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Sustainable urban development while preserving its historical and cultural identity

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Abstract:

The object of research is a comprehensive understanding of sustainable development in the urban structure of cities, especially in tourist cities undergoing rapid transformation, by analyzing the methods used in building these cities and their previous experiences with them. The research uses the city of Karbala as an example as it has a necessary historical background and long growth experience. **Method.** The research analyses the obstacles to their urban environment, structure, and components to understand and evaluate the strategies used in their development to promote sustainable development. These challenges require immediate and comprehensive intervention. Emphasis is placed on the development and achievement of sustainable development in various city centers and their internal and external neighborhoods. The comprehensive analysis of current and future challenges and urgent needs for a more sustainable urban environment and an improved quality of life for the city's population is reflected. **Results.** By achieving these goals, the city of Karbala can achieve a balanced and sustainable urban environment and improve the quality of life of its citizens. This requires close cooperation between local government, stakeholders, and the community and effective integration of efforts to implement development policies and programs while preserving historical and cultural identity of cities.

1 Introduction

Sustainable development in urban structures represents one of the most critical challenges of our time, particularly for cities undergoing rapid transformation [1], [2]. As urban centers expand and modernize, they encounter numerous issues related to infrastructure degradation, inefficient resource management, environmental threats, and the need to enhance the quality of life for their inhabitants [3], [4]. Addressing these multidimensional challenges requires a comprehensive approach, focusing on immediate interventions and long-term strategies that align sustainable development goals [5], [6]. The need for an integrated response that balances economic growth, social equity, and environmental preservation has never been more urgent [7], [8].

The ESG (Environment – Social – Governance) strategy is a megatrend in urban sustainable development.

The research work [9] highlights the cost-effectiveness of green envelopes in improving building efficiency. The results indicate that green roofs could reduce peak temperatures by up to 34.3 °C, leading to daily energy savings of 12.5% during summer. Green façades decreased the wall exterior surface temperatures by up to 3.4 °C and 5.1 °C on the test cold and hot days, respectively. Urban blue-green spaces can regulate the microclimate of the surroundings through providing shade and transpiration while saving the energy use of residents [10]. The study [11] used a new indicator, the ratio of construction land area to green space area (UGI). The analysis revealed that urban construction land expanded by a factor of 1.85 between 2000 and 2020, while China's overall UGI saw a substantial decline of 77.8%. Green building certification systems (GBCS) are vital for ensuring sustainable practices in the construction industry. However, limited works have holistically studied the operational, embodied and whole life cycle assessment (OEW) credits in GBCS [12], [13], [14]. Theoretical contribution of the research [15] to green building literature is to develop a consumer behavior model that is strategy-oriented and has generality and to offer empirical evidence. The study [16] underscores the importance of tailoring green building evaluation systems to regional attributes and provides a theoretical foundation to refine assessment systems and foster regionally adapted, sustainable green building development. The research [17] provides actionable insights to balance fiscal sustainability and environmental goals in promoting high-quality green construction development within the multi-level governance systems, offering a useful reference for countries with similar policy agendas.

This research takes a deep dive into sustainable development in the urban fabric, focusing on cities of historical and strategic significance currently experiencing accelerated urbanization [18], [19]. The study examines both the successes and shortcomings of the methods employed in urban planning, offering a critical analysis of past efforts and the lessons learned from them [20], [21]. Among these cities, Karbala, Iraq, stands out as a particularly compelling case study [22]. With its profound historical legacy and the pressures of modern urbanization, Karbala provides an ideal backdrop for examining the challenges of achieving sustainable urban growth while preserving cultural and environmental integrity [23], [24].

Although much research has been conducted on sustainable urban development, existing studies often fail to address Karbala's specific complexities [25], [26]. The unique blend of cultural heritage, religious significance, and rapid urban expansion presents challenges not fully explored in previous literature [27], [28]. There remains a significant scientific gap in understanding how to integrate environmental preservation with infrastructural modernization and cultural conservation in a city like Karbala [29], [30]. This gap underscores the necessity for innovative solutions to navigate the tensions between development and sustainability, providing a blueprint for other cities facing similar issues [31].

This research aims to fill this gap by developing a comprehensive framework for sustainable urban development in Karbala. Through a systematic analysis of the city's current urban challenges – from infrastructure deterioration and inadequate public services to environmental degradation and resource overconsumption – this study seeks to propose viable solutions to balance urban growth with sustainability. By doing so, it aims to contribute to the broader discourse on sustainable development and offer actionable strategies that can be adapted to other rapidly transforming cities.

