

Spatial Analysis of Natural Hazard and Climate Change Risks in Peri-Urban Expansion Areas of Dakar, Senegal:

An Innovative Pilot Study to Ramp up Local Disaster Management Practices

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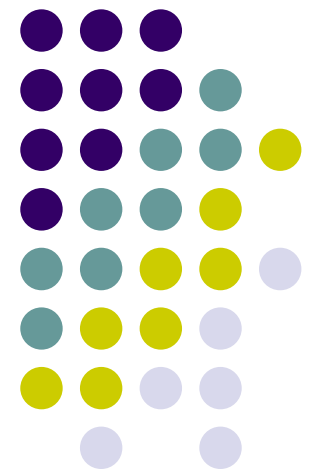
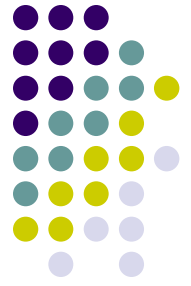




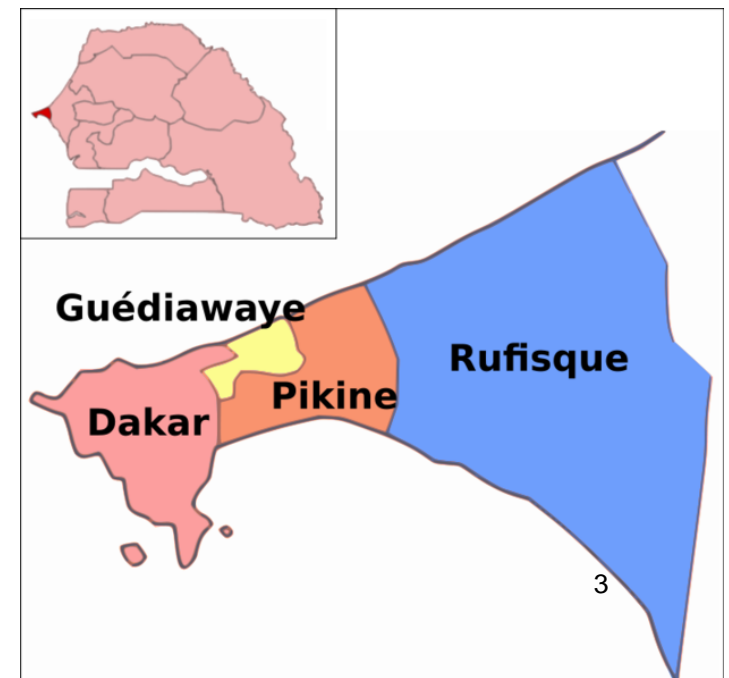
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I. Introduction: the Dakar Region, Senegal



- Stretches across 550 square kilometers (0.3% of the national territory)
- Shelters about 50% of Senegal urban population
 - the capital city since the French West Africa (AOF)
 - a hub of cultural and political leadership
 - The destination of large rural-urban migrations since the 1960s
- Consists of four administrative departments:
 - Department of Dakar,
 - Guédiawaye,
 - Pikine, and
 - Rufisque
- Has a population of 2,167,893
 - Department of Dakar : 871,038
 - Guédiawaye : 259,972
 - Pikine : 767,046
 - Rufisque : 269,737(2007)





- The Dakar Region
 - Contiguous expansion of urban built-up areas
 - a large proportion of the urban growth is occurring in the peri-urban areas (outer suburbs) of Dakar
 - Increased vulnerability to natural hazards and climate change risks
 - Flooding
 - Coastal erosion



