

WHAT IS URBAN RESILIENCE IN THE CONTEXT OF AFRICA: THE CASE OF GUEDIAWAYE CITY, DAKAR (SENEGAL)

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Image Source: Author

1. INTRODUCTION

Guediawaye city is a large suburb located on the north-northwest coastal fringe of the Dakar region. This city, which extends 3.9 km from north to south and 7.5 km from east to west, is particularly vulnerable due to its rapid and unmanaged growth, which has led to significant challenges. Guediawaye is a dormitory town, densely urbanized, and this situation is not recent. It will worsen and become more complex given the structuring projects to improve mobility and the opening of urbanization on the 150-hectare strip of casuarina trees to allow for the construction of housing and infrastructure. The unilateral downgrading of the coastal strip served as a barrier to coastal erosion, sea breezes, and flooding.

The objective of this article is to highlight the issues of vulnerability

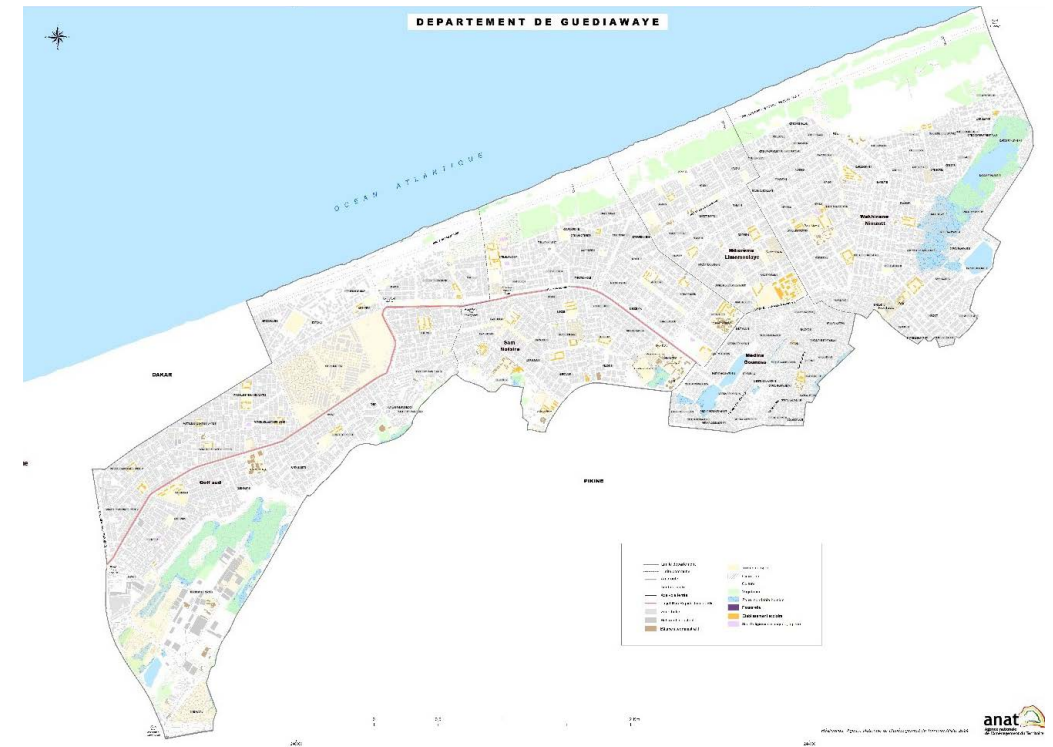


Figure 01 Map 1: Map of Guediawaye city

Source ANAT (2025)

and the challenges associated with co-constructing a community resilience approach in a context of land pressure, ecological fragility, and insufficient resources. It will also examine how ill-informed urban policies and development choices can contribute to increasing the vulnerability of a city in Africa. The paper provides a case study on Guediawaye City, addressing the challenges of urban resilience in an African context. It draws on the results of the diagnostic study of the city's sustainable development emergency plan.

