PRESERVING ARCHITECTURAL HERITAGE AND SUSTAINABLE DEVELOPMENT IN TANZANIA. UNIVERSITY RESEARCH AND SOUTH-SOUTH COOPERATION/

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Abstract. Tanzania faces significant challenges and opportunities within its urban and rural landscapes. A prevalent issue is the existence of numerous abandoned buildings constructed from both local materials and reinforced concrete. These structures pose aesthetic and environmental problems but offer potential for urban and rural regeneration and sustainability through circular economy principles.

International studies involving universities and research centers from Africa, Italy, and China have focused on sustainable design and historical-architectural conservation in Tanzania. Extensive observations of various architectural interventions across the Tanzanian region have revealed a landscape marked by underutilization and hybrid technologies, presenting both vernacular and contemporary features. Numerous historically valuable buildings in urban and peri-urban areas could undergo revitalization to reclaim cultural and territorial heritage.

In particular, Dar es Salaam faces a critical challenge: balancing rapid economic development with architectural preservation. The government's strategy of constructing skyscrapers in the city center threatens the unique character of early 20th-century low-rise, mixed-use buildings. Observations and documentation of this transformation express concern over the loss of traditional Swahili houses and early post-independence structures, a disappearing architectural marvel. Despite ongoing demolitions, the potential for preservation remains. The Dar es Salaam Centre for Architectural Heritage (DARCH) aims to safeguard endangered structures through research and conservation efforts. This research, developed since 2008 through several architectural projects in the territory and, since 2018, thanks to the collaboration between the University of Brescia (IT) and the RUCU of Iringa (TZ), also promotes the exchange of skills through education and the use of relevant advanced technologies, such as the laboratories of the Teaching Museum ZUMAA and the ZIBS Zhejiang University of Hangzhou, China.

A comprehensive approach to regenerating abandoned buildings, involving collaboration among international entities, architects, local authorities, and communities, necessitates detailed structural analysis, stakeholder engagement, and the use of local, sustainable materials. This strategy mitigates environmental impact, promotes local skills and resources, fosters a resilient and sustainable built environment, and enhances the cultural heritage of these places alongside their strategic economic contribution linked to tourism.

Introduction. The intersection of architectural heritage conservation and sustainable development has gained increasing significance in contemporary research, particularly in the Global South [1].

Tanzania, with its rich historical and cultural heritage, has emerged as a focal point in this discourse. Since 2008, the research presented here has employed a bottom-up approach, emphasizing the integration of local knowledge, materials, and techniques into conservation practices. This strategy aligns with the broader objective of fostering sustainable development that respects and utilizes cultural and architectural resources.

The grassroots methodology, developed through extensive fieldwork, laid the foundation for a robust inter-university collaboration between the University of Brescia in Italy and Ruaha Catholic University (RUCU) in Iringa, Tanzania. This partnership has since evolved, integrating a diverse range of stakeholders, including governmental agencies, local communities, and international institutions. Together, they have established an interdisciplinary framework for addressing the multifaceted challenges associated with heritage conservation amidst rapid urbanization.

The research underscores how the principles of tropical modernism, adaptive reuse, and international cooperation can converge to create sustainable and inclusive futures for Tanzanian communities. Moreover, it highlights the potential of South-South cooperation as a transformative tool for leveraging both local and global resources in promoting resilience, innovation, and cultural preservation.

Challenges and Opportunities in Tanzania. Tanzania's architectural heritage reflects a rich interplay of diverse historical influences, encompassing Swahili coastal architecture, colonial-era edifices, and post-independence modernist structures. These typologies collectively narrate the socio-cultural and historical evolution of the nation. However, this heritage is under increasing threat from rapid urbanization, economic pressures, and a deficiency in preservation frameworks. The demolition of emblematic buildings along Dar es Salaam's Samora Avenue exemplifies the precariousness of urban architectural heritage, as urban landscapes face relentless transformation. The loss of typologies such as Swahili vernacular houses, Indian merchant buildings, and early modernist structures underscores the pressing need for theoretical and practical solutions to their preservation.

