



POLICY BRIEF

ENHANCING URBAN GREENERY PLANNING IN THE CHANGING CLIMATE IN AFRICA: Addressing Porto-Novo and Parakou in Benin Republic

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EXECUTIVE SUMMARY

Tailored strategies are needed to address the functional decimation of different green spaces, particularly in peri-urban areas. Promoting the replacement of impervious surfaces with vegetation and trees can mitigate urban climate issues, fostering a

greener environment. Maintenance and conservation of existing ecological zones, along with the creation of new ones, should be prioritized for sustainable urban development.

INTRODUCTION

Climate change presents significant challenges globally (IPCC, 2018), notably affecting settlements (Scott et al., 2016; Russo and Cirella, 2020), particularly cities (UN-HABITAT, 2016). In places like Benin, inadequate awareness of growth trends obstructs sustainable development planning. Urbanization poses threats to green spaces in these regions, necessitating comprehensive management for urban sustainability (EEA, 2009; UN-HABITAT, 2016; Scott et al., 2016). Benin's cities face challenges from uncontrolled growth, leading to health issues like urban heat and flooding (MPDEPP-CAG), 2019; Falolou et al., 2020). Prioritizing the development and management of urban vegetation is crucial for climate resilience, yet research in this area is lacking, creating uncertainty in decision-making processes (Osseni et al.,



2015; Teka et al., 2017). Our research aims to provide valuable insights for rapid political action in the Republic of Benin to tackle these challenges effectively.

RESEARCH APPROACH

The analysis conducted in this brief utilized the datasets that incorporated multispectral satellite imagery, including Spot, Landsat, and Google Earth Pro. Additionally, observed meteorological data for air temperature spanning from 2000 to 2020, IGN historical data, and expected interviews, focus group discussions, and household surveys through semi-structured questionnaires were employed.

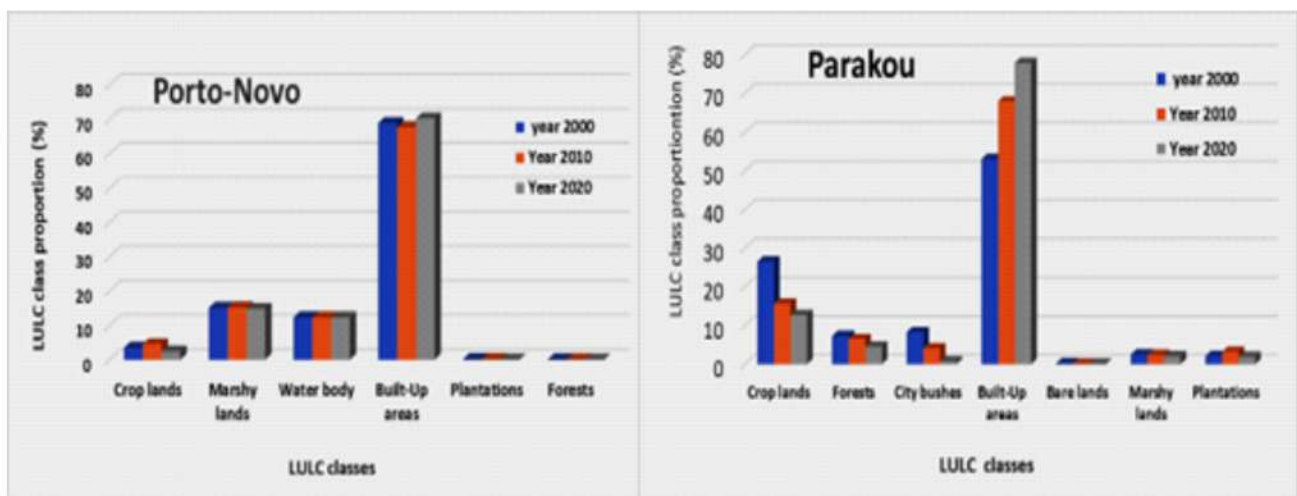
Remote sensing data from the years 2000, 2010, 2020, and 2022 were employed to extract information, facilitating the assessment of Land Use and Land Cover (LULC) as well as changes in green spaces. Various statistical analyses, such as the Mann-Kendall test, ANOVA followed by SNK test, Ripley's K test, Pearson Chi-square test, Correspondence analysis, Single Linear Regression, and Binary Logistic Regressions, were applied to comprehend the contents of the data.

Furthermore, R 4.2.0 software was used for the Mann-Kendall test, ANOVA followed by SNK test, Ripley's K test, and Single Linear Regression analysis. Simultaneously, the Statistical Package for the Social Sciences (SPSS) 23 software was employed for the Pearson Chi-square test, Correspondence analysis, and Single Linear Regression test.

KEY FINDINGS

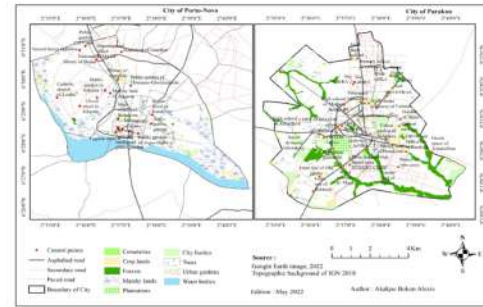
● Land Use impacts on green spaces

Urbanization poses a threat to green spaces in Porto-Novo and Parakou, requiring immediate conservation measures. Preserving crop lands and marshy areas in Porto-Novo and prioritizing various green spaces in Parakou are essential. Enforcing land use policies and protecting marshy lands and forests are key recommendations.