The methodological approach is based on a multisectoral and participatory approach involving administrative and municipal authorities as well as community associations in identifying resilience challenges and strategies. This case study draws not only on existing documentary research but also on direct contact with the field through visits to vulnerable areas. Working sessions with all local authorities were held to better understand current issues and emerging trends in the city's urbanization and to examine the strategic governance approaches implemented to strengthen its urban resilience. The master plan and municipal development plans were key documents consulted. The information was used specifically to analyze challenges and resilience.

2. GAPS & CHALLENGES OF DAKAR URBANIZATION

Planning the future of cities in a context of climate change, complex transformations, and dwindling financial resources is the greatest challenge facing African governments. Like other African cities, Senegal, a country whose urbanization has primarily developed along its coasts, is facing this situation. Today, Senegalese cities face multifaceted challenges in terms of infrastructure, water supply, waste management, urban mobility, access to energy, sanitation, and decent and affordable housing. Added to this are insecurity, poverty, underemployment, pollution, and the risk of natural disasters.

Senegal is marked by a dual uneven development pattern, with unbalanced territorial development and disorderly and poorly managed urban development. The long-standing absence of territorial and urban planning has resulted in urban management difficulties, environmental problems, and increased flooding in informal settlements. This situation has worsened over time, widening territorial inequalities and exacerbating mobility problems.

Furthermore, these cities, led by Dakar, are enduring most of the impacts of climate change, not only due to a lack of planning but also due to weak urban governance linked to a lack of coordination and dialogue between stakeholders.

Dakar, the vibrant capital of Senegal, stands as a prime example of rapid and uncontrolled African urbanization. Within this bustling metropolis, the city of Guediawaye emerges as a crucial case study for understanding urban resilience in the context of African cities.

2. URBAN RISKS AND VULNERABILITY ASSESSMENT IN GUEDIWAYE

Understanding spatial organization and the factors of vulnerability in Guediawaye is crucial to better understanding the complex mechanisms and dynamics that are at work in the context of great vulnerability and lack of resources.

The history of its settlement provides critical insights into its current vulnerabilities. Guediawaye city's vulnerability to climate change is increasing. The city faces several challenges and issues linked to climate change. Coastal erosion, sea encroachment, the downgrading of the casuarina tree strip, and the reduction of green spaces are major problems. The near-total artificialization of the land exacerbates vulnerability to flooding and limits access to essential services.