This study also seeks to enhance the quality of life for Karbala's residents by fostering a balanced approach to urban expansion. This involves improving the efficiency of resource use and public infrastructure and addressing social and environmental concerns central to sustainable development. By integrating advanced urban planning algorithms, data-driven decision-making, and evidence-based strategies, this research will offer a roadmap for policymakers, urban planners, and stakeholders to collaboratively pursue sustainable development goals, ensuring that Karbala evolves into a model of sustainable urban growth while preserving its historical and cultural identity.

2 Materials and Methods

Based on the ESG strategy, we will highlight four key aspects to sustainable urban development.

Land uses and transport. Due to the clustering of diverse activities within the urban core significant dependence appeared on public transportation. This reliance has become complete, with private cars and taxis being predominantly utilized. The geographical separation between the central work area and residential areas has consequently contributed to a rise in energy consumption and subsequently led to an escalation in air pollution within the urban environment. There is a need to prioritize the implementation and enhancement of comprehensive planning initiatives, road planning

strategies, efficient transportation systems, expanded greenery, regions, and the development and beautification of roads and streets.

Natural resources. Efficient utilization of natural resources, both within and outside the city, is imperative as they play a crucial role in enhancing the city's appeal to residents and fostering sustainable development. These resources encompass various elements such as parks, water resources, river banks, and green spaces.

Energy use. The urban core represents a significant concentration of energy consumption, necessitating the adoption and enforcement of effective energy policies within its buildings. Consequently, building regulations should incorporate environmental criteria, mandating heightened energy efficiency standards with a particular emphasis on integrating renewable energy sources.

Environmental waste. Commercial activities and mixed land use in urban city centers generate significant waste. Consequently, it becomes necessary to implement ecological management and disposal strategies to address this issue. By focusing on the reuse and manufacturing of waste materials, it is possible to reduce the overall volume of waste in city centers effectively.

The research object is the city of Karbala, the focal city of its district, not only serves as the administrative heart of the Karbala Governorate but also stands as one of the three main districts within the province. These districts are Karbala, Al-Hindiya, and Ain Al-Tamr. These districts encompass three district centers and four sub-districts, with each center comprising a district and each sub-district comprising a collection of villages and rural areas of various types.

The city of Karbala is situated between the latitudes (´´0 ´40 °32) and (´´0 ´30 °32) north of the equator and the longitudes (´´0 ´55 °43) and (´´0 ´5 °44) east of the Greenwich line. The area of this city is 135 km^2, constituting 26.63% of the area of the Karbala district, which is 507 km^2.

Karbala experiences a hot desert climate (BWh in the Köppen climate classification) with extremely hot, long, dry summers and mild winters. Almost all of the yearly precipitation is received between November and April, though no month is wet.

Typically, daily mean temperatures range from 36.4 °C in July to 10.6 °C in January. Daily maximum temperatures range from 44.7 °C to 16.6 °C respectively. Annual precipitation is 93.5 mm. Average relative humidity range from 28.2 % in June to 72.1 % in January.

3 Results and Discussion

3.1 The City Center

The city center of Karbala exemplifies the urban configuration of the city, which has experienced numerous urban changes in the last century and continues to transform. Moreover, the urban fabric of the city center is gradually deteriorating through:

- Challenges and maltreatment of heritage structures.
- The lack of organization in the blending of various purposes.
- The condition of the urban landscape has undergone a decline.
- Insufficient provision of green spaces and recreational amenities.
- Inadequate housing, particularly in the historic districts of the city center.
- Instances of Misuse of Government Constructions and Alterations in Utilization.
- The ecological issues linked to the discharge of wastewater into the Euphrates River.
- The issue pertains to housing and the densities at which accommodation is constructed.
- The issue at hand pertains to the inefficiency and deterioration of the public transport system.
- Infrastructure degradation and the inadequacy of solid waste management and collection systems.
- The issue at hand pertains to the indiscriminate encroachment on buildings, consequently leading to visual pollution.
- Urban regions sometimes experience traffic congestion due to an overwhelming number of cars on the road, leading to delays and decreased travel speeds.
- The degradation of public and essential services, the insufficiency of the allocated infrastructure in terms of functionality, and their non-compliance with established standards.

The central area of the city serves as its focal point, characterized by the high level of activity and the substantial traffic it generates. Implementing sustainable Development practices in the city center contributes to the long-term viability and sustainability of the city (Figure 1).