Sep. 2008 in Dakar 4



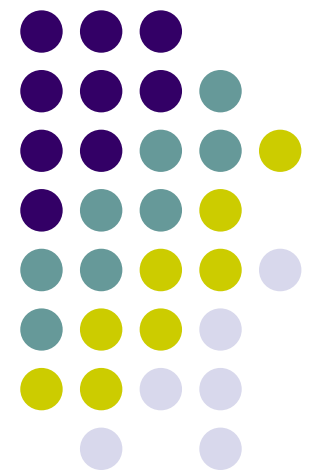
2. A Pilot Study

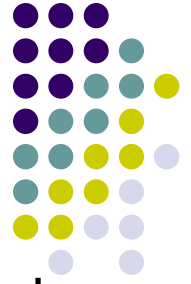
- An innovative pilot study in order to
 - (i) Develop state-of-the-art spatial analysis tools to spatially identify and evaluate natural hazard and climate change risks,
 - (ii) Address the critical knowledge and capacity gaps of local governments in dealing with rapid peri-urban expansion, and
 - (iii) Identify key triggers to ramp up local disaster management practices.
- The Spatial and Local Development Team (FEU), GFDRR, and in collaboration with colleagues from the Senegal Country Office
 - In consultation with local agencies and government counterparts at national/regional/local levels



- Three pillars of activities are being implemented sequentially
 - **Activity 1: Spatial Analysis** of Natural Hazard and Climate Change Risks and Hotspot Characterization in Peri-Urban Expansion Areas of Dakar, Senegal (done)
 - **Activity 2: Hotspot Characterization and Assessment of the Institutional Capacities at the Local Level** (done)
 - Primer questionnaire (Climate Resilient Cities, EAP)
 - Interviewed prefects, mayors/deputy mayors, technicians at local agencies, urban planners, land use specialists, financial experts, and hotel managers
 - **Activity 3: A final report synthesizing** the findings of Activities 1 and 2 and **proposing policy options.** (in progress)
- Consultation/validation workshop with key government counterparts at national/regional/local levels (done)

