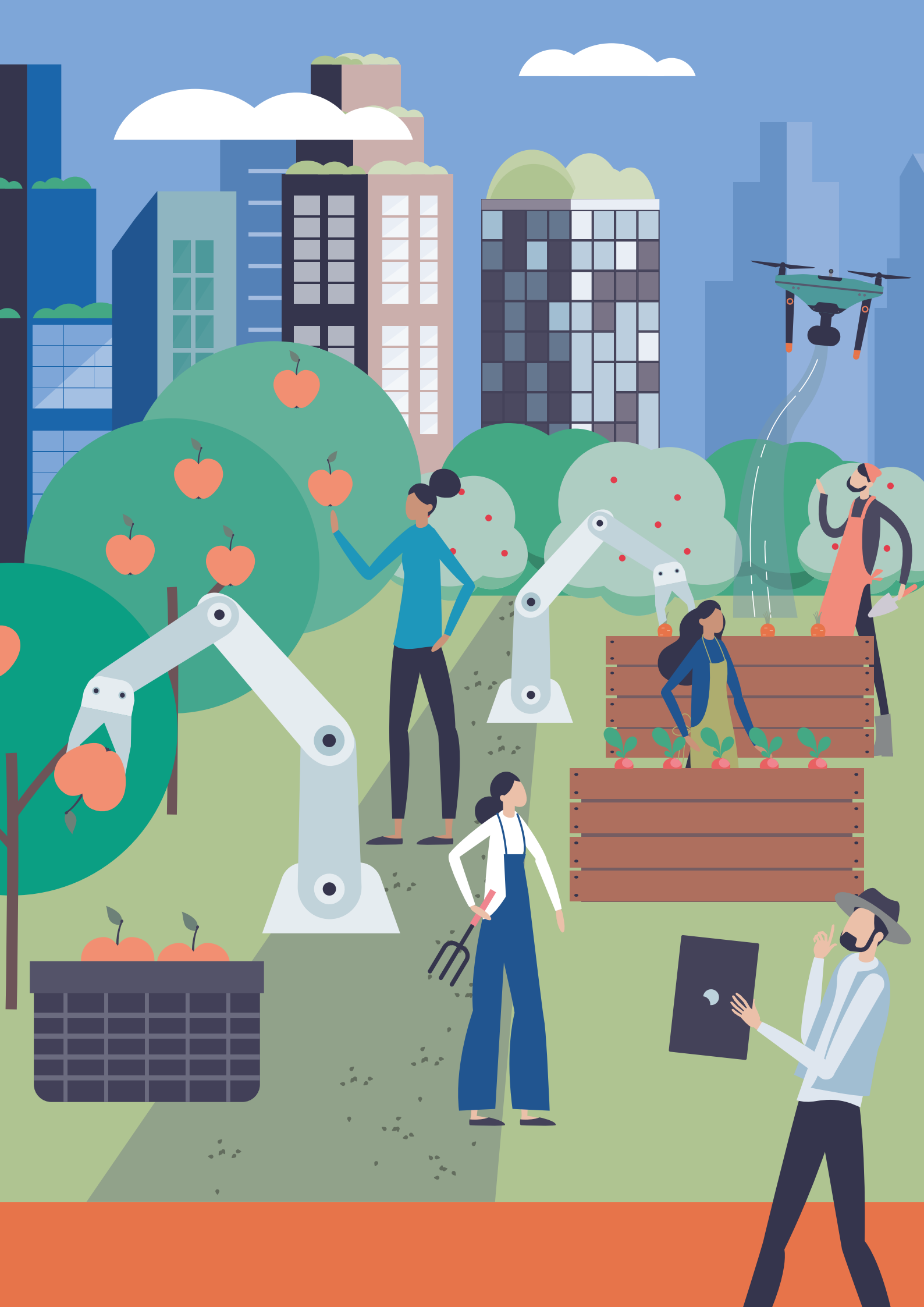
The rise of cobots presents significant opportunities for urban agriculture by enhancing efficiency, reducing labor-intensive tasks, and optimizing space usage. Collaborative robots can assist in planting, harvesting, and monitoring crops in vertical farms, rooftop gardens, and hydroponic systems. Their precision reduces waste, while automation increases productivity and sustainability. Mobile service robots could support logistics in urban food distribution, while exoskeletons may aid urban farmers in physically demanding tasks. Cobots enable scalable, high-yield food production in dense cities, making urban farming more viable and competitive. This trend fosters a future where technology and agriculture merge for resilient, smart food systems.

1 Fortune Business Insights, »Collaborative Robots Market Size Report«, 2023.

2 Universal Robots, »Cobot ROI Analysis«, 2022.

3 International Journal of Industrial Ergonomics, »Effectiveness of Exoskeletons in Reducing Muscle Strain«, 2023.

4 MIT Sloan Management Review, »The Impact of Human-Robot Collaboration on Productivity«, 2022.



SMART CITIES

Smart Cities leverage digital transformation and cutting-edge technologies to create highly efficient, sustainable, and inclusive urban environments. Central to this evolution is enhancing ecological resilience, fostering social cohesion, and actively promoting citizen participation. By harnessing innovations such as the Internet of Things (IoT), Artificial Intelligence (AI), and big data analytics, smart cities optimize urban operations, substantially improving quality of life and resource efficiency.

The global smart city market is experiencing exponential growth, valued at approximately $820 billion in 2022 and projected to reach $2.2 trillion by 2030.[1] Crucially, technological applications in areas such as energy management, transportation, and urban agriculture significantly enhance sustainability. Smart grids have demonstrated reductions in electricity consumption by around 20%, while intelligent traffic systems have successfully cut commute times by approximately 25%, substantially decreasing urban emissions.[2]

Urban agriculture represents a rapidly expanding dimension of smart cities, integrating sustainable food production directly into urban infrastructures. Smart urban farming systems leverage advanced technologies, including AI-driven hydroponics, vertical farming, automated irrigation, and blockchain-based food traceability systems, effectively reducing food miles, minimizing waste, and promoting food security.