Key challenges

1. Urbanization and Economic Pressures

The accelerated pace of urban growth in cities such as Dar es Salaam exerts immense pressure on historical urban fabrics. The prioritization of high-density residential or commercial developments, often driven by short-term economic imperatives, has resulted in the displacement or demolition of culturally significant structures. These dynamics mirror global trends in urban centers, where economic growth frequently takes precedence over architectural preservation.

2. Cultural Disconnect and Public Perception

A substantial proportion of local communities perceives historic buildings as obsolete or misaligned with contemporary functional requirements. This disconnect erodes the collective cultural identity and diminishes opportunities for utilizing heritage as a didactic resource or a catalyst for cultural tourism. Theoretical discourse in conservation highlights that the valuation of heritage often depends on its integration into present-day societal and economic narratives.

3. Resource Constraints and Expertise Gaps

Conservation initiatives in Tanzania are hindered by a dearth of financial resources, technical expertise, and access to modern technologies for documentation and restoration. Theoretical models emphasize the importance of institutional capacity-building and transdisciplinary approaches to address such systemic challenges. These issues are particularly pronounced in rural contexts, where recognition and formal documentation of heritage assets are often inadequate.

4. Vulnerability of Vernacular Typologies

As noted by Annika Seifert [2], the disappearance of vernacular architectural forms [3]—such as traditional Swahili houses and structures emblematic of the Indian Ocean trading heritage—reflects a broader pattern of material and cultural erosion (Figure 1) [4]. These typologies, which often employ sustainable materials like coral stone, thatch, and timber, offer invaluable insights into ecological design practices that are increasingly marginalized in contemporary urban development. FIGURE 1.

Emerging Opportunities. Despite the challenges, significant opportunities exist to integrate heritage conservation into sustainable development agendas:

1. Adaptive Reuse of Historic Structures

Adaptive reuse is a critical intervention that aligns with both preservation and modernization. Historic structures, such as former colonial administrative buildings, can be reimagined as educational institutions, cultural centers, or community hubs. By preserving architectural integrity while introducing contemporary functionalities, adaptive reuse fosters the dual objectives of heritage preservation and urban resilience. FIGURE 2.

2. Valorization of Traditional Materials and Techniques

Vernacular construction techniques and materials, deeply rooted in Tanzania's architectural traditions, offer significant ecological and economic advantages. The use of coral stone, timber, and other locally sourced materials aligns with contemporary paradigms of environmental sustainability. Theoretical frameworks emphasize the role of such practices in reducing environmental footprints while reinforcing cultural continuity. FIGURE 3.

3. Community Engagement in Conservation Efforts

The active involvement of local communities is integral to the success of conservation initiatives. Participatory models, which prioritize local knowledge and stakeholder engagement, ensure that interventions are culturally resonant and sustainable. By fostering a sense of ownership, community-driven conservation can act as a powerful mechanism for social cohesion and cultural resilience.

4. Global Parallels and Knowledge Exchange

The challenges faced by Tanzania resonate with those of other rapidly urbanizing cities, such as Singapore, Istanbul, and Kuala Lumpur, where heritage conservation is similarly in tension with economic development. Comparative studies underscore the importance of global knowledge exchange in devising contextually relevant conservation strategies.

Towards Sustainable Conservation Practices. By framing architectural heritage as a resource rather than a liability, this discourse illuminates pathways for integrating cultural preservation with socio-economic and environmental sustainability. The theoretical foundations of sustainable conservation emphasize its multifaceted contributions: preserving the cultural fabric, fostering environmental stewardship, and enhancing socio-economic resilience. The Tanzanian context, with its diverse typologies and unique challenges, provides fertile ground for exploring innovative and inclusive approaches to heritage conservation that reconcile the demands of modernity with the imperatives of cultural continuity.

The Role of the Dar es Salaam Center for Architectural Heritage (DARCH)

The Dar es Salaam Center for Architectural Heritage (DARCH) is a cornerstone institution in Tanzania's conservation landscape. Established through a collaborative initiative, DARCH adopts a multidisciplinary approach to addressing the challenges of heritage preservation within the context of urbanization.

Core Activities of DARCH

1. Documentation and Archiving:

DARCH has been pivotal in conducting detailed surveys and creating comprehensive digital archives of endangered buildings. This ensures that their historical and architectural significance is preserved for future generations.

