

HABITAT UNI Climate Change Hub Makerere University

1. Introduction

An estimated 40% of Africa's total population live in urban areas. Although urbanization rates vary between and within countries, there is an indication of a demographic shift toward an increasingly urban population on the continent. Future urbanization trajectories indicate an urbanizing Africa with increased wealth but vulnerable to climate variability and change. The key concern is how climate change impacts are likely to reinforce poverty and exacerbate urban food insecurity due to the double impacts of cities directly and rural areas, which significantly contribute to the urban food basket. The impacts of sea level rise, storm surges, saline water intrusion, coastal erosion, floods, and droughts are likely to have implication on urban systems, urban infrastructure, public health, economic development, local environmental resources, food security, and water supplies. These impacts will mostly affect the urban poor, women, elderly, and the young due to their vulnerability. As urbanization exacerbates these vulnerabilities, there is growing evidence that urban and peri-urban agriculture and forestry (UPAF) can play a role in poverty alleviation and potentially reduce vulnerability to climate change. We present a synthesis of scalable policy strategies of UPAF that have a potential to address climate change mitigation and adaptation. Studies on UPAF have often focused on the issues of livelihoods, poverty reduction, environmental pollution, health risks and urban policy emphasizing how cities can better provide safeguards from the negative consequences of UPAF. These negative consequences include particularly biological-chemical risks from grey water and heavy metal contamination. UPAF assessment has aided our understanding of production, distribution, access and utilization of crop nutrient reuse and recycling as well as urban food systems. There is a shift to the ecological importance of UPAF, focusing on the provision of ecosystem services, biodiversity conservation along the urban-rural gradient to support mitigation and adaptation to climate change.

Rationale for UPAF Policy

The extent to which UPAF is successful, particularly by enhancing food security and ecosystem services depends largely on how it is perceived by city officials and its level of integration with other urban policies. The key entry sectors for UPAF relate to ecosystem management, water and sewage management, and landscape management policies. UPAF still remains illegal in many African cities and this stems from concerns about health and other risks. For example, UPAF frequently incorporates the use of easily accessible resources of organic waste, sewage and market refuse for crop production. The risks as well as other concerns about UPAF have resulted in the disregard of UPAF as a formal land use and the development of restrictive UPAF policies in many cities. Two levels of UPAF targeted policy are synthesized to enable policy-makers adapt strategies that are appropriate to their specific cities.

2. Policy strategies for adaptation and mitigation of climate change in cities

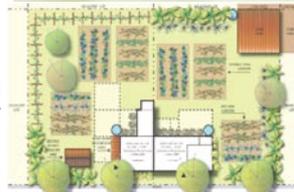
To address the risks associated with UPAF, several strategies and management options have been experimented in reducing poverty, enhancing urban ecosystem services through regulation of environmental processes. Moderation of micro climates, water filtration, nutrient reuse, biodiversity and supporting services for food production are critical for sustaining the local resource base upon which urban residents will increasingly depend. UPAF needs to be evaluated not only in terms of its contribution to food provisioning and to food security, but in relation to associated co-benefits for making cities resource efficient. The co-benefits of UPAF including storm protection, erosion control, flood regulation and micro climate moderation, carbon sequestration which have not been adequately integrated into urban policies. In cities of Ibadan, Kampala, Dakar, Douala, Nairobi and Addis Ababa, Accra, Kampala and Dar es Salaam UPAF has demonstrated flood reduction capabilities by extending the time lag between floods and storm runoff. In the case of coastal flooding, agroforestry has contributed to the reduction of coastal inundation during extreme events, for example, the cultivation of mangrove forests in Doula. In addition to reducing run off, more porous land surfaces support recharge of water tables and increase ground water flows. While wetland ecosystems are increasingly becoming recognized as economically sound and effective alternatives to traditional water treatment practices. City specific policies are needed to integrate management approaches that could help improve the provision of multiple ecosystem services through UPAF.

There are several pathways for climate mitigation and adaptation policy through urban agriculture. To reduce the carbon foot print of food consumed in cities, production of food close to cities or within city-regions has a potential to reduce the footprint. Likewise, instead of the tradition overhaul of organic wastes to landfills, cities can also promote nutrient recycling. The recycling of waste and sewage sludge for UPAF can enhance environmental quality and the functioning of ecosystem services. Although the aim was to reduce the waste problem, the co-benefits of emissions reduction, nutrient cycling, and reduced energy use can also be realized. Urban agriculture, especially city tree planting of multiple functional trees has a potential to sequester CO₂. These policies and strategies would have to include conservation of urban forest patches to sustain the ecosystem services. A strategy for mixing tree species is equally important since carbon sequestration capacity varies through the growth cycle of individual crop species.

