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Coastal Urbanization in The Context of Sea Level Rise. The Example of The '50 Pas Géométriques' Area In Martinique

*L'urbanisation côtière dans le contexte de l'élévation du niveau de la mer.
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Introduction and background about Martinique

- 1 The French West Indies are made up of 4 communities: Martinique, Guadeloupe, Saint-Barthélemy and Saint-Martin. These territories are located in the eastern part of the Caribbean arc, more than 6600 km from the mainland, France. They are not independent territories.
- 2 Martinique, a former colony, became a French department by Law n°46-451 of March 19, 1946. Fort-de-France is the capital. The collectivity of Martinique was created by the law of 27 July 2011 under Article 73 of the French Constitution.
- 3 Martinique is located between the island of Dominica to the north and the island of Saint Lucia to the south (Figure 1). The surface area of the territory is 1128 km². The northern part is more mountainous. Mount Pelee rises to 1397 m. The southern part of the island consists of low-lying areas with bays and inlets, wetlands... (Figure 2)

Figure 1: Location of Martinique in the Caribbean



Source : <https://www.universalis.fr/atlas/europe/france/martinique/>

Figure 2: Relief of Martinique



Source : <https://www.universalis.fr/atlas/europe/france/martinique/>

- 4 The population is estimated at 368,783 inhabitants according to the latest census. The population density is 327 inhabitants/km². (Chanteur, Reif, 2020). Thirty-two percent of the population, 32% of the buildings, 71% of the business areas are concentrated on the coast (ADDUAM, 2020).

1. History of the Coastal Urbanization of the '50 pas géométriques' Area

- 5 If we go back in time, history reveals elements on the stages of urbanization of Martinique coasts. In the seventeenth century, during colonization, a coastal strip of eighty-one point twenty metres, called '50 pas géométriques', was created to protect the shore in the French islands of the West Indies. It was the king's property. It was an inalienable zone, intended for the defence, the maintenance of the boats and allowing free movement along the shore. Natural coastal areas were protected (lagoon, swamp, mangrove).
- 6 During the following centuries, sailors and carpenters were allowed to settle there. With the abolition of slavery in the nineteenth century, freed plantation workers moved to these available lands.
- 7 In 1902, the volcanic eruption generated huge migration of people from the north to the center or to the south of the island. Several informal settlements were created on the hills but also on the coast. For example, Volga Plage built on a filled marshland in Fort-de-France. Urbanization is brutal. The inhabitants transpose the rural way of life into urban areas.
- 8 Between 1950 and 1970, there was an industrial crisis during which the sugar factories closed. Consequently, there was an important rural exodus to the coastal cities, where there was work. So, informal settlement grew. The urban explosion is reflected in the creation of numerous spontaneous neighbourhoods on the outskirts of certain cities and particularly on the coast (Figure 3). These neighbourhoods are self-built with recycled materials on the embankments of former swamps (e.g. the Volga Plage or Texaco neighbourhoods in Fort-de-France) or diffuse urbanization (e.g. François). Then, there is a process of 'hardening' of the hut (from wood to cement or reinforced concrete).
- 9 These stages explain why there is a very diverse typology of habitat. Even today, the urbanization of the coastline continues.

Figure 3: Evolution of urbanization between 1950 and 2017, Anse à l'Ane District in the city of Trois-Ilets



Source : <https://www.geoportail.gouv.fr/>

2. Consequences of the uncontrolled urbanization of the '50 pas géométriques' area

- 10 This uncontrolled urbanization has created a degradation of natural spaces by the removal of mangroves and an urban spread. However, the mangrove contributes to the natural defence of these areas against the swell.
- 11 There are many informal settlements with a lot of unsanitary housing and without equipment, and most of them are very vulnerable to natural risks such as erosion, swells, marine submersion, ...
- 12 The authorities are overwhelmed by the scope of the phenomenon.

3. Research Question and Methods

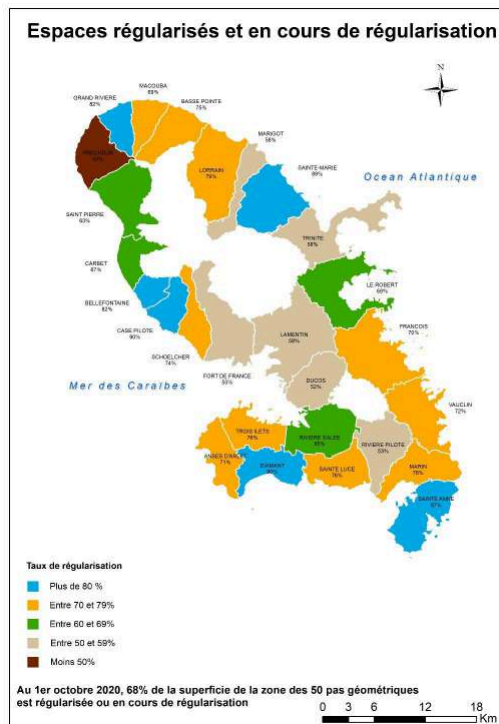
- 13 This research studies the impact of climate change on the management of the '50 pas géométriques' area. The research question is the following: How rising sea level leads to redesigning methodological tools for urban planning in Martinique?
- 14 The methods consist of analysing public policies about the management of the '50 pas géométriques' and sea level rise. Then, analysing the territorial strategies, the effectiveness of operational tools and conducting surveys about professional practices (with coastal managers or technicians from coastal communities).