2.1. HISTORY OF SETTLEMENT AND SPATIAL EVOLUTION

Human habitation within the current boundaries of Guediawaye dates

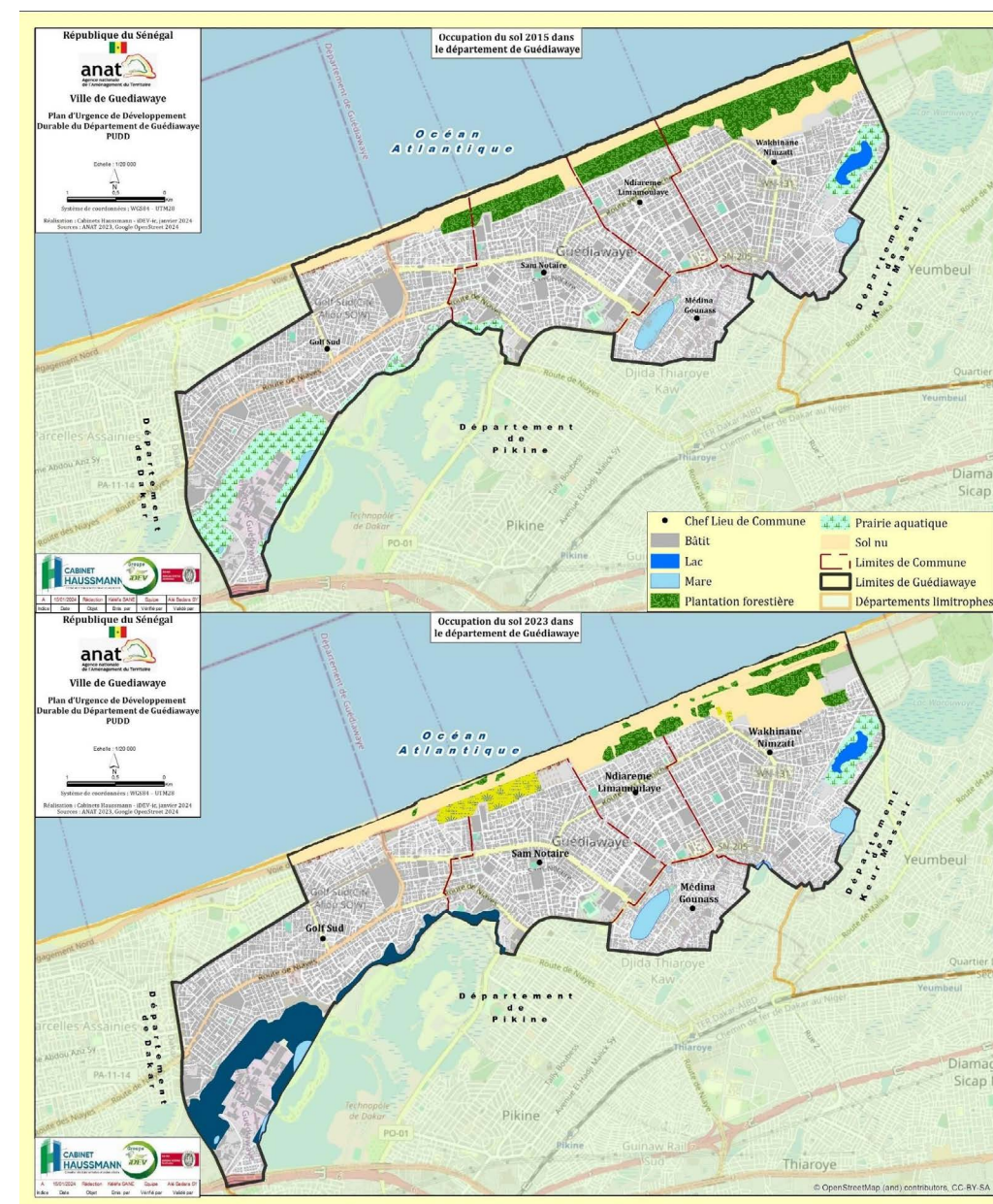


Figure 02 Map 2: Land Use in Guediawaye city from 2015 to 2023

Source: Haussmann / IDEV, 2024

back a long time. In 1883, the Ndingala hill in the Golf Sud commune was the original site and expansion point of the Layenne brotherhood. Later, due to a plague epidemic, the adherents and their guide migrated to Camberene village in the Dakar department. Significant spatial occupation of Guediawaye began in the late 1960s with successive waves of housing developments intended to resettle populations displaced from Dakar's informal settlements.

The city, which was almost non-existent in the mid-1960s, now sees built-up areas occupying almost its entire territory today. The city, which stretches 3.9 km from north to south and 7.5 km from east to west, has developed through a juxtaposition of housing developments. Today, it is home to 29,344 inhabitants per km². This rapid progression devoured reserved lands, agricultural zones, and even water bodies, often through risky topographical modifications. Notably, the built environment expanded towards the coastal strip after 1978, eventually encroaching upon and accelerating the reclassification of the “filao band”. In 2005, this coastal band’s filao plantations covered 96.7 ha (56% of its area), playing a crucial role as a natural barrier against sea advancement and marine spray.

2.2. DEMOGRAPHIC PRESSURE AND EXTREME DENSIFICATION

Guediawaye’s population has rapidly grown, more than doubling from 195,319 inhabitants in 1988 to 435,727 in 2023. This makes Guediawaye the most densely populated city in the Dakar region. This intense densification has led to unplanned occupation of uninhabitable areas like market gardening areas and depressions, resulting in highly flood-prone and overcrowded informal settlements, particularly around retention basins in Medina Gounass.

