

Urbanization and Floods: Focus on Antananarivo, Madagascar

Text-only version of the invited scientific presentation

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This presentation examined the relationship between rapid urbanization and flood vulnerability in the Antananarivo agglomeration, Madagascar. It focused on the spatial, environmental and socio-economic processes that contribute to flood risk, particularly in deprived and flood-prone urban areas.

The presentation first placed the case of Antananarivo within a broader urbanization framework. Urban growth is increasing worldwide, and this trend is particularly significant in Sub-Saharan Africa and Madagascar. Antananarivo, as the capital city of Madagascar, is experiencing strong demographic growth and peri-urban expansion. The agglomeration covers approximately 768 km² and had around 2.8 million inhabitants in 2018 (INSTAT, 2019). Projections indicate that the population could reach around 4.1 million inhabitants by 2033 (MAHTP and JICA, 2019). This growth is accompanied by increasing pressure on land, infrastructure, housing and urban services.

The expansion of Antananarivo is not limited to the historical city centre. The urban area has progressively extended toward peripheral municipalities, where land is often more available and less expensive. This peri-urbanization is driven by several factors, including demographic pressure, migration, the search for affordable housing, access to employment opportunities, and proximity to services and industries. However, this expansion also creates new challenges. Many peripheral areas are exposed to environmental risks, have limited infrastructure, and face social and land insecurity.

A major issue discussed in the presentation was land artificialization. Built-up areas have increased significantly over time. In 1975, approximately 4,143 hectares were built, representing about 5.4% of the agglomeration. By 2017, built-up areas had reached

approximately 16,250 hectares, or about 21.2% of the territory (Ramiamanana and Teller, 2021). This rapid increase reflects several urban dynamics, including densification, backfilling, migration, and the development of peri-urban settlements. The transformation of agricultural land, wetlands and low-lying areas into built spaces contributes to the reduction of natural water retention areas and increases exposure to flooding.

The physical geography of Antananarivo plays an important role in flood vulnerability. The city is located in a low-lying area characterized by river confluences, polders, and floodplains. The very low slope of some streams slows water flow and encourages water retention. These conditions make the agglomeration naturally sensitive to flooding, especially during the rainy season. In addition, the inability of the city to accommodate new inhabitants through adequate land management, infrastructure provision, and housing policies has contributed to the occupation of risk-prone areas.

The presentation then focused on built spaces located in flood-prone areas. In 2006, approximately 26.5% of built spaces were located in flood-prone zones. In 2017, this proportion was around 23% of built spaces, corresponding to approximately 32% of the population (Ramiamanana and Teller, 2021). These figures show that a significant share of the urban population is exposed to flood hazards. Flood-prone settlements are found in several types of locations, including the city center, swampy plains, riverbanks, streamsides, and low-lying peripheral areas.

The characteristics of housing in these areas further increase vulnerability. Many dwellings are precarious and built with mixed materials such as bricks, wood, and recycled materials. In some of the studied areas, more than half of the houses are smaller than 30 m² and are considered precarious (Ramiamanana, 2020). Drainage systems are often inadequate, which exacerbates water accumulation during heavy rainfall. These conditions make residents highly exposed to both direct flood impacts and longer-term socio-economic difficulties.

Flood vulnerability in Antananarivo is not only a physical or environmental problem. It is also strongly linked to social, economic and institutional factors. Poverty, informal settlements, lack of secure land tenure, limited access to infrastructure, and weak urban governance all contribute to increasing risk. At the same time, people continue to settle in flood-prone areas because these locations may offer important advantages: access to jobs and services, lower land prices, moderate rents, social integration, and opportunities linked to the informal economy.

The presentation adopted a co-evolutionary perspective on flood vulnerability. Demographic pressure contributes to urban sprawl, which can lead to informal settlements in flood-prone areas. These settlements are often associated with poverty, insufficient drainage systems, and fragile urban governance. These factors increase the vulnerability of populations. The relationship between urbanization and flood risk is therefore dynamic and cumulative: urban growth increases exposure, while social and institutional weaknesses limit the capacity to reduce risk.

The final part of the presentation raised several questions about the possibility of preventing construction in flood-prone areas. Stopping urban development in these zones may appear necessary from a risk management perspective, but it can also be unrealistic if the underlying drivers of settlement are not addressed. Housing demand, lack of affordable alternatives, weak planning tools, administrative constraints, corruption, limited information about flood risk, and socio-cultural factors all influence settlement patterns.

In conclusion, the presentation argued that improving flood resilience in Antananarivo requires more than technical flood-control measures alone. It requires an integrated understanding of urban growth, land use, housing conditions, infrastructure deficits, governance challenges and the everyday strategies of vulnerable populations. More research and better planning tools are needed to support resilient urban development and to improve living conditions for populations living in deprived and flood-prone areas.

References

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Keywords

Urbanization; Floods; Peri-urban areas; Flood vulnerability; Informal settlements; Urban resilience; Antananarivo; Madagascar;

Note

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