For instance, cities like Singapore and Tokyo have incorporated vertical farms and rooftop gardens into their urban landscapes, significantly increasing local food production while reducing reliance on imports.

IoT sensors monitor plant health, soil moisture, and nutrient levels in real time, optimizing resource use and crop yield. In addition, renewable energy integration, exemplified by Copenhagen's success in achieving a 42% reduction in CO_2 emissions since 2005, underscores the potential for smart infrastructure to mitigate climate change impacts.[3]

The sharing economy further complements smart urban strategies. Initiatives such as bike-sharing systems significantly reduce urban congestion and emissions – Paris's bike-share program alone prevents over 20,000 tons of CO_2 emissions annually.[4] Data-driven management, exemplified by Barcelona's smart water systems, generates considerable savings by improving efficiency and reducing waste.[5]

In sum, smart cities not only signify a technological shift but fundamentally redefine urban sustainability, resilience, and quality of life, placing urban farming at the heart of future-oriented urban planning.

Impact and Opportunities on Urban Agriculture

Urban agriculture integrated into smart cities would amplify the concept of circularity. It improves waste management: bio-waste, urine, green waste, construction waste via urban farms soil creation. The recovery of waste energy from building heating and air conditioning could be improved by productive greenhouses on rooftops. Connecting urban agriculture with rainwater management is also an opportunity for smart cities: urban farms buffer rainwater and collect grey and black water. Urban agriculture in a smart city also makes it possible to improve food flows and limit food waste, particularly through redistributing food.

1 Fortune Business Insights, »Smart Cities Market Analysis«, 2023.
2 International Energy Agency, »Smart Grids and Urban Traffic Report«, 2023.
3 City of Copenhagen, »Climate Action Plan Report«, 2023.
4 Paris Mobility Report, »Impact of Bike-Sharing Programs«, 2022.
5 Barcelona City Council, »Smart Water Management Case Study«, 2023.


AI

HUMAN EXCREMENT AS FERTILIZER

Some fields are fertilized with animal manure, but human excrement can also serve this purpose, as it contains essential nutrients like nitrogen, phosphorus, and potassium, which are crucial for plant growth. Urine, in particular, is easy to process into fertilizer due to its high nutrient content and availability. Studies suggest that human urine contains around 6 grams of nitrogen, 1.5 grams of phosphorus, and 2 grams of potassium per liter, making it a potent natural fertilizer.[1]

Human excrement is available in large quantities, which makes its use as fertilizer particularly appealing. The average person produces about 1.6 liters of urine per day, and globally, this amounts to roughly 4.6 trillion liters of urine annually, potentially providing an enormous resource for agriculture.[2] Utilizing excrement helps to reduce organic waste going to landfills and makes waste management more environmentally friendly. Globally, more than 2 billion people lack access to improved sanitation, creating a significant opportunity to recycle human waste for agricultural use.[3]

By employing processes such as anaerobic digestion or hot composting, human excrement can be processed safely for agricultural applications. For example, anaerobic digestion of human waste produces biogas for energy, while the remaining solids can be transformed into nutrient-rich compost. However, the widespread adoption of this technology is contingent on public acceptance, as health concerns and cultural norms frequently present challenges. Although the potential benefits of utilizing human excrement as fertilizer are evident, addressing these obstacles is crucial to integrating this sustainable practice on a broader scale.

Impact and Opportunities on Urban Agriculture

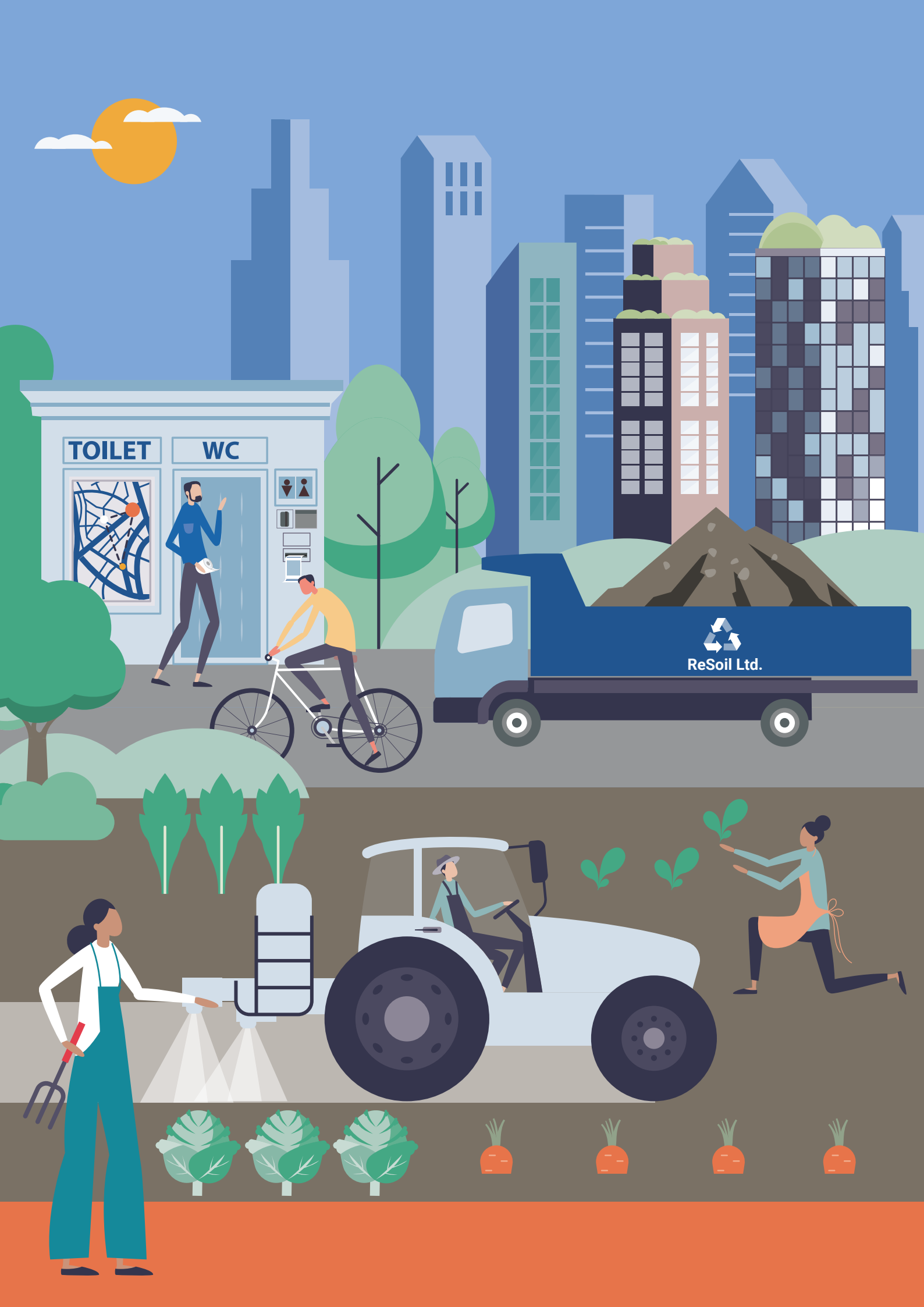
The proposed trend of nutrient recovery from human waste, such as urine and excreta, has been regarded as a crucial point in the advancement of urban green and urban agriculture, thus emulating trends found in nature as well as rural agriculture. The potential impacts are manifold, ranging from societal aspects, such as the economic impact on the local production of nutrients, gaining greater self-sufficiency in scarce nutrients and greater independence from nutrient pricing trends, particularly relevant for N and P obtained from urine in the form of ammonia, nitrate or struvite. As well as environmental impacts, reducing the needs for nutrient synthesis (like in the case of synthetic N) and transport.