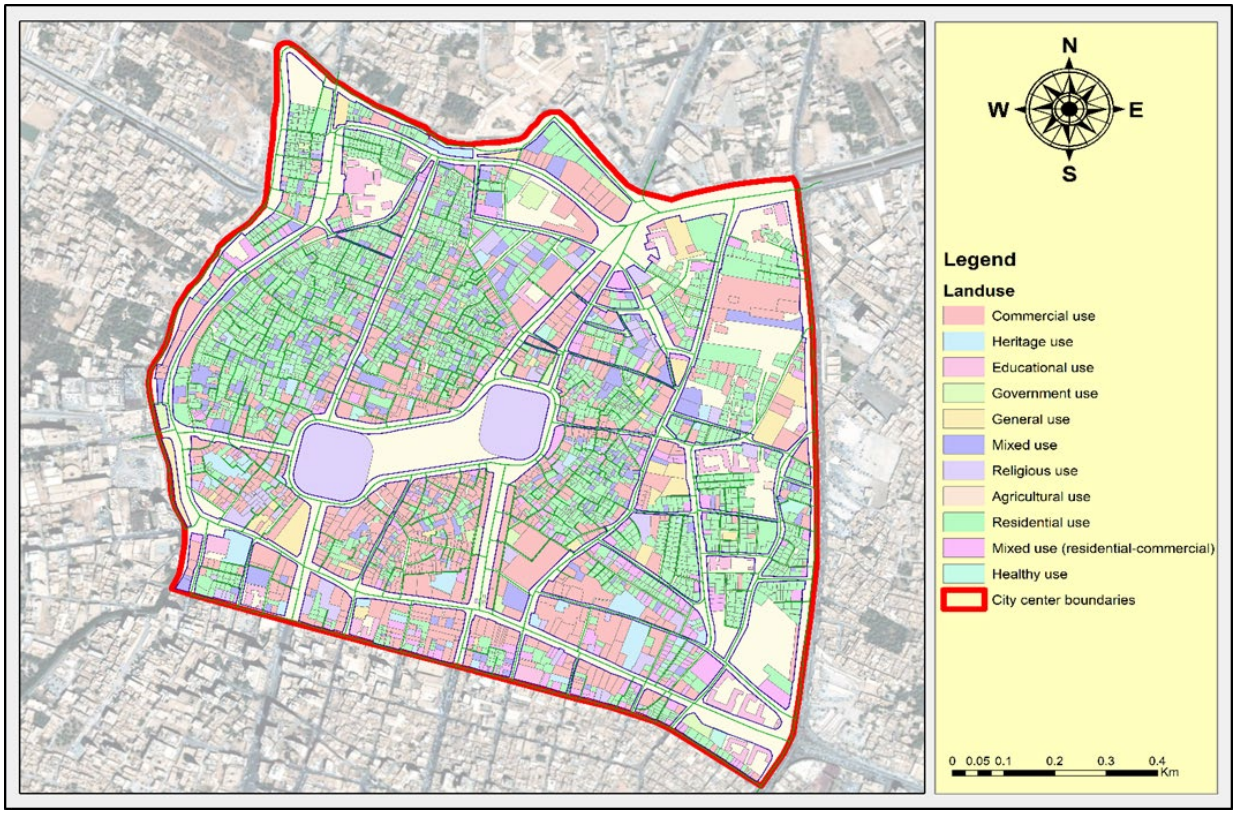

Fig. 1 – Sustainable development of the urban center of Karbala.

To attain equitable growth at the urban core level, it is imperative to focus on the development of the following aspects:

- The city's central region stands as a significant attraction for both residential and occupational endeavors.
- There's an emphasized need to reduce reliance on prolonged distances between functional zones, facilities, and residential conglomerates.
- It's paramount to address traffic congestion through the adept design of residential neighborhoods and sectoral hubs that adeptly cater to the populace's requisites in an efficient and direct approach.
- The quality of housing units can be elevated through the deployment of policies emphasizing restoration, advancement, and infrastructural improvement while moderating population density.
- An envisaged strategy for ameliorating environmental, aesthetic, and recreational components is the augmentation of green space areas.
- Advancement and broadening public transportation networks, considering future challenges, are crucial.
- A cornerstone in proficient urban planning is the optimized and efficient provisioning of parking facilities.
- A proposed strategy to combat traffic challenges involves bolstering pedestrian pathways while curbing direct vehicular accessibility.
- Adhering to international standards plays a pivotal role in enhancing energy consumption efficacy within edifices, endorsing renewable energy sources, and integrating innovative thermal energy systems.
- Waste minimization, recycling, and repurposing stand as foundational pillars in sustainable waste management.
- Given the scarcity of available land within urban zones, contemplating the implementation of refrigerated housing units emerges as an effective alternative.
- A viable strategy to alleviate workload intensity in urban city centers is the emphasis on cultivating a specialized workforce.

