



ADVANCING SUSTAINABLE RURAL-URBAN DEVELOPMENT IN EGYPT CASE STUDY OF URBAN SPACES IN THE VILLAGE OF SARYAQOS

Rania B. Shokry Abdel Rahman^{1*}

¹Architecture Department, Faculty of Engineering, Higher Institute of Engineering and Technology, Fifth Settlement, Cairo, Egypt

* Correspondence: Rania_badawy@outlook.com

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ABSTRACT

Egyptian rural villages face multifaceted challenges that span environmental, economic, urban, and social dimensions, with architecture serving as both a reflection of these dynamics and a potential solution. This study delves into the prospects of achieving sustainable development in Egypt's Delta Region through innovative architectural practices, emphasizing the intricate relationship between housing and developmental processes over time. Saryaqos village was strategically selected as a case study due to its pivotal location and active community initiatives aligned with sustainability principles. The research draws valuable insights from the village's sustainable practices. By underscoring the critical role of urban spaces in fostering social cohesion, the study proposes a holistic strategy in alignment with Egypt's Vision 2030. It advocates for a reimagining of communal spaces to address the evolving needs of residents while preserving cultural heritage. This comprehensive roadmap balances traditional values with modern necessities, offering a resilient and sustainable model for rural development in Egypt.

KEYWORDS: urban spaces, Egyptian villages, rural-urban environment, social interactions

تعزيز التنمية الريفية والحضرية المستدامة في مصر دراسة حالة الفراغات العمرانية بقرية سرياقوس رانيا بدوي شكري عبد الرحمن^{١*}

^١ قسم الهندسة المعمارية، المعهد العالي للهندسة والتكنولوجيا بالتجمع الخامس

البريد الإلكتروني للباحث: Rania_badawy@outlook.com

المخلص

تواجه القرى الريفية في مصر تحديات متعددة الأبعاد تشمل الجوانب البيئية والاقتصادية والحضرية والاجتماعية، حيث يعتبر المعمار انعكاساً لهذه الديناميكيات وحلاً محتملاً لها. تتناول هذه الدراسة آفاق تحقيق التنمية المستدامة في منطقة دلتا مصر من خلال ممارسات معمارية مبتكرة، مع التركيز على العلاقة المعقدة بين الإسكان والعمليات التنموية على مر الزمن. تم اختيار قرية "سرياقوس" كدراسة حالة نظراً لموقعها الاستراتيجي ومبادرات المجتمع النشطة التي تتماشى مع مبادئ الاستدامة. تستخلص الدراسة رؤى قيمة من الممارسات المستدامة في القرية. من خلال التأكيد على الدور الحيوي للمساحات الحضرية في تعزيز التماسك الاجتماعي، تقترح الدراسة استراتيجية شاملة تتماشى مع رؤية مصر ٢٠٣٠. تدعو إلى إعادة تصور المساحات المجتمعية لتلبية احتياجات السكان المتزايدة مع الحفاظ على التراث الثقافي. توفر هذه الخريطة الشاملة نموذجاً مرناً ومستداماً للتنمية الريفية في مصر، يوازن بين القيم التقليدية والاحتياجات الحديثة.

الكلمات المفتاحية: الفراغات الحضرية، القرى المصرية، البيئة الريفية الحضرية، التفاعلات الاجتماعية.

1. INTRODUCTION

Egypt's Sustainable Development Strategy: Vision 2030 marks a significant milestone in the country's comprehensive development efforts, bridging its rich history with its aspirations for the future. Drawing inspiration from the achievements of ancient Egyptian civilization, this vision outlines a roadmap toward a prosperous and advanced nation grounded in economic and social justice [1]. It seeks to rejuvenate Egypt's historic role in regional leadership while maximizing the utilization of its competitive advantages and resources. Vision 2030 embodies the aspirations of the Egyptian people for a dignified and fulfilling life, aligning with the modern Egyptian constitution's goals of achieving economic prosperity through sustainable development and balanced growth. The strategy's development framework is structured around three core dimensions: economic, social, and environmental.

A pivotal element of Vision 2030 is the emphasis on rural development, with a clear focus on improving the quality of life in Egypt's rural areas. The vision aims to reduce regional disparities by promoting sustainable development in rural communities, ensuring that these areas are equipped with the necessary infrastructure, education, healthcare, and economic opportunities [2]. This approach aligns with the broader goal of creating balanced development across the country, integrating rural areas into the national economy, and enhancing their contributions to Egypt's growth. By improving rural livelihoods and promoting sustainable agricultural practices, Vision 2030 strives to create a more inclusive and equitable society where the benefits of development reach all segments of the population.

Research Gaps

While these studies have made substantial contributions to understanding rural development in Egypt, there remain significant gaps. Few studies have comprehensively addressed the integration of sustainable architecture within rural housing strategies, particularly in the Delta Region [3]. Furthermore, there is limited research focusing on the adaptation of rural areas to climate change and its impact on agricultural productivity and resource management. The lack of studies evaluating the combined effects of sustainable practices, local community engagement, and infrastructural development poses an opportunity for this research to fill these gaps, particularly in rural areas like Saryaqos. This study aims to provide a detailed exploration of these elements, emphasizing the importance of urban spaces in fostering social cohesion and supporting Egypt's Vision 2030 goals for rural development.

Problem Statement

Although urban environments are intentionally designed, they exert profound effects on individuals' social and psychological well-being. This dynamic is particularly evident in Egyptian villages, where limited indoor spaces and economic challenges make outdoor areas essential extensions of living environments. These external spaces provide opportunities for social and recreational activities, fostering community cohesion and strengthening social ties.

However, the design and organization of these spaces in rural areas often fail to address the residents' social needs and activity requirements. This lack of purposeful design undermines their potential as vital components of daily life, leaving a gap in their functional and social utility.

Research Objective

This research aims to examine communal open spaces in Egyptian villages and evaluate their role in addressing residents' activities, needs, and social functions. By understanding the influence of these factors on spatial design, the study seeks to enhance social values and cohesion in rural communities through improved spatial organization.

Methodology

The study adopts a multidisciplinary approach to explore the following aspects as shown in **Fig. 1**:

- **Design and Interactions:** Analyzing the relationship between design and human interactions in rural and urban spaces within Egyptian villages.
- **Urban Layout:** Investigating the configuration of urban spaces in rural settings, aiming to classify villages based on their social and spatial organization.

- **Residential Clusters:** Examining various housing patterns in rural Egypt to identify how social functions shape the development of urban spaces.
- **Case Study:** Focusing on the social and urban spaces of Saryaqos village, highlighting the connection between spatial design and the community’s social needs and interactions.