This trend can also render an opportunity to urban agriculture and urban green to act as a sink for waste-bound nutrients, as in the case of biofilters for source separated urine and nutrient precipitation techniques in wastewater treatment plants, reducing potential discharge and runoff into natural environments and water bodies. Although technologies for the recovery of nutrients from urine and excreta already exist, their implementation is still at a very early stage. These technologies require not only a cultural change in society, but also a systemic change in building infrastructure, like in the case of nutrient recovery from source separated urine (with biological or chemical precipitation) to produce concentrated liquid fertilizer like AURIN or crystal precipitation such as struvite.

1 US Environmental Protection Agency, »Nutrient Composition of Human Urine«, 2023.

2 World Health Organization, »Global Water and Sanitation Report«, 2023.

3 United Nations, »Sanitation for All: Progress and Challenges«, 2022.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LIMITED SPACE AND EXPENSIVE RENTS IN CITIES

Cities across Europe and globally face escalating challenges related to limited space and increasingly unaffordable rents, driven primarily by rapid urbanization, rising property values, and chronic shortages of affordable housing. According to Eurofound, low- and middle-income families in Europe now allocate over 40% of their income to housing, intensifying economic strain and social inequalities.[1] Currently, nearly 75% of Europe's population resides in urban areas, heightening demand pressures and exacerbating land scarcity.[2]

Globally, this phenomenon is even more severe. Research by the World Economic Forum indicates that 90% of surveyed cities worldwide are categorized as unaffordable, with average housing prices frequently exceeding three times median household incomes.[3] Prominent European cities like London and Paris illustrate the acute nature of this problem, where average monthly rents for modest one-bedroom apartments surpass €1,800, significantly outpacing wage growth and affordability for middle-income earners.[4]

These urban challenges directly impact the potential for urban agriculture, a key strategy for enhancing food security and sustainability in cities. Despite significant interest in local food production, land scarcity and soaring property values severely constrain urban farming initiatives. For instance, in New York City, prices for vacant urban land increased by approximately 30% over the past decade, significantly reducing opportunities for accessible, community-based agriculture.[5]

To overcome these spatial and economic constraints, urban planners and agricultural innovators more and more explore advanced solutions such as vertical farming, rooftop agriculture, and integrated mixed-use developments. Vertical farming, in particular, presents a scalable method to maximize yield within limited urban spaces. Policy innovations, including zoning incentives for green spaces and tax benefits for developers integrating agricultural spaces into residential and commercial projects, could further stimulate growth in urban agriculture.

Addressing the interconnected challenges of housing affordability and urban agriculture land allocation through innovative, sustainable urban planning is critical to fostering resilient, inclusive cities equipped to meet future demands.

Impact and Opportunities on Urban Agriculture

The topic of limited space and expensive rents in cities presents both challenges and opportunities for urban agriculture. High land costs make traditional urban farming difficult, but innovative solutions like vertical farming, rooftop gardens, and hydroponic systems maximize productivity in minimal space. Integrating urban farms into mixed-use developments, residential complexes, and underutilized spaces – such as abandoned buildings or transport hubs – can enhance food security, while optimizing land use. Public-private partnerships and policy incentives can support urban agriculture's expansion, making fresh, local production more accessible. By embracing space-efficient techniques, urban farming can thrive despite rising costs, contributing to sustainable city living.

1 Eurofound, »Housing Costs and Quality of Life in Europe«, 2023.
2 European Commission, »Urbanization Trends in the EU«, 2022.
3 World Economic Forum, »Global Housing Affordability Report«, 2023.
4 Numbeo, »Cost of Living in European Cities«, 2023.
5 New York City Urban Agriculture Report, »Land Costs and Urban Farming«, 2023.

FARMING-AS-A-SERVICE

Farming-as-a-Service (FaaS) represents an innovative integration of technology with traditional agriculture, reshaping the way farming operations are conducted by enhancing efficiency, sustainability, and profitability. Inspired by IT-sector models like Software as a Service (SaaS), FaaS leverages advanced technologies – including data analytics, IoT sensors, artificial intelligence, and automation – to provide comprehensive agricultural support through digital platforms.

