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**THE GEOGRAPHY OF RISK
SPATIAL ORGANIZATION AND THE AMPLIFICATION
OF FLOOD IMPACTS IN MOZAMBIQUE**

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1. INTRODUCTION

Floods, although often associated with intense rainfall, tropical cyclones, and river-basin overflow, should be understood as phenomena shaped by the demographic and territorial organization of the country. The vulnerability observed results less from climatic exceptionality and more from the way in which the population, infrastructure, and economic activities have historically been distributed in space.

Mozambique has geographical features that amplify this interaction between nature and human occupation. A significant share of the territory lies at altitudes below 200 meters, and more than half of its river basins are shared with upstream countries, which increases exposure to floods generated its upstream borders. The country's downstream position within the regional hydrographic system means that water-management decisions in neighbouring countries directly influence water flow levels and the occurrence of inundations within national territory¹². This geophysical condition makes flood risk structural, recurrent, and transboundary.

However, the decisive factor is not only physical; it is also demographic. Recent studies indicate that the country could reach around 60 million inhabitants by 2050³, with a tendency towards concentration along rivers, lakes, and coastal zones, precisely the spaces most exposed to flooding risk⁴. Population growth in hydrologically active areas increases the density of people and economic assets in vulnerable zones, raising the magnitude of impacts even when the physical intensity of events remains broadly stable over time.

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² MHEWC (2026). *Mozambique – Multi-Hazard Early Warning System Design & Implementation Center*. <https://www.mhewc.org/mozambique/>

³ Instituto Nacional de Estatística (INE). (2023). *Moçambique – Publicação*. <https://www.ine.gov.mz/web/guest/d/mocambique-publicacao-1>

⁴ Cea, L., Álvarez, M., & Puertas, J. (2024). *Using integrated hydrological–hydraulic modelling and global data sources to analyse the February 2023 floods in the Umbeluzi Catchment (Mozambique)*. *Natural Hazards and Earth System Sciences*, 24(1), 225–243. <https://doi.org/10.5194/nhess-24-225-2024>

The territorial dimension of vulnerability is also reflected in the urbanization process. In several African cities, rapid urbanization has occurred without corresponding development of drainage, sanitation, or land-use planning infrastructure, leaving large segments of the population exposed to recurrent flooding⁵. This pattern repeats itself in Mozambican coastal cities. Beira, for example, built at negative altitude and subject to coastal erosion and failures in natural defences, faces rising flood risks that affect mobility, economic activity, and public health. Urban vulnerability therefore results from the interaction between geographic location, demographic growth, and territorial planning.

In rural areas, the relationship between population and risk takes different forms but remains structural. Studies conducted in the Limpopo basin show that vulnerability to floods is strongly linked to the social and economic conditions of communities, whose limited resources hinder the adoption of effective risk-reduction strategies⁶. Exposure is not only spatial; it is also socio-economic, shaped by poverty, dependence on agriculture, and the scarcity of alternative productive locations.

Analytically, this means floods should be treated as a phenomenon of spatial and demographic economics. They do not occur in a social vacuum; they interact with historical settlement patterns, expansion of informal settlements, and public decisions on location of infrastructure. Globally, the World Bank stresses that unplanned urbanization and inadequate infrastructure are central factors that amplify flood risks in cities, threatening the economic role of urban centres as engines of growth⁷.

Recent events illustrate the materiality of this interaction. Floods recorded between 2025 and 2026 caused loss of life, destruction of housing and of public infrastructure, loss of assets, and population displacement. The magnitude of the impact reflects not only rainfall intensity but also the location of populations and economic assets in hydrologically vulnerable territories. The central hypothesis guiding this analysis is therefore as follows: floods in Mozambique constitute less an isolated natural shock and more a phenomenon that reveals a territorial configuration that has reproduced exposure to risk over time. Understanding this demographic and territorial dimension is essential to move beyond approaches centred exclusively on emergency response and to advance development strategies that integrate spatial planning, population dynamics, and climate-risk management.

⁵ Zehra, D., Mbatha, S., Campos, L. C., Queface, A., Beleza, A., Cavoli, C., Achuthan, K., & Parikh, P. (2019). *Avaliação rápida do risco de inundações em assentamentos urbanos informais em Maputo, Moçambique: O caso de Maxaquene A*. Revista Internacional de Redução do Risco de Desastres, 40, 101270. <https://doi.org/10.1016/j.ijdr.2019.101270>

⁶ Lundgren, M., & Strandh, V. (2022). *Lidando com uma dupla dificuldade – Inundações e vulnerabilidade social em comunidades locais na zona rural de Moçambique*. Revista Internacional de Redução do Risco de Desastres, 77, 103023. <https://doi.org/10.1016/j.ijdr.2022.103023>

⁷ World Bank. (2026, 26 de Janeiro). *Strengthening flood resilience in rapidly growing cities*. <https://www.worldbank.org/en/results/2026/01/26/strengthening-flood-resilience-in-rapidly-growing-cities>

2. DEVELOPMENT

The demographic and territorial dimension of floods in Mozambique can be understood as the intersection of three long-term processes.