Guediawaye is a densely populated city, the densest in the region and the country. Since the city has been fully urbanized for over a decade, its development has long taken place in the interstices of the city, which explains its compact character until the declassification of the coastal strip, which offers 150 hectares of land reserves.

2.3. POOR URBAN PLANNING AND CLIMATE VULNERABILITY RISK

Guediawaye is exposed to multiple natural hazards stemming from its geomorphological and climatic contexts. These issues are not taken into account in the city’s planning. The long strip of casuarina trees was decommissioned for opening up this area to urbanization. To achieve this, a specific urban plan was drawn up, but it resembled more a patchwork of facilities and housing developments with little urban coherence, coordination, or vision.

Flaws were noted in the urban planning process because no decree was issued beforehand to order the development of the plans, no consultation was undertaken with local authorities, and technical services were not involved, which led to a series of non-compliances and irregularities. The urban plan for the Filao strip was developed using a unilateral approach that ignored the need for consultation with communities to address the urban, environmental, and land challenges in the area. Many facilities are planned between the major road corridor known as VDN and the ocean. With the arrival of the new government authorities, the provisions are being called into question and there are plans to revise the urban development

plans by canceling all the developments planned in the strip between the VDN and the ocean and providing for buffer zones around the lakes and the landfill of Mbeubeuss in order to preserve the wetlands.

Guediawaye is highly vulnerable to flooding, especially in low-lying areas where unauthorized construction has occurred in depressions and stormwater outlets. The high-water table and lack of adequate sewage systems mean that many neighbourhoods are inundated during the rainy season, as evidenced by major floods in 2005, 2008, 2009, 2010, 2012, and 2017.

Rapid urbanization has led to the almost complete artificialization of Guediawaye’s soils, with only remnants of green spaces remaining in the filao band. This reduces infiltration capacity, alters the hydrological balance, and increases runoff.

The intensity of marine spray affects plantations, homes, and metal structures. Additionally, the VDN, this major road corridor which runs along the ocean, is vulnerable to sand inundation due to its proximity to unfixed dunes, a consequence of the degradation of filao plantations. Over-frequentation of dunes by sports activities further destabilizes this ecosystem. The deficit in collective sanitation networks poses a high risk of groundwater contamination.

3. CURRENT ISSUES AND EMERGING TRENDS OF GUEDIWAYE CITY

Guediawaye city is a densely urbanized area, a situation that is not new. It will only grow and become more complex with the implementation of major mobility infrastructure projects which actively contributed to the openness of urbanization and accelerate urban sprawl along the filao strip. Given this situation, Guediawaye is undergoing profound transformations, characterized by persistent challenges alongside new dynamics shaping its future.

3.1 PERSISTENT CHALLENGES: GROWING UNSUSTAINABLE URBANIZATION AND POOR LIVING CONDITIONS.

Despite public efforts, Guediawaye’s rapid urbanization is not sustainable, marked by significant social inequalities. The population surge has drastically altered the physical landscape, with new neighbourhoods appearing in unsuitable zones, infrastructure built along the coastline, and green areas disappearing. This places immense environmental pressure on a context long characterized by a lack of major urban planning and investment. While spontaneous housing is not highly significant outside Médina Gounass, all communes suffer from a critical lack of basic social facilities, sanitation infrastructure, and dedicated zones for economic activities. The city remains highly exposed to various natural hazards due to its geomorphological and climatic contexts. Coastal erosion, sea-level