The FaaS market is experiencing significant global growth, projected to reach $10.4 billion by 2028, with a compound annual growth rate (CAGR) of approximately 15.4%.[1] The market comprises three primary segments: Firstly, Farm Management Solutions, which utilize precision agriculture technologies such as GPS-guided systems, sensors, automated irrigation, and drones. These innovations are proven to optimize resource usage, reducing water consumption by up to 30% and boosting crop yields by approximately 20% through real-time data analysis and decision-making support.[2] Secondly, Production Assistance services provide flexible access to essential equipment and skilled labor through rental and outsourcing models. This approach particularly benefits urban farmers and small-scale producers by eliminating prohibitive initial investment costs. The agricultural equipment rental market, valued at $8.7 billion in 2022, underscores the economic potential and growing demand for these accessible farming resources.[3] Thirdly, Market Access solutions link producers directly to consumers and suppliers via digital marketplaces, significantly enhancing farmers' profitability by broadening their reach and minimizing post-harvest losses – which globally account for approximately 14% of food production.[4]

Moreover, urban farming growingly benefits from FaaS by overcoming spatial limitations through vertical farms, rooftop gardens, and indoor agricultural systems integrated into urban infrastructures. FaaS platforms also facilitate knowledge sharing, best-practice dissemination, and community-based agricultural initiatives, making farming accessible and viable even in densely populated city environments.

Ultimately, FaaS embodies a crucial shift toward digitally empowered, sustainable agricultural ecosystems, paving the way for greater productivity, profitability, and environmental responsibility in urban farming contexts.

Impact and Opportunities on Urban Agriculture

Farming-as-a-Service (FaaS) offers several key opportunities and changes for future urban agriculture. IoT-based monitoring, IA drive (crop) management systems, and robotic automation can improve food production under the sub-optimal (urban) conditions. Urban agriculture can integrate with smart grids in water & waste recycling, and renewable energy. This will reduce the external inputs, decrease costs and improve energy efficiency of food production. FaaS enables urban farmers to sell directly to customers through digital marketplaces, which improves interaction with consumers and reduces dependency on long supply chains. FaaS-based devices and dashboards connect knowledge of food (growing) to local communities. To conclude FaaS makes food production in cities more efficient, sustainable, accessible and scalable without expanding the usage of land and external inputs – a crucial factor in tackling access to healthy and sustainable food for the expanding urban population.

1 Grand View Research, »Farming-as-a-Service Market Size«, 2023.

2 International Food Policy Research Institute (IFPRI), »Precision Agriculture and its Benefits«, 2022.

3 Research and Markets, »Agricultural Equipment Rental Market Report«, 2023.

4 Food and Agriculture Organization (FAO), »Post-Harvest Losses and Food Security«, 2022.


FOR RENT

NEW FORMS OF CONSUMER GOODS PROVISIONING

New forms of consumer goods provisioning are reshaping urban lifestyles by fostering sustainable, innovative approaches such as subscription models, rental and sharing services, refill systems, and deposit return schemes. These developments not only drive conscious consumption patterns but also reduce waste, minimize environmental footprints, and provide more accessible and cost-efficient product access.

Subscription-based provisioning is experiencing substantial global growth, projected to reach a market value of approximately $473 billion by 2026 – a 68% increase since 2021.[1] Within urban farming, subscription services offer fresh, locally-produced food through community-supported agriculture (CSA), meal-kit services, and urban-farm-to-table deliveries. These models enhance consumer engagement with sustainable agricultural practices and stimulate regular consumption of locally grown produce, fostering economic stability for urban growers. Platforms emphasizing product rental, sharing, and reuse further amplify sustainable urban lifestyles. Innovative initiatives such as urban tool-sharing platforms, vertical garden rentals, and community composting services reduce resource consumption while enhancing community participation. Sharing platforms contribute significantly to reducing urban congestion and resource waste, supporting a circular economy model and promoting social cohesion within cities. Refill systems and deposit-return schemes are also pivotal elements in this transformative trend. For instance, the European Union's deposit return systems (DRS) for beverage containers have achieved remarkable success, with recycling rates reaching up to 90% in leading countries like Germany. Such systems reduce packaging waste substantially, demonstrating the potential for broad application in other consumer goods segments.

Moreover, transparency and consumer education are essential in driving sustainable behaviors. Europe's success with deposit return systems demonstrates the impact of clear sustainability communication.[2] Similarly, in the wider consumer market, transparent labeling and initiatives that effectively convey sustainability credentials – such as product carbon footprint labels – significantly influence purchasing decisions, with 68% of global consumers favoring brands that provide clear environmental information.[3]

Ultimately, these innovative provisioning models represent a paradigm shift towards sustainable consumption, shaping a future urban landscape characterized by ecological responsibility, community connectivity, and economic resilience.

Impact and Opportunities on Urban Agriculture

The trend of new forms of consumer goods provisioning opens exciting possibilities for urban agriculture by promoting sustainable, flexible, and waste-reducing food distribution models. Subscription-based urban farm boxes, produce-sharing platforms, and refillable fresh food systems can enhance accessibility to local, seasonal produce. Deposit-return systems for reusable packaging and farm-to-door delivery services reduce waste and food miles, aligning urban farming with eco-conscious consumer trends. Additionally, transparency tools like carbon labeling can highlight the sustainability benefits of locally grown food, fostering consumer trust. By integrating these innovations, urban agriculture can become a key player in reshaping sustainable food provisioning in cities.

1 Statista, »Global Subscription Services Market Size«, 2023.

2 European Environment Agency, »Deposit Return Systems for Beverage Containers«, 2022.

3 Norwegian Ministry of Climate and Environment, »Climate Voucher and Consumer Behavior«, 2023.


E-RENT
SUBSCRIBED

15-MINUTE CITY

The 15-Minute City is an innovative urban planning model, envisioned to enable residents to access essential services – including work, education, healthcare, shopping, and leisure activities – within a 15-minute walk or bicycle ride from their homes. This concept, championed by urbanist Professor Carlos Moreno, advocates for integrated, mixed-use urban development designed around sustainable mobility, reducing dependence on private vehicles, and enhancing local livability and resilience.

