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Urbanization and habitat loss: an overview of rapidly growing cities in Saudi Arabia

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The rapid spread of urban areas operates as a main element in habitat loss patterns in rapidly expanding cities of the Global South. The review critically examines the natural environmental challenges associated with urban expansion, with particular emphasis on their impact on habitat degradation, biodiversity loss, and weather pattern alterations. This work aims to investigate biodiversity changes in habitat structure resulting from rapid urbanization, with a primary focus on Saudi cities, supported by comparative examples from other rapidly urbanizing cities in the Global South. Urbanization in Saudi Arabia; as an example; serves as an analysis that demonstrates swift population growth's effect on desert ecosystems combined with coastal environments along with wetland habitats. The adverse impacts of urbanization can be mitigated through sustainable planning approaches that incorporate green infrastructure and targeted conservation strategies. The Saudi green initiative presents an example of how development can work harmoniously with ecological conservation through organized sustainable approaches. Urban planning requires integration of biodiversity elements and strict environmental regulations to reduce adverse effects of urban development so cities can maintain sustainability standards.

KEYWORDS

urbanization, biodiversity loss, habitat fragmentation, Global South cities, Saudi Arabia

Introduction

The rapid growth of urbanization has transformed landscapes to become a dominant force which affects biodiversity in the contemporary era. A total of 84.95% of Saudi Arabians consisted of urban dwellers during 2023 (Almulhim and Cobbinah, 2023a; Almulhim and Cobbinah, 2023b). Rapid urban expansion throughout the globe has produced substantial land use alterations along with environmental stress and habitat destruction (Zlotnik, 2017; Gerten et al., 2019). The development of sustainable development plans demands full knowledge about how urbanization mechanisms impact biodiversity.

Multiple economics along with policy-related and demographic elements push forward the urban development process. The worldwide urban population projection for 2050 shows it will reach 68%, which will intensify stress on ecosystem resources and land (Gu, 2019). Research indicates that urban growth directly contributes to biodiversity loss through unintended habitat destruction, fragmentation, pollution, microclimate alterations, and the disruption of ecological processes (Liu et al., 2025). The uncontrollable growth of fast-expanding megacities has triggered the destructive movement of built-up areas into primary natural environments (Sun et al., 2020).

In the Global South, urbanization follows unique patterns that differ from those in industrialized nations. Peripheral urbanization, characterized by informal settlements, self-built housing, and unregulated expansion, is a defining feature of cities in developing nations (Caldeira, 2017). Human-initiated urban forms produce landscapes with extensive fragmentation that causes biodiversity to face challenges for survival in artificial human spaces. Urban

ecological decline intensifies when people with fewer resources do not have access to parks and conservation zones and forests that serve as biodiversity reservoirs (Rigolon et al., 2018).

Saudi Arabia offers a compelling case for examining the impact of urbanization on habitat loss due to its rapid urban expansion, variety of ecosystems, and biodiversity challenges within arid environments. Over the past few decades, the Kingdom has witnessed significant demographic and economic growth, resulting in the transformation of natural habitats into urban landscapes, especially in major cities such as Riyadh, Jeddah, and Dammam (Alatawi, 2022). This urban growth often comes at the expense of fragile desert and coastal habitats that are home to endemic and migratory species, making habitat degradation a critical concern (Mallick et al., 2025). Moreover, Saudi Arabia's Vision 2030 framework encourages urban development and infrastructure growth, which shed the light on the importance of integrating ecological sustainability into planning initiatives (Vision 2030, 2016). Saudi Arabia demonstrates rapid urban development at a global level while exhibiting various patterns of urbanization trends. Urban growth in Riyadh Jeddah and Makkah throughout the period of 1985–2014 led to the disappearance of 40 percent of their natural landscapes (Alqurashi and Kumar, 2019). The diminishing biodiversity stands as a result of increasing carbon dioxide output together with urban heat island phenomena that degrade air quality (Alajlan and Alreshaidi, 2022).