2. Education and Awareness:

Through workshops, exhibitions, and community programs, DARCH promotes public understanding of architectural heritage. Its efforts target a wide range of stakeholders, from students to policymakers, highlighting the role of heritage in shaping national identity.

3. Policy Advocacy:

The center collaborates with local and national government agencies to advocate for policies that integrate heritage conservation into urban development plans, balancing preservation with modernization.

Capacity-Building Initiatives

A significant aspect of DARCH's mission is capacity-building. The center organizes training programs focused on traditional construction methods, advanced digital documentation techniques, and sustainable design. By equipping Tanzanian professionals with these skills, DARCH not only addresses local conservation needs but also fosters employment and economic development.

DARCH exemplifies how architectural heritage can serve as a catalyst for innovation, education, and community engagement, offering a model for holistic sustainable development [5].

International Collaboration and South-South Cooperation

International partnerships have been central to advancing architectural heritage conservation in Tanzania. The collaboration between the University of Brescia and RUCU exemplifies the potential of interdisciplinary and cross-border initiatives to foster innovation and address complex challenges.

Engagement with Zhejiang University

In 2017 and 2019, the research extended to include Zhejiang University in Hangzhou, China. This collaboration is aimed at including Tanzanian studies in Chinese research and development processes, hoping to encourage the use of advanced technologies such as 3D modeling and digital reconstruction into Tanzanian heritage conservation projects. These methodologies have proven invaluable in documenting and preserving historical sites where physical restoration is constrained by resource limitations.

The Zhejiang University Museum of Art and Archaeology (ZUMAA) served as a model for integrating research with practical conservation. ZUMAA's cutting-edge laboratories inspired similar initiatives tailored to Tanzania's local needs, emphasizing the potential for global knowledge exchange.

The ZIBS China Africa Center

The establishment of the ZIBS China Africa Center further illustrates the transformative potential of South-South cooperation. The center promotes cultural exchange, academic research, and economic partnerships between China and Africa, fostering mutual understanding and innovation.

• Cultural Exchange: Through exhibitions, language programs, and festivals, the center celebrates the diversity of African and Chinese traditions, promoting cross-cultural appreciation.

• Economic Integration: Training programs and market access initiatives have enabled Tanzanian entrepreneurs to engage with Chinese markets, facilitating trade and investment.

These initiatives underscore the importance of transcending geographical boundaries to address shared challenges, enriching both conservation efforts and socio-economic development [6].

Case Study: Projects of Ruaha Catholic University (RUCU). The projects developed at RUCU exemplify the research's application of sustainability, inclusivity, and cultural preservation.

The initiatives at RUCU embody the synergy of sustainability, inclusivity, and cultural preservation, resulting from collaborative research efforts between RUCU and the University of Brescia. Formalized in 2019 through a Memorandum of Understanding (MoU), the partnership facilitated the identification and regeneration of significant structures within the campus. This collaboration led to the development of two distinct yet complementary projects: the International Disability Center (IDC) and the Science Park. Both initiatives aim to repurpose existing buildings, fostering an inclusive and sustainable built environment.

International Disability Center (IDC)

The IDC exemplifies a regenerative approach to underutilized structures, transforming a building with a central courtyard—a feature characteristic of Hehe architecture—into a model facility for accessibility and inclusion. The center integrates modern architectural elements while respecting its historical form, creating a space that caters to the diverse needs of the university community. Designed to serve as an international benchmark for accessibility, the IDC employs inclusive principles, such as barrier-free circulation, tactile paving, and ergonomic adaptations, ensuring usability for individuals with disabilities. By addressing both functional and symbolic roles, the IDC demonstrates how architecture can promote equality and social cohesion [7].

Science Park

Science Park, another landmark initiative, breathes new life into an incomplete reinforced concrete skeleton within the RUCU campus. Previously in a state of neglect, this structure now houses a dynamic facility featuring multi-level scientific laboratories, a medical training center, and classrooms dedicated to medical fields such as obstetrics. The project's phased approach—allocating specific functions to individual floors—ensures the efficient use of resources, allowing gradual completion aligned with available funding. The adaptive reuse of this skeletal framework underscores the importance of sustainable construction and the potential for previously abandoned spaces to serve vital community purposes.