Globally, the concept has gained significant momentum, with cities such as Paris, Barcelona, and Melbourne already implementing transformative urban policies. Paris, under Mayor Anne Hidalgo's leadership, has substantially expanded pedestrian and cycling infrastructure, resulting in a 35% increase in bike lane usage since 2020.[1] Barcelona's »superblocks« initiative has reclaimed more than 300,000 square meters for pedestrians and reduced neighborhood traffic by approximately 21%, significantly enhancing community engagement and urban vibrancy.[2]

The integration of urban farming into the 15-Minute City model further amplifies its sustainability potential. By embedding urban agriculture into neighborhoods, cities can increase food security, reduce food miles, and foster stronger community cohesion through shared gardening spaces and local markets. Community gardens, rooftop farms, and vertical farming initiatives become essential infrastructure components, providing fresh, local produce and strengthening urban resilience.

Research indicates that neighborhoods following the 15-Minute City principles could achieve up to a 25% reduction in urban carbon emissions, primarily due to decreased reliance on motorized transportation.[3] Also, pedestrian-friendly mixed-use developments typically witness up to a 20% increase in local economic activity driven by enhanced foot traffic, benefiting small businesses and local economies.[4]

Successfully realizing the 15-Minute City requires rethinking traditional urban zoning practices, favoring diverse, multifunctional spaces. By integrating housing, employment opportunities, educational institutions, and urban agriculture into compact urban clusters, cities can significantly enhance sustainability, equity, and quality of life, creating healthier, more resilient urban environments for future generations.

Impact and Opportunities on Urban Agriculture

The concept of 15-minute city is an opportunity to develop forms of urban agriculture in direct connection with the inhabitants of the district. A network of urban farms, accessible to all and managed in partnership between the city and a private player, would offer several benefits to the inhabitants: leisure time in an urban park, health through local food production as well as environmental awareness among children. But also simpler forms of urban agriculture, such as community gardens or easily accessible urban orchards, would offer collective breathing space in the heart of the densely populated city. Finally, if land is more difficult to find, urban agriculture in the 15-minute city can also find its place in the heart of existing landscaped parks, rooftops or in basements.

1 Paris City Council, »Cycling Infrastructure and Traffic Reduction Impact«, 2023.

2 Barcelona Urban Planning Department, »Superblocks and Public Space Reclamation Report«, 2022.

3 International Transport Forum, »Reducing Emissions through Urban Mobility Changes«, 2023.

4 Urban Land Institute, »Economic Benefits of Mixed-Use Neighborhoods«, 2023.


HOSPITAL
SCHOOL
12
3
6
9

EXTREME WEATHER EVENTS

Extreme weather events, such as heatwaves, severe cold spells, intense rainfall, prolonged droughts, hurricanes, and tornadoes, are porgressively impacting global urban environments due to climate change. These phenomena, once rare, have significantly grown in frequency, intensity, and duration. Recent observations indicate that extreme temperatures exceeding 40°C, and occasionally surpassing 50°C, are becoming more commonplace worldwide. For example, the Middle East recorded an unprecedented temperature of 54.4°C in 2021, highlighting the severity of heat-related extremes.[1, 2]

Human-induced climate change amplifies these events, severely affecting ecosystems, infrastructure, food systems, and public health. The World Health Organization (WHO) projects that every 1°C increase in global temperature intensifies daily extreme rainfall events by approximately 7%, elevating flood and landslide risks.[3] Concurrently, drought frequency has doubled in many regions over the past half-century, drastically impacting agricultural productivity and water availability.[4]

The World Meteorological Organization (WMO) stresses the critical importance of limiting global warming to 1.5°C to substantially reduce the vulnerability of human populations to extreme weather impacts.[5] Currently, nearly half of the global population – over 3.6 billion people – are at high risk from climate-related events, underscoring an urgent need for comprehensive adaptation strategies.[6] Economically, extreme weather inflicts severe damage, with floods and storms alone costing over $200 billion annually.[7]

In urban farming, the escalating threat of extreme weather necessitates innovative, resilient agricultural practices. Urban agriculture can mitigate some impacts by employing controlled-environment agriculture (CEA), vertical farming, hydroponics, and urban agroforestry. These approaches significantly reduce vulnerability to climatic fluctuations by creating stable growing conditions, protecting food security, and ensuring consistent yields.

Moreover, integrating green infrastructure, such as urban forests, permeable surfaces, and rooftop gardens, enhances cities' capacity to absorb heavy rainfall, reduce heat island effects, and provide essential habitats. Strengthening early warning systems, sustainable urban planning, and resilient infrastructure are essential components in adapting to and mitigating the profound impacts of extreme weather events in growingly urbanized environments.

Impact and Opportunities on Urban Agriculture

Forms of urban agriculture based on living soils will face similar stressors from climate change as rural agriculture. However, systems with higher levels of soil organic carbon, achieved through the regular use of compost readily available in cities, are better equipped to withstand droughts. Promoting crop diversity in urban agricultural systems will enhance their resilience to climate change in terms of production. While climate change may negatively impact production, it is unlikely to significantly affect the other essential services provided by urban agriculture, such as supporting biodiversity, fostering social cohesion, and promoting environmental education.

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2 World Meteorological Organization, »State of the Global Climate Report«, 2022.
3 World Health Organization, »Climate Change and Health Fact Sheet«, 2023.
4 Journal of Climate, »Trends in Drought Frequency and Severity«, 2023.
5 World Meteorological Organization, »Limiting Global Warming to 1.5 °C Report«, 2022.
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PRESERVING URBAN BIODIVERSITY AND ECOSYSTEMS

Preserving urban biodiversity and ecosystems is growingly essential as global urbanization continues to expand, intensifying pressure on natural habitats. Cities already support a surprising diversity of species, including endangered ones, hosting up to 20% of the world's bird species and 5% of plant species, thriving in urban forests, parks, gardens, and green rooftops.[1] However, urban biodiversity faces significant threats, such as habitat fragmentation, pollution, and the urban heat island effect, necessitating focused and innovative conservation strategies.