The growing population and expanding economy of Saudi Arabian cities have triggered major transformations of the land use patterns. Eastern and Central provinces have witnessed notable urban growth because industrial developments and infrastructure construction swallowed considerable areas of arid systems (Alqurashi and Kumar, 2019). For example, the Arabian leopard (*Panthera pardus nimr*) together with the Asir magpie (*Pica asirensis*) experience the worst effects of habitat fragmentation in Saudi Arabia. The continuing decline of natural environments combined with escalating tensions between humans and wildlife now puts these species under greater danger (Almulhim and Cobbinah, 2023a; Almulhim and Cobbinah, 2023b). Deforestation stemming from urban sprawl has diminished the availability of food combined with water resources which led to decreased native desert species populations (Liu et al., 2025).

Urbanization across Saudi Arabia has contributed to both biodiversity reduction as well as the intensification of environmental pollutants including airborne contaminants and water pollution. According to research, carbon pollution in urban zones grows in step with economic development until it reaches hazardous levels for sensitive environmental systems (Alajlan and Alreshaidi, 2022). Environmental services such as urban green spaces, wetlands, soils, and coastal ecosystems regulate climate by absorbing carbon, reducing heat, and mitigating floods, but their decline due to urbanization increases cities' vulnerability to extreme weather events (Sun et al., 2020).

Sustainable urban development strategies remain vital for Saudi Arabia because of its ongoing urban development process. Sustainable urban planning system includes three key areas such as land preservation alongside infrastructure development using smart practices for biodiversity protection to counter urbanization's negative environmental effects (Gu, 2019). Sustainable economic expansion becomes achievable through adoption of green urban development policies and conservation zoning schemes and renewable energy initiatives (Gerten et al., 2019).

The Government of Saudi Arabia needs to implement various protective policies to stop uncontrolled urban development yet simultaneously support forest renewal programs and protect animal

migration areas (Almulhim and Cobbinah, 2023a; Almulhim and Cobbinah, 2023b). Promoting both better transportation systems and urban vegetation improvements will establish environmentally sustainable cities with lower carbon emissions (Zlotnik, 2017).

This review investigates habitat loss due to rapid urbanization by studying Global South cities focusing on Saudi Arabia as an example. Studying habitat loss in Saudi Arabia provides valuable insights into how urbanization impacts biodiversity in arid and semi-arid regions, which are often underrepresented in global urban ecology research.