Activity 1: Spatial Analysis





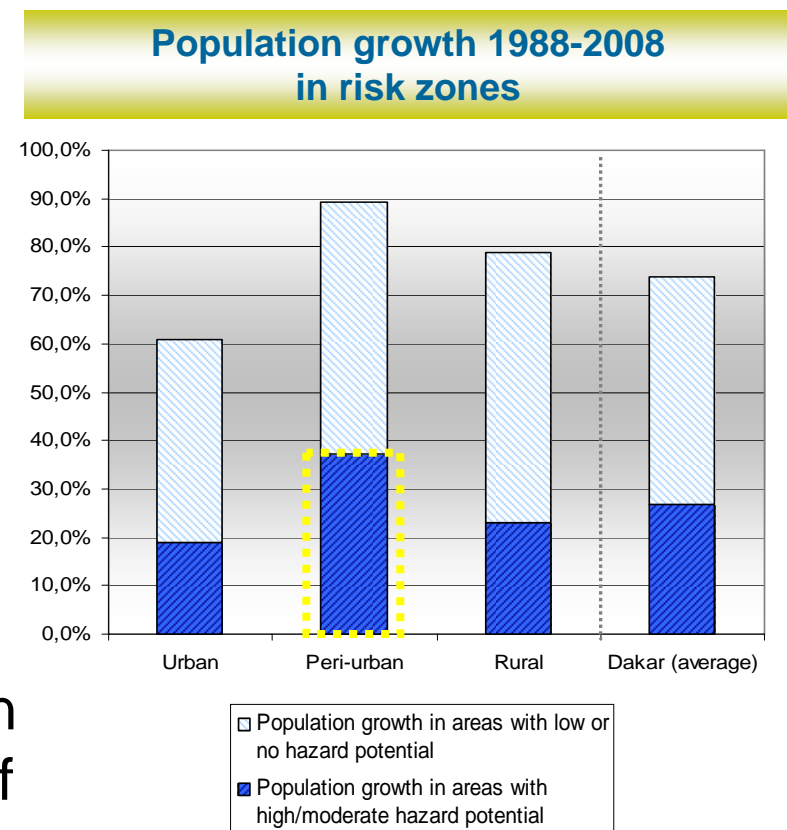
3. Spatial Analysis

- Spatial Analysis of Natural Hazard and Climate Change Risks
- Develop a generic methodology supporting urban growth analysis related to natural hazards and climate change risks
 - Monitoring Peri-urban expansion: geospatial mapping of urbanization
 - Risk diagnostics: identification and mapping (task 3) of key risks and vulnerability
 - inland flooding, coastal erosion, and sea level rise
 - Spatial analysis to measure socio-economic impacts of urban expansion in peri-urban areas vulnerable to natural hazard and climate change risks.
- Focus is on enabling cross-city/cross-country assessments on a continental level
- Comprehensive geographic information base employing time-series satellite, socio-economic and other geospatial data

Main Findings from Spatial analysis



- Rapid urban expansion in peri-urban areas
- However, Peri-urban built-up areas are more exposed to risks
 - In Dakar's peri-urban communes, almost **40%** of the new population has settled in areas with high or moderate hazard potential from inland flooding, coastal erosion or sea level rise
- Peri-urban open land (non built up) is also more exposed to risks
- Further urban expansion (in peri-urban areas) would cause a higher degree of vulnerability





4. Institutional Survey Analysis

- In order to support hotspot characterization and assessment of institutional capacities in the Dakar region
 - The methodology and survey questionnaires are based on the recently completed report on *Climate Resilient Cities: A Primer on Reducing Vulnerabilities to Climate Change Impacts and Strengthening Disaster Risk Management in East Asian Cities.*
- The questionnaire is divided into three modules
 - Definition of hotspots
 - The institutional framework
 - The peri-urban areas
- During the survey in December, 2008, local authorities were interviewed
 - Préfets, city authorities (Mayors, Deputy Mayors), technicians from the cities of Dakar, Guédiawaye, Pikine, and Rufisque, urban planners, land use specialists, financial experts, and hotel managers.



Main Findings from institutional survey

- The survey also confirms **peri-urban areas are more vulnerable** to natural hazard and climate change risks.
- A large proportion of people residing in peri-urban areas are
 - floating population (people living in irregular zones),
 - in unauthorized development (wrt urban planning regulations),
 - in informal/squatter settlements, and
 - in locations highly vulnerable to natural disasters.
- Peri-urban areas are also more vulnerable to climate change risks
 - in particular, precipitation change
- Peri-urban areas are **politically and economically neglected**,
 - not political centers where political decision-makers reside
 - nor economic centers with agglomerated industrial/business activities.

Well-organized post-disaster management



- Current governance structure of hazard and disaster management
 - The High Commission of Civil Protection (CSPC)
 - Chaired by the Minister of Interior
 - The Regional Committee of Civil Protection (CRPC), Governors
 - The Auxiliary Committee of Civil Protection (CAPC): Prefects
 - The Division of Civil Protection (DPC)
 - The permanent secretariat of the CSPC
 - It organizes and heads various civil protection departments at all levels.
- The National Emergency Organization Plan (ORSEC)
 - Adopted since 1993
 - In order to coordinate relief operations in times of disaster
 - The ORSEC plan can be triggered by the CSPC.
- Clearly defined disaster management mechanism at department level (headed by Prefects)
 - Local authorities (Mayors) are also involved in disaster management.



However,

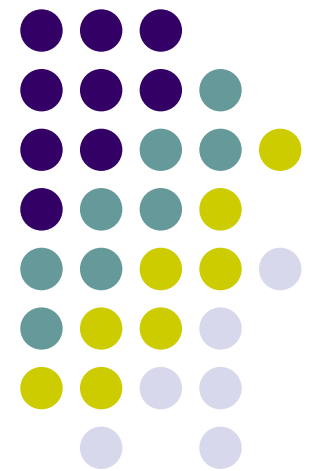
- National disaster response mechanism is not often tested and hardly any simulations.
- The absence of a specific service (local government unit) devoted to hazards and disaster management at the local (commune) level
- The absence of preparedness mechanism to mitigate the climate change impacts



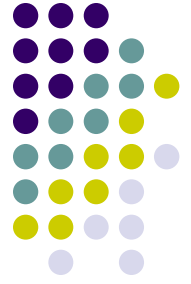
How about ex-ante measures?