4. Results/Data Analysis

4.1. Management of Coastal Urbanization in The '50 Pas Géométriques' Area

- 15 We will now present the main public policies put in place to curb the coastal urbanization of the '50 pas géométriques' area and their associated results.
- 16 Authorities implement 'RHI' operations throughout the island (both on the coast and inland). With the housing crisis, the authorities systematically demolished unsanitary and informal housing and relocate residents without property titles in collective housing. But it had created a big social and cultural crisis (brutal displacements, breakdown of social ties, rejection of collective housing). Sometimes, people come back to live on the coast.
- 17 The '50 pas géométriques' area is managed by two main managers:
- In urban areas (1000 ha), 'l'Agence des 50 pas géométriques', a public institution was created in 1996 to equip the residents with sanitation facilities, organize the spatial planning and give land tenure to occupants without property titles (5,000 occupants). Since 2010, the aim is to accelerate this process. One of the main tools to give land tenure or not is the natural risk prevention plan (called 'PPRN' in French: '*Plan de Prévention des Risques Naturels*'). This tool had been created in 1996, but the first PPRN appeared in 2004 and was revised in 2013. When the house is located in an area with high risk, there is no possibility to have land tenure. In this case, the agency has to relocate the occupants and give them compensation. But, up to now, land regularization is not over. Only sixty-eight percent (68%) is done (Figure 4).

Figure 4: Monitoring of regularized areas and areas in the process of being regularized on October 1st 2020



Source : Agence des cinquante pas géométriques, 2020

- In natural areas (85 ha), the 'Conservatoire du Littoral', a public institution can buy lands when urban pressure is too strong.
- 18 Despite these public policies, the urbanization has continued to grow (Mohamed Soilihi *et al.*, 2015). There is no reducing informal settlements in the area.

4.2. Sea-Level Rise: The New Challenge of Managing Coastal Urbanization in The '50 Pas Géométriques' Area

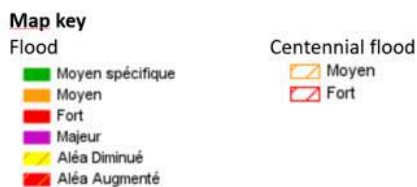
- 19 Nowadays, in Martinique, the main issues (human, economic and ecological) are concentrated on the coast. Coastal urbanization is continuing.
- 20 According to the results of the C3AF project, Martinique is a territory vulnerable to climate change (GRED, 2019). In 2016, Yann Pelis and Pascal Saffache have estimated that around 5% of Martinique could be directly impacted by sea-level rise and cyclonic swells in 2100 (Saffache, 2016). These results were based on the 2013 IPCC report, which indicated a rate of rise of around 2.5 mm/year. However, according to the IPCC report in 2019, sea-level rise is accelerating and is rather of a range of 3.6 mm/year (Oppenheimer *et al.*, 2019). The water level indicated on the map produced by Yann Pelis could therefore be reached before 2100 (Figure 5).

Figure 5: Assessment of marine intrusion in Martinique due to climate change by 2100



- 21 Thus, as the sea level rises, the island functioning can be challenged. The management of the '50 pas géométriques' area is therefore even more crucial.
- 22 Up to now, institutions lean on a risk-management tool, called 'PPRN', that has no obligation to consider sea-level rise (Figure 6). The PPRN currently in force date from 2013. They therefore do not take into account the latest IPCC data on the rate of sea level rise.

Figure 6: Extract from the PPRN map, Anse à l'Ane District in the city of Trois-Ilets