Global urbanization and biodiversity: trends and challenges

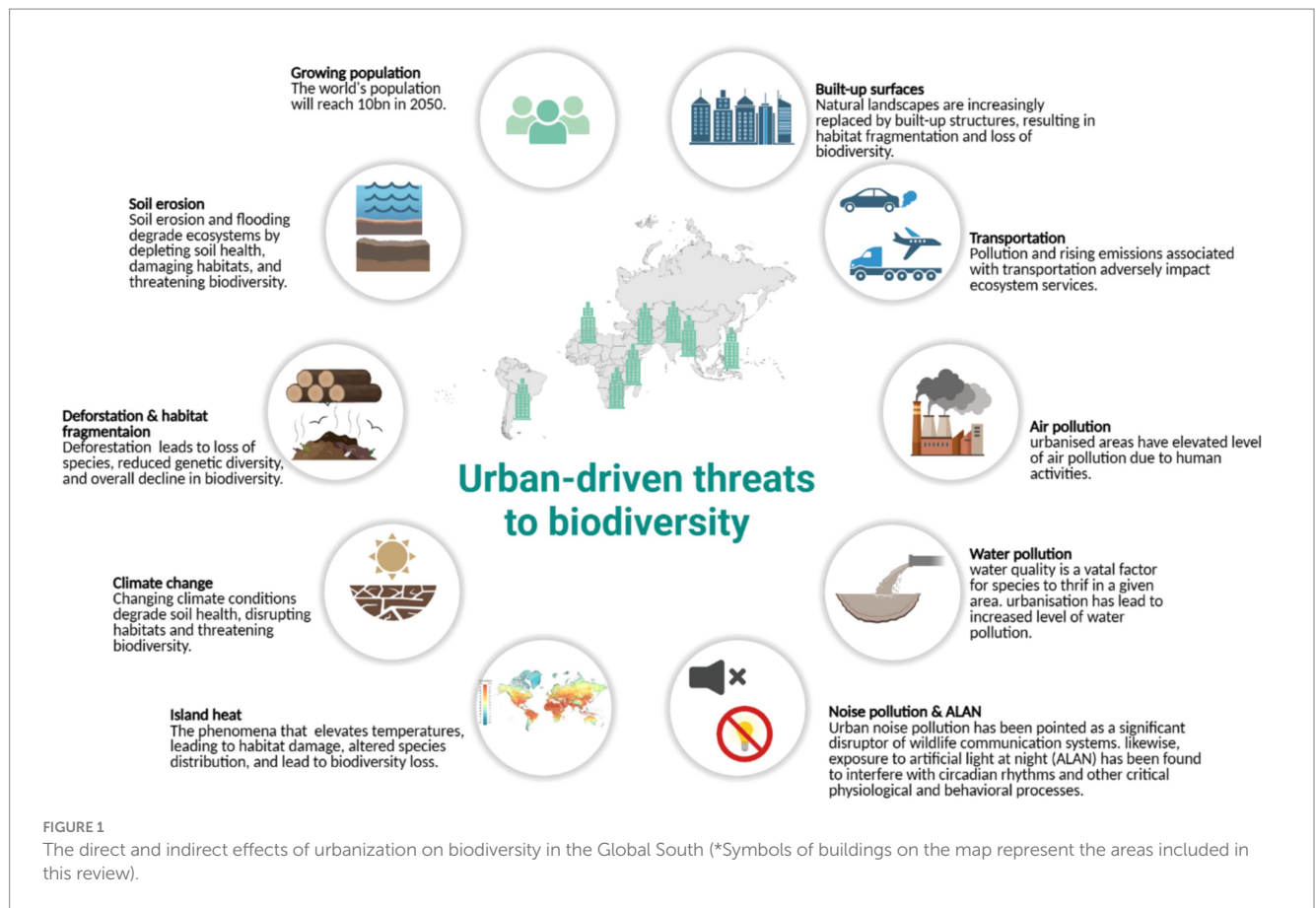
Urbanization stands as a fundamental transformative power that transforms present-day societies and impacts biodiversity along with ecosystem stability to a significant degree. Research clarifies that the world will have 68% of its people living in urban areas by 2050 thus placing overwhelming pressure on natural landscapes (Nagendra et al., 2018). Urban growth in the Global South develops at an unmatched speed through spontaneous and uncontrolled development practices. Research indicates that urban land expansion will endanger more than 800 species worldwide thus accelerating global biodiversity decline (Simkin et al., 2022).

The direct and indirect effects of urbanization on biodiversity stem from such changes in land use and habitat fragmentation as well as climate change and pollution (Figure 1). Urban expansion clears natural habitats for built structures which causes native species to disappear while permitting entry of non-native invasive species (Knapp et al., 2021). The exchange of forests with wetlands and grasslands allows urban areas to develop which causes extreme habitat destruction. Rapid urban development in tropical areas such as Southeast Asia and sub-Saharan Africa has triggered the elimination of vital biodiversity hotspots containing endemic as well as endangered species (Güneralp et al., 2017). Pollution from industrial activities and air missions from transportation combines harming natural ecosystems thus creating urban environments where numerous native species struggle to survive (Rega-Brodsky et al., 2022).

Urbanization produces climate changes that create the urban heat island effect through which cities become warmer than surrounding rural areas because concrete asphalt and additional urban materials absorb excessive heat (Rastandeh and Jarchow, 2021). The climatic changes negatively impact flora by interfering with reproduction cycles and damaging food supplies while blocking natural animal migration. Urban centers that release increasing amounts of carbon emission worsen climate change problems which stress vulnerable ecosystems even more (Liu et al., 2025).

Urban expansion in the Global South: a unique challenge

Urbanization across the Global South shares several key challenges that are also increasingly evident in Saudi Arabia, particularly concerning land use transformation, informal expansion, and environmental inequalities (Figure 1). For example, A study uses Landsat data from 1992 to 2022 to show dramatic transformation from vegetation and farmland to built-up areas in Nigeria, with rising land surface temperatures (Ishaya et al., 2024).



Endemic in African and South Asian cities and Latin American settlements is the unplanned dispersal of settlement which produces disordered land alteration and environmental deterioration (Caldeira, 2017). Likewise, the spread of urban growth throughout sub-Saharan Africa now occupies preserved habitats and natural wildlife passageways which has diminished wildlife living space (Güneralp et al., 2017). The unmanaged expansion of megacities Jakarta and São Paulo generates flooding along with soil erosion and deforestation that worsens biodiversity destruction (Zain et al., 2022).