- The historical concentration of productive activities and human settlements in river valleys and alluvial plains, where soil fertility, water availability, and access to transport routes created local advantages.
- The accelerated urbanization, marked by the informal expansion of settlements, has led to occupation of natural drainage areas and persistent deficits in sanitation and drainage infrastructure.
- The accumulation of institutional vulnerabilities in spatial planning, reflected in weak capacity to regulate land use, to internalize risk in investment location, and to link territorial planning with river-basin management.

These three dynamics are not parallel; they reinforce one another and turn episodes of intense precipitation into amplified socio-economic shocks.

In rural areas, exposure to risk has an economic rationale. Family farming frequently settles in zones by the river and alluvial lowlands because these areas offer more productive soils, higher residual moisture, and easier access to water. What appears, in post-disaster discourse, as “occupation of a risk zone” is often the viable choice under severe constraints: when access to fertile and safe land is limited, when productivity outside alluvial zones is lower, when non-agricultural labour markets are small, and when transport and irrigation infrastructure is scarce.

The consequence is that exposure ceases to be a “location error” and becomes a structural component of rural survival. This helps explain why vulnerability tends to persist after repeated floods: permanent relocation would imply losing more productive land, social networks, proximity to local markets, and accumulated productive assets. Research on social vulnerability in the Lower Limpopo shows that response and recovery capacity varies with the type of capital available in communities, and that constraints in resources and access reduce the effective margin for adaptation, including mobility as a risk-reduction strategy⁸.

The Limpopo basin is particularly instructive because it is a space where floods and droughts occur as alternating risks. Exposure derives not only from the event but from the fact that the territory combines climate variability, contrasting land uses, and institutional asymmetries in water management, creating a framework of “double exposure” for

⁸ Lundgren, M., & Strandh, V. (2022). *Navigating a double burden – Floods and social vulnerability in local communities in rural Mozambique*. *International Journal of Disaster Risk Reduction*, 77, 103023. <https://doi.org/10.1016/j.ijdr.2022.103023>

households dependent on agriculture⁹. In development-economics terms, this translates into vulnerability: in flood years, production and assets are lost; in drought years, income and the capacity to rebuild are lost; in combination, the possibility of accumulation is reduced. The most relevant consequence is the tendency towards spatial poverty traps: exposed and poor territories where poverty reproduces itself because exposure to shocks prevents the accumulation that would allow exit from the geography of risk¹⁰.

The demographic component deepens this logic. Population growth implies greater pressure on land and higher densification of settlements, both rural and peri-urban. When demographic growth and land fragmentation occur together, the probability of expansion into marginal areas increases, including floodplains, unstable slopes, and zones with deficient drainage. In parallel, the urbanization process concentrates people in spaces where relatively safer land is costly, and where the effective alternative for low-income families is informal occupation of environmentally fragile areas. A synthesis made by the UN-Habitat, drawing on the World Bank projections, points to a trajectory in which 50 to 60% of Mozambique's population could live in cities by 2050, corresponding to 30 to 36 million people¹¹. The implication is that, even if the physical intensity of floods does not increase, the growth in the number of people and assets in exposed urban areas would by itself tend to raise economic and social losses.

It is therefore in urban space that the territorial dimension of floods becomes most critical for public policy. A rapid flood-risk assessment of informal settlements in Maputo identifies a causal chain typical of rapid urbanization in the Global South: fast expansion, weak planning, growth of informal neighbourhoods, and the blocking of natural drainage pathways, with worsening frequency and severity of flooding¹². This mechanism is analytically relevant because it makes flooding partly endogenous: disorderly urbanization alters surface runoff, impermeabilizes the soil, and obstructs watercourses, generating inundations where natural drainage previously existed. Economically, this means risk is not limited to "heavy rains" but is produced by an occupation process that increases the probability of loss.

