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Drivers and Challenges of Indigenous Floriculture in Urban Road Reserves: Evidence from Old Bagamoyo Road, Dar es Salaam, Tanzania

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ABSTRACT

This study investigates the drivers and challenges of indigenous floriculture in urban road reserves along Old Bagamoyo Road, Dar es Salaam. Roadside floriculture has become a livelihood strategy, driven by unemployment, rising demand for ornamental plants, and the availability of road reserve spaces. Using interviews, questionnaires, and field observations, data were collected from 120 practitioners. Results show that floriculture contributes significantly to household income, with average monthly earnings of TZS 250,000–400,000, while 68% of respondents reported improved living standards. Beyond income, floriculture enhances urban aesthetics and biodiversity. However, challenges persist: 74% cited insecure land tenure, 59% lacked access to credit, and over half faced threats from urban expansion policies. Despite these constraints, indigenous knowledge remains central to sustaining roadside gardens. The study concludes that floriculture in road reserves is both an informal economic activity and an ecological service, warranting recognition in urban planning. Policy interventions should integrate local knowledge, provide institutional support, and safeguard spaces for floriculture to advance sustainable urban development.

Keywords: Green infrastructure management; Informal urban livelihoods; Land use constraints; Peri-urban horticulture; Sustainable streetscape practices

INTRODUCTION

Urban green spaces (UGSs) have gained substantial attention in global urban planning discourses due to their multifaceted role in enhancing ecological sustainability, public health, and social cohesion within increasingly dense urban environments (Addas, 2023; Dmitrović et al., 2025). In the context of rapid urbanization, modern cities are facing mounting challenges associated with environmental degradation, loss of biodiversity, and growing public health concerns. Internationally, the integration of green infrastructure, including floriculture, into urban design frameworks is viewed as a significant step toward mitigating these challenges while supporting the transition to sustainable and livable cities (Zhang et al., 2021; Gunapala et al., 2025). Urban floriculture, particularly when indigenous species are prioritized, has emerged as a component of broader urban agriculture and green infrastructure strategies, contributing both ecological value and sociocultural relevance (Artmann & Sartison, 2018; Pradhan et al., 2024).

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Globally, indigenous floriculture plays a role not only in enhancing the aesthetics of cities but also in contributing to the functionality of UGSs, such as regulating ecosystem services including air purification, temperature moderation, and soil stabilization (Zhang et al., 2021; Charles et al., 2020). These ecosystem functions are vital in mitigating the environmental impacts of dense urban development. Research conducted in European and North American cities indicates that the strategic use of urban spontaneous vegetation (USV) and informal green spaces (IGS) can facilitate biodiversity conservation and improve perceived urban well-being (Włodarczyk-Marciniak et al., 2020; Phillips & Lindquist, 2021). In this context, urban floriculture, especially when based on local or indigenous species, is aligned with efforts to establish sustainable and contextually relevant UGSs. Several studies highlight that ecosystem services derived from floriculture extend beyond environmental benefits. Dmitrović et al. (2025) emphasized the psychological and social contributions of UGSs, revealing that urban residents derive well-being from the presence of biodiverse and functionally designed green areas. The concept of service sheds further light on the spatial relationship between ecological benefits and urban beneficiaries, offering a framework for urban ecosystem service delivery through vegetation planning (Charles et al., 2020). Moreover, the use of Nature-Based Solutions (NbS) such as floriculture in urban design has been supported as a viable mechanism to address climate change adaptation, food security, and biodiversity loss in urban areas (Artmann & Sartison, 2018). This integration of ecological and social functions highlights the necessity of studying floriculture not merely as ornamentation but as a strategic component of urban sustainability.

Urban green infrastructure is increasingly central to development debates in Sub-Saharan Africa, where urban expansion has not always been met with adequate green planning. In many African cities, including those in Tanzania, rapid urban growth is leading to increased demand for land and corresponding loss of natural vegetation cover. Despite this, the integration of indigenous vegetation in urban planning remains limited, and the potential contributions of floriculture to urban sustainability are underexplored. Research has suggested that green spaces, when effectively integrated into the urban fabric, can reduce reliance on costly and carbon-intensive infrastructure while addressing environmental and health risks such as air pollution, urban heat islands, and flood vulnerability (Mwageni, 2023). In addition, the multifunctionality of green spaces is being re-examined in light of their potential to address broader urban vulnerabilities, especially in low- and middle-income cities (Gunapala et al., 2025). In the East African context, floriculture has typically been viewed through the lens of commercial horticulture, often targeting export markets and involving non-native species. However, recent interest in indigenous species for urban applications reflects growing recognition of their adaptability, ecological compatibility, and cultural resonance. In urban Tanzania, particularly Dar es Salaam, informal practices such as potted street gardens and spontaneous vegetation management reflect an ongoing negotiation between residents, planners, and environmental conditions (Afrad & Kawazoe, 2020; Threlfall & Kendal, 2017). These practices demonstrate varying degrees of success and acceptance, influenced by socioeconomic status, governance capacity, and spatial limitations.