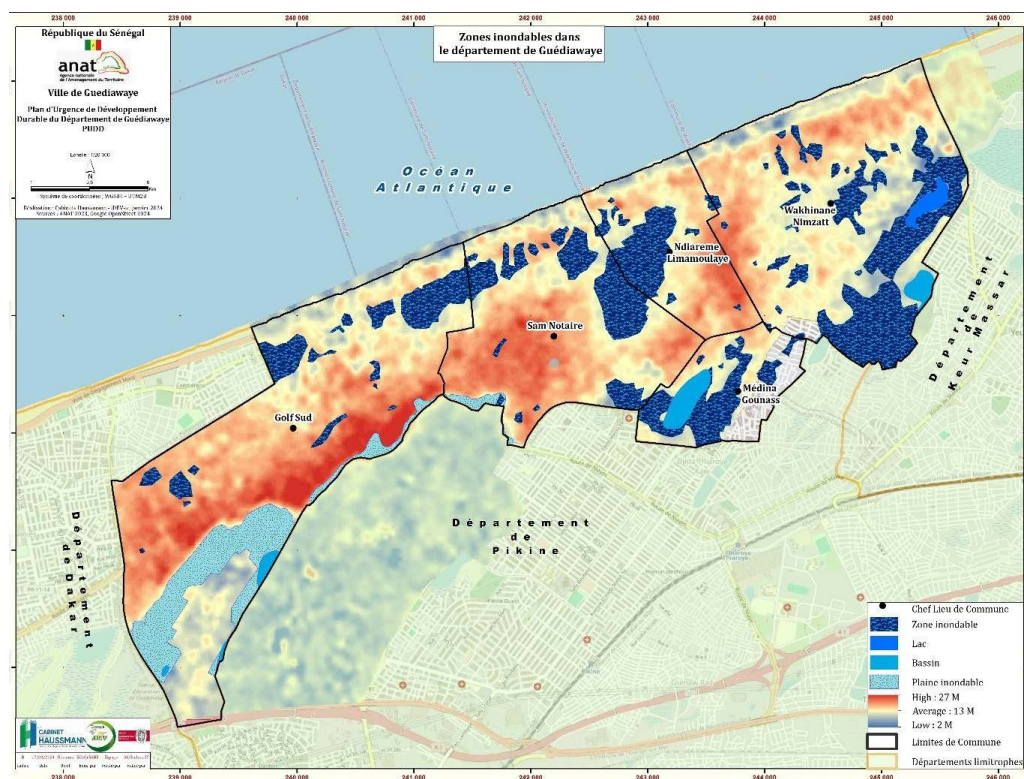


Figure 03 Map 3: Flood zones in the city of Guediawaye

Source: Haussmann / IDEV, 2024

rise, and the degradation of the filao band continue to pose threats to dunes and socio-economic infrastructure. The reduction of green spaces and widespread soil artificialization remain critical issues, increasing vulnerability to climate change impacts like rising sea levels and floods that impact infrastructure and access to basic services.

3.2. EMERGING URBANIZATION TRENDS: A CITY UNDERGOING DEEP CHANGE WHILE WAITING TO BECOME SUSTAINABLE.

The impacts of climate change, particularly flooding and coastal erosion, are becoming more pronounced. The ongoing expansion onto dune cords, while deemed a “necessary evil,” is a significant factor in spatial mutation, given its environmental consequences. The reclassification of the 150 ha filao band for urbanization, particularly for housing, represents a profound shift. This development, if not managed with functional diversity, risks reinforcing Guediawaye’s “dormitory city” character, increasing densification and “concretization”. There is a recognized opportunity to integrate ecological, economic, and social sustainability into this new land reserve through new resilient urban development models.

Guediawaye is witnessing a transformation of its social fabric with the



Figure 04 Photo: Ndiarème Limamoulaye, Souff Sou Wékh district

Source: Haussmann, 2024

arrival of a new middle class in certain “beautiful neighbourhoods”. This trend is expected to continue with improved accessibility. A process of gentrification is underway, characterized by the modernization of existing housing in the city’s interstices to accommodate wealthier social categories in areas like Gadaye, Cité Aliou Sow, Dalal Jamm, and Cité Magistrats. This is accompanied by an urban requalification of space due to the lack of land reserves, sometimes involving the transformation of public spaces for commercial use. Historically, Guediawaye has been Dakar’s most densely populated city. While densification can be beneficial for sustainable urban development, the current sprawl and artificialization of the coastal band are considered a planning failure due to their environmental and social impacts.