- In order to mitigate disasters, reduce vulnerability, and adapt to climate change variability
- Urban Master Plans (PDU), The Urban Mobility Plan for the Agglomeration of Dakar (PDUD), The Regional Land-Use Planning Framework (SRAT), The Regional Integrated Development Plan (PRDI)
 - **Legislated, but not forcefully implemented**
- Construction standards and authorization by Urban Planning Service (under the Ministry of Urban Planning and Housing)
 - **Compliance certificate is not demanded**
- Significant gap between legislation at national/regional level and implementation at local level.

How to ramp up local disaster management practices?



5. How to ramp up local disaster management practices (1)



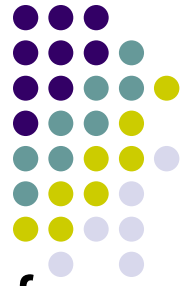
- There are **significant knowledge and capacity gaps**.
- The magnitude of knowledge gap is more severe at local level than at regional or national levels.
- **The knowledge gap drives capacity differences among governments.**
 - The national and regional governments are relatively well aware of natural hazards and climate change risks, and have initiated (national) action plans and planning regulations.
 - However, local governments, without local knowledge or local public awareness, do not have instruments or political will to address those issues and enforce regulations at local level.

5. How to ramp up local disaster management practices (2)



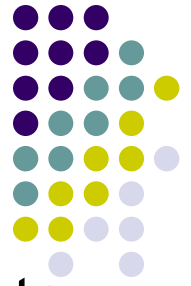
- **Sensitization** or public awareness on natural hazards and climate change risks is **a Key Trigger**.
- Natural hazard and climate change risk maps, as our spatial analysis produces, visualize spatial locations of disaster risks and significantly improve public sensitization.
- Local public awareness will build up political pressure for capacity building of local agencies, better coordination among different levels of institutions, and effective implementation of ex-ante mitigation measures and urban planning regulations.

5. How to ramp up local disaster management practices (3)

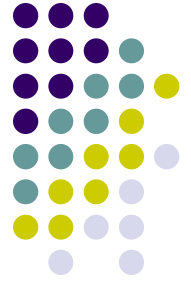


- **Capacity building of local agencies** is critical for the success of local disaster management.
- Local agencies are at the forefront of implementing disaster management instruments and rescue actions when a disaster occurs.
- Practical trainings and information dissemination workshops for local agencies as well as for local communities are important.

5. How to ramp up local disaster management practices (4)



- Many poor migrants and informal dwellers will continue to settle in precarious **peri-urban areas** without proper urban planning enforcement.
- Future urban expansion will be more concentrated in peri-urban areas.
- We expect peri-urban areas are more prone to worsening adverse welfare and economic impacts from disasters and climate changes.
- Those adverse impacts in peri-urban areas will be further exacerbated by weak institutional capacity and political negligence at local level.
- In sum, sensitization and spatial emphasis on peri-urban disaster management are critical for long-term disaster mitigation, vulnerability reduction, and adaptation to climate change in the Dakar Region.



6. Moving forward

- How to pull the trigger: **sensitizing local agencies and local communities**
- Dissemination events in close collaboration with key government counterparts and local agencies.
- A focal point: the Municipal Development Agency (ADM)
 - Transfer the final project report, data and information
 - Work together and revise ADM disaster management training modules, which are delivered regularly
 - Organize joint training sessions and workshops inviting local agencies and local communities
- Public broadcasting and local school programs can be utilized to sensitize local natural hazard and climate change risks and preparedness at local level
- Share information and work together with WB and donors/governments' urban projects in Dakar

Many Thanks

