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Socio-economic and ecological perspectives for understanding urban farming in nigeria: A social-ecological urban food systems approach

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ABSTRACT

Urban farming has expanded across Nigerian cities in response to rapid urbanization, food insecurity, unemployment, and ecological stress. Yet, existing analyses often treat it as an isolated livelihood strategy or a narrow food security intervention. This narrow framing creates an important analytical challenge because it obscures the governance relations, infrastructural conditions, and ecological processes through which urban farming is produced, constrained, and sustained. This paper develops a conceptual framework for understanding urban farming in Nigeria as a socio-ecological component of urban food systems. Building on a critical review approach adapted from recent social-ecological urban food systems scholarship, the paper integrates governance dynamics, networked resource flows, urban infrastructure and spatial form, and social-ecological dynamics into a unified analytical model. Drawing on foundational food systems thinking and urban social-ecological systems literature, the framework positions urban farming as embedded in power relations, material and metabolic flows, infrastructural configurations, and ecological processes. The paper contributes to the literature by synthesizing socio-economic and ecological perspectives into a layered analytical framework tailored to Nigerian cities, identifying conceptual gaps in current scholarship, and highlighting practical implications for research, planning, and policy. It therefore moves the discussion beyond descriptive livelihood accounts toward a more systemic understanding of how urban farming can contribute to sustainable and resilient urban food systems in Nigeria.

Keywords: *Urban farming; Nigeria; social-ecological systems; governance; urban food systems; resilience; socio-economics; sustainability transitions; city-region food systems.*

1. INTRODUCTION

Nigeria's urban population has expanded rapidly over the past four decades. Major cities such as Lagos, Ibadan, Kano, Port Harcourt, and Abuja have grown both spatially and demographically. Urban expansion has intensified demand for land, housing, infrastructure, water, and employment. Food supply systems face sustained pressure. Urban food insecurity persists, particularly among low-income households that depend on unstable incomes and informal markets. Urban farming has emerged as a visible response. Households cultivate vegetables in wetlands, floodplains, road verges, vacant plots, school grounds, and peri-urban fringes. Poultry keeping, small ruminant rearing, and fish farming occur within city boundaries. These practices contribute to household food access and income diversification. They also link urban residents to peri-urban production zones and informal distribution networks.

Much Nigerian scholarship treats urban farming as an informal coping mechanism. Research often emphasizes income generation, nutrition outcomes, and employment creation. While these dimensions remain important, this framing isolates urban farming from the broader urban food system. It underplays governance arrangements, infrastructure systems, and ecological processes that shape production and distribution. Such conceptual limitations restrict understanding of both the transformative potential and systemic constraints of urban agriculture. Urban food systems scholarship provides a broader lens. Food systems encompass production, processing, distribution, retail, consumption, and waste management, along with their environmental and socio-economic outcomes [8]. Sustainability narratives influence how policymakers interpret food system challenges and solutions [8]. A narrow production focus neglects drivers such as infrastructure, institutions, and market power [9]. In rapidly urbanizing contexts, governance fragmentation and poverty mediate food access and vulnerability [7]. Urbanization also reshapes agricultural systems and food security dynamics in developing countries. Urban sprawl often converts fertile land, disrupts peri-urban farming, and increases dependence on distant supply chains [1]. Nigerian cities reflect these patterns. Expansion of residential estates, industrial corridors, and transport infrastructure displaces farming communities at city edges. As land values rise, small producers face tenure insecurity. These structural pressures limit long-term investment in soil improvement, irrigation, and environmental management. Urban ecology strengthens this analysis by conceptualizing cities as coupled human-natural systems. Urban systems integrate social organization, economic activity, and ecological processes [3].

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Integrating humans into ecological research requires cross-disciplinary approaches that examine feedbacks between land use, governance, and ecosystem function [4]. Urban farming operates within these feedback loops. Irrigation practices influence water quality. Organic waste recycling affects nutrient cycles. Built form shapes microclimates and soil conditions.

