**SSA DRM Dashboard**

*Methodological Notes*

[To update]

**Methodological notes and data sources**

* **Cities are delineated based on Africapolis (2023).** Consequently, city boundaries may differ from administrative borders or local definitions used to delineate city extents. “New cities” refers to those urban areas with 0 population in 2000 and more than 10,000 inhabitants in 2020.
* The pool of graphed cities is based on the national ranking in terms of population in 2020 according to Africapolis (2023) – the 5 largest cities within that ranking are plotted.
* **Country extents were retrieved from the GADM 4.1 dataset.**
* **Built-up surface data is derived from the Global Human Settlement Layer (GHSL)** of the European Commission’s Joint Research Centre.
* **Population data is derived from the population rasters of the GHSL product, as well as UN DESA’s World Urbanization Prospects (WUP) 2018 and World Population Prospects (WPP) 2022 datasets.**
* **The Fathom 3.0 dataset was used to estimate flood-prone areas by return period.** Built-up is considered exposed to floods if the water height for a given return period exceeds 30 cm. Flood hazard refers to both fluvial and pluvial.
* **Projections of climatic variables were retrieved from the World Bank’s Climate Change Knowledge Portal.** Median values were used.

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**Notes**

1. Built-up is considered exposed to floods if the water height due to a fluvial or pluvial flood for a given return period exceeds 30 cm. These estimates are computed by overlaying built-up surface data with flood hazard maps.
2. Median values of the projections were used for future climate scenarios. Projections of built-up exposed to flood in 2050 assume that built-up per capita remains equal to its 2020 value. For demographic scenarios, Fig. 8 displays the estimates of exposed built-up based on probabilistic population projections. These correspond to estimates based on the probabilistic median, and the 80 and 95 percent prediction intervals of the population projections.
3. City boundaries may differ from administrative borders or local definitions used to delineate city extents. A total of 112 cities were identified in 2020. “New cities” refers to those urban areas with 0 population in 2000 and more than 10,000 inhabitants in 2020.
4. The analysis aims to gauge the effect of future hazard and demographic/urbanization scenarios on flood exposure rather than forecasting future flood risk due to significant uncertainties. Combining flood exposure projections from climate change and demographic scenarios for estimating future flood exposure is not recommended. Additionally, projections are spatially valid at the national level but are not disaggregated at the subnational level due to spatial heterogeneities.
5. Built-up surface data is derived from the Global Human Settlement Layer (GHS-BUILT-S R2023A) of the European Commission's Joint Research Centre. Flood-prone areas were derived from the Fathom 3.0 dataset. Population data is derived from the population rasters of the GHSL product, the UN DESA’s 2018 World Urbanization Prospects, and the 2022 World Population Prospects datasets. Data on population living in slums is from the World Development Indicators. Historical disaster data was retrieved from the EM-DAT dataset. Projections of precipitation variables were retrieved from the World Bank’s Climate Change Knowledge Portal. Cities are delineated based on Africapolis (2023).

Exposure to floods in a context of a changing climate and evolving urbanization

***A glance at the impact of past disasters***

**Future flood risk will be determined by evolving risk drivers.** This document describes findings from a quantitative assessment of exposure to fluvial and pluvial floods based on global datasets. It also examines how climate change, demographic dynamics, and urbanization will likely increase the exposure to floods in the upcoming decades.

***Quantifying the exposure to floods***

**As cities have grown, so has their exposure to floods.**  In many cases the growth rate of built-up in flood-prone areas has exceeded that in safer regions, resulting in an increasing proportion of built-up areas being exposed to floods

**These findings suggest that urban expansion has occurred without major consideration of potential flooding and that, if these dynamics hold, the expected increase of population could magnify flood risk in coming decades in both urban and rural areas.**

***Population and built-up are growing fast***

**While multiple population projections exist in the literature, they generally agree on a significant increase in population—particularly urban—over the next few decades.** These projections imply that if current vulnerability trends continue, flood risk could also increase in future decades.

***A changing climate will shape future flood exposure***

**To understand the effects of climate change on future flood exposure, current built-up areas were overlaid with flood maps developed based on future climate conditions.** These flood maps are created by inputting new climate patterns aligned with different SSPs scenarios into hydrological models to characterize potential changes in flooding dynamics. This analysis isolates changing hazard conditions from all other factors, although ultimately impacts will also be shaped by urbanization and vulnerability dynamics.

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| **Fig. 7 – Built-up exposed to floods in km2 (2050)**  A graph of different colored bars  Description automatically generated |

**Under future climate conditions, the increase in flood exposure should be larger for recurrent flood events than for extreme but infrequent floods**. The magnitude of this increase will be highly dependent on the realization of future climate conditions. The additional amount of built-up area that becomes exposed to recurrent floods (10-year return period) will increase by between 25% and 59%, while it will be between 12% and 26% in the case of more extreme floods (100-year return period, Fig. 7).

***The intersection of climate change and development dynamics will increase exposure to floods***

**To inform about the potential flood exposure at the national level by 2050 and project the evolution of key flood risk drivers, back-of-the-envelope calculations were conducted under two complementary types of scenarios**. The first explores the effect of population increase on built-up exposed to floods and quantifies flood exposure in 2050 due to demographic and urbanization changes, while holding current climate conditions invariant. The second type of scenario uses flood hazard maps based on future climate conditions (SSPs) to quantify future exposure to floods due to climate change, while holding current built-up and population constant. These calculations rely on multiple assumptions and should be considered as an order-of-magnitude analysis.

**Results suggest that the increase in future flood exposure will depend to a larger extent on the future demographic and urbanization dynamics than on climate change conditions (Fig. 8).** The amount of new built-up areas and their location in flood-prone areas are uncertain and will depend on the combination of these variables. Nevertheless, the increase of built-up areas exposed to floods is larger under demographic/urbanization scenarios than under climate change scenarios. Ultimately, risk drivers such as climate change, demographic dynamics, urbanization, environmental and land degradation, and socioeconomic vulnerability can have a compounding effect in shaping future flood risk. Further understanding and addressing these interactions is crucial to develop effective adaptation strategies, strengthen resilience, and reduce the impacts of flooding.

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| **Fig. 8 – National built-up areas exposed to floods im km2 (2050)**  **A close-up of a graph  Description automatically generated** |

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