In Dar es Salaam, the role of indigenous floriculture within urban road reserves exemplifies this intersection of informality, ecological potential, and urban management. Road reserves, often characterized by underutilized or mismanaged space, offer a spatial niche where floriculture can serve multiple purposes, ranging from aesthetic beautification to environmental regulation and microclimatic modification (Addas, 2023). While these areas present potential sites for floricultural development, their informal usage also introduces challenges related to tenure security, maintenance, and regulatory clarity. The experiences of

cities like Graz in Austria and Novi Sad in Serbia illustrate how structured planning and community engagement can contribute to increased satisfaction with and performance of UGSs (Addas, 2023; Dmitrović et al., 2025). These international lessons suggest potential pathways for localized implementation in cities like Dar es Salaam. Urban floriculture practices, especially those that incorporate indigenous species, contribute significantly to regulating services that can mitigate the environmental pressures exerted by dense road networks. The concept of human appropriation of net primary production (HANPP) provides a useful lens through which to understand how floriculture affects broader ecosystem processes (Zhang et al., 2021). As HANPP increases due to infrastructural expansion, the regulating capacity of ecosystems declines, unless offset by restorative vegetation strategies such as indigenous planting (Urrego-Mesa et al., 2019; Paudel et al., 2021). The potential role of floriculture in reversing or stabilizing this trend points to its relevance in the sustainability agenda of rapidly urbanizing cities.

Despite the ecological and social benefits, several constraints to urban floriculture in Tanzanian cities remain. These include limited institutional support, lack of formal recognition in policy frameworks, competing land-use priorities, and insufficient public awareness regarding the ecosystem functions of indigenous vegetation (Prévot et al., 2018; Artmann & Sartison, 2018). Moreover, as noted in studies from cities like Łódź and Detroit, public perception plays a significant role in determining the success or failure of floriculture-based interventions in informal or semi-formal urban spaces (Włodarczyk-Marciniak et al., 2020; Phillips & Lindquist, 2021). In Dar es Salaam, the fragmentation of responsibility between local government, road authorities, and community actors further complicates the establishment of sustainable and well-maintained green interventions in road reserves. Understanding the drivers and challenges of indigenous floriculture in these spaces requires a multi-scalar analysis that incorporates both ecological functionality and the socio-political context of urban land management. In many cases, informal floricultural practices emerge from a sense of civic responsibility or aesthetic preference among residents, yet lack technical guidance or regulatory backing (Gusto et al., 2023). Studies have shown that the success of pro-biodiversity initiatives is frequently linked to individuals' connectedness with nature and access to experiential knowledge, rather than formal education or policy enforcement alone (Prévot et al., 2018). Consequently, fostering biodiversity conservation in urban settings such as Dar es Salaam may benefit from integrating local knowledge and participatory planning approaches that elevate indigenous floricultural practices (Manikas et al., 2020).

The present study focuses on Old Bagamoyo Road in Dar es Salaam, a vital transport corridor marked by rapid urbanization, increasing vehicular activity, and spatial pressure on green reserves. As one of the city's primary road arteries, Old Bagamoyo Road represents a critical urban landscape where informal and formal green interventions intersect. This site offers a unique case for investigating the operational dynamics, benefits, and limitations of indigenous floriculture in road reserves. The study explores how local actors navigate governance structures, resource limitations, and spatial constraints to implement floriculture practices, and the extent to which these efforts contribute to environmental regulation, aesthetic enhancement, and community well-being. Through this lens, the research contributes to ongoing academic discussions about the multifunctionality of UGSs, especially in African urban contexts where infrastructural investment often outpaces green planning. Insights from this study aim to inform urban policy and practice, particularly in identifying scalable, contextually appropriate strategies for integrating floriculture into urban infrastructure planning. The inclusion of indigenous species is emphasized not only for their

ecological suitability but also for their potential to anchor urban identities and enhance the cultural relevance of green interventions in Tanzania's rapidly urbanizing environments.