World Bank documentation on the Maputo Urban Transformation Project reinforces the interpretation that flooding is a recurrent problem in informal settlements, associated with the near absence of drainage systems, with direct implications for public health and

⁹ Silva, J. A., Eriksen, S. H., & Ombe, Z. A. (2010). *Double exposure in Mozambique's Limpopo River Basin*. The Geographical Journal, 176(1), 78–95. <https://doi.org/10.1111/j.1475-4959.2009.00343.x>

¹⁰ Bird, K., & Higgins, K. (2010). *Spatial Poverty Traps: An Overview*. Overseas Development Institute.

¹¹ UN-Habitat. (2023). *Mozambique Country Brief: Sustainable urbanization, climate resilience and peace*. https://unhabitat.org/sites/default/files/2023/07/mozambique_country_brief_final_en.pdf

¹² Zehra, D., Mbatha, S., Campos, L. C., Queface, A., Beleza, A., Cavoli, C., Achuthan, K., & Parikh, P. (2019). *Rapid flood risk assessment of informal urban settlements in Maputo, Mozambique: The case of Maxaquene A*. International Journal of Disaster Risk Reduction, 40, 101270. <https://doi.org/10.1016/j.ijdrr.2019.101270>

productivity¹³. Although this is often treated as a sanitation issue, it is also an issue of labour economics and human capital. When floods and standing water increase the incidence of waterborne and vector-borne diseases, they reduce available workdays, raise medical expenditures, lower school attendance, and thereby generate economic losses that extend beyond the event itself.

Beira offers an example of how urban territorial vulnerability can be addressed, at least partially, through planning and investment in drainage and water retention. The Beira Master Plan 2035 describes interventions aimed at flood relief, including deeper drainage channels and a retention basin of around 150 hectares linked to wetlands and the ocean¹⁴. The analytical relevance lies not only in the project but in the underlying economic principle: drainage and retention infrastructure functions as an urban public good that reduces losses, stabilizes economic activity, and protects the value of housing and productive capital. When such infrastructure does not exist, risk is effectively privatized and falls disproportionately on those with the least capacity to self-protect. When it exists, part of the risk is socialized through public investment, with potential gains in equity and efficiency.

Even where planning exists, vulnerability persists if territory is not regulated consistently. In Mozambique, as in many African contexts, informal expansion tends to outpace the State's regulatory capacity, and infrastructure arrives late or not at all. This mismatch between demographic growth and planning capacity is a critical variable for understanding why impacts repeat themselves. In institutional-economics terms, it is a problem of intersectoral coordination: river-basin management, public works, housing, municipalities, agriculture, and social protection often operate in silos. When coordination fails, roads are built without adequate drainage, urban expansion proceeds without runoff capacity, and occupation of vulnerable zones is reinforced by the absence of feasible housing alternatives.

Recent floods illustrate the materiality of these coordination failures and the demographic scale of impacts. In January 2026, reports indicated more than 620,000 affected people and more than 72,000 inundated houses, along with extensive damage to roads, bridges, and social infrastructure, including health centres¹⁵. A further report in Gaza province pointed to more than 300,000 displaced people, with a significant share of the province

¹³ World Bank. (2020). *Mozambique – Maputo Urban Transformation Project*.

<https://documents1.worldbank.org/curated/en/108481607914849331/pdf/Mozambique-Maputo-Urban-Transformation-Project.pdf>

¹⁴ SDUBeira. (2026). *Beira Master Plan 2035* — Plano Director da Beira. <https://sdubeira.co.mz/en/plano-diretor-2035/>

¹⁵ Reuters. (2026). *Mozambique president cancels Davos trip due to severe floods*.

<https://www.reuters.com/sustainability/climate-energy/mozambique-president-cancels-davos-trip-due-severe-floods-2026-01-19/>

underwater, red alerts issued, and potentially very high recovery costs¹⁶. For territorial analysis, these figures indicate that the shock is not localized; it hits rural, peri-urban, and urban spaces simultaneously, producing displacement and service disruption that affect local and national economies through logistical interruptions¹⁷.

In such circumstances, population mobility should be treated as an economic risk-management strategy. During severe floods, temporary displacement to accommodation centres, circular mobility of household members seeking alternative work and income, and, in some cases, permanent migration when repeated shocks destroy the productive or housing base can all be observed. The central implication is that floods reshape the geography of work and consumption. Displaced households change their economic insertion, increase dependence on urban markets and transfers, and face transition costs related to housing, transport, and the rebuilding of networks. When mobility becomes recurrent, territory produces demographic instability and, through it, economic instability. Although measuring flood-induced migration requires microdata, the Limpopo literature suggests vulnerability varies over the disaster cycle and depends on assets and networks, consistent with the hypothesis of selective and unequal mobility¹⁸.