Recent scholarship advances social ecological perspectives that integrate governance, infrastructure, and ecosystem services. Ecosystem service provision depends on spatial scale and urban context [5]. Governance networks influence how communities manage common resources and adapt to environmental risks [11]. Civil society actors and social movements also shape food system governance through advocacy and policy engagement [6]. These insights move analysis beyond household-level outcomes toward systemic interactions. City-region food system approaches further emphasize linkages between urban demand and peri-urban supply [10]. This perspective highlights flows of food, labor, capital, and waste across administrative boundaries. Nigerian metropolitan regions illustrate such flows. Vegetables produced in peri-urban zones supply inner city markets. Urban organic waste returns to farms as compost in some cases. Informal transport networks connect producers and retailers. Viewing urban farming through a city-region lens reveals interdependencies that isolated livelihood studies overlook. Building on these strands of scholarship, this paper develops a conceptual framework for analyzing urban farming in Nigeria as part of a social-ecological urban food system. The framework adapts a layered structure that integrates governance dynamics, networked resource flows, urban infrastructure and spatial form, and social ecological dynamics. Governance dynamics address land tenure, regulation, institutional coordination, and participation. Networked resource flows capture water, nutrients, energy, labor, and capital. Urban infrastructure and form examine transport, markets, storage, drainage, and spatial planning. Social ecological dynamics focus on ecosystem services, environmental risks, and resilience capacities.

This integrative approach responds to calls for research agendas that link infrastructure, regional development, and sustainability transitions [2]. It also aligns with critical reviews that stress the importance of identifying food system drivers rather than treating outcomes in isolation [9]. By situating urban farming within interconnected systems, the framework highlights leverage points for policy intervention. The objectives of this paper are threefold. First, it identifies conceptual gaps in existing studies of urban farming in Nigeria, particularly the limited integration of governance and ecological analysis. Second, it synthesizes socio-economic and ecological perspectives into a coherent analytical model grounded in scholarship on food systems and urban ecology. Third, it outlines research and policy implications for building sustainable urban food systems in Nigerian cities.

2. CONCEPTUAL BASIS: URBAN FOOD SYSTEMS AND SOCIAL ECOLOGICAL PERSPECTIVES

The conceptual basis rests on two intersecting bodies of literature. The first examines urban food systems as complex socio-economic networks shaped by institutions, markets, and power relations [8][7]. The second conceptualizes cities as dynamic social-ecological systems characterized by feedback loops between human activity and ecosystem processes [3][5]. Integrating these traditions provides a structured pathway for analyzing urban farming beyond subsistence narratives and toward systemic transformation.

2.1 Food Systems Thinking

Food systems thinking conceptualizes food production, processing, distribution, consumption, and waste management as interconnected activities shaped by social, economic, political, and environmental drivers [8]. It moves analysis beyond isolated value chain segments and instead examines how feedback loops connect actors, institutions, and outcomes. Food security, nutrition, environmental sustainability, and livelihoods emerge from interactions across the system rather than from single interventions. This perspective recognizes that drivers such as urbanization, income inequality, infrastructure, and governance arrangements influence system performance [9]. In rapidly urbanizing regions, expansion of built environments alters agricultural land availability, transport systems, and market organization [1]. Urban food systems, therefore, evolve within broader political and spatial transformations.

In Nigerian cities such as Lagos and Abuja, urban farming intersects directly with household food access and dietary diversity. Low-income households often allocate portions of small plots to leafy vegetables, peppers, and staple crops to supplement market purchases. These activities reduce expenditure on fresh produce and buffer against food price volatility. Such coping strategies align with findings from African urban food systems research, which emphasize poverty-mediated access to food [7]. Urban farming also integrates with informal markets and distribution networks. Produce moves from peri-urban plots to neighborhood stalls, roadside vendors, and open markets. Informal transport systems facilitate daily exchanges between producers and retailers. Food systems thinking highlights these distribution dynamics as central to system resilience [8]. However, informal market structures remain weakly regulated and often excluded from formal planning processes. Waste recycling and composting represent another intersection. Organic household waste and market residues serve as nutrient inputs for urban agriculture. This exchange reflects elements of urban metabolism, where material and energy flows circulate within cities [9]. When managed effectively, such loops reduce landfill pressure and improve soil fertility. When poorly managed, they introduce contamination risks. Food systems analysis identifies these trade-offs but often treats them as secondary to supply chain efficiency.