- The formulation of strategic housing policies includes capitalizing on vacant land through the regularization and incentivization of historically valued areas.

3.2 The Inner City

The internal region, the contemporary sections of the city center represent the subsequent stage of the urban development cycle, showcasing the following distinctive attributes:

First, the shift from residential utilization to Commercial Development.

Secondly, the prevalence of large housing blocks near central areas exemplifies the absence of individual families' dominance over specific housing units, coupled with the increasing demand for efficient housing solutions and accompanying infrastructure. This has resulted in significant pressure on these housing blocks due to the intense focus on redevelopment in the central region. Consequently, these areas' living patterns and population density have been affected, as they can accommodate mixed uses and expansions.

To effectively implement sustainability standards within urban areas, it is imperative to establish a harmonious equilibrium between environmental considerations and housing requirements. This necessitates prioritizing specific criteria, including providing green spaces, afforestation initiatives, mitigating overcrowding, and reducing mixed land use (Figure 2).

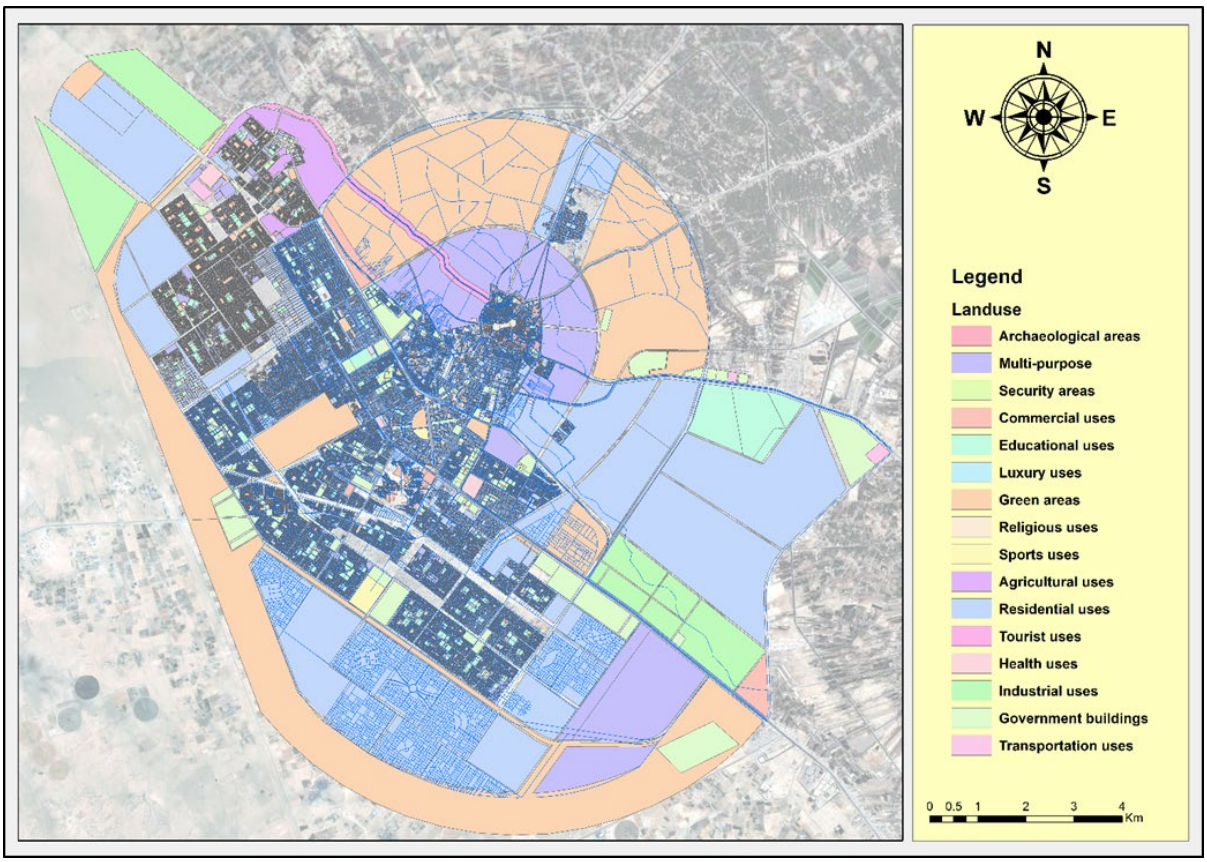

Fig. 2 – Sustainable urban development of the inner area in Karbala.