Global South cities face an essential problem because certain populations lack proper access to green areas. Research shows that urban people who earn a lower income face barriers to parks and forests alongside other green space areas which diminish both natural habitat protection and human living quality (Rigolon et al., 2018). Green infrastructure deficiencies within cities cause environmental wrongs by putting disadvantaged groups in charge of ecological devastation (Pauleit et al., 2021).

The role of urban green infrastructure in biodiversity conservation

Cities possess an essential capability to protect biodiversity when they apply sustainable planning and management strategies. Arbitrated urban green infrastructure which includes parks, urban forests, rooftop gardens and green corridors demonstrates proven practice for increasing biodiversity and ecosystem services in metropolitan areas (Nassary et al., 2022). The implementation of

Nature-Based Solutions (NbS) within urban planning decreases heat stress together with air pollution filtration as well as serving as habitat for adapted species to thrive (Rega-Brotsky et al., 2022).

Green cities in tropical and arid regions have recently emerged as a solution to biodiversity reduction problems and improved urban operational stability. The cities Bogotá and Medellín together with Singapore have established wildlife corridors along with wetland restoration and native vegetation reintroduction to boost urban biodiversity (Zain et al., 2022).

Urban biodiversity policies need to combine both community involvement and native ecological understanding for creating sustainable conservation practices. Cities which involve their residents in community-driven greening programs achieve superior biodiversity enhancements and sustainable conservation achievements (Nagendra et al., 2018).

As urbanization continues to shape the world, particularly in the Global South, balancing economic development with biodiversity conservation is a pressing challenge. There is growing recognition that cities should be conceived as integrated ecological systems, where urban development and natural environments coexist harmoniously rather than operate in competition (Sanderson et al., 2018).

Special cases of urbanization and biodiversity loss in the Global South

Research shows that urbanization stands as the main cause behind biodiversity decline yet affects different areas of the world in distinctive ways (Nagendra et al., 2018). Natural ecosystems experience

significant stress because of urban expansion; however, cities often contribute to economic development and social advancement. The rapid urban growth throughout the Global South regions produces extraordinary detrimental effects on biodiversity (Nagendra et al., 2018). Multiple case studies present distinct types of biodiversity challenges due to urban expansion in the Global South (Table 1). These situations underscore the importance of developing context-specific environmental strategies to address the challenges of urbanization while enhancing ecological resilience.

Urban land-use change and ecosystem services: the case of the Pearl River Delta, China

The Pearl River Delta Metropolitan Region of China provides a defining example of both land-use changes and biodiversity decline. Rapid urban expansion in this region has transformed agricultural land into one of the most densely populated and prominent metropolitan areas globally. The elimination of critical ecosystem services such as water purification, climate regulation and soil fertility occurred because of these developments (Liu et al., 2019). Wetlands and forests switched into industrial and residential zones both split habitats while decreasing native species abundance which triggered permanent ecological unsteadiness. The situation shows how lack of control over urban development creates sensitive environments that become exposed to climate change and environmental destruction (Liu et al., 2019).

Coastal biodiversity under threat: the case of Sousse, Tunisia and Concón Bay, Chile

Urban coastal development continues to be one of the primary threats which harms biodiversity conservation efforts. Tourism-related urban expansion in Sousse has resulted in reduced vegetation and heightened surface temperatures which accelerates habitat destruction according to Boussema et al. (2023). The rapid urban growth in Concón Bay Chile along the coast caused marine biodiversity loss because industrial settlement and residential development led to coastal erosion together with water contamination and habitat destruction (Martínez et al., 2020). The urgent requirement for sustainable coastal planning becomes evident through these examples that show the necessity to combine conservation tactics such as marine protected areas and tighter land-use rules for maintaining coastal ecosystem longevity (Martínez et al., 2020).

The impact of urbanization on climate and biodiversity: the case of Islamabad, Pakistan

The development of urban areas produces climate changes through heat island effects which modify the regions where plants and animals thrive. The expansion of urban areas in Islamabad Pakistan resulted in vegetative cover destruction and consequently produced substantial temperature increases in the area according to Waseem and Khayyam (2019). The warmer conditions in urban areas create problems for local

biodiversity because previously suitable species from cool habitats find survival difficult. Built-up areas expansion coupled with diminishing green spaces results in increased urban heat propagation while reducing the city's natural carbon dioxide sequestration ability and water cycle control mechanisms which consequently worsens climate modifications.