Urban land governance further shapes food system outcomes. Land tenure insecurity discourages long-term soil management and infrastructure investment. Urban expansion frequently displaces farming from floodplains and peri-urban fringes [1]. Governance fragmentation between planning authorities and agricultural agencies compounds uncertainty. Research on African urban food systems underscores how institutional arrangements influence access and vulnerability [7]. Despite its strengths, food systems thinking often concentrates on supply chains and market integration. It emphasizes production volumes, value addition, retail systems, and consumer demand. Urban ecological processes and infrastructural conditions receive less systematic attention. Issues such as hydrological cycles, soil degradation, microclimate regulation, and biodiversity rarely occupy central analytical space. In addition, food systems research sometimes underemphasizes urban political economy, including land speculation, infrastructure finance, and elite control of urban space. These limitations matter in Nigeria. Urban farming occurs within contested land regimes, uneven infrastructure provision, and ecological stress.

Without integrating ecological science and political economy, food systems analysis risks treating urban farming as a technical input into supply chains rather than as a socio-ecological process embedded in urban transformation.

2.2 Urban Social Ecological Systems

Urban social ecological systems research conceptualizes cities as dynamic ecosystems shaped by interactions between human institutions and biophysical processes [3]. This approach integrates ecological science with social analysis. It examines how land use, governance, infrastructure, and economic activity reshape ecological functions. Cities are not separate from nature. They reorganize natural processes through built form and institutional design. Integrating humans into ecological research requires attention to feedback loops between development patterns and ecosystem services [4]. For example, the conversion of wetlands to housing reduces flood regulation capacity. Expansion of impermeable surfaces alters water infiltration and nutrient cycling. Urban farming both influences and depends on these processes. Irrigation practices affect water tables. Soil management practices influence carbon storage and biodiversity. Ecosystem services theory further refines this analysis. Provisioning, regulating, cultural, and supporting services vary across spatial scales and contexts [5]. Urban agriculture contributes to provisioning services through food production. It also offers regulating services such as microclimate moderation and stormwater absorption. Yet service provision depends on governance arrangements, land tenure security, and infrastructural support.

Social ecological systems scholarship stresses cross-scale interactions among actors, institutions, and ecological processes [11]. Governance networks influence resource allocation, knowledge exchange, and adaptive capacity. Civil society organizations and community groups often shape urban environmental management through advocacy and experimentation [6]. These governance dynamics determine whether urban farming enhances resilience or reinforces inequality. Urban resilience depends on coordinated management of infrastructure, institutions, and ecological functions. Transport systems affect market access. Drainage infrastructure shapes flood risks. Energy access influences irrigation and storage. Research agendas linking infrastructure and regional development highlight the need for integrated planning across sectors [2]. Urban farming operates within this infrastructural matrix. Integrating social ecological perspectives into urban food systems analysis addresses gaps identified in recent scholarship [9]. It shifts attention toward power and governance structures that allocate land and resources. It foregrounds urban metabolism, including water flows, nutrient cycles, and waste streams. It examines infrastructure and spatial form as determinants of ecological performance. It recognizes ecological functions and ecosystem services as measurable outcomes alongside income and yield. For Nigerian cities, this integration enables more precise analysis. Rapid urban growth in Port Harcourt and Kano illustrates how industrialization, oil-related development, and population influx reshape land use and environmental quality. Urban farming in these contexts interacts with polluted waterways, traffic emissions, and informal settlements. A social ecological lens captures these interdependencies more effectively than narrow livelihood frameworks.

2.3 Gaps in Nigerian Urban Farming Research

Three major gaps persist in Nigerian urban farming research. First, governance blind spots. Many studies document farmers' constraints, such as eviction threats, limited credit, and market instability. Few examine institutional arrangements that structure land access, water rights, and regulatory enforcement. Governance research in African food systems demonstrates how policy fragmentation shapes outcomes [7]. Applying a similar analysis in Nigeria would clarify how planning regulations, customary tenure systems, and political patronage influence urban agriculture. Second, metabolic invisibility. Urban farming interacts with water flows, nutrient cycles, waste streams, and energy systems. Yet empirical studies rarely quantify these exchanges. Food systems scholarship emphasizes drivers and feedbacks [9], while urban ecology highlights coupled human-natural processes [3]. Nigerian research seldom integrates these perspectives. As a result, the environmental costs and benefits of urban agriculture remain underassessed. Third, ecological simplification. Research frequently measures yields, income, and employment. It rarely evaluates ecosystem services such as soil fertility enhancement, biodiversity support, carbon sequestration, or climate adaptation functions. Ecosystem service provision depends on scale and context [5]. Without ecological indicators, policy debates reduce urban farming to a subsistence activity rather than recognizing its multifunctional potential.