Urban planners and environmental managers play a pivotal role, yet they often operate under tight budgets and insufficient policy guidance, typically allocating less than 1% of municipal funds towards biodiversity projects.[2] Nonetheless, cities implementing targeted biodiversity measures experience notable ecological and social benefits. For instance, increasing green space coverage by just 10% has been shown to enhance local biodiversity by 15–20%, fostering healthier ecosystems and boosting ecological resilience.[3]

Successful urban biodiversity initiatives growingly rely on interdisciplinary approaches that integrate ecological science, urban planning, and community engagement. For example, Singapore's »City in Nature« strategy successfully elevated urban greenery by 40% since the 1980s by embedding biodiversity objectives directly into city planning frameworks.[4] Similarly, urban agriculture initiatives, such as community gardens, vertical farming, and rooftop agriculture, actively support biodiversity by creating crucial habitats for pollinators, birds, and beneficial insects while simultaneously improving urban food security and promoting sustainable living.

Besides, urban biodiversity plays a critical role in enhancing urban resilience and residents' overall quality of life. Exposure to urban nature significantly reduces stress levels, reportedly by up to 30%, and positively impacts mental and physical health, encouraging active lifestyles and community cohesion.[5] Furthermore, green infrastructure solutions – like bioswales, rain gardens, and green roofs – help cities mitigate climate impacts by reducing flooding, lowering temperatures, and improving air quality.

Ultimately, integrating biodiversity conservation into urban farming and city planning not only protects natural ecosystems but also creates vibrant, resilient, and sustainable urban communities.

Impact and Opportunities on Urban Agriculture

The trend of preserving urban biodiversity and ecosystems offers significant opportunities for urban agriculture to enhance sustainability and ecological resilience. Urban farms, green roofs, and community gardens can serve as habitats for pollinators, birds, and beneficial insects while promoting soil health and air quality. Agroecological practices, such as polyculture and companion planting, support biodiversity and reduce the need for chemical inputs. Additionally, integrating urban farms into green infrastructure projects can strengthen climate adaptation efforts. By fostering diverse, nature-friendly growing spaces, urban agriculture not only contributes to food security but also enhances urban ecosystems, creating healthier, more livable cities.

1 Urban Biodiversity Research Consortium, »Biodiversity in Cities: A Global Perspective«, 2023.
2 ICLEI Local Governments for Sustainability, »Municipal Budget Allocation for Urban Biodiversity«, 2022.
3 Journal of Urban Ecology, »Green Space and Biodiversity Correlation«, 2023.
4 Singapore National Parks Board, »City in Nature Strategy Report«, 2023.
5 Environmental Health Journal, »Urban Nature and Mental Well-being Study«, 2023.

LABEL ACCURACY AND TRANSPARENCY

Consumers are paying more and more attention to health aspects, sustainability, and ethical standards such as fair working conditions and animal welfare. Studies show that 73% of global consumers are willing to pay more for sustainable products, and 66% actively seek out brands with clear ethical practices.[1] As a result, brands that implement responsible sourcing and environmentally friendly production methods are gaining favor.

Label Accuracy and Transparency are critical in building consumer trust and promoting sustainable practices across the entire value chain. Transparent labeling helps consumers make informed choices, and nearly 80% of consumers indicate that they find transparency in food labels to be essential for ensuring safety and quality.[2] Transparency includes the disclosure of production processes, ingredients, and the social and environmental impacts of products. For example, 62% of food companies now voluntarily provide detailed sourcing and environmental impact data on their labels, a trend driven by growing consumer demand for information.[3]

Traceability is another important aspect of label transparency. It allows consumers to track products along the entire supply chain, ensuring food safety and quality. A recent study found that 54% of consumers are more likely to trust a brand that offers traceable information about its supply chain.[4]

Furthermore, food traceability technologies such as blockchain have been shown to reduce fraud and improve product safety, with some estimates suggesting blockchain could reduce food recalls by up to 50%.[5] By embracing label accuracy and transparency, companies are meeting consumer demand for responsibility and contributing to a more sustainable, ethical economy.

Impact and Opportunities on Urban Agriculture

While the push for accuracy and transparency in labeling might be growing, it is important to recognize that its impact on transforming urban agriculture and food systems may be overstated. Behavioral science suggests that labeling alone has a very limited impact on consumer behavior, which is shaped by complex socio-cultural and financial factors long before consumers even see a product's label. Moreover, focusing too much on labeling may neglect the broader marketing and packaging systems that also influence food choices. For urban agriculture, additional labeling requirements could add administrative burdens on small producers, who already face numerous regulatory challenges. Meanwhile, larger corporations, with more resources are better equipped to navigate the requirements and may influence the policy development, potentially continuing to greenwash and undermine true sustainability efforts.