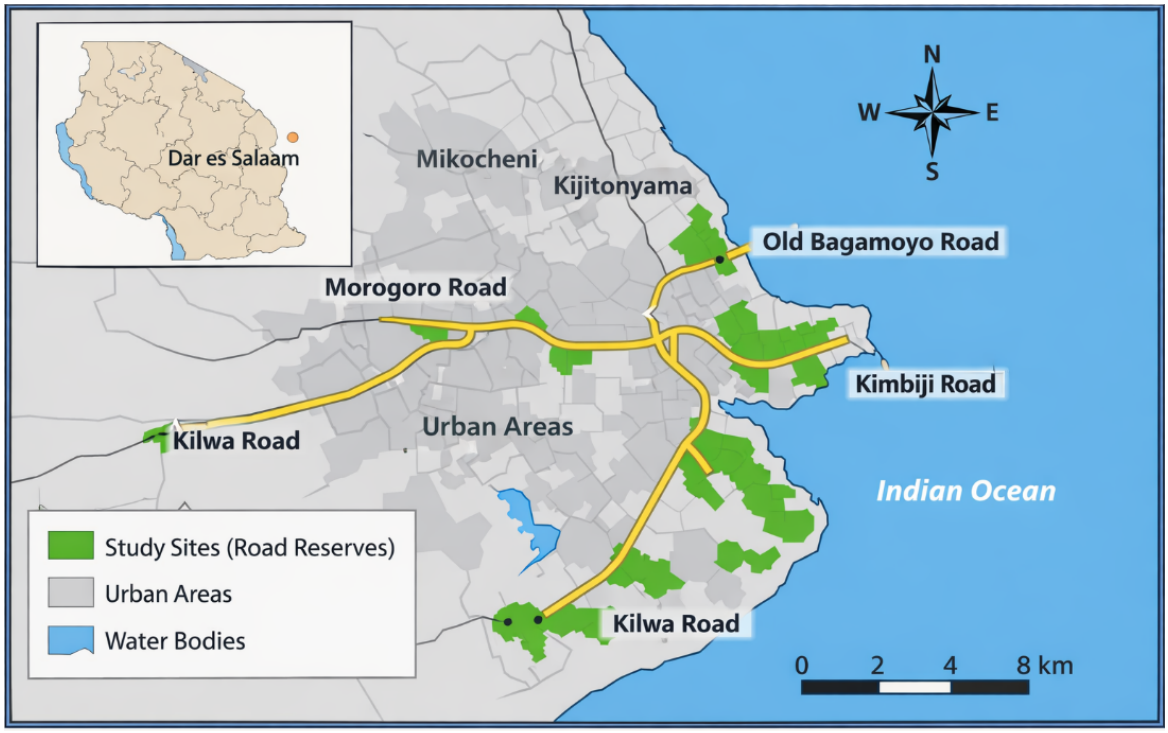
RESEARCH METHODOLOGY

Research design

This study employed a mixed-methods research design, integrating both quantitative and qualitative approaches to generate a comprehensive understanding of floriculture practices along road reserves in Kinondoni Municipality, Dar es Salaam. The combination of numerical data and interpretive insights was essential to investigate the socio-economic relevance, land use dynamics, and indigenous plant cultivation within these peri-urban spaces. Quantitative methods enabled the identification of patterns, distributions, and measurable characteristics of floriculture activities. In contrast, qualitative methods allowed for an exploration of the lived experiences, motivations, and spatial interactions of floriculturists and stakeholders. The mixed-methods approach offered a valuable framework for triangulating data, enhancing both the validity and richness of the findings.

Study area

The study was conducted in Kinondoni Municipality, one of the three administrative districts of Dar es Salaam, Tanzania. Situated along the eastern coastline, Kinondoni spans approximately 321 square kilometres and comprises a heterogeneous urban landscape that includes residential settlements, commercial centres, and agricultural enclaves. The study specifically focused on Old Bagamoyo Road, a key transport corridor that extends through the wards of Msasani, Mikocheni, and Kawe. This arterial route plays a pivotal role in linking the northern suburbs to the inner city and has become an informal locus for floriculture activity. Road reserves along this corridor have been appropriated for the cultivation of ornamental and indigenous plants by local residents and small-scale horticulturists. These practices are visible manifestations of community engagement in urban greening, contributing both aesthetic and ecological value while also serving as informal economic opportunities. The choice of Old Bagamoyo Road as the study site was informed by its diverse floriculture presence, accessibility, and its position within broader urban development dynamics. Its visibility and strategic urban location offered a fertile ground for examining how floriculture is integrated into the public landscape and how such integration intersects with issues of land access, livelihood sustainability, and the preservation of indigenous plant species.



Map 1: Case study area

Sampling strategy

The study employed a purposive sampling strategy to identify individuals actively engaged in floriculture along Old Bagamoyo Road. This approach facilitated the deliberate selection of participants based on their direct involvement in plant cultivation and sale, ensuring the collection of relevant and experience-based data. Snowball sampling was also used to expand the sample size, allowing initial participants to refer others who were similarly engaged in floriculture activities but may have been otherwise difficult to identify through formal records due to the informal nature of many operations. In total, sixty floriculture practitioners were selected to complete structured questionnaires. In addition, five key informants, including municipal planning officials, ward leaders, and experienced local florists, were identified and interviewed to provide institutional and historical perspectives on floriculture practices and urban land use management. Two focus group discussions were conducted, each comprising between six and eight participants who were drawn from various floriculture sites within the wards of Mikocheni and Kawe. These discussions were instrumental in generating collective insights on the challenges and strategies that define floricultural engagement in Kinondoni. To complement participant-reported data, field observations were also carried out across twelve floriculture plots to assess plant varieties, land management practices, and the spatial organization of activities.

Data collection methods

Structured questionnaires were administered in person to floriculture practitioners working along the selected sections of Old Bagamoyo Road. The questionnaires were designed to elicit information on a range of variables, including the types of plants cultivated, sources of income derived from floriculture, land tenure and usage rights, access to water and other resources, educational background of practitioners, and perceptions of environmental and economic benefits associated with floriculture. The questionnaire was pre-tested with a small

group of practitioners before the main data collection phase. This step allowed for refinement of question clarity and improved the overall reliability of the instrument.

Semi-structured interviews were conducted with five key informants to explore expert perspectives on floriculture, urban green space planning, and informal land use. These interviews were particularly focused on examining regulatory frameworks, support mechanisms available to local floriculturists, challenges related to the use of road reserves for plant cultivation, and the role of floriculture in contributing to urban sustainability. The flexibility of the semi-structured format facilitated in-depth discussion while maintaining consistency across participants. In addition to individual interviews, two focus group discussions were held with floriculture practitioners from different locations along the study corridor. These discussions allowed participants to collectively reflect on shared experiences, constraints, and locally developed solutions related to land access, competition for space, and plant theft. The group setting also fostered interaction among practitioners, providing additional insights into communal practices, informal collaborations, and cultural preferences in plant selection, especially the use of indigenous species.

Field observations were conducted at floriculture sites during different times of day to examine plant health, plot maintenance routines, the relationship between plantings and surrounding infrastructure, and informal tenure indicators such as fences or demarcated plots. Observational data were recorded using standardized templates and were supplemented with photographic documentation to support thematic analysis. Particular attention was given to the types of flora being cultivated, with a view to distinguishing between indigenous and exotic species and understanding the reasoning behind practitioners' choices.