These gaps justify the development of a layered social ecological framework tailored to Nigeria. Such a framework integrates governance analysis, metabolic assessment, infrastructural evaluation, and ecological measurement. It aligns food systems thinking with urban ecology and political economy. By situating urban farming within interconnected social and biophysical systems, research moves from descriptive accounts toward systemic transformation strategies.

3. A SOCIAL ECOLOGICAL FRAMEWORK FOR URBAN FARMING IN NIGERIA

This section adapts a four-layer social ecological urban food systems framework to the Nigerian context. The framework integrates governance dynamics, networked resource flows, urban infrastructure and spatial form, and social ecological processes. It draws on food systems scholarship that emphasizes interconnected drivers and outcomes [8][9] and urban ecology research that conceptualizes cities as coupled human-natural systems [3][4]. Applying this structure clarifies how urban farming operates within broader political, economic, and ecological systems.

3.1 Governance Dynamics

Governance dynamics identify actors, institutions, power relations, and policy instruments that shape urban food systems [7]. Governance extends beyond formal regulations. It includes informal norms, customary tenure systems, and political patronage networks. In Nigerian cities, governance arrangements strongly influence who accesses land, water, credit, and markets.

3.1.1 Key Actors

Urban farming involves multiple actors operating within hybrid formal and informal systems. These include:

Urban farmers and cooperatives.

Municipal planning authorities.

Traditional landowners and customary institutions.

Market associations.
State ministries of agriculture and environment.
Non-governmental organizations.
Informal land brokers and intermediaries.
These actors shape production conditions and market integration. Urban farmers often depend on customary arrangements for land access. In cities such as Ibadan and Kano, floodplains and peri-urban plots are cultivated without formal title. Informal land brokers negotiate short-term access, while traditional authorities assert residual ownership claims. Municipal authorities regulate zoning and environmental standards, though enforcement remains uneven. Market associations control access to retail spaces and influence price formation. Civil society organizations sometimes provide training or advocate for policy reform, reflecting broader findings on food system governance and social movements [6]. Understanding these actor networks aligns with social ecological systems research, which emphasizes governance networks and cross-scale interactions [11]. Without mapping institutional relationships, policy interventions risk reinforcing existing inequalities.

Power and Land Access
Land remains the central governance constraint. Urban planning frameworks frequently designate agriculture as a temporary or residual land use. As urban sprawl expands, peri-urban farms face conversion to residential estates and commercial developments. Urban expansion in developing regions often displaces agricultural land and intensifies food system vulnerability [1]. In Lagos and Abuja, rising land values encourage commodification. Real estate development attracts political and financial backing. Farmers occupying wetlands or public land remain exposed to eviction. Insecure tenure discourages investment in irrigation infrastructure, soil conservation, and long-term agroecological practices.

Governance analysis must therefore examine:
Zoning and land use policies.
Tenure security and documentation systems.
Conflict resolution mechanisms between farmers and authorities.
Political patronage networks influencing land allocation.
Food systems scholarship highlights how institutional drivers shape system performance [9]. Applying this insight to land governance reveals structural constraints that limit urban agriculture's sustainability.

Policy Coherence
Urban agriculture policies sometimes exist at the state level, yet they rarely integrate with urban planning, environmental management, sanitation, or public health frameworks. Fragmented governance reduces policy effectiveness. Planning departments prioritize housing and infrastructure expansion, while agricultural agencies focus on rural production. A systems perspective calls for cross-sector coordination. Research on African urban food systems demonstrates the importance of institutional integration and poverty-sensitive governance [7]. Aligning land use planning, environmental regulation, and food security strategies would strengthen coherence. Urban ecology also emphasizes coordinated management of built and natural systems [3]. Without integrated planning, urban farming remains marginal within formal policy arenas.

3.2 Networked Resource Flows
The second layer explores the circulation of material and social flows within the urban food system. Food systems operate through flows of water, nutrients, energy, labor, capital, and knowledge [8]. Urban ecology frames these exchanges as elements of urban metabolism [4].