3.3. INCOMING DEEP CHANGES TO THE URBAN LANDSCAPE

The spatial organization is currently marked by the BRT, which forms the backbone of Guediawaye’s urban fabric. Like new transport infrastructure such as the North Clearance Route 3 (VDN3), the Bus Rapid Transit (BRT) is helping to shape the urban structure. It gives Guediawaye a new identity by strengthening the connectivity and accessibility of the city, which was once very isolated and difficult to access. An urban planning tool for structuring the territory like the toll motorway, the BRT heralds significant social and urban transformations as an accelerator for the requalification of public space and the revitalization of neighbourhoods.

The BRT system is set to profoundly transform Guediawaye’s urban landscape and spatial identity. Traversing 10 km of the city with 7 stations, the BRT offers rapid access to Dakar’s city centre, enhancing Guediawaye’s connectivity and accessibility, moving it from an enclave to a more attractive city. It is expected to drive new urbanization, strengthen urban



Figure 05 Photo: Bus BRT (source Senenews.com)

dynamism, and increase land value in the areas it crosses. This presents an opportunity to promote high-end business real estate and establish a Central Business District (CBD) given the city's improved accessibility.

The urban sprawl along the dune ridges, considered a necessary evil, is a factor to consider in the upcoming spatial transformation. Given that the damage has already been done, this land reserve offers the opportunity to integrate key aspects of sustainability—eco-economic, economic, and social—through the introduction of new sustainable and resilient urban development models. The masterplan for the northern coastal strip shows that housing is the dominant function in the planned development. If no action is taken to promote functional diversity, this change in the vocation of this classified area in favor of housing will contribute to reinforcing

Guediawaye's dormitory town character, as well as the densification and concretization of the city. Given the intrinsic potential of the site and the relative accessibility offered by the VDN and the BRT, it would be appropriate, in a logic of functional diversity, to promote business real estate to encourage the construction of a latest generation business centre.

4. BUILDING URBAN RESILIENCE: STRATEGIC AND GOVERNANCE APPROACHES

African cities are marked by poor capacity for planning and anticipation. In this context, initiating a territorial resilience approach can prove difficult, especially since the notion of resilience is a relatively new concept for urban planning in Africa. It emphasizes the capacity to anticipate, absorb, recover, and adapt functions after disturbances or shocks.

4.1. GOVERNANCE APPROACHES BASED ON MULTI-LEVEL COORDINATION AND COMMUNITY ENGAGEMENT.

Building urban resilience in Guediawaye demands a comprehensive, integrated, and adaptive approach. That's also requires an understanding of how stakeholders are involved in the urban management of climate change issues. To strengthen community resilience to hazards, it is necessary to encourage greater citizen participation and close coordination between central government entities, implementing agencies, and municipal authorities. Strengthening the technical capacities of Guediawaye's local authorities on urban resilience aspects has become a priority for sustainable and integrated urban planning.

4.2. BUILDING COMMUNITY RESILIENCE

Like other cities across the country, Guediawaye city is bearing the brunt of the impacts of climate change, not only due to a lack of planning and anticipation, but also due to the weakness of sustainable urban governance and the absence of forward-looking leadership to influence and steer structural changes in the urban fabric. Therefore, achieving a sustainable city is an essential objective, as the current urbanization model is unsustainable. The rapid transformation of urban spaces and the resulting dysfunctions in the context of climate change are exacerbating urban risks and disasters and the impoverishment of households. In this context, it is urgent to encourage and support citizen participation to build community resilience in the face of hazards. The City Council unanimously approved the proposal for urban sprawl along the filao strip, thereby reducing wooded areas and increasing the city's vulnerability to climate change with the disappearance of wooded areas. This newly vacated space constitutes a future development hub that will house new facilities to fill the city's infrastructure gap.