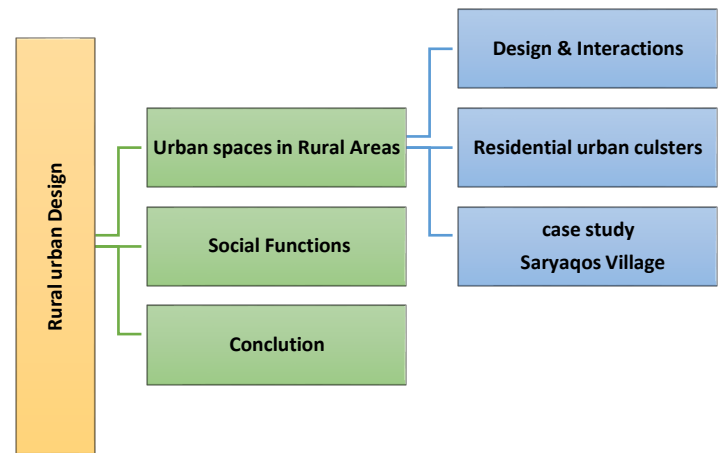


Fig. 1: Methodology diagram (Source: author)

2. Urban and Rural Sustainability

Achieving sustainability in response to global environmental challenges is a multifaceted and critical endeavor. While international efforts to green economies and enforce regulatory frameworks have gained momentum, true sustainability necessitates localized, community-driven approaches [4]. Urbanization and industrialization, while offering socioeconomic opportunities, have concentrated populations in cities, making them significant contributors to global pollution and hubs of complex challenges such as affordable housing shortages, poverty, crime, traffic congestion, and deteriorating air quality. This urban influx is further compounded by rural-to-urban migration, driven by technological advancements, economic growth, and often by conflict or social instability. Such migration intensifies the strain on urban infrastructure, leading to the rise of informal settlements and slums, while simultaneously leaving rural areas underdeveloped and socioeconomically fragile. Addressing these interconnected issues requires a dual focus: fostering sustainable urban development through innovative planning and green technologies and revitalizing rural communities to reduce migration pressures. A balanced, integrated approach that combines large-scale policies with small-scale, community-centered initiatives is paramount to achieving lasting sustainability. **Fig. 2** illustrates the interconnected relationship between urban and rural areas, emphasizing how migration patterns, energy consumption, and infrastructure impact both environments. The diagram visually represents the flow of factors such as energy efficiency, rural support systems, and migration influences. It also highlights the challenges of urbanization and the need for integrated solutions to foster sustainable development, focusing on localized solutions and energy efficiency in rural and urban settings [1].

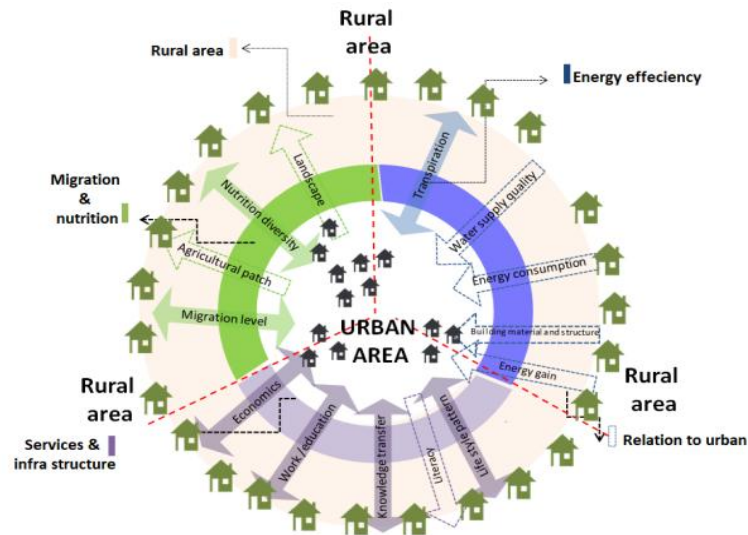
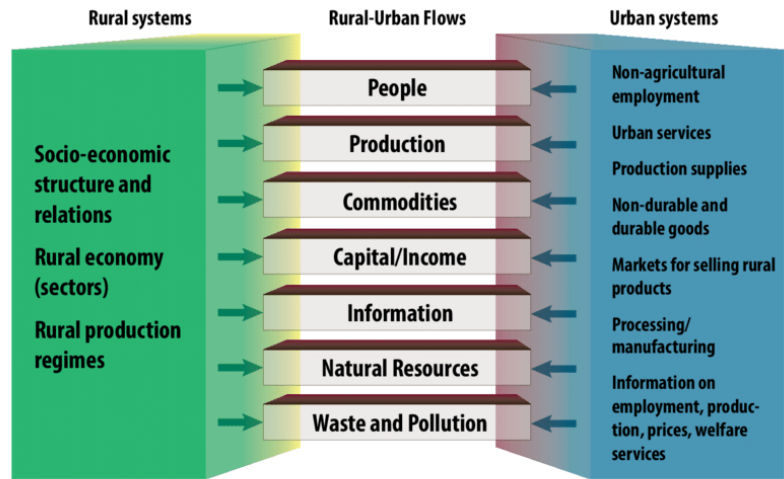


Fig. 2: Integrated Urban-Rural Dynamics: Addressing Urbanization and Migration Challenges through Energy Efficiency and Localized Solutions (Source: Adapted from Repp et al. 2012)

3. Urban Characteristics of Rural Settlements (rural-urban linkages)

Egypt's Rural Development Initiative represents a vital effort to address the urban, economic, social, environmental, and political challenges faced by one of the fastest-growing countries in the Arab world. Among the key issues is a steadily increasing population and persistent rural-to-urban migration, which exacerbate urban pressures and result in significant development challenges [Fig.3]. Over the decades and centuries, urban development has evolved, with substantial shifts in the use and organization of urban spaces. Strengthening rural-urban linkages is essential in this context, as these connections facilitate the flow of goods, services, and people between rural and urban areas, promoting economic growth and improving livelihoods in both regions [5].



Adapted from: Allen, A. 2010. Pathways to Sustainability: Agendas for a New Politics of Environment, Development and Social Justice. Presented at: Peri-urban Dynamics, 23 - 24 September, Institute of Development Studies, Sussex, UK.