Wetland and stream degradation in the Global South: lessons from Brazil and West Africa

Wetlands and streams in urban areas suffer from development encroachment because these ecosystems perform essential water cleaning functions and control floods and protect biodiversity. The Brazilian and West African regions have witnessed recurring wetland damage because of industrial development and poor environmental regulations according to Wantzen et al. (2019). Wetlands, which provide critical breeding grounds for fish, amphibians, and bird species, have been increasingly polluted or drained to accommodate urban development.

Microbial biodiversity and soil health in urban areas: the case of Delhi, India

The process of urbanization creates substantial changes in soil microbiome structures which thereby disrupt crucial biodiversity beneath the surface. Studying Delhi, India revealed that pollution from urbanization together with habitat destruction caused the decline of important soil-dwelling AMF fungi (Gupta et al., 2018). The disappearance of beneficial microbes from soil endangers the sustainability of urban agriculture and plant resistance as well as the stability of ecosystems because of uncontrolled urban growth. The case demonstrates why urban planning should incorporate soil conservation through pollution control methods and sustainable land management and green infrastructure for sustaining important microbial communities.

The urbanization-biodiversity Nexus in Southeast Asia

Southeast Asia is home to some of the world's most biodiverse ecosystems; however, much of this biodiversity is being lost due to rapid urban expansion. Extensive deforestation for urban development has led to the destruction of critical wildlife habitats, displacing numerous species across countries such as Thailand, Vietnam, and Malaysia (Hughes, 2017). Intense pressures from illegal wildlife trade, land encroachments and infrastructure development also take place in these areas, which are further accelerating species in extinction rates.

Conservation and future challenges in Africa's expanding cities

Biodiversity conservation is complicated by Africa's fast urbanization. Cities like Lagos (Nigeria), Nairobi (Kenya),

TABLE 1 Multiple case studies present distinct types of biodiversity challenges due to urban expansion in the Global South.

Urban-based threat	Landscape	Area	Reference
Land-use change and biodiversity loss	Wetland/forest	China	Liu et al. (2019) and Sun et al. (2020)
Habitat destruction	Coastal	Tunisia	Boussema et al. (2023)
Marine biodiversity loss	Coastal	Chile	Martínez et al. (2020)
Vegetative cover destruction and increased temperature	Forests/costal	Pakistan	Waseem and Khayyam (2019)
Wetland damage due to industrial development	Wetland	Brazil and West Africa	Wantzen et al. (2019)
Changes in soil microbiome structure	Flood plain	India	Gupta et al. (2018)
Biodiversity loss and illegal wildlife trade	Forests	Southeast Asia	Hughes (2017)
Habitat destruction	Forest/mountains	China	(Bai et al., 2019)
Species loss, such as large mammals and migratory birds	Woodland/savanna/wetland	Nigeria/Kenya/South Africa	Güneralp et al. (2017)
Vegetation cover destruction and increased temperature	Woodland/savanna/wetland	Nigeria	Ishaya et al. (2024)
Land-use change and biodiversity loss	Forests/grasslands	Saudi	(Mallick et al., 2025)
Deforestation and increased land temperature	Desert	Saudi	Mallick et al. (2025)
Change land use due to Population growth	Desert	Saudi	Alqurashi and Kumar (2019)
Resources usage and environmental damage	Desert	Saudi	Almulhim and Cobbinah (2023a) and Almulhim and Cobbinah (2023b)
Biodiversity loss	Costal/desert/wetland	Saudi	Ansari et al. (2022) and Alatawi (2022)
Wetland degradation due to industrial development	Wetland/costal	Saudi	Al-Obaid et al. (2017)
Increased emissions and changed precipitation cycle	Costal/desert/wetland	Saudi	Toukabri and Chaabi (2025)
Increased level of pollution (air/water/noise and artificial light at night)	Costal	Saudi	Moatamed (2021)

Johannesburg (South Africa) are growing at an unprecedented rate, at the cost of woodlands, savannahs, and wetlands (Güneralp et al., 2017). These habitats have suffered massive loss, and this has resulted in profound species loss, in the form of large mammals and migratory birds. But green belt projects, community led afforestation initiatives and urban wildlife corridors that are happening in these cities provide hope for integrating the biodiversity with the urban planning. Key to dealing with urban growth and ecological conservation will be strengthening environmental policies, promoting sustainable urban development, and investing in nature-based solutions.