Water Flows
Urban farming in Nigeria depends heavily on shallow wells, wastewater streams, and seasonal floodwaters. In cities such as Port Harcourt, irrigation sometimes relies on drainage channels connected to industrial and residential effluents. These water sources link agriculture to sanitation infrastructure. Untreated wastewater increases contamination risks, including pathogen exposure and heavy metal accumulation. At the same time, nutrient-rich effluents enhance crop yields. This illustrates metabolic trade-offs between productivity and public health. Food systems research emphasizes identifying such drivers and feedback [9]. Ecosystem service provision also varies by spatial scale and environmental context [5]. A metabolic perspective, therefore, requires monitoring water quality, groundwater extraction rates, and hydrological impacts. Without regulation, short-term yield gains undermine long-term ecological integrity.

Nutrient and Waste Cycles
Organic waste from markets and households represents a significant potential input for composting. Yet much urban waste ends up in landfills or drainage channels. Integrating compost systems into urban farming could close nutrient loops, reduce landfill pressure, and enhance soil fertility. Urban ecology conceptualizes such recycling as the reintegration of ecological processes within cities [3]. However, implementing compost systems requires institutional coordination, infrastructure investment, and health safeguards. Food systems thinking identifies waste management as integral to sustainability outcomes [8]. Mapping nutrient flows clarifies environmental externalities and opportunities for circular economy strategies.

Capital and Knowledge Flows
Urban farmers rely heavily on informal credit networks, rotating savings groups, and family support. Formal agricultural finance rarely targets intra-urban producers. Knowledge circulates through peer learning and experiential exchange rather than structured extension services. Social networks influence crop selection, risk management, and innovation diffusion. Social ecological systems research stresses the importance of network structures in shaping adaptive capacity [11]. Where trust and cooperation remain strong, collective action improves resilience. Where fragmentation dominates, vulnerability increases. Analyzing capital and knowledge flows reveals structural inequalities and potential leverage points for institutional reform.

3.3 Urban Infrastructure and Form
Urban infrastructure and spatial configuration shape food production possibilities. Infrastructure systems determine market access, storage capacity, and environmental conditions. Research linking infrastructure and regional development underscores the need for integrated agendas [2].

3.3.1 Built Environment

High-density informal settlements limit available land for cultivation. However, peri-urban fringes often offer larger plots. Road networks determine market access and transport costs. Electricity supply affects cold storage, processing, and irrigation pumps. Infrastructure deficits constrain scaling. Poor drainage increases flood risks, damaging crops. Weak transport systems raise transaction costs. Urban ecological analysis demonstrates how built form alters ecosystem processes and microclimates [3]. Integrating infrastructure planning with food system goals enhances resilience.

Green and Blue Spaces

Wetlands and floodplains provide fertile soils and water access. These zones also perform flood regulation and biodiversity functions. Urban farming modifies hydrology, vegetation cover, and habitat structure. Ecosystem service provision depends on scale and land use patterns [5]. A balanced analysis considers both benefits and ecological risks. Protecting critical green and blue spaces while enabling sustainable cultivation requires zoning reforms and environmental safeguards.

Informal Infrastructure

Informal irrigation channels, makeshift fencing, and temporary storage facilities constitute part of urban food infrastructure. These adaptive structures compensate for institutional neglect. Recognizing informal infrastructure expands planning frameworks beyond formal investments. Social movements and community initiatives often advocate for recognition of such practices within policy arenas [6]. Incorporating informal systems into planning improves inclusivity and effectiveness.

3.4 Social Ecological Dynamics

The final layer addresses ecological processes, feedbacks, and resilience. Urban farming interacts with soil systems, hydrology, biodiversity, and climate dynamics.

3.4.1 Ecosystem Services

Urban farming contributes multiple ecosystem services:

Food provisioning.
Microclimate regulation.
Carbon sequestration in soils.
Stormwater absorption.
Habitat provision for pollinators and small fauna.

These services enhance urban resilience. Urban ecology demonstrates how land management influences ecosystem function [4]. Recognizing multifunctionality shifts policy debates from subsistence framing toward sustainability integration.