Data analysis

Quantitative data obtained from structured questionnaires were coded and entered into the Statistical Package for the Social Sciences (SPSS) and Microsoft Excel for analysis. Descriptive statistics such as means, frequencies, percentages, and cross-tabulations were used to profile participants and summarize key variables. Visual representations including tables and charts were generated to facilitate the interpretation of trends related to plant selection, land tenure arrangements, and income levels associated with floriculture. Qualitative data from interviews, focus group discussions, and field notes were analysed using thematic analysis. This involved transcribing audio recordings, reading the transcripts multiple times, and assigning initial codes to significant segments of text. These codes were then organized into themes that reflected recurring ideas and patterns across participants. Themes were developed to capture the socio-cultural, economic, and environmental dimensions of floriculture as practiced along road reserves. Attention was given to identifying contrasts between institutional perspectives and practitioner experiences, particularly in relation to indigenous plant use and informal urban greening efforts. Verbatim excerpts from participant narratives were used to illustrate salient themes and enhance the interpretive depth of the analysis. To improve the trustworthiness of the findings, data triangulation was employed. This involved comparing and cross-validating information obtained from questionnaires, interviews, focus group discussions, and direct observations. Triangulation helped to ensure consistency across data sources and contributed to a more robust understanding of the floriculture practices and their implications for urban sustainability.

Ethical considerations

Ethical protocols were observed throughout the research process to ensure the integrity and responsibility of the study. All participants were fully informed of the objectives of the research and provided their voluntary consent before participating. Confidentiality was maintained by anonymizing personal identifiers and securing all data in password-protected digital files. Participants were also informed of their right to withdraw from the study at any time without consequence. Institutional and local approvals were obtained prior to fieldwork. These included formal permissions from the Kinondoni Municipal Council and ward leadership, as well as informal consent from site custodians and community leaders where necessary. Ethical guidelines regarding respectful engagement, cultural sensitivity, and transparency in reporting were strictly followed during all interactions.

Methodological justification

The methodological framework adopted in this study was intentionally designed to respond to the complexity of floriculture as an emergent and often informal practice within urban Tanzania. The integration of qualitative and quantitative tools made it possible to examine floriculture from multiple vantage points, capturing both the empirical characteristics of the practice and the subjective meanings attributed to it by those directly involved. In particular, the focus on road reserves as multifunctional urban spaces required a methodology capable of interrogating the intersections between informality, spatial justice, ecological consciousness, and local economic activity. The inclusion of both institutional voices and community actors enabled a balanced representation of the dynamics shaping floriculture in Kinondoni and provided a critical foundation for subsequent analysis and interpretation.

RESULTS

Socio-demographic characteristics and participation patterns in floriculture

The socio-demographic composition of respondents engaged in indigenous landscaping reveals substantial implications for labour dynamics, educational access, and economic dependency patterns within the informal floriculture sector of Dar es Salaam. A review of educational attainment levels demonstrates a labour force with limited formal academic credentials (Table 1). Nearly half of respondents (48%) reported primary school as their highest level of education, while an additional 25% did not complete primary education. These figures reflect a constrained educational trajectory for the majority, shaping the types of economic activities accessible to them. Only 20% had completed secondary school, and a mere 7% attained tertiary education through a diploma or degree. The low representation of post-secondary qualifications restricts entry into formal labour markets and reinforces reliance on informal economic activities such as floriculture. Economic dependency on floriculture further emphasizes this structural limitation. Over half of respondents (58%) reported floriculture as their sole livelihood source, suggesting limited diversification of income streams. The remaining 42% supplement floriculture with other informal work, including vegetable farming, transportation services, and petty trade. This pattern reveals both the economic significance and the fragility of floriculture as a livelihood strategy, particularly in the context of fluctuating urban land use and market access.

Gender representation within the sector is highly imbalanced. Men account for 98% of those engaged in floriculture activities, while women comprise just 2%. This disparity reflects a broader gendered division of labour, where physical demands, cultural perceptions, and unequal access to resources shape participation. The near-exclusion of women points to persistent barriers within the sector, whether related to land access, mobility, or occupational

norms. Despite the informal nature of floriculture, it remains subject to structural gender inequalities that limit its inclusive potential. Without targeted interventions, such as gender-responsive training and support programs, this imbalance is unlikely to shift. TThe combined analysis of education, economic reliance, and gender participation indicates that indigenous landscaping functions as a survivalist enterprise for undereducated urban residents, particularly men. Its informal character provides low-barrier entry but limits upward mobility and resilience. Enhancing access to education, diversifying income strategies, and removing gendered obstacles are central to improving both livelihoods and equity within this segment of urban agriculture.

Table 1: Socio-demographic characteristics and economic participation of respondents in indigenous floriculture

Variable	Category	Percentage (%)
Education level	Below Standard Seven	25
	Primary School Completed	48
	Secondary School Completed	20
	Diploma or Degree	7
	Total	**100**
Dependence on floriculture	Solely Floriculture	58
	Floriculture + Other Activities	42
	Total	**100**
Gender participation	Male	98
	Female	2
	Total	**100**

Socio-economic and spatial drivers of indigenous landscaping along road reserves

The findings reveal a complex interplay of socio-economic motivations and spatial opportunities contributing to the growth of indigenous landscaping practices along road reserves in Dar es Salaam, particularly in Kinondoni Municipality. Floriculture along these marginal urban spaces has evolved not merely as an aesthetic enhancement but also as a livelihood strategy shaped by structural constraints and local agency. The data suggest that a multiplicity of factors, both individual and systemic, contribute to the expansion of this activity, with substantial differences in participation levels and motivational drivers across the study area. As presented in Table 2, the most frequently cited driver of engagement in floriculture was income generation, accounting for 20% of the responses. Participants consistently identified floriculture as a principal source of household income, enabling expenditures on essentials such as food, rent, healthcare, and education. Monthly earnings from this activity range from TShs 500,000 to 2,500,000 for proprietors, while employees receive between TShs 70,000 and 300,000. The activity thus provides a significant contribution to informal urban economies and household sustenance, particularly in a context where formal employment is limited.