Therefore, to attain sustainable development in the region, it is imperative to establish the following:

The interior structure of the urban area requires design adaptations to fit the unique local conditions, which encompass:

- The utilization of renewable energy sources.
- The enhancement and advancement of public transport.
- One key objective is to enhance the quality of public services.
- The processes of collecting, treating, reusing, and utilizing waste materials.
- Sustaining the integration of diverse land uses within this geographical area.
- The revitalization of residential areas and the conservation of their inherent qualities.
- This study aims to explore the re-engineering of the existing road network to identify and implement road design strategies that prioritize safety and minimize pollution levels.

- One potential strategy for mitigating the impact of current mixed uses and future expansions of non-residential use is implementing measures to reduce the associated pressure.
- Enhance the design and development of residential areas to create a visually appealing environment by leveraging the benefits of urban design principles.
- Enhancements in the previously underutilized regions currently engage in environmentally harmful practices overseas.
- One potential strategy for mitigating overcrowding is prioritizing utilizing public and metro transportation systems.
- One potential area for enhancement involves the optimization of mixed-use zones and the mitigation of pollutants.
- Implementing measures to mitigate traffic speed and density is crucial for safeguarding residential areas.
- To uphold the stability of residential areas, it is imperative to prevent substantial population increases.

Based on our analysis, it is evident that future modifications are necessary to attain sustainable development within the region's interior. These modifications can be enumerated as follows:

First, one potential approach to enhancing the appeal of residential areas involves implementing strategies to augment the presence of green spaces.

Secondly, the mitigation of excessive population densities by incorporating open spaces in regions exhibiting undesirable levels.

3.3 The Outer City

The following elements must be considered to achieve sustainable development at this level (Figure 3).