The distributive dimension becomes particularly clear when observing the effects of floods on consumption and poverty. A recent note on PreventionWeb reports findings from a study on vulnerability to natural shocks in Mozambique, indicating short-term consumption losses of 11 to 17% among affected households, with greater impacts on poor rural households, and linking the shock to an increase of around 6 percentage points in the poverty rate¹⁹. Even acknowledging that such figures depend on empirical design and the population of reference, they are consistent with the interpretation that floods destroy assets and reduce income, pushing households below their pre-flood welfare levels and slowing recovery where initial capital is low. From a territorial perspective, this suggests floods do not only reveal poverty; they also produce and deepen it, in effects that can become spatially concentrated.

This is precisely where spatial planning asserts itself as a macro-structural variable. While emergency response is indispensable to save lives, the political economy of risk shows that without effective land-use instruments, reconstruction tends to reinstate vulnerability in

¹⁶ Mangwiro, C., & Imray, G. (2026, January 19). *Mozambique flooding displaces 300,000, president cancels Davos trip*. AP News. <https://apnews.com/article/flood-mozambique-southern-africa-rain-weather-12a2a9d5204710cb8db637ebfd7b4fab>

¹⁷ Dadá, Y (2026). *Agricultura, mercados e pobreza rural: Evidência das cheias de 2026 em Moçambique*. Destaque Rural nº 359.OMR

¹⁸ Lundgren, M., & Strandh, V. (2022). *Navigating a double burden – Floods and social vulnerability in local communities in rural Mozambique*. *International Journal of Disaster Risk Reduction*, 77, 103023. <https://doi.org/10.1016/j.ijdrr.2022.103023>

¹⁹ Santos, R. J. M. G. (2026). *Mozambique: why the most vulnerable pay the highest price in floods*. PreventionWeb. <https://www.preventionweb.net/news/mozambique-floods-why-most-vulnerable-keep-paying-highest-price>

the same places. The central point is that territorial vulnerability is not a natural attribute; it is a social production mediated by institutions, markets, infrastructure, and demography. In this sense, development analysis should culminate in a conclusion: the flood is the visible event, but the determinant is how the country organizes its economy in space. Where people live, where they cultivate, where they build, and how territory connects to markets shape the magnitude of impact.

3. CONCLUSION AND RECOMMENDATIONS

Reading floods in Mozambique through a demographic and territorial lens shifts the debate from an approach centred on the climatic event to a structural analysis of development. The evidence discussed shows that the magnitude of impacts does not derive exclusively from precipitation intensity or river-basin dynamics but from the way the population, productive systems, and infrastructure are distributed across the territory. Floods thus act as indicators of a historical pattern of spatial occupation that combines local economic rationality with systemic fragility. The recurrence of impacts is a manifestation of structural weaknesses in planning, institutional coordination, and the articulation between sectoral policies. While these dimensions remain misaligned, responses will continue to focus on managing successive crises, with rising human and economic costs that may accumulate from previous events.

For that reason, addressing the effects of floods requires integrating risk management into the development process itself. Spatial planning should systematically incorporate climatic and hydrological information, guiding the location of infrastructure, urban expansion, and agricultural programmes. In rural areas, production policies should be articulated with drainage, water-retention, and land-conservation interventions, reducing exposure without compromising the productive base. In cities, the progressive upgrading of vulnerable settlements and investment in stormwater infrastructure should be treated as instruments of economic policy, capable of protecting human capital and ensuring continuity of activities.

Territorial infrastructure such as resilient roads, drainage systems, and retention structures should be treated as productive assets and not merely as post-disaster responses. By ensuring circulation of goods, access to markets, and stability of livelihoods, these investments directly reduce transaction, transition costs, and preserve household incomes. In parallel, financial mechanisms adapted to climate risk can help prevent natural shocks from becoming irreversible processes of decapitalization.

The effectiveness of these measures depends, however, on stronger institutional coordination. River-basin management, urban planning, agricultural policy, and social protection need to operate based on a shared territorial diagnosis, overcoming the sectoral fragmentation that often characterizes public intervention. Without such

articulation, solutions remain partial and unable to alter the structural logic linking spatial occupation and vulnerability.

Ultimately, floods in Mozambique should not be seen only as episodes that interrupt development, but as signals that the model of territorial organization requires adjustment. Resilience is not built merely by responding better to events, but by gradually reorganizing the relationships between population, production, and space. Treating territory as a central variable of economic and social policy makes it possible to reduce exposure to risk and create more stable bases for rural and urban growth.

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