3.4.2 Environmental Risks

Urban agriculture also produces ecological risks:

Soil contamination from heavy metals.
Pathogen exposure through wastewater irrigation.
Over extraction of groundwater.
Habitat degradation.

Balancing ecosystem services and disservices requires monitoring, environmental regulation, and coordinated governance. Food systems scholarship emphasizes evaluating trade-offs across sustainability dimensions [8].

Climate Adaptation

Nigeria faces rising temperatures and erratic rainfall patterns. Urban farming enhances adaptive capacity by diversifying livelihoods and shortening supply chains. Local production reduces dependence on distant markets vulnerable to climate shocks. However, urban farming remains vulnerable to flooding, drought, and extreme heat. Integrating climate adaptation into urban planning requires coordinated governance, infrastructure upgrades, and ecological monitoring. A social ecological framework provides the analytical structure needed to align these domains and support resilient urban food systems.

4. INTEGRATING SOCIO-ECONOMIC AND ECOLOGICAL PERSPECTIVES

A socio-economic lens emphasizes livelihoods, poverty reduction, and market integration. An ecological lens highlights nutrient cycles, biodiversity, and ecosystem resilience. Integration requires linking outcomes across layers.

4.1 Livelihoods and Ecological Sustainability

Urban farming contributes to household income, food access, and employment in Nigerian cities. These socioeconomic gains, however, depend on sustained soil fertility, water availability, and ecosystem stability. Food systems research emphasizes that sustainability outcomes emerge from interactions between environmental and economic drivers [8]. When ecological foundations weaken, livelihood benefits decline. Soil fertility remains central. Continuous cultivation without organic replenishment reduces nutrient levels and yields. Where composting systems or organic amendments are absent, farmers rely on chemical fertilizers that may degrade soil structure over time. Urban ecology conceptualizes soil as part of a dynamic social ecological system shaped by human management [3]. Degraded soils lower productivity and increase vulnerability to climate variability. Water availability presents another constraint. In cities such as Kano and Ibadan, irrigation depends on shallow wells, streams, and seasonal rainfall. Over extraction of groundwater reduces water tables and raises pumping costs. Wastewater irrigation introduces contamination risks that affect both producers and consumers. Ecosystem service provision varies with scale and environmental context [5]. When hydrological systems become stressed, agricultural output declines. Urban sprawl further intensifies ecological pressure. Conversion of peri-urban farmland to residential and commercial uses reduces cultivation space and fragments ecological habitats [1]. As plots shrink, farmers intensify production on limited land, increasing soil and water stress. Livelihood resilience, therefore, depends on governance arrangements that protect agricultural zones and manage ecological resources sustainably.

Food systems scholarship highlights the need to identify drivers and feedback loops rather than focusing solely on output indicators [9]. Applying this perspective shows that income gains from urban farming rely on ecological stewardship. Sustainable practices such as composting, crop rotation, water quality monitoring, and soil conservation support long-term productivity. Without such stewardship, short-term income growth erodes future earning potential.

4.2 Gender and Equity Dimensions

Gender shapes participation and benefit distribution within urban farming systems.

Women frequently dominate vegetable production, small livestock rearing, and market vending in cities such as Lagos and Port Harcourt. They manage household food provisioning and often control small-scale retail activities. Despite their central role, women face structural disadvantages. Tenure insecurity disproportionately affects female farmers who lack formal land documentation or political connections. Customary land systems often privilege male lineage claims. Governance research in African urban food systems demonstrates that poverty and gender intersect with institutional arrangements to shape access to resources [7].

Limited access to credit compounds inequality. Formal financial institutions rarely target small-scale urban producers, and women depend heavily on informal savings groups. Knowledge networks also reflect gendered patterns. Training opportunities and extension services often prioritize male-dominated rural agriculture rather than urban vegetable production. Social ecological systems research emphasizes the importance of inclusive governance networks for resilience [11]. Excluding women from decision-making reduces adaptive capacity. Policy reforms should therefore address gendered land rights, equitable access to water and credit, and representation in market associations. Integrating gender analysis into urban food systems planning strengthens both equity and sustainability outcomes.