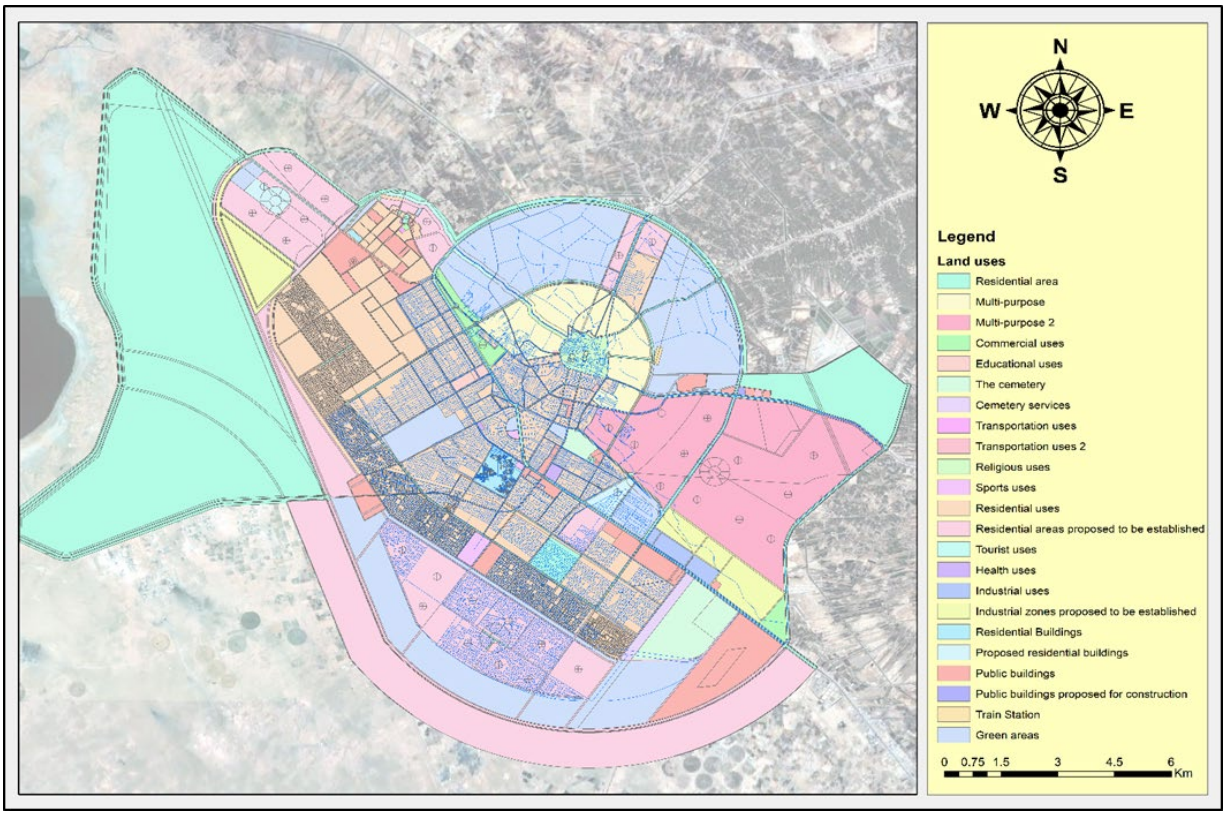

Fig. 3 – Sustainable urban development of the outer area in Karbala.

The outer framework of the urban area requires design modifications to accommodate specific local conditions, including:

- The need to preserve gardens and reclaimed lands.
- There is a need to balance land use in all areas of the city to ease pressure on the center. There is a need to develop public transport.

- To strengthen the urban fabric of the outlying city by making the most of the land within the current urban structure by selecting land below the level of use or vacancy and developing mechanisms for linking new and old neighborhoods.
- It is essential that the current development of the world ' s region be made more intensive in existing neighborhoods through a policy of filling out empty and underutilized areas.
- The possibility of directing urban upgrading beyond the metropolitan area at a later stage on priorities beginning with empty land followed by non-productive land.
- Use and exploitation of vacant land for agriculture and afforestation and use as urban vents to improve the environment.

It can be said that future changes are required to achieve sustainable development in the outlying area of the city, which can be mentioned as follows:

- They are improving the environment of residential areas and providing diversity in housing patterns.
- Provision of more significant areas of open land and linking them to natural sites.
- Provision of mixed-use areas of work and housing.
- Development and development of public transport.
- Use of renewable sources of energy.
- Development of residential centers.
- Use waste reuse policy.

4 Conclusions

1. To ensure sustainable development in urban limbs, it is necessary to develop public transport systems, preserve green spaces, and adopt balanced land use practices. Comprehensive urban planning is necessary for enhancing infrastructure, roadways, and transportation systems, focusing on augmenting green areas, and revitalizing historic buildings inside the city center.
2. To achieve sustainability in transport and energy consumption, it is essential to shift towards the implementation of efficient public transport systems and decrease dependence on private automobiles.
3. Adopting renewable energy sources and enforcing stringent energy efficiency requirements in buildings is crucial.
4. The attainment of a balanced state between residential and commercial expansion is crucial within the urban core development, requiring a methodical strategy that emphasizes the conservation and revitalization of residential areas. Urban design and land-use management, through implementing concepts that promote aestheticism and strategically expand green spaces, contribute to addressing the challenges of overcrowding and pollution.
5. Improving housing diversity and promoting the environment is vital for sustainable development, and these aspects can be enhanced by developing various housing designs and establishing effective communications between open spaces and natural areas.
6. In promoting sustainable urban development in the suburbs, two key strategies emerge: implementing legislation on waste reuse and expanding the use of renewable energy sources. The development of public transport and services in conjunction with integrating renewable energy sources and applying effective waste management techniques may significantly mitigate the environmental impacts of high population density in urban environments.

References

1 Merylova, I., Smilka, V. and Kovalska, G. (2023) Public Spaces in Historic Environment as Urban Fundamentals of Sustainable Development. IOP Conference Series: Earth and Environmental Science, Institute of Physics. https://doi.org/10.1088/1755-1315/1275/1/012026

2 Hampwaye, G., Siame, G., Muchindu, M. and Nchito, W.S. (2024) Urbanization and Urban Development in Zambia. In: Chitonge, H., Fundanga, C.M., Songwe, V. and Kabinga, M., Eds., The Oxford Handbook of the Zambian Economy, Oxford University Press. https://doi.org/10.1093/oxfordhb/9780192864222.013.15

3 Sleem, S., Mandour, A. and Diab, M. (2022) Guidelines for Urban Quality Assessment to Uplift Sustainable Development of the Built Environment. Case Study of AL Rehab Neighborhood. IOP

Conference Series: Earth and Environmental Science, Institute of Physics. https://doi.org/10.1088/1755-1315/1113/1/012013