Source : www.pprn972.fr

- 23 As seen previously, in view of the extent of the informal sector in Martinique, land regularization has become one of the main public policies in the '50 pas géométriques' area. Today, the sea level rises questions the relevance of continuing this policy in the long term for several reasons.
- 24 Then, integrate the last data on sea-level rise in the Caribbean means more areas with high hazards where it is not possible to give land tenure. So, there will be more people to compensate. Indeed, since the Letchimy law of 2011, the right to land and the right to property have been separated. Homeowners who have built without right or title on land exposed to risks can be compensated under certain conditions (Letchimy, 2011). But the national fund dedicated to that is limited. The Fonds de Prévention des Risques Naturels Majeurs (FPRNM, also known as the 'Barnier Fund') provides compensation for all expropriations of property exposed to a major natural hazard: i.e. both metropolitan and overseas territories. So, there will be more people to relocate. But where? Inside the area it's quite limited. And outside of it seems to be complicated too. It is therefore necessary to determine what new spaces will be available for urbanization, given that the trend is to limit the amount of land that can be developed (e.g. the Grenelle laws, the 'Zero Net Artificialisation' objective of the Biodiversity Plan, the draft Climate and Resilience Law, etc.) and the fact that the relief is very mountainous, with many hills inland.
- 25 In its National Climate Change Adaptation Plan (PNACC), France advocates a strategic retreat (ONERC, 2017). However, few municipalities have embarked on developing a strategy for adapting to sea-level rise in Martinique. Only one municipality defined an adaptation strategy to sea-level rise and decided to relocate people (500 constructions) in the hills in the city called Le Prêcheur. There are two main reasons for this: some inhabitants are in emergency situations as their building is already under water and

the strong political will of the mayor (Saffache *et al.*, 2020). Some tentative thinking is going on in other municipalities. Some are thinking about identifying areas for possible relocation. The retreat of the coastline is perceived in an unequal manner among the actors present in Martinique. The technicians perceive it, sometimes in a very subtle way. During the interviews, it is above all the evolution of the sandy beaches that seems to affect them the most.

Conclusion

- 26 The history of urbanization in the '50 pas géométriques' zone has highlighted the increasing vulnerability of this area. In recent decades, coastal urbanization has been intense and uncontrolled.
- 27 The various public policies implemented have not succeeded in halting the process of uncontrolled urbanization. Today, most of the issues are on the coast.
- 28 Today, sea-level rise is a major challenge and a reminder of the importance of more resilient management of this area. Sea-level rise is a good opportunity to question the efficiency of our tools or methods. There is a need to adapt our tools, especially in the context of our changing understanding around climate change.
- 29 It is now urgent that decision-makers, planners and other urban actors give priority to risk management and informal management as part of their strategy to improve coastal urbanization management and build climate resilient cities.
- 30 **Recommendations for a more resilient and sustainable territory**
- In order to control coastal urbanization, it is necessary to reinforce controls. Today, controls are still lacking because urban planning is a municipal responsibility. However, the citizens are also voters. It is above all a political problem due to the close proximity between the citizen and the municipal representatives.
 - 'PPRN' revision is in progress. Taking into account the latest data on sea-level rise in the 'PPRN (the natural risk prevention plan) must be more ambitious, since, according to the experts the phenomenon seems to be accelerating.
 - It is desirable to increase the number of reflections to move towards a strategic withdrawal for the most vulnerable neighbourhoods. Some municipalities do not seem to have realized the urgency of the situation.
- 31 **Implication and perspective for a more resilient and sustainable territory**
- 32 Through this article, we have begun to identify the inconsistencies and gaps that hinder the controlled urbanization of the coastline. It will then be a matter of identifying other shortcomings but also, and above all, other ways of action. The aim is to provide elements for a global reflection on the development of an island territory like Martinique. The recommendations formulated should help to improve the effectiveness of the actions of local actors.

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ABSTRACTS

The management of sea-level rise in Martinique, a French island in the Caribbean, is a great concern. Island vulnerability is proven. Human, economic and ecological issues are concentrated on the coast. Because of the uncontrolled coastal urbanization, the functioning of the territory can be challenged. Urban restructuring is necessary to ensure the urban resilience. This article looks at the history of the urbanization of the '50 pas géométriques' zone to understand how this vulnerability arose, and at the policies implemented to try to control urbanization in this coastal zone, before tackling the new planning issues linked to the context of climate change and, more particularly, sea-level rise.

This paper was produced for the presentation made at the Caribbean Urban Forum, 2021.

La gestion de l'élévation du niveau de la mer en Martinique, une île française des Caraïbes, est une grande préoccupation. La vulnérabilité de l'île est avérée. Les enjeux humains, économiques et écologiques se concentrent sur le littoral. L'urbanisation incontrôlée du littoral peut remettre

en cause le fonctionnement du territoire. Une restructuration urbaine est nécessaire pour assurer la résilience de la ville. Cet article revient sur l'histoire de l'urbanisation de la zone des « 50 pas géométriques » pour comprendre comment cette vulnérabilité est apparue, et sur les politiques mises en œuvre pour tenter de maîtriser l'urbanisation de cette zone côtière, avant d'aborder les nouveaux enjeux d'aménagement liés au contexte du changement climatique et plus particulièrement de l'élévation du niveau de la mer.

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INDEX

Mots-clés: urbanisation côtière, stratégie territoriale, politiques publiques, informalités, élévation du niveau de la mer, Martinique

Keywords: coastal urbanization, territorial strategy, public policy, informalities, sea-level rise, Martinique

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