Fig. 3: Flows across the rural urban continuum

(Source: https://www.researchgate.net/publication/313037563_City_Regions_as_Landscapes_for_People_Food_and_Nature)

Furthermore, the integration of ecosystem service flows along the urban-rural continuum highlights the importance of managing natural resources that connect rural and urban landscapes as shown in Fig. 4. These services include clean water supply, air purification, food production, and waste recycling, which are critical for the sustainability of both urban and rural areas. Coordinated planning and enhanced infrastructure can ensure the equitable distribution of these services, fostering resilience and sustainable development across Egypt’s diverse regions [6].

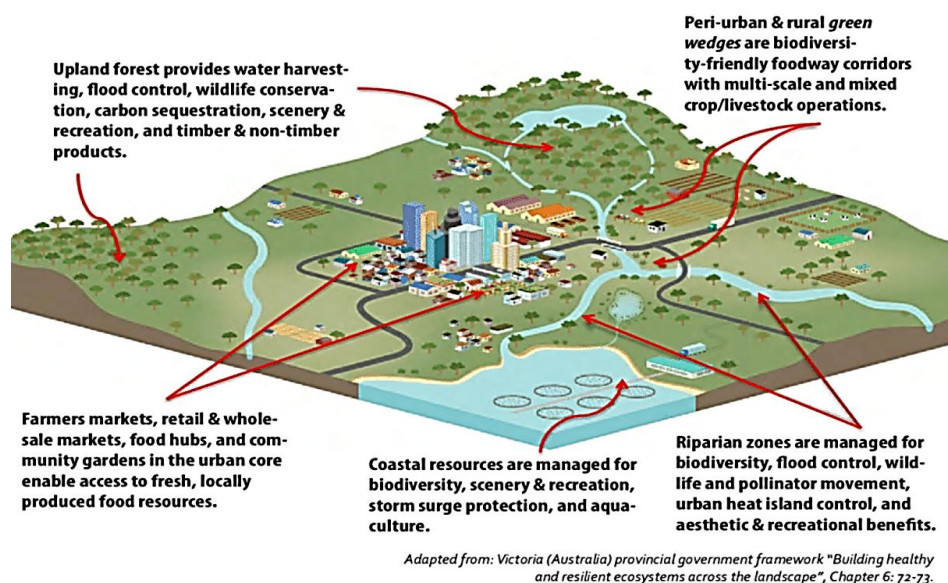


Fig. 4: Ecosystem service flows along the urban rural continuum

(Source: https://www.researchgate.net/publication/313037563_City_Regions_as_Landscapes_for_People_Food_and_Nature)

Egypt has launched several rural development initiatives over the years to improve living conditions and promote sustainable growth in rural areas. The Rural Development Program (2014), launched by the Ministry of Local Development, focused on enhancing infrastructure, healthcare, education, and energy access in rural communities [7]. In 2016, the Ministry of Planning and Economic Development introduced the National Rural Development Strategy, which aimed to reduce regional disparities by improving agricultural productivity and basic services. More recently, the Decent Life Initiative (2021), spearheaded by President Abdel Fattah El-Sisi and led by the Ministry of Local Development, has been working to improve the quality of life in rural Egypt by providing infrastructure, health, education services, and creating job opportunities, with a particular focus on marginalized villages. These initiatives align with Egypt's Vision 2030 and reflect a strategic approach to fostering sustainable rural development [8].

3.1. Village Life

Rural life in Egyptian villages is deeply rooted in agriculture and community living, with a strong connection to the land and nature. These villages often begin as small hamlets, where families and local communities rely on farming and livestock as their primary means of livelihood. Over time, these small settlements grow and expand, eventually developing into larger communities with a central town hub that serves as the focal point for surrounding rural areas. As these villages evolve, they become interconnected with neighboring regions, offering shared resources, services, and opportunities for trade and commerce [9]. The growth of these villages is not just about physical expansion, but also about the cultural and social dynamics that shape them. Rural traditions and customs, such as agricultural practices, local crafts, and communal festivals, are passed down through generations, ensuring the preservation of the village's heritage [10]. Additionally, occupations in rural Egypt often revolve around the cycles of nature and the seasons, with farming activities like planting, harvesting, and animal husbandry taking center stage in the daily lives of villagers. These occupations are closely tied to the physical and natural environment, with the fertile soil of the Nile Delta and the desert areas surrounding these villages providing resources for agricultural production.

The relationship between rural communities and their environment shapes not only their livelihoods but also their social structures and ways of life. The village is not just a place of residence, but a space where generations collaborate, share knowledge, and contribute to the well-being of the community. This close-knit social fabric is maintained through collective activities, such as farming cooperatives, village councils, and communal gatherings, which strengthen the bonds between individuals and reinforce the village's cultural identity. As rural Egyptian villages continue to grow and modernize, the delicate balance between preserving traditional ways of life and embracing new technologies and practices remains a central challenge [11].

3.2. Village Settlements

Rural settlements in Egypt are shaped by a complex interplay of human populations, natural environments, and economic resources [12]. They can be categorized into two primary dimensions:

- Functional Level: This pertains to agriculture within the community, with settlements accessing shared fields, though they are geographically separated.
- Social Interaction Level: This level is shaped by social connections, showing marked contrasts between rural and urban regions. These differences in social organization are reflected in the spatial layouts of both settings.

3.3. Types of Settlements in Rural Areas

Rural settlements generally fall into two categories [13]:

- Mobile Villages: Temporary settlements, primarily associated with nomadic farming practices.
- Semi-Settled Villages: Communities that balance herding and agricultural activities.
- Settled Villages: These are further divided into:
 - Small Towns: Serving as market hubs with basic services.
 - Strategic Locations: Fortified villages that provide refuge in high-risk areas.
 - Community Villages: Traditional settlements, such as those in ancient Egypt and India, characterized by strong community ties.
 - Large Estates: Farms with consolidated agricultural communities, featuring centralized services like trade, education, and healthcare.

3.4. Rural Agglomeration Patterns in Egyptian Villages

Unstructured growth, particularly on surrounding agricultural lands, often leads to significant changes in the traditional layouts of villages to accommodate modern infrastructure. Early structures were typically simple, but more recent developments feature organized, multi-story concrete buildings [14]. This shift reflects the changing demographics of villages; as new groups of workers increasingly reside in these areas while commuting to nearby urban centers for employment. Types of Village Patterns [15]:

- Nucleated Villages: Homes are clustered at the center of agricultural fields, promoting strong social connections due to their close proximity.
- Linear Villages: These villages develop along major roads or waterways, with houses and agricultural fields arranged in a linear fashion.
- Scattered Villages: Buildings are dispersed with no clear arrangement, leaving open spaces that often host scattered services or activities.
- Mixed-Pattern Villages: These villages combine elements of various patterns, often beginning with circular layouts and evolving into more linear forms to align with road or canal developments.