4 Caló, F., Abdikan, S., Görüm, T., Pepe, A., Kiliç, H. and Sanli, F.B. (2015) The Space-Borne SBAS-DInSAR Technique as a Supporting Tool for Sustainable Urban Policies: The Case of Istanbul Megacity, Turkey. *Remote Sensing*, MDPI AG, **7**, 16519–16536. https://doi.org/10.3390/rs71215842

5 Khalifa Mohammed Ali, N. and Abbas Ahmed, Z. (2021) Planning Sustainable Environmental Neighborhoods Is a Step towards the Direction of Sustainable Cities. IOP Conference Series: Earth and Environmental Science, IOP Publishing Ltd. https://doi.org/10.1088/1755-1315/754/1/012033

6 Alaeddinne El Jamassi and Al-Qeeq F.S. (2013) Using GIS in Sustainable Urban Design in Developing Countries (Gaza Strip, Palestine as a Case Study). *IUG Journal of Natural and Engineering Studies*, Gaza, 83–100. https://www.researchgate.net/publication/269699489_Using_GIS_in_Sustainable_Urban_Design_in_Developing_Countries_Gaza_Strip_Palestine_as_a_Case_study

7 Al-Abayechi, Y.F. and Al-Khafaji, A.S. (2023) Forecasting the Impact of the Environmental and Energy Factor to Improve Urban Sustainability by Using (SEM). *Civil Engineering Journal*, **9**, 2554–2567. https://doi.org/10.28991/CEJ-2023-09-10-013

8 Korniyenko, S. V, Kozlova, O.P. and Astafurova, T.N. (2019) Increasing Habitat Sustainability in Residential Areas of the First Mass Series. *IOP Conference Series: Materials Science and Engineering*, **687**, 055012. https://doi.org/10.1088/1757-899X/687/5/055012

9 Guo, R., Min, Y., Gao, Y., Chen, X., Shi, H., Liu, C., Zhuang, C. (2024) Unlocking energy and economic benefits of integrated green envelopes in office building retrofits. *Building and Environment*, **261**, 111747. https://doi.org/10.1016/j.buildenv.2024.111747

10 Yang, F., Yang, D., Zhang, Y., Guo, R., Li, J., Wang, H. (2024) Evaluating the multi-seasonal impacts of urban blue-green space combination models on cooling and carbon-saving capacities. *Building and Environment*, **266**, 112045. https://doi.org/10.1016/j.buildenv.2024.112045

11 Song, F., Bao, J., Li, T., Yu, T., Yuan, Y., Huang, X., Bao, A., De Maeyer, P. (2024) Contrasting inequality of green spaces and buildings between cities in China. *Building and Environment*, **254**, 111384. https://doi.org/10.1016/j.buildenv.2024.111384

12 Olanrewaju, O.I., Enegbuma, W.I., Donn, M. (2024) Operational, embodied and whole life cycle assessment credits in green building certification systems: Desktop analysis and natural language processing approach. *Building and Environment*, **258**, 111569. https://doi.org/10.1016/j.buildenv.2024.111569

13 Tighnavard Balasbaneh, A., Sher, W., Madun, A., Ashour, A. (2024) Life cycle sustainability assessment of alternative green roofs – A systematic literature review. *Building and Environment*, **248**, 111064. https://doi.org/10.1016/j.buildenv.2023.111064

14 Mulya, K.S., Ng, W.L., Biró, K., Ho, W.S., Wong, K.Y., Woon, K.S. (2024) Decarbonizing the high-rise office building: A life cycle carbon assessment to green building rating systems in a tropical country. *Building and Environment*, **255**. https://doi.org/10.1016/j.buildenv.2024.111437

15 Ho, S.P., Wen, S.C., Hsu, W.C., Bambo, I.M.A. (2024) Raising the demand for residential green buildings: A general consumer behavior model, the evidence, and the strategies. *Building and Environment*, **252**, 111267. https://doi.org/10.1016/j.buildenv.2024.111267

16 Li, H., Geng, Y., Shen, K., Wales, N., Skitmore, M. (2025) Optimizing regional disparities in green building evaluation: A random walk-linear regression analysis in China. *Building and Environment*, **273**, 112740. https://doi.org/10.1016/j.buildenv.2025.112740

17 Hu, Q., Xiong, F., Shen, G.Q., Liu, R., Xue, J., Wu, H., Zhou, X. (2025) Incentive mechanism design for promoting high-quality green buildings in China's multi-level governance system. *Building and Environment*, **269,** 112358. https://doi.org/10.1016/j.buildenv.2024.112358