4.3. INVESTMENT IN RESILIENT INFRASTRUCTURE & URBAN BASIC SERVICES

The resilience of urban infrastructure must be central to climate issues. The idea is to enable essential systems and services to continue operating during and after disruptions and natural disasters. Hazards that can occur and prevent the proper functioning of urban infrastructure are subject to climate change, including flooding, erosion phenomena linked to the advance of the sea, the disappearance of the casuarina strip with its corollary adverse effects, and increased pollution due to greenhouse gases.

In its current state, Guediawaye's urban infrastructure remains highly exposed to hazards. For example, despite the efforts made by the State through the Municipal Development Agency for flood management, Guediawaye, particularly the municipalities of Médina Gounass and

Wakhinane Nimzatt, suffers every winter, as some facilities are blocked by rainwater, making them inaccessible. Congestion problems are acute for the mobility of people and their goods.

4.4. NATURE BASED SOLUTIONS AND ENVIRONMENTAL PROTECTION.

The wetlands of the Guediawaye city are represented by the lakes of Thiourour, of Technopole and the retention basins of Médina Gounass and Wakhinane Nimzatt, developed as part of flood control efforts. In an urban context marked primarily by a land shortage and global warming, these wetlands represent potential areas for relaxation, recreation, and development for the population. If no action is taken in these wetlands, the local populations will be tempted to continue the occupations already observed and to fill in certain parts to protect themselves from the effects on health (mosquito breeding grounds) and safety (drowning, refuge of criminals). The integrated management of these environments must make it possible to safeguard the ecological and ecosystem functions (agriculture, livestock, fishing), to support the economic development through autonomy of sustainable management of the sites through the exploitation of potential in various fields (eco-tourism, games, catering, aquaculture), to fill the deficit in landscaped areas, to improve the living environment, to contribute to the promotion of ecological and eco-citizen awareness, particularly among young people through the development of socio-educational activities, leisure (playgrounds, picnics, walking trails), training and environmental education. The aim is to support, on the one hand, the urbanization process of the various districts affected by these wetlands, and on the other hand, to support the implementation of the management plan for the Technopole nature reserve.

CONCLUSION

Guediawaye City stands as a microcosm of the complex urban resilience challenges facing African cities. Its history of rapid, often informal urbanization, coupled with intense demographic pressure, has created a highly vulnerable urban fabric. The city is acutely exposed to environmental risks, particularly devastating floods and accelerating coastal erosion driven by climate change, exacerbated by the loss of natural buffers like the filao band. Chronic socio-economic vulnerabilities, including inadequate infrastructure, a dominant informal economy, high unemployment, and rising urban insecurity, further compound these issues.

Despite these formidable challenges, Guediawaye is undergoing significant transformations. Major transport infrastructures like the BRT and the VDN3 are enhancing their accessibility and attractiveness, sparking a process of gentrification and prompting a re-evaluation of its spatial identity from a marginalized “dormitory city”. However, this new urban dynamic also brings challenges of managing sprawl, ensuring equitable access to services, and protecting remaining natural ecosystems.

This is why the roadmap for city resilience must include among these key interventions substantial investment in resilient infrastructure (drainage, housing, sanitation), aggressive implementation of nature-based solutions for coastal protection and wetland preservation, and policies that foster economic diversification and social cohesion. The use of artificial intelligence should enable the city to leverage data and technology for early warning systems and informed planning, while ensuring sustainable financing mechanisms for resilience projects. The challenge is to transform Guediawaye’s rapid mutations into truly sustainable and resilient development, creating a city where all inhabitants can thrive in the face of future shocks and stresses.