4. The Significance of Urban Spaces in Village Social Life

Egyptian villages exhibit a variety of growth patterns, influenced by population increases and unplanned urban expansion, particularly on surrounding agricultural lands. Traditional layouts are often adapted to accommodate modern infrastructure, resulting in significant transformations in village structures [16].

4.1. Distinct Characteristics of Rural Society Compared to Urban Society

- Homogeneity: Rural connections are long-standing and deeply rooted within the neighborhood, reinforced by shared culture and economic conditions. [17].
- Family Cohesion: Rural families are notably cohesive and supportive of each other [17, 18].
- Traditional Behaviors: Rural communities are characterized by spontaneous, value-driven behaviors, where traditional values are prioritized over secular ones.
- Privacy: Family life is kept separate from the external environment, rural social bonds are intimate and built on shared hopes and challenges [17]. Weak social ties, based on self-interest, typically characterize urban areas.

4.2. Social Functions of Urban Spaces in Villages

The social functions of urban spaces in rural villages are pivotal in shaping the way communities interact and bond. These spaces serve a range of essential roles that contribute to both the quality of life and the social cohesion of rural areas. However, the previous subsection offers a general view of settlement types in rural areas, which overlooks the specific rural settlement patterns most prevalent in Egyptian communities, especially those situated along the Nile Valley and Delta. In Egypt, these rural settlements are classified by the administration into three main categories: local villages, satellite villages, and dependencies [18, 19]:

- Local Villages are the traditional heart of rural life in Egypt, where agricultural activities, social events, and daily routines revolve around the central urban space. These villages typically house a large proportion of the population and are often characterized by a dense network of residential buildings, markets, and communal gathering spaces. Local villages are vital for maintaining social ties and cultural practices, providing a strong sense of belonging and continuity for the rural population.
- Satellite Villages are emerging as an important part of Egypt's rural development. They are typically located near larger urban centers and act as extensions of these towns, supporting rural-to-urban migration patterns. These villages often have smaller populations and are more specialized in certain agricultural or economic functions. They maintain strong ties to local villages but are more connected to urban economies and infrastructures, offering opportunities for development and expansion.
- Dependencies are smaller settlements that depend on larger local villages or urban centers for economic, administrative, and social functions. These communities are often less developed in terms of infrastructure and services but play a crucial role in the broader rural network by supplying resources like labor, agricultural products, and raw materials to the larger villages.
- In the context of these three settlement categories, urban spaces within Egyptian rural areas serve several social functions that foster connections and strengthen communal life:
- Gathering: Urban spaces are crucial for fostering a sense of community. They act as informal meeting points where villagers engage in everyday social interactions, creating bonds of trust and mutual understanding. These areas enable casual greetings and extended conversations, which are essential for maintaining the village's social fabric [18].
- Communication and Learning: These spaces are hubs for cultural exchange, providing an environment where individuals can observe and learn from others, thereby strengthening communal knowledge [18]. They serve as platforms for transmitting values, customs, and practices from one generation to the next.
- Events and Celebrations: Urban spaces are central to the organization of weddings, festivals, and other communal events, which are significant in reinforcing traditions and social bonds. These events contribute to the shared cultural identity of the village.
- Self-Expression: Villagers often express themselves in urban spaces through art, music, and personal interactions, enriching the cultural landscape of the community. These spaces offer a venue for self-expression and creativity [19].

- **Safety and Security:** Urban spaces also provide a sense of security, especially for children. Semi-private areas within these spaces enable residents to observe and ensure the safety of their children, contributing to a feeling of safety and community watchfulness [٢٠].
- **Play Areas:** In the absence of private play areas, urban spaces function as vital playgrounds for children, promoting their physical and social development. These spaces support recreational and educational activities that are crucial for the growth of the younger generation [20].
- **Overall Social Interaction:** Finally, urban spaces facilitate communication and exchanges of ideas, allowing villagers to engage in discussions, share experiences, and build relationships. This strengthens the community's ties and enhances its ability to adapt to external changes and challenges.

5. Rural Dwellings and Their Relationship with External Spaces

The design of rural dwellings significantly influences their relationship with the surrounding spaces. By examining the functional layout of interiors, it becomes possible to identify the activities required for external spaces and evaluate the interaction between private and public areas [21]. In rural communities, these external spaces are often used for social gatherings, agricultural activities, and daily tasks that require both private and communal areas to blend seamlessly.

Rural-Urban Spaces: In the context of rural communities, the term "rural-urban spaces" refers to the transitional areas that exist between traditional rural living and urban expansion. These spaces are characterized by a blend of agricultural practices, residential structures, and increasingly urbanized infrastructures, where rural activities coexist with emerging urban amenities. The design and organization of these spaces are critical in facilitating the smooth integration of rural traditions with modern urban developments, helping rural areas adapt to population growth, industrialization, and changing employment patterns. In Egyptian villages, housing has undergone considerable transformation due to factors such as population growth, diminishing agricultural land, and a shift toward non-agricultural employment. These changes have spurred urbanization trends and the adoption of modern building materials. Consequently, traditional village life has evolved, with multi-family homes and contemporary amenities becoming increasingly prevalent [21]. The introduction of modern building materials and urban planning principles has reshaped the appearance and functionality of rural dwellings, reflecting the merging of rural and urban lifestyles. This transition has led to the development of "rural-urban spaces," where the boundaries between the rural environment and urban structures become more fluid, providing a dynamic setting for the evolving needs of rural communities.

5.1. Egyptian villages now host two main types of homes

- **Traditional Dwellings:** Found mostly in the original village area, featuring elements like large entrance doors for animals, reception areas, a central courtyard, multi-purpose rooms, and service areas arranged around the main courtyard. Built with materials like mud, stone, and simple facades [21, 22].
- **Modern Dwellings:** Resulting from economic and social changes, modern rural homes include a porch, reception area, living spaces, and amenities such as bathrooms and kitchens. Similar to traditional homes, they also have roofs for vertical expansion [22].

5.2. Changes in Rural Dwelling Composition

- **Porches:** In response to growing vehicle traffic on narrow village streets, many larger homes now incorporate external porches. These structures provide residents with protection and serve as transitional spaces between homes and the outside environment [22, 23].
- **Shops on Facades:** The shift away from agriculture as the primary occupation has driven the emergence of new income streams, prompting the addition of shops to the facades of homes. This trend reflects the evolving economic activities within rural communities [23].