18 Albasri, N.A.R.H., Shakir, H.S. and Al-Jawari, S.M. (2023) Monitoring and Prediction Functional Change of Land Uses Toward Urban Sustainability. *International Journal of Sustainable Development and Planning*, International Information and Engineering Technology Association, **18**, 2015–2023. https://doi.org/10.18280/ijsdp.180703

19 Khalaf, H.M. The Role of Religious Tourism Sites in Achieving Sustainability (The Kufa And Al-Sahla Mosques In Najaf, A Case Study). https://zienjournals.com/index.php/tjm/article/view/4269

20 Al-Ghiyadh, M.A.-K. and Al-Khafaji, S.J.N. (2021) The Role of Urban Planning and Urban Design on Safe Cities. *IOP Conference Series: Materials Science and Engineering*, **1058**, 012065. https://doi.org/10.1088/1757-899X/1058/1/012065

21 Al-Shebillawy, E.J., Stetsenko, S.E. and Al-Mossawy, B.A. (2021) Intelligent Transportation Strategy to Promote Sustainable Urban Transport Tools (Case Study of the City of Najaf - the Republic of Iraq). *IOP Conference Series: Materials Science and Engineering*, **1079**, 042061. https://doi.org/10.1088/1757-899X/1079/4/042061

22 Al-Shammari, R. (2024) Historical Centers: An Exploratory Comparison of Sustainable Applications in Urban Renewal Projects – Najaf and Karbala, Iraq. *Wasit Journal of Engineering Sciences*, **12**, 55–69. https://doi.org/10.31185/ejuow.Vol12.Iss3.543

23 Fahad, A.F., Al-Jameel, H.A. and Al Muhanna, R.R.A. (2023) Evaluating Urban Streets and Public Transportation in Karbala City Using GIS. *E3S Web of Conferences*, **427**, 04009. https://doi.org/10.1051/e3sconf/202342704009

24 Al-Mossawy, B.A., Stetsenko, S.E. and Al-Shebillawy, E.J. (2022) Spatial Analysis to Justify Urban Decisions in the Planning and Distribution of Green Spaces within the Urban Range of Cities (Case Study of the City of Samawah - Republic of Iraq). IOP Conference Series: Earth and Environmental Science, IOP Publishing Ltd. https://doi.org/10.1088/1755-1315/988/5/052047

25 Abbas Jasim, I., Lafta Farhan, S., Sachit Senah, H., Kareem Al-Mamoori, S. and Al-Maliki, L.A. (2021) Measuring City's Social Urban Sustainability Criteria Using GIS: Kut City as a Case Study. 2021 International Conference on Advance of Sustainable Engineering and Its Application (ICASEA), IEEE, 188–193. https://doi.org/10.1109/ICASEA53739.2021.9733012

26 Al-Jaberi, A.A., Al-Khafaji, A.S., Ivankina, N.A. and Al-Sawafi, M.H. (2019) The Idea of Pedestrian Pockets as a Key for Successful Transit-Oriented Development for Najaf City-Republic of Iraq. *IOP Conference Series: Materials Science and Engineering*, **698**, 033029. https://doi.org/10.1088/1757-899X/698/3/033029

27 Hussein, H.M.A. (2017) Spatial Analysis of Land Use Changes in the City of Karbala After 2003. University of Baghdad, Baghdad. https://coart.uobaghdad.edu.iq/wp-content/uploads/sites/11/2024/01/%D8%A7%D9%84%D8%AC%D8%BA%D8%B1%D8%A7%D9%81%D9%8A%D8%A9.pdf

28 S. J. Al-Saadi. (2003) Urban Land Management in the City of Baghdad. University of Baghdad, Baghdad. http://iurp.uobaghdad.edu.iq/wp-content/uploads/sites/31/2020/09

29 The Ministry of Planning. (2022) The Comprehensive Development Plan for the City of Karbala. Baghdad. https://mop.gov.iq/wp-content/uploads/2022/11/stplan.pdf

30 Al-Hajjaj, M.A.J. (2014) Indicators of Urban Sustainability. University of Baghdad, Baghdad. https://coart.uobaghdad.edu.iq/wp-content/uploads/sites/11/2024/01/%D8%A7%D9%84%D8%AC%D8%BA%D8%B1%D8%A7%D9%81%D9%8A%D8%A9.pdf

31 Farhan, S.L., Merie, U.A.A.K. and Alobaydi, D. (2023) Challenges and Opportunities of the Urban Structures of Holy Cities: The Case of Old Najaf, Iraq. *IOP Conference Series: Earth and Environmental Science*, **1129**, 012034. https://doi.org/10.1088/1755-1315/1129/1/012034