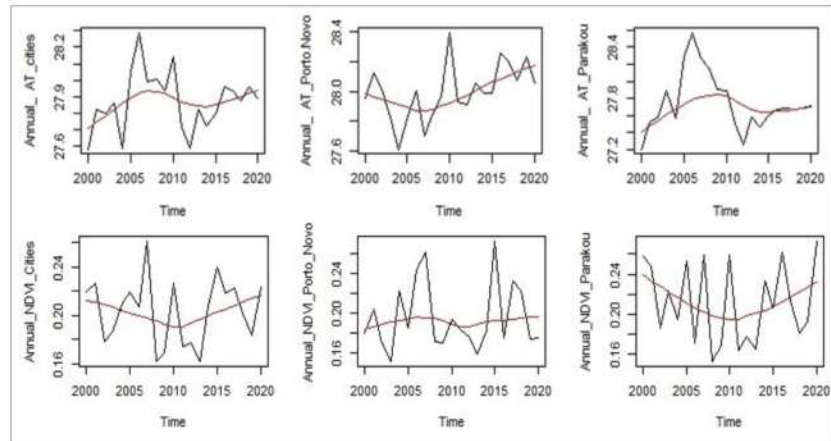
● Pattern and distribution of green spaces

Forests, marshy lands, and plantations exhibit similar configurations in urban green spaces across cities. Yet, statistical variations within each city emphasize the need for universal green space management strategies. Uneven distribution reflects urbanization's impact on ecosystem services, emphasizing the importance of inclusive planning for all residents' well-being.



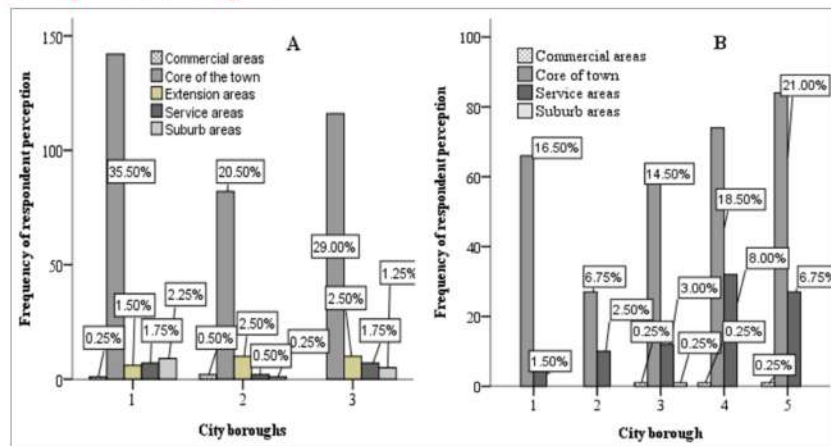
● Urban greening and seasonal temperature reduction

Understanding urban greening trends and seasonal temperature variations is crucial for heat island adaptation. Porto-Novo and Parakou exhibit fluctuating vegetation index and air temperature patterns, lowest in January to June. Effective vegetation management, especially irrigation, is vital for long-term temperature reduction, necessitating further research on irrigation feasibility.



● Stakeholder involvement in green space development

Residents' commitment in urban green spaces development is strongly recommended, given the significance of urban vegetation in the context of climate change. The findings of the weakness of local involvement, emphasize the essential role of institutional cooperation in promoting public engagement in urban green space development in Benin.



IMPLICATION OF FINDINGS

The unbridled urbanization is exerting excessive pressure on green spaces, especially forests, marshy lands, and plantations. Additionally, cities demonstrate fluctuating vegetation index and air temperature patterns, with the negative impacts occurring from January to June. This implies that if immediate and consequential measures are not implemented against the decimation of urban greenery and to promote a greener environment in these cities, it will have significantly unbearable urban impacts for the future.

CONCLUSION

Our findings highlight the importance of institutional collaboration, education, and awareness in promoting public participation in urban green space initiatives in Benin. This policy brief provides valuable insights for policymakers, urban planners, and project stakeholders committed to advancing sustainability through green spaces.

POLICY RECOMMENDATIONS

The overarching policy recommendation for addressing climate change and urban environmental degradation through enhancing urban green spaces is to integrate comprehensive and coordinated approaches. This involves:

1. Enforcing urban land use policies and aligning urban planning with climate change impacts to ensure sustainable development;
2. Avoiding the conversion of marshy lands and existing forests into residential areas, instead prioritizing the creation of urban parks;
3. Setting minimum size requirements, increasing density, enhancing diversity, ensuring consistent distribution, prioritizing specific strategies; and
4. Implementing intelligent water management practices, and fostering effective institutional collaboration are integral to achieving this overarching recommendation.

These measures collectively aim to maximize the benefits of urban green spaces and promote sustainable urban development in the face of climate change challenges.



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