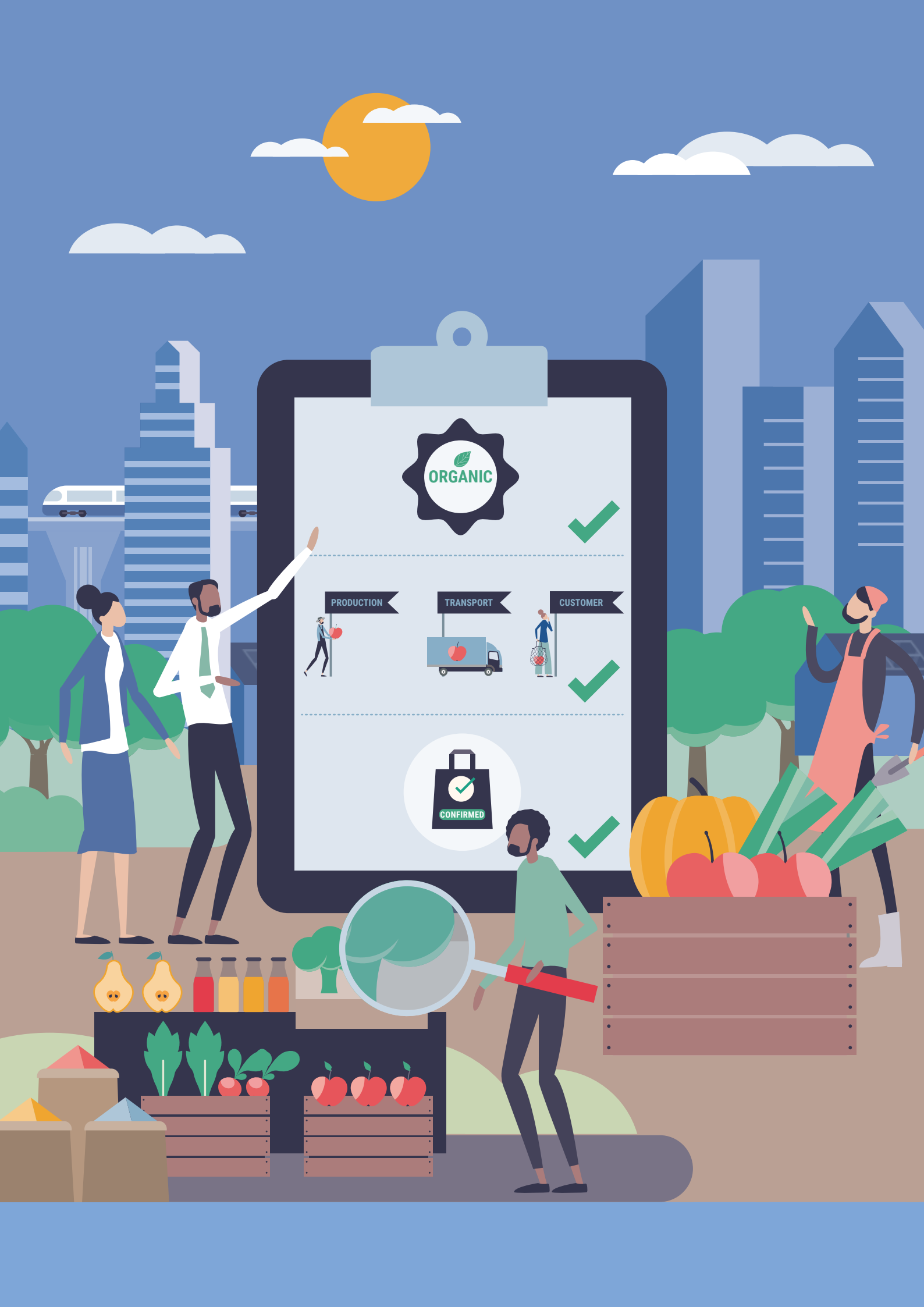
1 Nielsen, »Global Sustainability Report«, 2023.

2 Food Marketing Institute, »Consumer Trends in Food Transparency«, 2022.

3 Transparency-One, »The State of Supply Chain Transparency«, 2023.

4 IBM, »The Value of Traceability in Consumer Products«, 2022.

5 World Economic Forum, »Blockchain's Role in Food Safety and Traceability«, 2023.


ORGANIC
PRODUCTION
TRANSPORT
CUSTOMER
CONFIRMED

WATER ALLOCATION PRIORITIES

Water allocation priorities have emerged as a critical global issue, particularly relevant for sustainable urban farming, given the intensifying competition for finite water resources. Driven by rapid urbanization, population growth, and climate change, water scarcity is steadily becoming a central challenge. The United Nations predicts that by 2030, nearly half of the global population will reside in regions experiencing high water stress, with approximately 1.8 billion people facing absolute water scarcity.[1] Climate change intensifies these impacts, with areas such as sub-Saharan Africa and parts of South Asia projected to suffer more frequent and prolonged drought conditions.[2]

Urban agriculture, essential for enhancing food security in densely populated cities, directly depends on effective water resource management. Sustainable water allocation is vital, as urban farms typically compete with residential, industrial, and energy sectors for limited water resources. Traditional agriculture currently accounts for approximately 70% of global freshwater use, emphasizing the urgent need for more efficient urban farming methods such as drip irrigation, hydroponics, and aquaponics, which reduce water usage by up to 90% compared to conventional agriculture.[3]

Moreover, prioritizing water allocation for urban agriculture can significantly enhance local food security, reduce dependency on imports, and improve the overall resilience of urban food systems. Integrated water management strategies, combining policy-driven allocation frameworks with innovative technology, will become essential. Cities that implement smart water management systems have demonstrated significant reductions in water waste – Barcelona, for example, achieved annual savings of €58 million through smarter water management practices.[4]

Sustainable water allocation also has ecological implications, safeguarding freshwater biodiversity – ecosystems that support over 10% of global species.[5] Effective water governance, therefore, requires inclusive approaches involving local governments, communities, agricultural stakeholders, and urban planners to collectively determine equitable and resilient water management strategies. Such integrated resource management approaches will be crucial in avoiding conflicts, ensuring equitable access, and sustainably meeting the demands of rapidly urbanizing populations.

Impact and Opportunities on Urban Agriculture

The trend of water allocation priorities poses both challenges and opportunities for urban agriculture. With agriculture consuming 70% of the global freshwater, urban farms must adopt water-efficient practices to remain viable. Technologies like drip irrigation, hydroponics, and rainwater harvesting can reduce water use while maintaining productivity. Greywater recycling and closed-loop systems offer further opportunities to optimize urban water resources. Additionally, integrating urban farms into the city's water management strategies can enhance resilience to drought and climate change. By prioritizing sustainable irrigation and resource efficiency, urban agriculture can contribute to food security while minimizing its water footprint in increasingly water-stressed environments.

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2 Intergovernmental Panel on Climate Change (IPCC), »Climate Change and Water Resources«, 2022.