6. The Concept of Social Space

Social space encompasses both physical and virtual environments where individuals engage, such as public squares, parks, or online platforms. These spaces, whether publicly or privately managed, are integral to shaping social interactions and collective experiences. Henri Lefebvre conceptualized all space as inherently social, serving as a metaphor for lived experiences. It incorporates both public and private domains while reflecting the intricate social relationships, traditions, obligations, and expectations of a community [24]. In pre-modern societies, space and place were closely intertwined, with each location serving a distinct social purpose [Fig. 5]. However, modern developments have increasingly decoupled space from a fixed place, a phenomenon evident in urban expansion and migration trends. This transformation has contributed to the creation of a globalized "social space," characterized by central hubs and peripheral areas, reflecting the far-reaching social effects of migration and economic changes [24, 25].

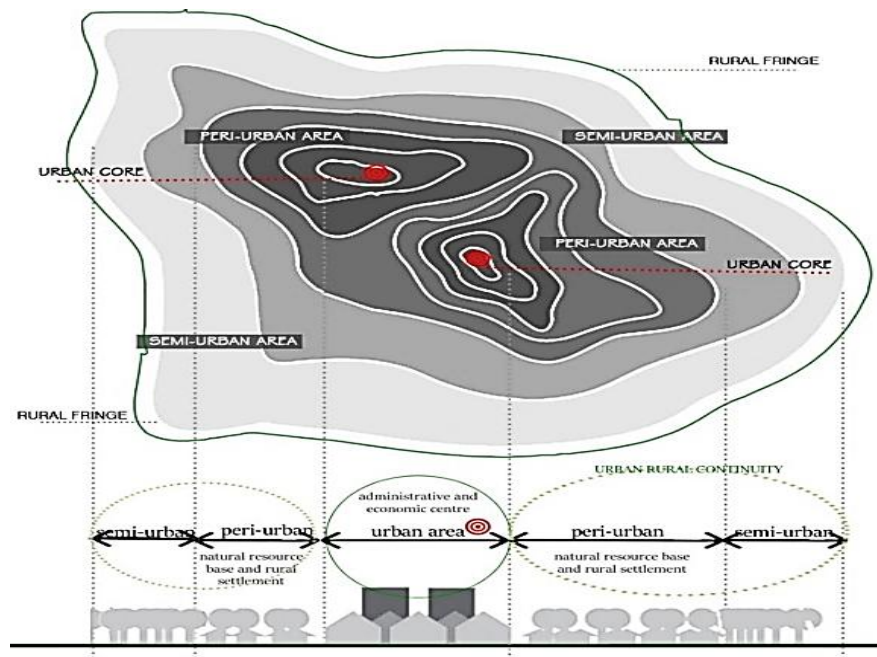


Fig. 5: Diagram illustrating Placement of urban, peri urban and rural areas

(Source: Carr et al., 1992; Carmona, 2003).

The organization of urban spaces in Egyptian villages involves analyzing movement networks and fabric structures [26] as shown in Fig. 6.

- Movement and Fabric Networks: Examines Road layouts, from main routes to secondary pathways, focusing on their organization.
- Fabric Structure: Considers relationships between buildings, assessing how adjacency and separation impact external space types and forms. Richard identifies three fabric patterns: point, strip, and cohesive.
- Egyptian villages historically feature tightly clustered houses connected by narrow pathways, reflecting a traditional lifestyle. Modern village extensions, however, have wider streets and fewer communal spaces due to car entry, with high-rise buildings replacing older courtyard-centered homes.
- The urban layout in Egyptian villages includes [27]:
 - Main Roads: Typically, a circular road or central longitudinal route, serving as the primary axis for services and community activities.
 - Subsidiary Roads: Radial paths in nucleus villages or transverse roads in linear villages, featuring small social spaces.

- Secondary Roads and Alleys: Narrow pathways leading to homes, often dead-ended in older areas, creating semi-private spaces.



Fig. 6: Structure of Urban Spaces in Egyptian Villages (source : author)

The Mosque Square, as the central social and economic hub of the village, hosts critical activities and services, including religious, social, and commercial functions. Surrounded by the mosque at its center, public buildings such as medical centers and schools, and commercial shops, the square serves as a gathering place for villagers. Activities in the square include street vendors selling produce, social gatherings for discussions, and recreational events like children's games and religious celebrations [27, 28]. Additionally, semi-public spaces within house clusters function as human-scaled areas promoting social interaction, where residents leave doors open for ongoing communication. These spaces, often shaded by trees, serve as areas for social gatherings and children's play but are lacking in modern village extensions, threatening social connections. Front yards in Egyptian villages are essential for daily life, consisting of an entrance area large enough for livestock and farming tools, and a "Mastaba" (raised platform), which serves as a private social space for neighborly interactions and children's play. In homes along busy roads, the Mastaba is often replaced by a raised threshold ("Fraidah") to protect residents from passing vehicles [29].

7. Case Study: Saryaqos Village

Saryaqos Village, located in El-Khanka District, Qalyubia Governorate, has undergone significant spatial and social transformation. Initially a nucleated settlement defined by a central circular road and radial pathways, it has evolved into a structured village responding to population growth, economic pressures, and changing rural dynamics. The village's initial compact form served basic needs but expanded via a second circular road, improving service distribution and connectivity [30]. Further growth saw longitudinal expansion into agricultural land. Today, the village spans an estimated 2.3 km², with a population nearing 45,000. The administrative boundaries fall under the El-Khanka Local Council. **Fig. 7** presents a land use map of Saryaqos showing its main roads, surrounding villages, and its proximity to the central city. This study assesses strategies for rural sustainability amid urbanization, emphasizing governance, planning, power structures, and the role of the state. The analysis draws on key areas within the village, highlighting the transformation in spatial organization and the role of public spaces [31].

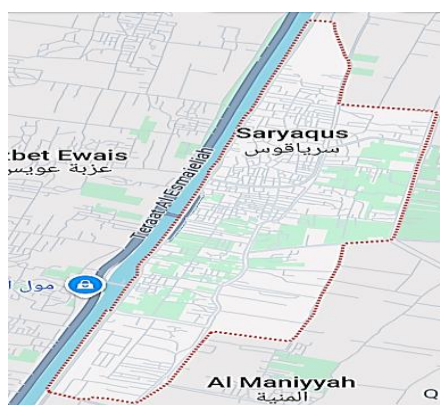


Fig. 7: Map showing the location of study areas within the village

7.1. Overview of the Village and Its Characteristics

The spatial structure of Saryaqos reflects a blend of traditional identity and modern necessities. It has shifted from nucleated housing to organized, clustered forms extending outward. Courtyards, narrow pedestrian paths, and shaded social zones dominate the urban layout. These features enhance accessibility and social interaction, reduce car dependency, and reinforce cultural patterns. Public spaces serve multifunctional roles—economic, social, and religious—while facing challenges like overcrowding, infrastructure strain, unplanned growth, and fragmentation [31, 32].