The availability of road reserves, also reported by 20% of respondents, reflects the spatial dimensions of floriculture growth. These open urban spaces have become sites of informal land use, providing accessible terrain for plant cultivation. Approximately 93% of respondents identified road reserves as facilitating their participation in floriculture. Despite their temporary and often insecure tenure, such spaces offer proximity to clients and visibility

for sales, especially in high-traffic areas such as Old Bagamoyo Road, Morogoro Road, and Kilwa Road. However, expansionary urban infrastructure projects have introduced instability, requiring floriculturists to periodically relocate. A shortage of employment opportunities, cited by 19% of respondents, further reinforces the economic rationale behind this activity. With 73% of participants reporting completion of primary education or less, access to formal jobs remains constrained. Floriculture thus emerges as a practical alternative, enabling income without the prerequisite of advanced education. Respondents noted that participation in this field also diverts youth from engaging in delinquent behaviour, suggesting an ancillary social benefit. The demand for ornamental and indigenous plants was also identified as a contributing factor, cited by 18% of respondents. This demand stems from residential beautification efforts, formal events, and commercial landscaping needs. Participants highlighted regular purchases for weddings, business functions, and private homes, especially during weekends. This sustained market provides incentive for the continued cultivation and diversification of plant varieties. Environmental concern and recreational interest were noted by 15% of respondents. Participants with higher educational attainment were more likely to identify ecological motivations, including the contribution of floriculture to improved air quality, visual aesthetics, and the reduction of waste accumulation in underutilized urban spaces. These respondents perceived floriculture as both meaningful and enjoyable, blending environmental ethics with livelihood strategy.

Prior experience in horticultural work accounted for 4% of responses. This experience was typically gained through employment in private gardens, expatriate households, or landscaping firms. Participants reported leveraging these skills to establish independent ventures, reflecting a form of informal vocational capital that facilitates self-employment. As one participant from Msasani Ward explained, prior work with expatriate gardeners during the 1990s laid the foundation for their current business. Smaller proportions of respondents cited intergenerational inheritance (3%) and peer influence (2%) as enabling factors. In some cases, floriculture enterprises were inherited from parents or older relatives, while in others, individuals were motivated by observing the success of peers engaged in the activity. These findings suggest that floriculture also operates within familial and social networks, reinforcing its embeddedness in community life.

Table 2: Factors influencing the growth of floriculture along road reserves

Factor	Percentage (%)
Income generation	20
Availability of open spaces	20
Shortage of employment	19
High demand for ornamental plants	18
Environmental conservation & hobby	15
Experience from previous work	4
Family heritage	3
Peer influence	2
Total	**100**

The spatial distribution of floriculture practices across selected road corridors further highlights the concentration of activity in specific locations. As shown in Fig. 1, 53% of floriculturists were based along Old Bagamoyo Road, followed by 28% along Kimbiji Road. Other roads such as Morogoro, Kilwa, and Nyerere recorded significantly lower proportions.

This distribution points to spatial clustering, likely shaped by factors such as foot traffic, land availability, soil conditions, and proximity to high-income residential neighbourhoods. Old Bagamoyo Road, in particular, supports the highest concentration of floriculture plots, suggesting a localized hub of activity and a favourable environment for plant cultivation and sale.

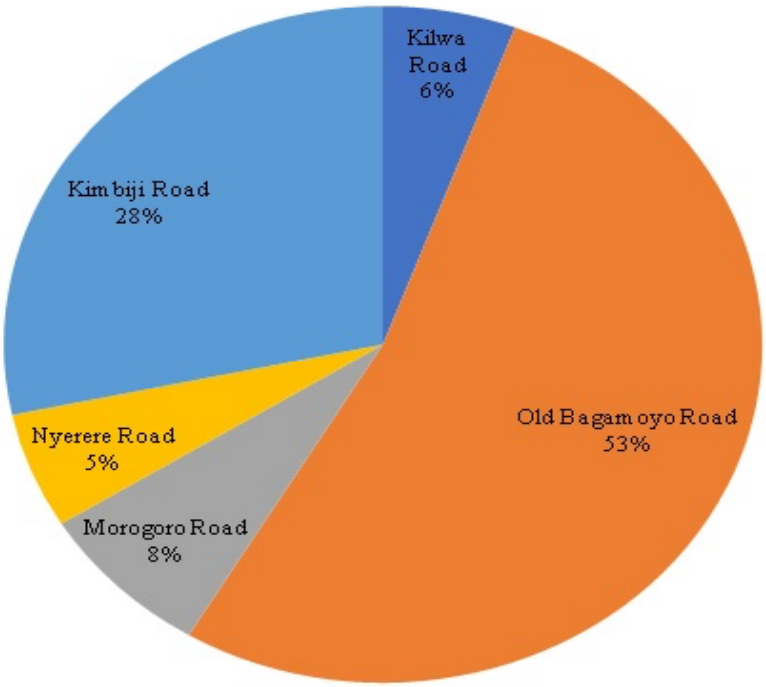


Fig. 1: Distribution of indigenous landscaping activities across five road reserves