3 Food and Agriculture Organization (FAO), »The State of Water Resources in Agriculture«, 2022.

4 International Water Management Institute (IWMI), »Groundwater Depletion and Agriculture«, 2023.

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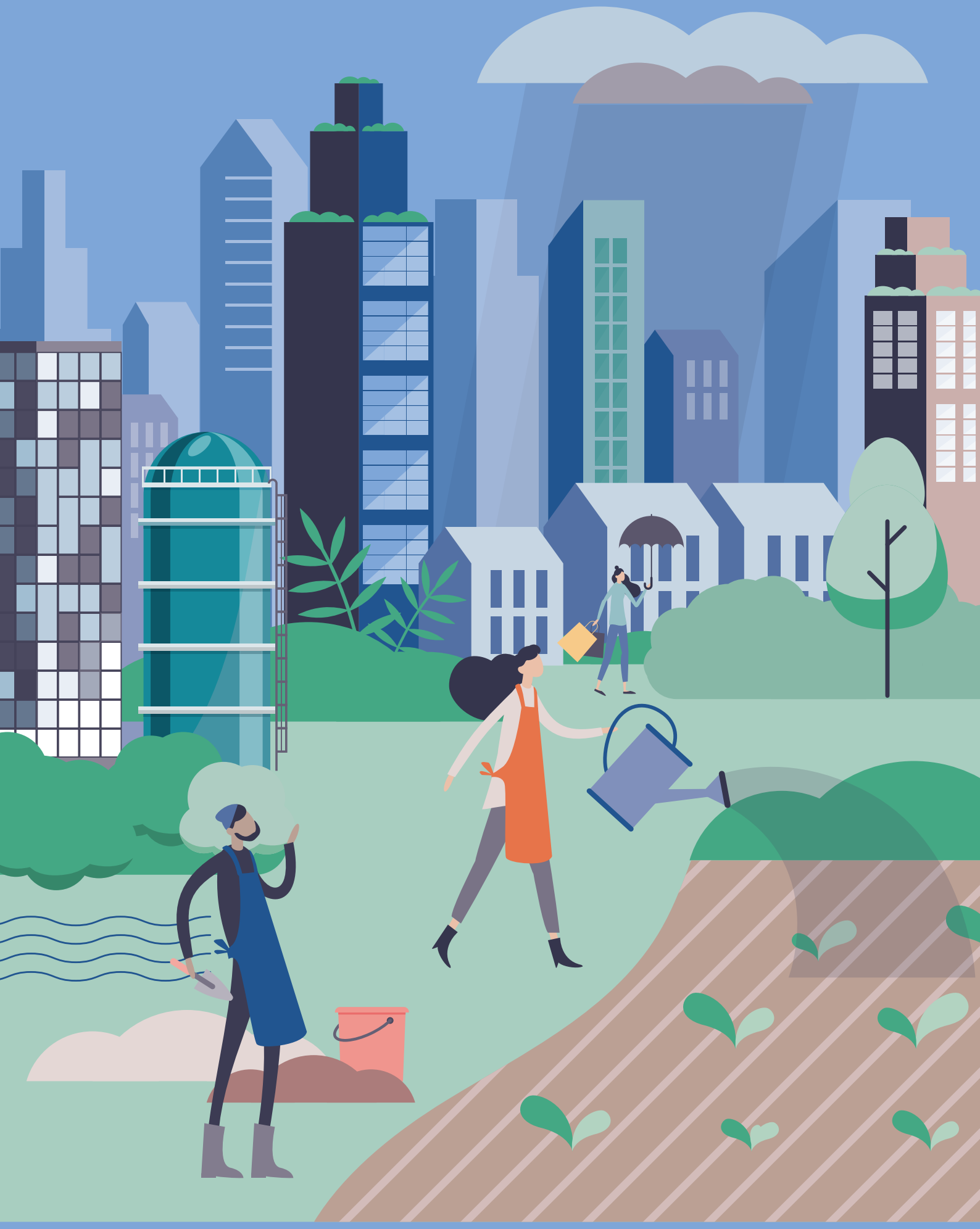

PARTICIPATORY URBAN GOVERNANCE/DECISION MAKING

Participatory urban governance, characterized by the active involvement of citizens and diverse stakeholder groups in urban decision-making processes, is becoming more and more significant in shaping sustainable, inclusive cities. This approach emphasizes cooperation, transparency, inclusion, and local empowerment. According to the United Nations, approximately 60% of urban regions globally have adopted participatory decision-making frameworks.[1] These range from neighborhood-level initiatives to extensive urban redevelopment projects, involving local governments, community organizations, civil society groups, and private enterprises.

Inclusive urban planning exemplifies participatory governance by directly integrating citizens into the planning and design phases of urban projects. A report from the World Resources Institute (WRI) indicates that cities employing participatory mechanisms are 20% more likely to prioritize policies aimed at environmental sustainability and social equity.[2] Engagement formats such as public forums, co-design workshops, and digital participation platforms encourage community dialogue, build social cohesion, and amplify traditionally marginalized voices.[3]

In the context of urban farming, participatory governance proves particularly impactful. Community-driven agricultural projects, like urban community gardens and local food cooperatives, thrive on citizen participation, benefiting significantly from grassroots knowledge, localized decision-making, and collective management. This not only enhances food security and promotes sustainability but also fosters community resilience and empowers citizens to actively shape their living environments.

Participatory governance also improves public trust and accountability. Cities actively incorporating citizen engagement report up to 30% higher satisfaction rates with municipal services compared to those without such involvement.[4] This approach strengthens the social fabric by enabling more equitable distribution of urban resources, reducing social inequalities, and encouraging sustainable practices.

Looking ahead, as urban areas face increasingly complex challenges related to sustainability, resilience, and social equity, participatory governance emerges as a crucial strategy. By involving citizens directly in urban agriculture initiatives, cities can leverage local expertise, foster community ownership, and cultivate resilient urban environments equipped to meet future challenges effectively.

Impact and Opportunities on Urban Agriculture

Participatory urban governance creates valuable opportunities for urban agriculture by integrating community voices into food system planning. Citizen involvement in land-use decisions can secure space for urban farms, while co-design workshops and digital platforms can help shape inclusive food policies. Collaborative initiatives, such as community-supported agriculture (CSA) or cooperative urban farms, strengthen social cohesion and local empowerment. Engaging diverse stakeholders ensures urban agriculture aligns with community needs, promoting food security and sustainability. By embedding urban farming in participatory governance structures, cities can enhance resilience, improve access to fresh food and create greener, more inclusive urban environments.

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2 World Resources Institute, »Participatory Urban Planning and Sustainability«, 2022.

3 International Association for Public Participation (IAP2), »Public Participation Guidelines«, 2022.

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