7.2. Study Areas in the Village

Two study areas illustrate the socio-spatial evolution:

- **Main Mosque Square:** Central community hub with religious, social, and commercial roles.
- **House Cluster Spaces:** Smaller residential nodes encouraging neighborhood interaction.

7.2.1. Main Mosque Square

The square forms the social and religious nucleus of Saryaqos. The mosque, centrally located (clarified in updated maps), anchors the square's function. Surrounding it are packed soil grounds with trees, essential services, shops, and vendors. This space supports daily interaction, prayer gatherings, markets, and events. It reinforces community bonds and embodies the cultural rhythm of the village. A semi-enclosed communal node functioning as the village's religious, commercial, and social hub as shown in **Fig. 8**. The mosque anchors the space, which is surrounded by essential services and informal economic activity (e.g., street vendors). This space plays a central role in facilitating cohesion, access, and cultural expression [32, 33].



Fig. 8: Activities in the Main Mosque Square

Table 1: Analysis of Main Mosque Square Space

Aspect	Details	Challenges	Recommendations
Spatial Layout	Central mosque within a semi-enclosed space, surrounded by dense development and packed soil ground	Limited spatial flexibility due to dense surroundings	Define spatial boundaries and introduce zoning for better use
Functionality	Multi-functional: religious gatherings, social interaction, and market activities	Conflicting uses during peak times	Allocate designated areas for each function to reduce overlap
Accessibility	Connected by narrow roads; accessible on foot from all directions	Vehicle encroachment disrupts pedestrian flow	Introducing pedestrian paths and restrict unnecessary vehicle entry
Aesthetics	Plain facades, minimal greenery, informal stalls dominate visual character	Uninviting appearance and lack of shaded areas	Add trees, improve facades, and introduce traditional furniture
Social Role	Serves as a central node for prayers, events, and daily encounters	Overcrowding during religious or social events	Improve infrastructure and organize space for event use

7.2.2. House Cluster Spaces

These spaces are semi-enclosed clusters with shared communal areas. They foster privacy and social exchange and adapt to population pressures while preserving a traditional lifestyle. Two examples: A node near the main road with benches and informal commerce and A compact cluster among mud-brick homes where limited indoor space shifts activity outdoors [33]. Smaller-scale communal areas located near residential clusters, reflecting traditional spatial layouts as shown in Fig. 9. Used for informal gatherings, children’s play, and community interactions, these spaces are central to daily life but face challenges such as congestion and lack of formal planning.



Fig. 9: Activities in House Cluster Spaces

Table 2: Analysis of House Cluster Spaces

Aspect	Details	Challenges	Recommendations
Spatial Layout	Dense housing around central node	Limited open space	Zoning to enhance function
Functionality	Events, recreation, parking	Overlap between functions	Separate recreational from vehicular zones
Accessibility	Narrow streets, pedestrian-friendly	Car encroachment	Improve pedestrian paths
Aesthetics	Basic facades, minimal greenery	Visual discomfort	Add shaded seating, landscaping
Social Role	Traditional communal space	Overcrowding	Upgrade infrastructure, formalize event zones
Traffic	Perimeter street supports flow	Noise and safety concerns	Traffic calming near homes
Infrastructure	Unpaved ground, weak drainage	Weather-related issues	Surface paving and drainage solutions

The spatial dynamics of Saryaqos Village reflect a dual-core system centered around the Main Mosque Square and House Cluster Spaces, each serving distinct yet interconnected roles in community life. The Main Mosque Square, a semi-enclosed space anchored by the central mosque and flanked by shops and services, functions as the village’s religious, social, and commercial nucleus. It fosters daily interaction, hosts communal events, and reinforces cohesion through its multifunctional use. In contrast, the House Cluster Spaces—smaller gathering areas near roads and traditional mud-brick homes—support informal social interaction and preserve neighborhood intimacy. Despite their cultural and functional value, both spaces face shared challenges, including traffic intrusion and inadequate infrastructure. Addressing these issues through zoning, pedestrianization, and surface improvements is essential to enhance their usability, comfort, and contribution to sustainable rural development.

7.3. Proposal for Urban Ruler Space Development

A comprehensive drawing of the current status of the development proposal based on activities in the external spaces



Fig. 10: A comprehensive drawing of the current situation of the study spaces



Fig. 11: A comprehensive drawing of the current status of the development proposal based on activities in the external spaces

1. Spatial Layout:	• Central Open Space: A semi-enclosed central area acts as the layout's focal point, encouraging community interaction and privacy while maintaining accessibility. • Organic Arrangement: The design adopts an organic layout that mimics natural pedestrian flows, evoking a traditional village atmosphere. • Building Orientation: Surrounding structures define the open space, enhancing its usability and creating a cohesive edge.	• Linear Organization: The design follows a linear structure centered around a primary street or corridor, serving as the main axis connecting various zones. • Central Axis Importance: The main street supports both vehicular and pedestrian circulation, acting as the backbone of movement and connectivity. • Organized Grid Layout: Surrounding blocks are arranged in a structured, grid-like pattern, emphasizing urban order.
2. Functionality:	• Mixed Use: The open space supports communal activities like gatherings and markets, while adjacent buildings likely integrate residential and commercial purposes. • Circulation: Pathways radiating from the central space emphasize pedestrian connectivity.	• Zoning: The layout integrates mixed uses along the primary axis, combining commercial, residential, and public functions. • Public Spaces: Open areas, likely courtyards or communal spaces, provide opportunities for community gatherings and recreation.
3. Accessibility:	• Pedestrian Priority: Narrow pathways prioritize foot traffic and ensure accessibility from various directions. • Vehicular Access: The absence of road infrastructure minimizes vehicular interference, promoting a pedestrian-friendly environment.	• Connectivity: The central axis is easily accessible, with smaller pathways connecting surrounding blocks, ensuring smooth navigation. • Pedestrian Movement: The proximity of pathways and open spaces to the main street enhances walkability and pedestrian convenience.
4. Aesthetic and Environmental Considerations:	• Greenery: Trees enhance visual appeal, provide shade, and improve environmental quality, particularly in warmer climates. • Traditional Design Elements: The organic pathways and semi-enclosed spaces reflect a traditional village character, fostering cultural familiarity.	• Symmetry and Order: The balanced, grid-like layout ensures visual clarity and enhances the overall aesthetic appeal. • Potential for Greenery: Open spaces and road edges offer opportunities for incorporating greenery, improving environmental quality and comfort.
5. Social and Cultural Role:	• Community Hub: The central space acts as a hub for social interactions, cultural events, and communal activities, strengthening its role within the community.	• Community Interaction: The inclusion of open spaces within residential areas fosters social engagement and cultural activities. • Central Axis Utility: The main street serves as a potential venue for events, gatherings, and cultural interactions.
6. Challenges:	• Overcrowding: The space may become congested during peak activities. • Maintenance: Sustaining greenery and cleanliness could pose challenges without proper management. • Accessibility: Narrow pathways may limit access for individuals with mobility issues.	Overcrowding Risk: The dense block arrangement could lead to congestion, particularly along the main axis. Limited Open Spaces: The emphasis on built structures may restrict recreational opportunities, reducing the availability of communal areas.