Urbanization and land-use change in Saudi Arabia

Economic development together with infrastructure projects along with changes in the population have resulted in quick urban growth throughout Saudi Arabia. Urban expansion in Saudi Arabia during 1985–2014 consumed massive regions of natural land as well as agricultural areas (Alqurashi and Kumar, 2019; Alahmadi and Atkinson, 2019; Aljehani, 2024; Atlas of Urban Expansion, 2016; Al-Sahhaf, 2000). For example, the urban sprawl of Riyadh, the capital of Saudi Arabia, has exhibited substantial expansion between the 1990s and 2020, as evidenced by satellite imagery and documented urban development patterns (Figure 2). Research conducted in Abha highlights an extensive growth of development zones which has led to the loss of forests and grasslands in this mid-sized south-western city (Mallick et al., 2025). Riyadh as the capital city has experienced extensive desertification caused by urbanization together with heightened climate risks (Alshammari, 2019).

The Saudi Arabian process of urban growth presents major challenges in semi-arid and arid zones because these natural ecosystems already face high vulnerability. A recent study indicates desert municipalities like Riyadh, Tabuk, and Al-Qassim face growing land temperature increases because they have lost vegetation and gained more built surfaces (Mallick et al., 2025). The deterioration of urban habitats because of this effect creates less comfort in urban areas and poses a risk to both native plants and animals (Moatamed, 2021).

The rapid urbanization in Saudi Arabia as a Global South nation has triggered major environmental changes because of its fast-growing cities and changing economy and rising population. The last few decades have brought unprecedented changes to urban land use patterns across Riyadh, Jeddah, Makkah, and Abha (Alqurashi and Kumar, 2019). The Saudi Arabian Vision 2030 functions to transform urban infrastructure systems but the country still faces critical problems with urban growth and resource usage together with environmental damage (Almulhim and Cobbinah, 2023a; Almulhim and Cobbinah, 2023b).

Biodiversity loss and habitat fragmentation

Biodiversity loss has become severe because of urban expansion mainly affecting coastal, desert and wetland ecosystems. The Tabuk region shows deteriorating native species and habitats because human activities are rising while natural resources decrease (Ansari et al., 2022). The degradation of Saudi Arabia's wetlands reaches extreme levels because of urban development and industrial pollution as well as water extraction (Al-Obaid et al., 2017).