Descriptive statistics from the comparative analysis of floriculture factors and indigenous landscaping practices are summarized in Table 3. This analysis supports the conclusion that indigenous landscaping exhibits a higher mean and greater variation relative to general floriculture factors. Specifically, indigenous landscaping had a mean value of 20.2, compared to 12.6 for the broader floriculture-related variables. The standard deviation for indigenous landscaping was also higher at 20.5, indicating greater variability in practice or perception across respondents. Skewness and kurtosis values suggest asymmetry and non-normality in both data sets, though the distribution for indigenous landscaping is more positively skewed, suggesting that a smaller group of participants reported significantly higher activity levels. The coefficient of variation, which measures relative dispersion, was also higher for indigenous landscaping, underscoring its uneven distribution and potentially site-specific dynamics.

Table 3: Descriptive statistics for floriculture and indigenous landscaping variables

Statistic	Floriculture factors	Indigenous landscaping
N	8	5
Min	2	6
Max	20	53
Mean	12.6	20.2
Std. error	2.9	9.2
Variance	66.3	422.2

Stand. dev	8.1	20.5
Median	16.5	8
25 prcntil	3.25	6
75 prcntil	19.75	40.5
Skewness	-0.5	1.4
Kurtosis	-2.1	0.9
Coeff. var	64.5	101.7

Livelihood contributions of indigenous landscaping

The contribution of indigenous landscaping to household livelihoods in Dar es Salaam reflects a broader pattern of urban informal employment, where economic survival is secured through low-capital, labour-intensive ventures. The data indicate that floriculture plays a substantive role in income generation, employment creation, and social stabilization within the city's marginal spaces, particularly along road reserves. A significant proportion of floriculturists operate on a full-time basis, with 58% of respondents reporting floriculture as their sole economic activity (Table 4). The remaining 42% combine it with other forms of informal work such as petty trading, masonry, or transport services. These figures reflect not only the centrality of floriculture in household economies but also the economic precarity that necessitates income diversification. For proprietors, monthly earnings from floriculture range between TShs 500,000 and TShs 2,500,000, while hired labourers receive between TShs 70,000 and TShs 300,000. This level of income, although modest in the context of formal employment benchmarks, is sufficient for many to meet essential needs such as rent, food, school fees, and medical expenses.

The sector's reach extends beyond plant sales. A number of floriculturists also engage in complementary services, including landscaping for private clients, supplying flowers for events, selling gardening tools, and planting trees in urban green spaces. These services can yield an additional TShs 100,000 to 500,000 per month. These multifaceted income streams point to an adaptive strategy that maximizes the use of available urban space and client demand. In total, over 794 individuals are employed in the floral sector across five key road reserves. This employment base contributes not only to economic sustenance but also to broader urban stability. Respondents noted that floriculture activities provided meaningful work for youth who might otherwise remain idle or become vulnerable to informal or criminal economies. As such, the sector is perceived to have a stabilizing effect on social conditions, particularly in lower-income areas.

Environmentally, the presence of floriculturists in road reserves has helped reduce informal dumping by repurposing underutilized urban land for cultivation and beautification. In doing so, these activities contribute to improved urban aesthetics and micro-ecological benefits, even if they operate within contested or insecure tenurial arrangements. The combined economic, social, and environmental benefits demonstrate that indigenous landscaping functions as more than a subsistence strategy. It is a responsive form of urban adaptation that addresses both livelihood and ecological deficits in rapidly urbanizing spaces.

Table 4: Livelihood contributions and income sources in indigenous landscaping

Livelihood aspect	Details
Sole dependence on floriculture	58% of respondents

Mixed livelihood strategies	42% of respondents (e.g., petty trade, driving, masonry)
Monthly income (owners)	TShs 500,000 – 2,500,000
Monthly income (employees)	TShs 70,000 – 300,000
Income from landscaping services	TShs 100,000 – 500,000
Total estimated employment	Over 794 individuals across five road reserves
Additional activities	Event floral supply, tool sales, tree planting
Social benefits	Youth employment, reduced informal/criminal activity
Environmental contributions	Reduced waste dumping, improved urban aesthetics

Interpretation of constraints in the floriculture sector

Floriculture in Dar es Salaam, while economically significant for many informal workers, remains burdened by a set of interrelated constraints that limit its productivity, sustainability, and potential for expansion. The challenges reported by respondents span environmental, institutional, financial, and technical dimensions, reflecting the fragile foundations upon which this informal urban sector operates. Water scarcity emerged as the most widely reported constraint, affecting 85% of participants (Table 4). This problem is particularly acute during the dry season when access to safe irrigation water becomes limited, compelling floriculturists to rely on polluted or insufficient water sources. The direct consequence is stunted plant growth, reduced yields, and a higher vulnerability to disease.

Limited access to capital was reported by 80% of respondents. The inability to secure financing constrains the purchase of essential agricultural inputs such as improved seeds, fertilizers, and pesticides. This resource deficit compromises both the quality and scale of production and reflects broader exclusion from formal financial systems, often exacerbated by the unregistered status of most floriculture enterprises. Seasonal fluctuations in market demand were also cited by a substantial proportion (75%) of floriculturists. Sales tend to decline during dry periods, and the absence of reliable demand forecasting or market linkages leaves many unable to adjust their production or pricing strategies accordingly. This contributes to income instability and wastage of unsold stock.