CONCLUSIONS AND RECOMMENDATIONS

The results derived from the case study in Saryaqos Village. The analysis focuses on how urban design influences social cohesion within the village, with particular emphasis on key aspects such as public open spaces, social interactions among residents, and the impact of these spaces on daily life. The data collected through field observations, surveys, and interviews with local residents will be analyzed to understand the role these elements play in the quality of life in the village. The relationship between the design of public spaces, such as the Mosque Square, and house cluster spaces, with the social dynamics that foster community interaction, will be explored. Additionally, the study will examine the challenges the village faces due to modern urban transformations, such as the spread of urbanization in newer developments, which reduce shared spaces and impact social cohesion among residents. The aim of these results is to provide a comprehensive understanding

of how urban planning affects social sustainability in rural Egyptian communities and how these dynamics can be improved to ensure sustainable social growth in the future.

Conclusions

- Saryaqos Village has undergone significant transformation due to population growth and socio-economic changes.
- Initially, the village featured a nucleated settlement with tightly clustered residential units, but it has expanded into a more dispersed settlement with a second circular road and longitudinal growth extending into surrounding agricultural land.
- The Main Mosque Square continues to be the central hub for the village, integrating social, religious, and economic activities.
- The square hosts regular community events, local markets, and religious gatherings, reinforcing social cohesion and fostering interaction among villagers.
- It serves as a platform for economic activities, such as street vendors selling produce, and for social events, strengthening community ties and preserving cultural practices.
- House Cluster Spaces are critical to maintaining the social structure of the village, providing communal areas where neighbors interact and share daily experiences.
- These spaces help to sustain social cohesion by encouraging informal gatherings and fostering a sense of belonging.
- However, modern extensions of the village lack these shared spaces, potentially leading to social fragmentation and diminishing community interaction.
- The study highlights the need for a balance between modern urban developments and the preservation of traditional communal values.
- The integration of new urban features, such as multi-functional public spaces and pedestrian-friendly designs, should not come at the expense of the social fabric of the village.
- Urban design should aim to enhance existing communal spaces while ensuring that they remain functional and accessible for future generations.
- Urban development in rural areas like Saryaqos must prioritize the preservation of spaces that promote social interaction and connectivity.
- Modernization should address the growing population while ensuring that communal life remains central to the design and development of urban spaces.
- The study emphasizes that sustainable development practices should incorporate the social needs of the community, ensuring that the village's growth does not come at the expense of its social cohesion.

Recommendations

- **Optimized Urban Design:** In Saryaqos, urban design should focus on integrating communal spaces with modern developments. Residential areas should continue to evolve while preserving the social coherence provided by public squares and house clusters.
- **Functionality of Public Spaces:** Given the vital role of spaces like the Mosque Square in fostering social cohesion, future urban planning should prioritize multifunctional public spaces that serve both social and economic needs, ensuring that these spaces remain central to village life.
- **Preserving Social Connectivity:** Modern village extensions should incorporate communal spaces and walkable areas similar to traditional house clusters, fostering neighborly interaction and avoiding isolation. The lack of these spaces in new areas threatens the social fabric of the village and should be addressed in future development projects.

- Infrastructure Improvements: The village's infrastructure should be upgraded to support both the growing population and social activities. Improvements in road quality, drainage, and pedestrian pathways will help maintain the usability of public spaces, particularly in adverse weather conditions.