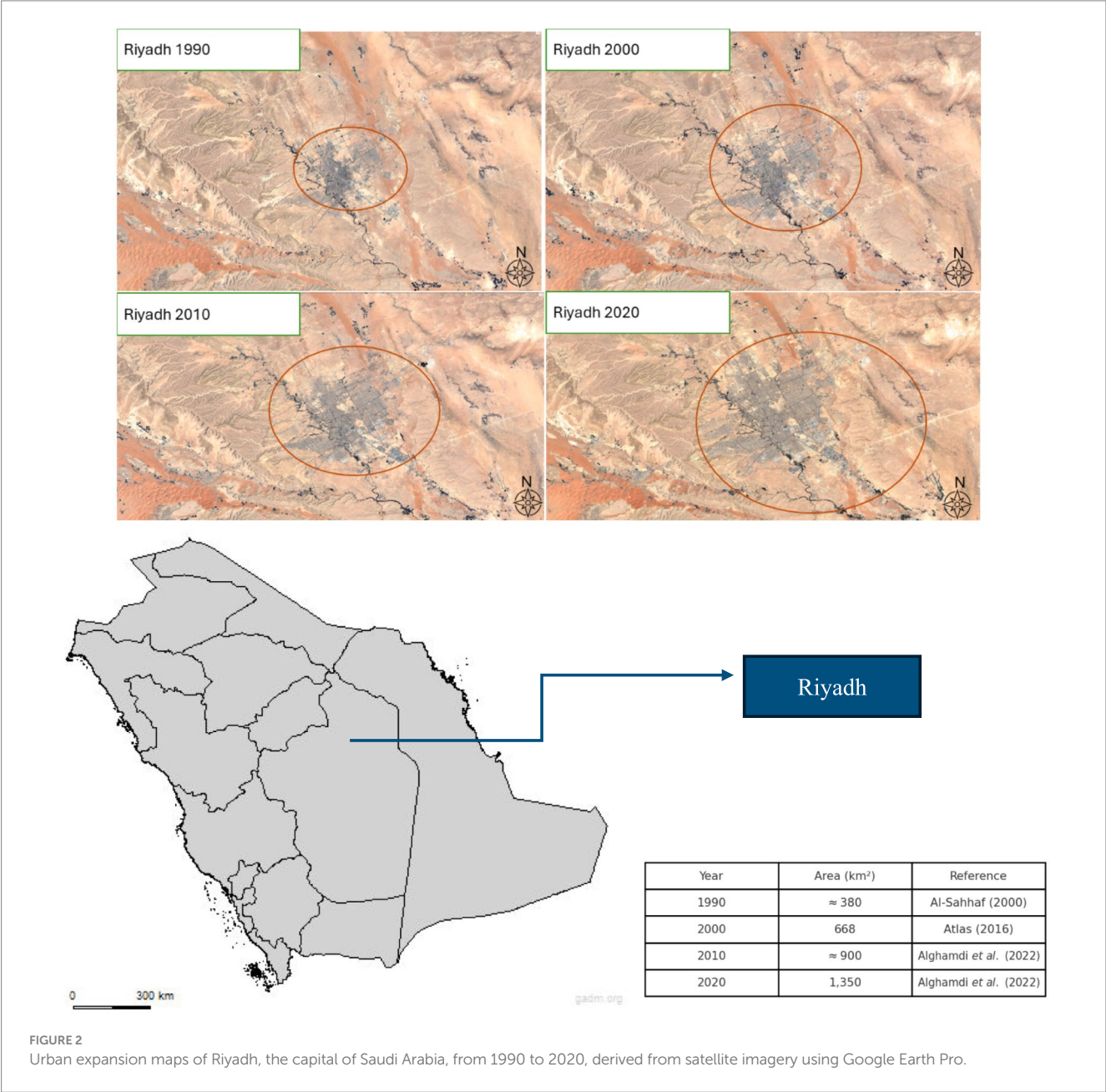
The coastal areas of the Red Sea and Persian Gulf face dangers from urban development projects together with land reclamation operations and industrial sector expansion (Alatawi, 2022). The construction activities have brought harm to marine biodiversity which includes coral reefs along with mangroves and fish communities. A steady increase in urban expansion exceeds the progress of ecological restoration activities which aim to minimize these negative effects.

The urbanization-climate Nexus in Saudi Arabia

Saudi Arabia faces worse climate-related challenges because of urban expansion which resulted in emissions increases alongside

greater energy need and changed precipitation cycles (Toukabri and Chaabi, 2025). Urban growth results in the destruction of natural carbon absorption areas like forests and wetlands thus increasing climate change threats (Mallick et al., 2025). According to experts, sustainable urban planning requires an immediate focus on three key strategies which include carbon sequestration together with water conservation and renewable energy implementation to balance urbanization-caused environmental impacts (Abubakar and Dano, 2020).

Anthropogenic activities have negatively affected natural vegetation cover especially through Aseer region development because of urban expansion and forest loss (Moatamed, 2021). The contamination from urban industries throughout Jeddah cities has polluted both air and water sources to a degree that affects both human beings along with the habitat health (Moatamed, 2021).



Sustainable urban planning and conservation efforts

The Kingdom of Saudi Arabia addresses its sustainable urban development issues by establishing green infrastructure, conservation approaches and biodiversity protection systems. The Saudi Green Initiative undertakes extensive plant seed distribution to build forest areas and boost natural system durability (Aldossary et al., 2022). Conservation programs have been initiated to protect endangered species, alongside efforts to restore wetlands and manage coastal ecosystems more sustainably (Alatawi, 2022).

Urban sustainability frameworks introduce biodiversity protection concepts into city planning especially when dealing with rapid growth such as South-Western Saudi Arabia (Aldossary et al., 2022). Researchers have recognized ecosystem-based adaptation strategies as essential for managing the relationship between urban development and ecological defense.