Both projects reflect a shared commitment to sustainability and innovation, employing locally sourced materials and eco-friendly construction methods. The integration of these principles not only preserves the cultural integrity of the campus but also fosters community engagement, setting a precedent for future interventions in Tanzania and beyond.

Tropical Modernism and Sustainability: Contemporary Relevance. The principles of tropical modernism, developed during the mid-20th century, are more relevant than ever in addressing contemporary global challenges such as climate change, rapid urbanization, and resource scarcity. These architectural strategies, deeply rooted in contextual responsiveness, offer lessons on creating environmentally sustainable, socially inclusive, and economically viable built environments.

Tropical modernism, as applied in Tanzania, prioritizes harmony between architecture and the natural environment. Key design features such as shaded verandas, wide eaves, elevated foundations, and natural ventilation systems demonstrate a deep understanding of local climatic conditions. These elements reduce reliance on energy-intensive technologies, such as air conditioning, by making use of passive cooling and natural light. This approach is particularly significant in the face of global climate change, as it minimizes carbon footprints and promotes resilience to extreme weather events.

The architectural works of Anthony Almeida and Beda Amuli, both prominent figures in Tanzanian tropical modernism, provide a rich legacy for contemporary reinterpretation. Almeida's designs for public buildings,

which incorporate locally available materials and prioritize functionality, exemplify how modernist principles can be adapted to specific cultural and environmental contexts. Similarly, Amuli's contributions, including residential and institutional projects, demonstrate how modernism can harmonize with vernacular traditions to create architecture that is both innovative and rooted in local identity [8].

Today, these principles are being revisited and expanded upon through research and education. For instance, the incorporation of renewable energy systems such as solar panels into tropical modernist designs adds a layer of technological innovation while maintaining their sustainable ethos. Water management techniques, including rainwater harvesting and gray water recycling, further align with the principles of environmental stewardship. These strategies are particularly vital in Tanzania, where access to clean water and energy remains a challenge in both urban and rural areas.

Cultural sustainability also plays a pivotal role in ensuring the continued relevance of tropical modernism. By preserving the architectural language and building traditions of tropical modernist structures, communities maintain a tangible connection to their history while adapting to the demands of modern life. Educational initiatives at institutions like RUCU integrate these principles into architectural curricula, equipping future architects with the knowledge and skills necessary to apply tropical modernism in innovative ways. This approach not only ensures the legacy of tropical modernism but also encourages its evolution in response to contemporary needs.

Moreover, tropical modernism offers valuable insights into inclusive design, particularly in creating built environments that accommodate diverse user needs. For instance, by combining its inherent adaptability with universal design principles, architects can create spaces that are not only environmentally sustainable but also socially equitable. This dual emphasis on sustainability and inclusivity underscores the enduring relevance of tropical modernism in addressing the interconnected challenges of the 21st century [9].

In the broader context of global architectural discourse, tropical modernism serves as a counterpoint to homogenized international styles, which often neglect local conditions and cultural specificities. By embracing tropical modernist principles, Tanzanian architecture asserts its identity on the global stage while offering solutions that are intrinsically tied to local realities. This approach contributes to the ongoing dialogue about the role of regionalism in creating a sustainable future, demonstrating how locally inspired strategies can address global challenges [10].

Through a combination of tradition, innovation, and contextual sensitivity, tropical modernism remains a vital framework for architects and planners. It serves as a reminder that sustainable development is not a universal formula but a process that must be adapted to the unique characteristics of each region. By drawing from this rich architectural heritage, Tanzania continues to lead by example, showcasing the potential of tropical modernism to inspire solutions that are as practical as they are profound.

Conclusions. Tanzania's cultural and architectural heritage embodies the collective memory and identity of its communities, offering a profound resource for shaping sustainable futures. From Swahili coastal architecture to mid-century modernist designs, these structures are not just relics of history but living artifacts that narrate the interplay of culture, environment, and socio-economic dynamics. In preserving these assets, sustainable conservation practices serve as a cornerstone for fostering resilience and inclusivity while addressing contemporary challenges.