The resilience of sub Saharan African cities will depend on how institutions, individuals, and authorities respond to reduce the climate change impacts. Effective local adaptation is key and this requires short to long-term planning. Although knowledge of UPAF's adaptation potential exists, this knowledge has



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“Planning for climate change in cities requires intergrated urban agriculture systems.”



been scattered in reports and project documents, and are mostly site specific. Evidence on micro-scale adaptations exists on how urban agriculture is helping communities and cities to adapt but these require scaling up. Adapting to climate change impacts associated with extreme events such as flooding has been evaluated with a range of agro-enterprises, including productive greening strategies with fruit trees, herbal shrubs, high-value vegetables on hill slopes and in valleys to increase water infiltration and to reduce potential flood occurrence. In addition, the harvesting of rain water and run off has a potential for providing water for all year production of crops in cities. Increased urban agriculture and forestry also has potential to moderate micro climates and to reduce impacts of heat waves. UPAF demonstrates scalable adaptation strategies that create jobs, enhance food security and support livelihoods. In this manner, UPAF links poverty and climate change if strategies are designed to address the impacts. Cities have begun to take steps to review bylaws and regulations that have long restricted urban agriculture. For example, colonial zoning bylaws have been revised to allow for specific production systems in specific zones in Kampala, Uganda and Kumasi, Ghana. Agriculture has been incorporated into urban expansion plans for Kinshasa, Dar es Salaam, Dakar, Bissa and Maputo. In Lagos and Ibadan, state governments have embarked on urban greening programmes involving tree and grass planting in strategic public open spaces including road islands and road setbacks as well as roundabouts. Although the aim is to promote city aesthetics, this practice of policy support has indirect benefits to building resilience for climate change. Recognition of UPAF as a formal land-use is an important step towards its incorporation with more comprehensive and tailored city strategies to reduce their overall ecological footprint and increase resilience to climate change.

3. Possible Policy Strategies for Integrated UPAF Systems

Integrating UPAF in city plans and development for resilience will require UPAF enterprises that are designed to recycle nutrients, improve water and pollution management, reduce waste streams to landfills and create value chains that can create economic opportunities or enhance food security for the urban dwellers especially the poor. There are economically feasible, socially acceptable and environmentally supportive enterprises that offer entry points for integrating urban agriculture in development for climate mitigation and adaptation. Four integrated systems are important for policy in building urban resilience. 1) Integrated crop-livestock systems: This type of UPAF system can be practiced with benefits of enhancing food production and security but mainly nutrient recycling. 2) Urban agroforestry systems: This type of UPAF system can occur in two forms. First, planting multi-purpose trees and shrubs for food production that would sequester CO₂. Second is the form that can be practiced in peri-urban zones with a little more land for production. 3) Aquaculture-livestock-cropsystems: This type of system hinges on nutrient recycling and utilization and has a potential to reduce organic wastes that would otherwise emit GHGs. This type has a high potential to contribute toward food security and enhance livelihoods while mitigating climate change by adding fish production to the urban agriculture and livestock industry of cities. 4) Crop systems: This forth strategy is associated with cities that have extensive peri-urban green zones or institutional land patches. These cities, still have a high potential to contribute significantly toward food security. Urban crop systems of a wide range of crop types can play a significant role in addressing the urban heat is land, coastal erosion and flood control.

4. Conclusion

UPAF plays a variable but often substantial role in sub-Saharan African urban livelihood strategies. While challenges and risks exist, especially in relation to health, conflict with other land uses and outdated planning regulations, well managed UPAF policy supported strategies of crop systems, crop-livestock integrated systems, crop-forestry systems and aquaculture-livestock-crop integrated systems have considerable potential to promote urban mitigation of, and adaptation to climate change. UPAF contributions to adaptation come in several forms of sustainable employment, resource efficiency, promoting urban food security. This will support adaptation to threats by building long-term resilience with supporting infrastructure. While climate mitigation will be achieved through CO₂ sequestration and avoidance of Methane from landfills.

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