REFERENCES

- [1] G. Ahmed, W. M. Youssef, and M. M. Hammouda, "Achieving Urban Sustainability in Developing Countries: Solutions and Challenges," *Al-Azhar Engineering Journal*, vol. 45, no. 2, 2023. [Online]. Available: https://jaes.journals.ekb.eg/article_371835.html
- [2] M. El-Mahdy, A. El-Kady, and R. Agha, "Measuring Urban Maturity of Medium-Sized Cities: Case Study of Senbellawein City," *Al-Azhar Engineering Journal*, vol. 45, no. 2, 2023. [Online]. Available: https://jaes.journals.ekb.eg/article_371694.html
- [3] A. N. Abdel Hakim and M. A. A. Mohamed, "Activating the Role of Regional Planning in Evaluating Rural Villages: Case Study of Banha Center Villages - Egypt," *Al-Azhar Engineering Journal*, vol. 44, no. 1, 2022. [Online]. Available: https://jaes.journals.ekb.eg/article_207719.html
- [4] A. Repp et al., "City Regions as Landscapes for People, Food and Nature," Research Gate, 2012. [Online]. Available: https://www.researchgate.net/publication/313037563_City_Regions_as_Landscapes_for_People_Food_and_Nature
- [5] "Egypt's Decent Life Project is closing the rural-urban divide with a \$16 billion investment and a holistic approach to development," Fair Planet, 2023. [Online]. Available: <https://www.fairplanet.org/editors-pick/egypt-sets-an-example-for-nations-with-rural-urban-development-gaps/>
- [6] "Egypt's Haya Karima Initiative: An assessment of its rural development impact," CGSpace, 2023. [Online]. Available: <https://cgspace.cgiar.org/bitstreams/49f914a8-2c16-496f-b337-4f24dadfc995/download>
- [7] Ministry of Local Development, "Projects," [Online]. Available: <https://www.mld.gov.eg/en/projects>. [Accessed: May 23, 2025].
- [8] FAOLEX, "National Rural Development Strategy," [Online]. Available: <https://www.fao.org/faolex/results/details/en/c/LEX-FAOC180559/>. [Accessed: May 23, 2025].
- [9] M. Amer, "Egyptian Rural Practices: Living Heritage and Musealization," ICOMOS Advisory Committee Scientific Symposium, Marrakesh, Morocco, Oct. 2019. [Online]. Available: https://www.researchgate.net/publication/332497225_Egyptian_Rural_Practices_Living_Heritage_and_Musealization
- [10] H. Ghonimi, "The Role of Social Structures in Egyptian Rural Communities," *Journal of Rural Studies*, vol. 30, no. 2, pp. 150–162, 2014.
- [11] M. Ghanem, "Improving Regional and Rural Development for Inclusive Growth in Egypt," Brookings Institution, 2017. [Online]. Available: <https://www.brookings.edu/wp-content/uploads/2016/06/Arab-EconPaper2Hafez-FINAL.pdf>
- [12] S. Shalaby, "A Comparison of Masr El-Gdida and New Cairo City," *Journal of Architecture, Engineering and Technology*, vol. 1, no. 2, pp. 23–34, 2003. [Online]. Available: https://jaes.journals.ekb.eg/article_19123_c737ff605cccd6e4a387bcb35fc8d1d3.pdf
- [13] M. Carmona, "Contemporary Public Space, Part Two: Classification," *Journal of Urban Design*, vol. 15, no. 2, pp. 157–173, 2010. [Online]. Available: <https://www.scribd.com/document/601522259/Matthew-Carmona-2010-Contemporary-Public-Space-Part-Two-Classification>
- [14] Y. O. M. Mahgoub, "The Transformation of Traditional Rural Settlements in Egypt," International Symposium on Traditional Environments in a New Millennium, Amasya, Turkey, 2001. [Online]. Available: https://www.academia.edu/1652833/The_Transformation_of_Traditional_Rural_Settlements_in_Egypt
- [15] "12.2 Rural Settlement Patterns," Introduction to Human Geography, Washington State University. [Online]. Available: <https://opentext.wsu.edu/introtohumangeography/chapter/12-2-rural-settlement-patterns/>
- [16] S. Shalaby, "A Comparison of Masr El-Gdida and New Cairo City," *Journal of Architecture, Engineering and Technology*, vol. 1, no. 2, pp. 23–34, 2003. [Online]. Available: https://jaes.journals.ekb.eg/article_19123
- [17] M. Carmona, "Contemporary Public Space, Part Two: Classification," *Journal of Urban Design*, vol. 15, no. 2, pp. 157–173, 2010. [Online]. Available: <https://www.scribd.com/document/601522259>
- [18] Y. O. M. Mahgoub, "The Transformation of Traditional Rural Settlements in Egypt," International Symposium on Traditional Environments in a New Millennium, Amasya, Turkey, 2001. [Online]. Available: <https://www.academia.edu/1652833>
- [19] "12.2 Rural Settlement Patterns," Introduction to Human Geography, Washington State University. [Online]. Available: <https://opentext.wsu.edu/introtohumangeography/chapter/12-2-rural-settlement-patterns/>
- [20] Y. Mahgoub, "The Transformation of Traditional Rural Settlements in Egypt," International Symposium on Traditional Environments in a New Millennium, Amasya, Turkey, 2001. [Online]. Available: https://www.academia.edu/1652833/The_Transformation_of_Traditional_Rural_Settlements_in_Egypt

- [21] H. Fathy, *Architecture for the Poor: An Experiment in Rural Egypt*. University of Chicago Press, 1973. [Online]. Available: <https://press.uchicago.edu/ucp/books/book/chicago/A/bo3641441.html>
- [22] Y. Mahgoub, "The Transformation of Traditional Rural Settlements in Egypt," International Symposium on Traditional Environments in a New Millennium, Amasya, Turkey, 2001. [Online]. Available: https://www.academia.edu/1652833/The_Transformation_of_Traditional_Rural_Settlements_in_Egypt
- [23] H. Lefebvre, *The Production of Space*. Oxford, UK: Blackwell, 1991.
- [24] "Social space," Wikipedia, 2025. [Online]. Available: https://en.wikipedia.org/wiki/Social_space
- [25] W. S. Abdeldayem and T. El-Khouly, "Investigating the Urban Structure of Newly Planned Cities in Egypt: The Case Study of New Cairo City," ResearchGate, Nov. 2020. [Online]. Available: https://www.researchgate.net/publication/337654536_Investigating_the_urban_structure_of_newly_planned_cities_of_Egypt_case_study_of_New_Cairo
- [26] M. Amer, "Egyptian Rural Practices: Living Heritage and Musealization," ICOMOS Advisory Committee Scientific Symposium, Marrakesh, Morocco, Oct. 2019. [Online]. Available: https://www.researchgate.net/publication/332497225_Egyptian_Rural_Practices_Living_Heritage_and_Musealization
- [27] Y. Mahgoub, "The Transformation of Traditional Rural Settlements in Egypt," International Symposium on Traditional Environments in a New Millennium, Amasya, Turkey, 2001. [Online]. Available: https://www.academia.edu/1652833/The_Transformation_of_Traditional_Rural_Settlements_in_Egypt
- [28] H. Fathy, *Architecture for the Poor: An Experiment in Rural Egypt*. Chicago, IL: University of Chicago Press, 1973.
- [29] "Saryaqos," Wikipedia, 2025. [Online]. Available: <https://en.wikipedia.org/wiki/Saryaqos>
- [30] A. Elshater, "Revealing the transformation of spatial structure of greater Cairo: Insights from satellite imagery and geospatial metrics," ResearchGate, Jan. 2025. [Online]. Available: <https://www.researchgate.net/publication/385685586>
- [31] M. R. Iandolo et al., "Multitemporal analysis in Google Earth Engine for detecting urban changes using optical data and machine learning algorithms," arXiv preprint arXiv:2308.11468, Aug. 2023. [Online]. Available: <https://arxiv.org/abs/2308.11468>
- [32] A. Elshater, "Revealing the transformation of spatial structure of greater Cairo: Insights from satellite imagery and geospatial metrics," ResearchGate, Jan. 2025. [Online]. Available: <https://www.researchgate.net/publication/385685586>
- [33] M. R. Iandolo et al., "Multitemporal analysis in Google Earth Engine for detecting urban changes using optical data and machine learning algorithms," arXiv preprint arXiv:2308.11468, Aug. 2023. [Online]. Available: <https://arxiv.org/abs/2308.11468>