Saudi Arabia's ongoing urban transformation has prompted the development of several innovative strategies aimed at addressing the environmental pressures associated with rapid urban growth. Given the persistent challenge of water scarcity in the region, sustainable urban development must be guided by enduring concerns regarding freshwater availability. Early research highlighted how increased water consumption from urban areas places added strain on the country's limited resources, necessitating policies that prioritize conservation and efficient use.

Urban expansion patterns in major cities such as Jeddah further demonstrate how unregulated growth and transportation networks contribute to spatial fragmentation and ecological degradation. A spatial-temporal analysis of Jeddah revealed significant urban sprawl and disjointed infrastructure development, undermining both environmental sustainability and urban efficiency (Aljoufie et al., 2013). In response to rising energy demands linked with such expansion, renewable hybrid systems—particularly solar PV–diesel–battery models—have been tested to supply clean, decentralized energy in remote urban communities (Rehman and Al-Hadhrami, 2010).

The preservation of ecologically valuable coastal ecosystems is also vital. In the Arabian Gulf, the spatial decline of mangrove forests has been closely associated with the expansion of coastal infrastructure, posing significant threats to biodiversity and compromising the integrity of natural coastal defense systems (Almahasheer, 2018). At the same time, energy use in residential sectors continues to climb, particularly in the Eastern Province, making energy efficiency a key priority for reducing the environmental footprint of urbanization (Alrashed and Asif, 2014).

Saudi Arabia has also begun investing in futuristic and climate-conscious urban designs. One such project is NEOM's "The Line City," which integrates vertical urban development, minimal land use, and ecological buffers to limit environmental degradation while accommodating growth (Alwafi, 2025). Green urban initiatives like the Green Riyadh Project offer additional promises, showing how extensive urban greening can reduce land surface temperatures and help counteract the urban heat island effect (Imam, 2023).

Together, these examples represent a shift toward sustainability in Saudi urban policy—one that incorporates water efficiency, renewable energy, biodiversity conservation, and

climate-resilient infrastructure into a cohesive response to the country's urbanization challenges.

Recommendation and conclusion

Urbanization of land by human activities has created widespread biodiversity decline as it damages biotic habitats while causing environmental stress. Saudi Arabian land use practices demonstrate the ecological issues because urban growth encroaches on essential biological locations and natural populations. Sustainable planning of cities alongside conservation strategies and reforms in policies will reduce environmental pressures. Biodiversity conservation measures, in conjunction with nature-based solutions and ecological development strategies, must be reinforced to foster the creation of sustainable and resilient cities. The adoption of ecological urban planning that integrates biodiversity conservation into land-use policies is essential for promoting sustainable development in Saudi Arabia. This includes:

- Mapping and legally protecting high-biodiversity zones before new development begins, especially in and around protected areas and biodiversity hotspots.
- Creating urban ecological buffers (green corridors and conservation zones) that connect fragmented habitats and allow species migration and genetic exchange.
- Mandating Environmental Impact Assessments (EIAs) to include biodiversity metrics and cumulative ecological effects.

A particularly innovative policy tool would be the use of Nature-Based Solutions (NbS)—such as restoring degraded urban edges with native vegetation, or rewilding former construction sites to create microhabitats. These low-cost interventions can enhance urban resilience while supporting wildlife (Seddon et al., 2020). Furthermore, biodiversity-sensitive urban design (BSUD) should be mainstreamed into planning codes, requiring developers to incorporate elements like wildlife-friendly street lighting, bird nesting structures, and pollinator gardens.

At the national level, institutions such as the National Center for Wildlife should engage in strategic collaboration with municipal and regional planning authorities to develop and implement a 'No Net Loss' biodiversity framework. Such a framework should be aligned with the objectives of Saudi Arabia's Vision 2030 and designed to ensure that urban development activities do not result in the irreversible loss of natural habitats. Additionally, citizen science programs can be leveraged to monitor biodiversity in and around urban areas, increasing public engagement and data availability for decision-making (Aldossary et al., 2022).

In conclusion, aligning urban growth with biodiversity protection is not only a conservation imperative but also a national sustainability goal under Vision 2030. By integrating ecological considerations into spatial planning processes, Saudi Arabia can promote urban development that is in harmony with natural ecosystems rather than contributing to their displacement.

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Generative AI statement

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