The theoretical framework of sustainable conservation hinges on a holistic understanding of heritage, encompassing environmental, cultural, and socio-economic dimensions. This approach advocates for practices that minimize environmental impact while enhancing the cultural and economic vitality of local communities. In Tanzania, where urbanization and resource limitations present significant obstacles, adopting strategies such as adaptive reuse, local material integration, and community-centered design becomes imperative. These methods not only safeguard historical assets but also create opportunities for education, employment, and innovation, reinforcing the socio-economic fabric.

Cultural preservation, as demonstrated in the initiatives discussed, transcends the act of protecting buildings; it entails fostering a sense of ownership and pride within communities [11]. This involves active participation in conservation projects, ensuring that interventions align with local traditions, needs, and aspirations. For instance, the adaptive reuse projects at RUCU exemplify how inclusive design principles and sustainable practices can transform underutilized spaces into vibrant centers of learning and accessibility.

Environmental sustainability is another critical pillar, emphasizing resource efficiency and ecological balance. Practices such as using locally available materials, employing traditional construction techniques, and integrating renewable energy systems not only reduce the carbon footprint but also resonate with the principles of tropical modernism. This architectural approach, deeply rooted in the Tanzanian context, provides a blueprint for creating structures that harmonize with the natural environment while addressing modern needs [12].

Lastly, the nexus between cultural heritage and socio-economic resilience cannot be overlooked. Preserving architectural heritage can catalyze tourism, generate employment, and inspire local industries, contributing to economic diversification. Moreover, fostering partnerships—such as those between RUCU, the University of Brescia, and Zhejiang University—demonstrates the transformative potential of interdisciplinary and international collaboration in creating replicable models for conservation and development.

As Tanzania navigates the pressures of globalization and urban growth, its architectural heritage offers a pathway for achieving sustainable development goals [13]. By embedding principles of cultural preservation, environmental stewardship, and social equity into conservation practices, these initiatives not only honor the past but also pave the way for a resilient and inclusive future. The integration of research, education, and community engagement ensures that these efforts remain dynamic, adaptive, and impactful across generations. In doing so, the Tanzanian experience serves as a compelling model for other regions grappling with similar challeng-

es, underscoring the universal value of heritage as a driver of sustainable progress.

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Figures.

FIGURE 1 - Matasalamat Mansion, 1948. Samora Avenue, Dar es Salaam (TZ).

FIGURE 2 - Administrative offices in Dar es Salaam and Moshi (TZ).

FIGURE 3 - Zaramo House, Kijiji cha Makumbusho, Dar es Salaam (TZ).

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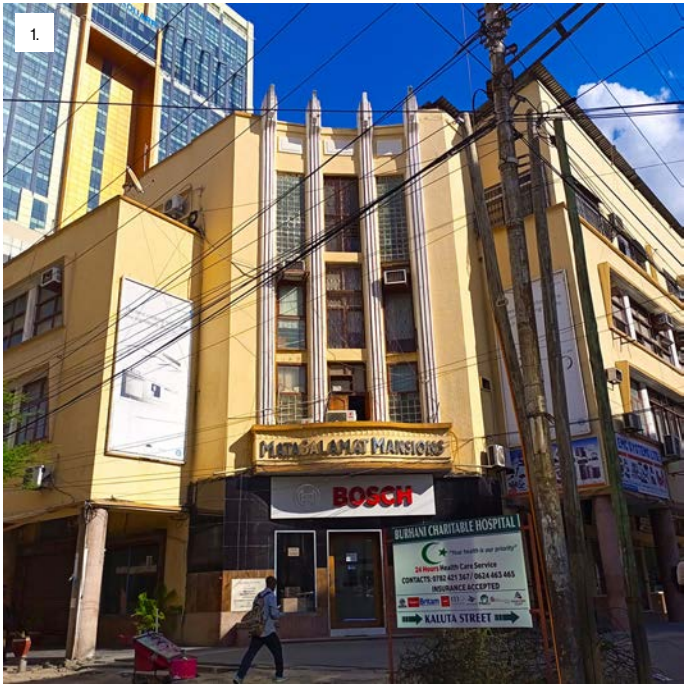
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2.


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