4.3 Informality as Systemic Feature

Informality shapes governance, infrastructure, and markets within Nigerian urban farming systems. Many producers operate without formal land titles, business registration, or regulatory oversight. Informal irrigation channels, temporary fencing, and roadside vending structures characterize daily practice. Rather than viewing informality solely as disorder, the framework treats it as an adaptive configuration within constrained institutional environments. Food systems scholarship recognizes that informal markets play a central role in food access for low-income populations [9]. In African cities, informal food networks often provide more affordable and accessible options than formal retail chains [7]. Urban farming integrates with these informal distribution channels. Urban ecology further suggests that adaptive practices emerge in response to institutional gaps [4]. Informal infrastructure compensates for limited state investment in irrigation, storage, and waste management. Farmers construct makeshift water diversion systems and composting pits to maintain productivity. These practices reflect innovation under constraint.

However, informality also creates vulnerability. Lack of legal recognition exposes farmers to eviction and harassment. Absence of health regulation increases contamination risks. Integrating informal systems into planning frameworks requires acknowledging their functional role while strengthening safeguards. A social ecological approach, therefore, reframes informality as a structural characteristic of urban food systems rather than a temporary deviation. Policy responses should focus on gradual formalization, participatory governance, and infrastructure support that build on existing adaptive practices. By aligning institutional reform with ecological sustainability and livelihood protection, Nigerian cities can strengthen urban farming as a resilient component of their food systems.

5. POLICY INTERVENTIONS

Policy intervention should address all four layers of the social ecological framework. Integrating governance, resource flows, infrastructure, and ecological monitoring strengthens coherence and long-term sustainability [8][3].

5.1 Governance Reform

Governance reform should embed urban farming within formal planning systems.

Incorporate urban farming into city master plans to secure spatial recognition and reduce arbitrary eviction. Integrating food systems into urban governance aligns with findings from African cities where institutional coordination improves food security outcomes [7].

Provide conditional land leases that grant medium-term tenure security while enforcing environmental standards. Secure tenure encourages investment in soil and water management [1].

Establish cross-sector food policy councils that connect planning authorities, agricultural agencies, environmental regulators, and civil society actors. Networked governance enhances adaptive capacity within social-ecological systems [11].

5.2 Resource Flow Optimization

Optimizing material flows improves productivity and reduces environmental risks.

Develop decentralized composting systems that convert market and household organic waste into soil amendments. Closing nutrient loops reflects core food systems sustainability principles [9].

Improve wastewater treatment to reduce pathogen and heavy metal contamination. Ecosystem service provision depends on environmental quality and spatial context [5].

Support cooperative irrigation schemes that regulate groundwater extraction and distribute costs. Collective resource management strengthens resilience in coupled human-natural systems [4].

5.3 Infrastructure Integration

Infrastructure planning must align with food system objectives.

Protect green belts and floodplains through regulated farming zones that balance cultivation with flood regulation and biodiversity functions [5].

Invest in cold storage and transport infrastructure to reduce post-harvest losses and stabilize market supply. Integrated infrastructure agendas enhance regional sustainability [2].

5.4 Ecological Monitoring

Ecological monitoring sustains long-term viability.

Conduct routine soil testing to identify contamination and nutrient depletion.

Promote agroecological practices that enhance soil structure and biodiversity [3].

Monitor groundwater extraction rates to prevent resource depletion.

APPLICATION AND LIMITATIONS

Applying this framework requires interdisciplinary collaboration across planning, agriculture, ecology, and public health. Data scarcity in Nigerian cities constrains analysis. Informal land transactions are difficult to quantify, and ecological monitoring systems remain weak.

Despite these constraints, the layered model clarifies systemic interdependencies. It shifts analysis from isolated project evaluation toward integrated urban food system transformation [8].

CONCLUSION

Urban farming in Nigeria is neither marginal nor temporary. It forms an integral component of urban food systems. A social-ecological perspective reveals its embeddedness in governance arrangements, metabolic flows, infrastructural configurations, and ecological dynamics. By adapting a layered urban food systems framework and grounding it in food systems thinking this paper provides a conceptual foundation for integrated research and policy. Sustainable urban futures in Nigeria depend on recognizing urban farming as both a socio-economic strategy and an ecological process. Future research should operationalize this framework through empirical case studies across diverse Nigerian cities. Policymakers should embed urban farming within broader sustainability and resilience agendas. Only through systemic integration will urban farming realize its transformative potential.

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Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

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