Land tenure insecurity presents another structural limitation, with 70% of respondents indicating that their operations are vulnerable to displacement due to road expansion or redevelopment. Since floriculture activities are typically located in road reserves—spaces not legally designated for permanent settlement—cultivators are exposed to periodic eviction without compensation. A lack of government recognition was identified by 65% of participants as a barrier to growth. Unlike other agricultural sub-sectors such as food crops or livestock, floriculture remains absent from official municipal data systems, limiting access to public funding, training programs, and infrastructure support. This lack of institutional visibility weakens policy advocacy and prevents formal sector integration.

Over half of the respondents (60%) cited pest and disease outbreaks—especially fungal infections—as a major problem. These affect the aesthetic and biological quality of plants, thereby reducing market value. Simultaneously, 55% of participants reported challenges in gaining direct market access. Small-scale floriculturists are often bypassed in procurement processes, with institutions favouring larger suppliers, which reduces income opportunities for those in the informal sector. Technical constraints also remain pronounced. Fifty percent of respondents noted deficiencies in farming techniques and access to appropriate technologies. Antiquated cultivation practices and a lack of training reduce productivity and compromise the competitiveness of floriculture in urban markets. The absence of modern

irrigation systems, spades, and sprayers—cited by 45%—further compounds these inefficiencies. The absence of collective organization presents a structural barrier to sectoral development. Only 40% of respondents indicated involvement in any form of farmer group or association. This weak institutional cohesion hampers collective bargaining, advocacy, and access to shared resources or information.

Table 5: Major challenges reported by floriculturists in Dar es Salaam

Challenge	Percentage (%) of respondents affected
Shortage of water and unsafe water	85
Low capital for buying inputs	80
Low market demand during dry seasons	75
Insecure tenure of road reserves	70
Lack of government recognition	65
Pest and disease infestation	60
Lack of direct market access	55
Low skills and technology	50
Shortage of working tools	45
Poor solidarity among farmers	40

Proposed strategies for strengthening the floriculture sector

In response to the multiple challenges facing floriculture in Dar es Salaam, both key informants and survey respondents outlined a series of strategic interventions aimed at improving the resilience, productivity, and formal recognition of the sector. These recommendations, while varied in scope, converge around institutional reform, infrastructure development, market access, and capacity enhancement. The most widely supported intervention, endorsed by 85% of respondents, was formal government recognition and support for floriculture (Table 6). This proposal reflects a critical gap in municipal and national planning frameworks, where floriculture remains excluded from agricultural development agendas. Recognizing the sector as a legitimate urban economic activity would facilitate access to public resources, policy protections, and urban planning initiatives. This recognition is essential to ensure that floriculture benefits from the same levels of support granted to other agricultural sub-sectors.

Closely aligned with this recommendation is the establishment of dedicated floriculture zones, supported by 80% of respondents. These zones would offer secure tenure and infrastructure specifically tailored to the needs of floriculturists. Such areas could reduce displacement risks associated with urban road expansion and provide the physical conditions necessary for sustainable cultivation—such as access to water, shelter, and transportation networks. This approach also has the potential to organize the sector spatially, improving visibility and accessibility to customers. Capacity building through training and technical support was highlighted by 75% of participants. The sector currently suffers from skill shortages and reliance on outdated practices. Structured training programs in business management, pest control, sustainable horticulture, and post-harvest handling would equip floriculturists with the tools to improve both the quantity and quality of their output. This also creates opportunities to adopt climate-resilient practices and introduce value-added services such as landscape design.

The issue of market access emerged as another critical area of concern, with 70% of respondents advocating for reforms to procurement systems that currently favour large, often external suppliers. Introducing direct tendering mechanisms for small-scale floriculturists would eliminate exploitative intermediaries, ensure fairer pricing, and increase profit margins for local producers. Such reforms would also help integrate floriculture more effectively into municipal greening and beautification projects. Community collaboration and cooperative organization were supported by 63% of respondents as a way to improve solidarity, advocacy, and access to resources. Stronger associations would enable floriculturists to engage more effectively with government institutions, share tools and knowledge, and collectively negotiate for improved services. Despite being one of the least formalized sectors in the urban economy, floriculture holds considerable potential for transformation through targeted collective action. These strategies, if implemented in tandem, could significantly enhance the sustainability of the floriculture sector, increase its contribution to employment and income generation, and strengthen its role in promoting environmental sustainability and urban aesthetics.

Table 6: Strategies proposed to address floriculture sector challenges

Strategy	Percentage (%)
Government recognition and support	85
Dedicated floriculture zones	80
Training and capacity building	75
Direct market access	70
Community collaboration	63

DISCUSSION

Informal livelihoods, spatial opportunity, and socioeconomic marginalization

The prevalence of indigenous floriculture as a primary livelihood strategy among less-educated and economically marginalized populations in Dar es Salaam exemplifies the broader reliance on informal economies in rapidly urbanizing cities. As argued by Manikas et al. (2020), floriculture represents an underexplored form of urban agriculture that blends aesthetics, subsistence, and commercial goals. However, the spatial marginality of floriculturists—who predominantly operate on contested road reserves—underscores the systemic urban exclusion of informal workers.