REFERENCES

- ADM, October 2014, Development and dissemination of a Detailed Urban Planning Plan (PUD) in the peri-urban area of Dakar (Pikine and Guédiawaye), Urban Data,
- ADM, June 2015, Proposal for a draft Detailed Urban Planning Plan (PUD) in the peri-urban area of Dakar (Pikine and Guédiawaye).
- ADM, December 2011, Final ESIA report for PROGEF (Rainwater Management Project, Phase 1 - storm drainage structures).
- ADM, January 2011, Study of the master plan for rainwater drainage in the peri-urban region of Dakar, Report Number, Watershed division
- Blouin, J.L., 1990. Biophysical inventory of the Niayes region. Summary document, Directorate of Water and Forests, Senegal.
- GGGI, Green Secondary Cities Guidelines in Senegal, 2017
- GGGI, Roadmap for the implementation of the Guidelines for the Development of Secondary Green Cities in Senegal, 2017
- IAGU, 2005, Environmental Profile of the city of Guédiawaye, IAGU
- ANONYMOUS, 2021, Decree 2021-701 of June 4, 2021 promulgating the Detailed Urban Planning Plan for the Guédiawaye Coastal Strip.
- DIALLO Yaya, BALDE Kadiatou, OUEDRAOGO Adama, and DRAMOU Bernadette, A City Assaulting its Wall: The Destruction of the Guédiawaye Coastal Strip by the Advance of the Urban Front, *Revue Espace, Territoires, Sociétés et Santé*, [Online] 2022, published December 31, 2022, accessed 2023-10-27 05:33:50, URL: <https://www.retssa-ci.com/index.php?page=detail&k=272>
- Dia Souleymane, 2000, Les Niayes du Nord, Evolution d’une région littorale en crise, PhD thesis, Rouen, 438 p.
- Directorate of Protected Community Marine Areas (DAMCP), January 2022, Development and Management Plan for the Urban Nature Reserve of the Grande Niaye de Pikine and Dependencies (2022-2026), January 2022.
- Faye et al., 2014. An Assessment of the Risk Associated with Urban Development in the Thiaroye Area (Senegal). *Environmental Geology*, 45: 312-322.
- LY Abdoulaye, 2021, The Socio-Economic and Environmental Impacts of the Reconversion of the Green Strip of the Coast of the Department of Guédiawaye, End of Study Dissertation,

Higher School of Applied Economics, Cheikh Anta Diop University of Dakar, 125 p.

Martin A., 1970. The Groundwater of the Cap Vert Peninsula, Their Use for Water Supply in Dakar, BRGM,

United Nations 2007, Committee for Development Policy, Economic Commission for Europe.

Ndong et al. 2018. Outdoor and Indoor Air Pollution Exposure: A Cross-Sectional Study in Dakar City (Senegal). *Toxicology Letters: Supplement 1* 295: 167. <https://usherbrooke.on.worldcat.org/oclc/7849274656>

PNA-FEM, 2022, Studies on Scientific Knowledge on Climate Change for the Health, Agriculture, Land Transport Infrastructure, and Risk Management Sectors and flood-focused disasters at the national level.

SAGNE Papa, FALL Boubacar, BA Kader, YOUM Jean-Paul Marcel, GANE SARR Jean-Pierre, and SOW El Hadji, 2021, "Morpho-sedimentary evolution of the northern coast of Dakar (Senegal): example of the Guédiawaye and Malika beaches," *Geo-Eco-Trop.*, 2021, 45, 2: 283-298

SAGNE Papa, FALL Boubacar, BA Kader, YOUM Jean-Paul Marcel, GANE SARR Jean-Pierre, and SOW El Hadji, 2021, "Mapping the historical dynamics of the coastline of the Guédiawaye and Malika beaches (Dakar, Senegal)," *European Scientific Journal*, ESJ, 17(25), 214. <https://doi.org/10.19044/esj.2021.v17n25p21>

SECK Moussa, November 2021. Analysis of the effects of air pollution in Senegal, the case of Dakar. Master's thesis in environment, Sherbrook University, Canada.

Sonia CHAOUI, 1996, Hydrogeology and hydrochemistry of the Cape Verde peninsula (infrabasalt aquifer and Thiaroye aquifer), Senegal, ORSTOM internship report.

Tandia A., Deme I., Sarr M., 2004. Surface aquifer and urban pollution in Africa. Final report for Senegal, UNEP/UNESCO/UN-HABITAT/ECA