WASCAL
West African Science Service Centre on Climate Change and Adapted Land Use

Federal Ministry of Education and Research

POLICY BRIEF

OPTIMISING URBAN GREEN SPACES IN THE DAKAR REGION (SENEGAL): A LAND SUITABILITY ANALYSIS APPROACH

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EXECUTIVE SUMMARY

Urban green spaces are critical for enhancing the quality of life, promoting biodiversity, and mitigating the effects of climate change. The Dakar Region, Senegal's capital, is experiencing rapid urbanisation, putting pressure on its limited green spaces. This policy brief advocates for the use of land suitability analysis to optimise the planning and development of urban green spaces in Dakar. By employing a scientific approach to assess land suitability, the city can make data-driven decisions that maximise the benefits of green spaces while addressing environmental, social, and economic challenges.

INTRODUCTION

Urban green spaces (UGS) enhance well-being and environmental quality through climate regulation, carbon capture, and recreation (Swanwick et al., 2003; Nowak et al., 2013; Hurlimann et al., 2021). Dakar's rapid urban expansion has reduced green space by over 2,000 ha since 1990, worsening heat stress, pollution, and spatial inequality (Cissé et al., 2024). Most existing UGS are fragmented and poorly distributed. To reverse this trend, planners must adopt tools that promote equitable, sustainable development. Land suitability analysis (LSA) enables targeted green space planning by identifying high-potential sites (Li et al., 2020). This policy brief presents LSA as a strategic tool for restoring UGS in Dakar, helping to build a healthier, more inclusive, and resilient urban environment.

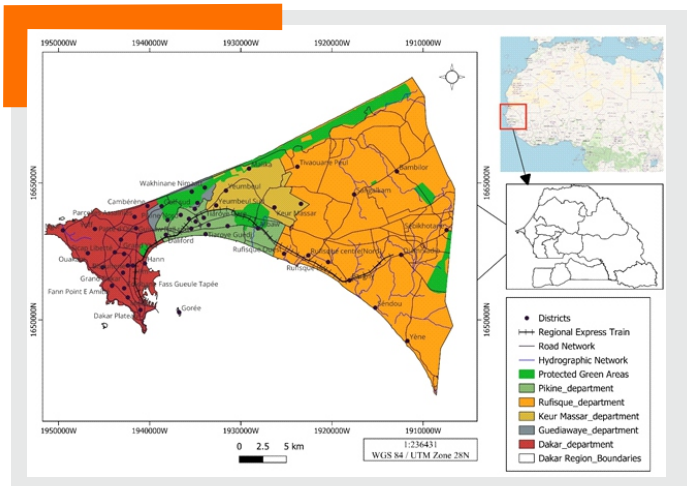

Figure 1: Location of Study Area

RESEARCH APPROACH

A Multi-Criteria Analysis (MCA) approach was used to support green space planning in Dakar. Criteria influencing land suitability were ranked using FAO standards, from highly suitable (S1) to permanently unsuitable (N2). The Analytical Hierarchy Process (AHP) enabled comparison of each criterion by importance through pairwise scoring. These values were used to calculate weights. The final step, weighted overlay analysis, combined all weighted criteria layers to identify priority zones. This method provides policymakers with a practical, replicable model to allocate urban green spaces in ways that reflect environmental, social, and planning priorities for sustainable city growth.

KEY RESEARCH FINDINGS

1. Suitability of the criteria

Six criteria were selected for this study: land use and land cover of the area, soil types, slope, population density, proximity to existing green spaces, and proximity to roads.

A detailed land suitability assessment identified strategic areas for green space development in the Dakar region. Bare land, comprising 45.25% of the territory, was the most suitable, while built-up areas (39.32%) held moderate potential. In contrast, existing green spaces, water bodies, and agricultural land were unsuitable due to existing land use.

Sandy loam soils, present in 31.41% of Dakar, were deemed ideal for green spaces. The dominant sandy clay soils (66.29%) were moderately suitable. Topographically, Dakar offers optimal conditions, 96.84% of the region is flat (slope <5%), enhancing development feasibility.

Population density informed spatial prioritisation: highly dense areas (>2,000 inhabitants/km^2) were classified as highly suitable, reflecting the demand for accessible green spaces. In terms of spatial distribution, areas located more than 6 km from existing green spaces (36.81%) were prioritised to promote even access.

Road proximity further refined this analysis; 41.41% of the land is within 1 km of roads, improving accessibility and implementation potential.

This integrated evaluation provides policymakers with a clear, actionable roadmap to guide urban greening initiatives, focusing investments where environmental capacity, social demand, and accessibility align most strongly. It supports inclusive, climate-resilient urban development in a rapidly growing metropolitan context.