This spatial informality mirrors what Addas (2023) describes as the “unsmart layer” of smart cities, where urban greening and infrastructure development often disregard those who sustain them informally. The lack of security of tenure and institutional recognition found in the study is not unique; similar spatial uncertainties have been observed in roadside horticulture in West Africa, where policy frameworks have yet to accommodate micro-entrepreneurial activities despite their socio-economic significance (Olowu et al., 2020).

The overwhelming male dominance in the sector, with women nearly absent from formal floriculture activities, reveals deeper gendered exclusions in access to land, credit, and skill-building. Pradhan et al. (2024) emphasize that sustainable urban development must account for inclusivity in urban agriculture sectors, particularly given their potential to absorb underemployed youth and women. Without structural interventions that lower barriers for women, floriculture risks replicating the very inequalities it seeks to address.

Institutional vacuum and market disempowerment

One of the most critical findings of this study is the invisibility of floriculture in municipal policies and economic planning. The lack of government recognition restricts floriculturists' access to support systems such as extension services, finance, and tenders. As observed by Artmann and Sartison (2018), policy blind spots toward urban agriculture hinder the systemic benefits that such green livelihoods offer, including climate resilience, social inclusion, and biodiversity enhancement. The market disempowerment of small-scale floriculturists—who face seasonal price crashes and reliance on middlemen—can be interpreted as a form of economic disenfranchisement. Gusto et al. (2023) similarly identify trust deficits, institutional fragmentation, and knowledge gaps as barriers to market access in urban green practices, especially for pollinator-friendly gardens in urban America. The lack of direct market channels weakens the position of producers, who often lack the bargaining power to compete with large-scale suppliers, as noted by Dmitrović et al. (2025).

Furthermore, inadequate access to training, low technology uptake, and poor inter-farmer collaboration diminish the productivity and resilience of floriculture enterprises. This aligns with findings by Mwangi et al. (2020), who detail how water scarcity, outdated tools, and fragmented knowledge systems constrain urban floriculture in East African cities. The technological lag reflects broader structural neglect of informal green sectors, despite their proven value in urban ecology and employment.

Urban sustainability and missed environmental potential

Floriculture in Dar es Salaam is not merely an economic activity—it contributes to urban ecology, beautification, and waste management in tangible ways. The strategic greening of road reserves by floriculturists helps reduce dust, mitigate urban heat, and prevent illegal dumping. These benefits resonate with research by Włodarczyk-Marciniak et al. (2020), who emphasize the ecological value of informal green spaces in post-industrial cities, particularly in regulating microclimates and enhancing residents' environmental awareness.

Yet, the contributions of informal floriculture to urban sustainability remain systematically undervalued. As Charles et al. (2020) argue, regulating ecosystem services—such as air purification and microclimate regulation—are often disconnected from their human beneficiaries due to institutional blind spots. In Dar es Salaam, floriculturists are effectively offering public environmental goods without recognition, compensation, or policy support. This represents a critical missed opportunity. Threlfall and Kendal (2017) stress the distinct ecological and social roles played by wild and informal green spaces in urban environments, warning that formal city greening strategies that exclude such actors are ecologically shortsighted. Moreover, Mwageni (2023) shows that informal green interventions in Dar es Salaam's residential areas offer cost-effective solutions for both health and climate risks—reinforcing the untapped potential of indigenous landscaping efforts. The role of floriculture in youth employment also holds substantial social value. Afrad and Kawazoe (2020) have demonstrated that interaction with informal green spaces can reduce depression and enhance mental health, especially among unemployed youth. Floriculture thus serves a dual function: economic survival and psychosocial well-being—yet remains unrecognized in either sector.

CONCLUSION

Floriculture in Dar es Salaam operates at the intersection of urban informality, environmental stewardship, and livelihoods, yet it remains institutionally invisible and structurally marginalized. Despite its ecological and economic value, it is neither integrated into

municipal planning nor supported through adequate policy frameworks. This neglect undermines a sector that not only provides employment to hundreds of individuals, many with limited formal education, but also contributes to urban aesthetics, climate adaptation, and public health through green infrastructure. Transforming floriculture from an overlooked survivalist practice into a recognized component of urban development requires deliberate action from municipal authorities, planners, and development partners. Formal zoning for floriculture activities could stabilize tenure and reduce the vulnerability of operators to displacement, while targeted subsidies and access to affordable finance would enable investment in tools, improved seeds, and irrigation systems. Training programs should focus on practical horticultural knowledge, but also equip floriculturists with basic business, marketing, and digital skills to expand their economic reach.

Public procurement policies must shift to prioritize inclusion of small-scale producers through direct tendering and transparent supply chain mechanisms. This can reduce dependence on intermediaries and allow fairer pricing, especially during peak seasons. Encouraging stronger farmer associations and cooperative platforms can help build collective bargaining power and facilitate peer-to-peer learning. Importantly, interventions must also recognize and challenge gender disparities in the sector by supporting female entry and retention in floriculture through inclusive training, access to credit, and mechanization where physical labour constraints exist. Integrating informal floriculture into urban sustainability agendas aligns with global trends toward nature-based solutions and inclusive green transitions. When nurtured and formally recognized, indigenous landscaping holds the potential to reshape how cities grow—making them not only greener and more beautiful, but also more equitable and resilient.

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CONFLICT OF INTEREST

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

AUTHOR CONTRIBUTIONS

WI: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Visualization, Writing – original draft, Writing – review & editing. NJB: Supervision, Validation, Visualization, Writing – review & editing. CLM: Supervision, Validation, Visualization, Writing – review & editing.

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