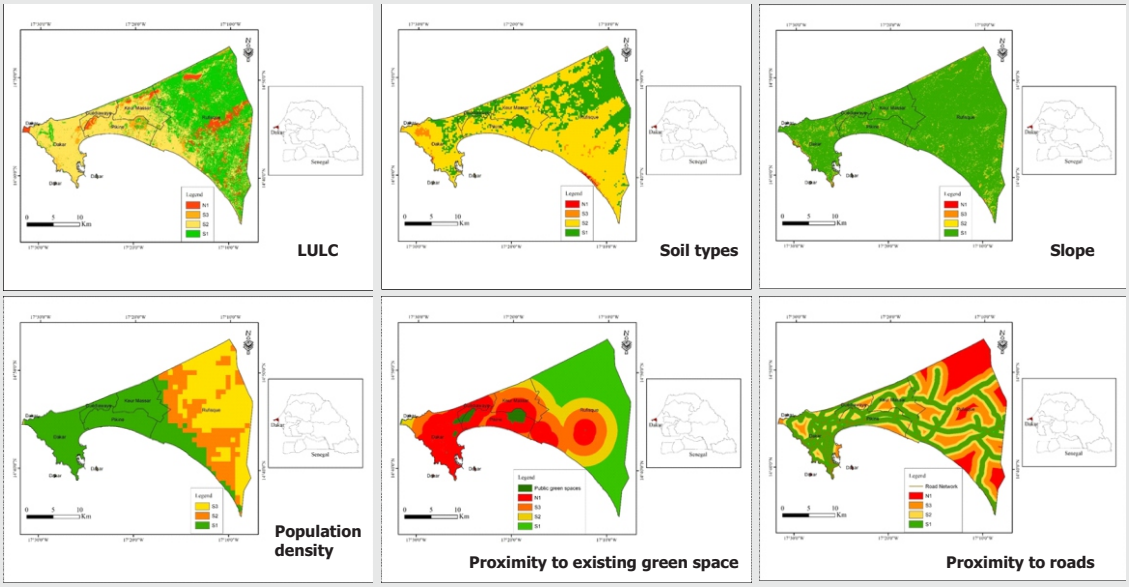

Figure 2. Suitability of the criteria

2. Weight of the criteria

The AHP method ranked land use and land cover, proximity to green spaces, and population density as key factors influencing green space planning in Dakar. Lower weights were assigned to slope and soil. The analysis is validated with a 0.09 consistency ratio, confirming the model's soundness for policy application.

3. Overall suitability areas

Dakar's green space suitability analysis reveals high development potential, over 90% of the region is viable. Most areas are moderately suitable (76.08%), with prime zones in Rufisque and Keur Massar (14.75%). Only a minimal portion (9.18%) is less or not suitable, supporting strategic urban greening efforts.

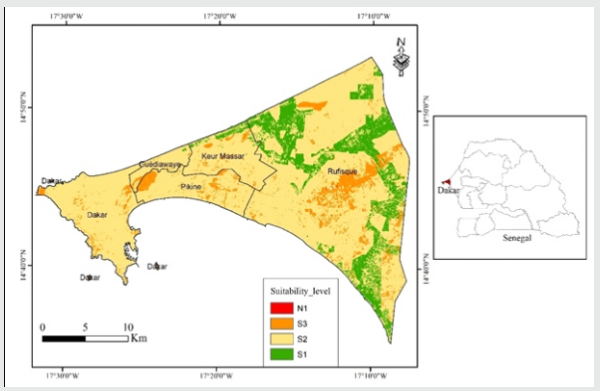

Figure 3: Final suitability map for green spaces of the Dakar region

CONCLUSION

Given the numerous environmental challenges in the Dakar Region, expanding the availability of public green spaces by developing new ones in suitable locations is crucial. This will help preserve urban ecosystem services and improve accessibility for residents. The analysis of potential sites for green spaces, based on various criteria, highlights that considerable areas in the region are well-suitable for such development.

IMPLICATION OF FINDINGS

If green spaces are to be effectively integrated into the urban fabric of a dynamic city like Dakar, decision-makers must reconsider their planning approach. This involves initiating new developments for these green spaces, prioritising the most suitable sites, and selecting the types of spaces based on the site's level of appropriateness.

POLICY RECOMMENDATION

To enhance urban resilience and equitable access to ecosystem services, the Dakar Region should adopt a tiered green space strategy that aligns with land suitability. Moderately suitable areas within urban cores should prioritise small parks and street greenery to improve livability and access. Highly suitable peripheral zones should be reserved for large green infrastructure, such as urban parks or forests, to maximise ecological benefits. Integrating physical and socio-economic criteria into planning will ensure efficient land use, reduce spatial disparities, and support long-term sustainability in green space development.

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