Urban Africa Risk Knowledge

Briefing

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From global climate narratives to local urban adaptation decisions

Dominant global climate change narratives and framings frequently do not translate well into local adaptation decision making. Narratives, such as increasing droughts, increasing flooding, and more frequent extreme events, are often not supported by climate science evidence at the local scale. Even if plausible at the local scale, they potentially dominate other more important local scale climate and non-climate risks. Additionally, framings such as the impact of 1.5°C or 2°C global warming are frequently inappropriate and unhelpful in local decision making, despite being powerful drivers of global policy. A more nuanced and locally informed understanding of climate risk and its interplay with non-climate risks is urgently needed, particularly in complex development contexts such as cities.

Policy Pointers

- The relevance of global climate change narratives should be carefully considered at the local level.
- In urban contexts, global climate change trends cannot be assumed to align with local climate change trends.
- 1.5°C/2°C global warming framings cannot be easily translated to local level decision making as this can lead to confusion.
- Locally informed understanding of climate risk and its interplay with non-climate risks is urgently needed in the context of cities.

The international climate research, policy, and donor community is inadvertently impeding effective and timely adaptation decision making in developing nation cities. Strong global climate change narratives and framings that have played such an important and powerful role in international policy development and negotiations frequently do not translate meaningfully or accurately into local contexts, making them unhelpful in local adaptation decision making. This is particularly true in complex decision contexts such as cities.[1]

Global climate change narratives often describe a relatively simple and singular climate future, such as increased risk of flooding and droughts. They emerge from syntheses of global scale climate impact analysis and are informed by scientific evidence. For example, in the IPCC SREX report, the summary for policymakers states: "It is likely that the frequency of heavy precipitation or the proportion of total rainfall from heavy falls will increase in the 21st century over many areas of the globe".[2] This is a synthesis statement based on climate model projections and expert judgement that forms a global climate change narrative. This particular narrative is frequently simplified to: "Climate change increases the risk of frequent and intense extreme rainfall events" and presented as the most likely case at the local level, without adequate assessment. Similar narratives exist around droughts, flooding, and other hazards. These narratives describe a singular certain future that is not plausible everywhere. Although it is understandable that decision makers are drawn to the simplicity, certainty, and perceived authority of global narratives, we argue that there should be more attention paid to wrestling with decisions informed by local scale evidence and understanding – albeit more uncertain and complex.

Global framings of climate change, such as 1.5°C warming, can also confuse and impede

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decision making in local contexts such as cities. Although the 1.5°C framing has proven to be effective in motivating global scale mitigation, it is unclear how it might be translated into adaptation action at the city scale. As with the global narratives, discourse around the global framing has already shifted to translation into local contexts. Calls for decision-relevant local scale information framed within 1.5°C and 2°C warming have begun to emerge. However, this framing can add an unhelpful level of complexity and uncertainty to an already complex information landscape, as we illustrate below.

Both global narratives and framings are strongly informed by local scale evidence. The global narrative of increased flood risk is informed by evidence of observed changes, as well as climate projections and impacts analysed and/or downscaled at the local scale. Research on local scale impacts under 1.5°C warming is necessary to provide evidence to the global analysis and narrative of 1.5°C.[3] However, this does not mean that this research, framed within 1.5°C global warming, is suitable or the most useful for local scale decision making. It may form part of the evidence base to inform local scale decisions, but the distillation of climate impact messages relevant to local decision making needs to happen within the local context, not within the global policy and advocacy space.[4]

Case study 1: Flooding in Dar es Salaam

In Dar es Salaam, actors at the city scale are heavily focused on urban flooding, as evidenced by interviews conducted with policymakers and practitioners.[5] While this constitutes an important urban risk, it is potentially inaccurately framed as a climate change risk. Projections of rainfall changes are highly uncertain and are strongly dominated by natural variability prior to mid-century. The conflation of flooding in Dar es Salaam with a climate change risk (at least in part) appears to constitute a good example of how international development agencies, funders and researchers[6] have adopted a dominant climate change discourse that is grounded in climate physics generally and is certainly a plausible future in many regions, but is not always necessarily aligned with the most recent locally-relevant evidence. The media often does a similar thing. For example, an article entitled *These are the African cities most vulnerable to climate change*, puts Dar es Salaam forward as the most flood-affected country in east Africa,[7] thus presenting climate change as the driver to flooding. While linking floods to increased rainfall, the article does not state where the evidence regarding increased rainfall comes from. This approach to assuming an increase in flooding seems to be widespread and is often not supported by climate model data. Climate projections for Dar actually reveal that the strongest climate signal in this location is for future temperature increases.

Although flooding in Dar es Salaam is an important urban risk, the drivers are tied to urbanisation patterns, a change in upstream catchment run-off, and natural climate variability. Framing it potentially inaccurately as a climate change-related risk causes confusion and may limit the effectiveness of future climate change messages.

At the same time as international and local attention in Dar es Salaam is paid to flooding, interviews conducted with city actors (eg local and higher levels of government, the private, public and NGO health sectors) show that the city is currently underprivileging responses to the potential health impacts of temperature increases. Interviews with informal settlement residents (which capture around 75 per cent of Dar es Salaam's spatial extent) suggest that they have high vulnerability (both current and future) to a wide range of potential negative health and wellbeing impacts from heat, mediated through high exposure and sensitivity to heat coupled with low capacity to adapt. Although heat is increasingly gaining recognition as an important urban climate impact,[8] the historical lack of attention to it at the global level has meant that it has not been on donors' and researchers' priority lists previously.

Case study 2: 1.5°C and cities

The 1.5°C framing was developed to explore the potential avoided impacts of limiting global warming to 1.5°C or 2°C degrees, and therefore to provide evidence supporting mitigation with these warming limits. This has proved to be a very powerful framing and the resultant evidence compels strong responses. However, the inevitable drive to translate 1.5°C global warming into local scale climate impacts, while valuable in the context of global avoided impact, introduces a further challenge to local adaptation decision making.

Climate change projections have previously been produced for future time periods, for example the 2030 to 2050 period. Uncertainty is expressed as a range of possible magnitudes of change within or averaged over that period. The 1.5°C framing involves two conflated dimensions of uncertainty. The first is the timing of reaching a particular global warming threshold. This warming threshold is evaluated at the global scale, not the local scale. The CMIP5 ensemble climate model simulations project that 1.5°C of warming could be reached as early as 2012 (ie some models indicate we should have already reached the threshold) through to as late as 2044.[9] This means there is an uncertainty of around 30 years. These dates assume high emissions pathways; if we include other emissions pathways then the uncertainty increases further. The second dimension is the magnitude of local scale change or impact at that particular warming threshold. So whereas a decision maker might previously have been presented with the possibility of a rainfall change ranging from -10 per cent to +20 per cent within the 2030 to 2050 period, they are now potentially presented with a rainfall change of -15 per cent to +25 per cent over a period centred sometime between 2012 and 2045.

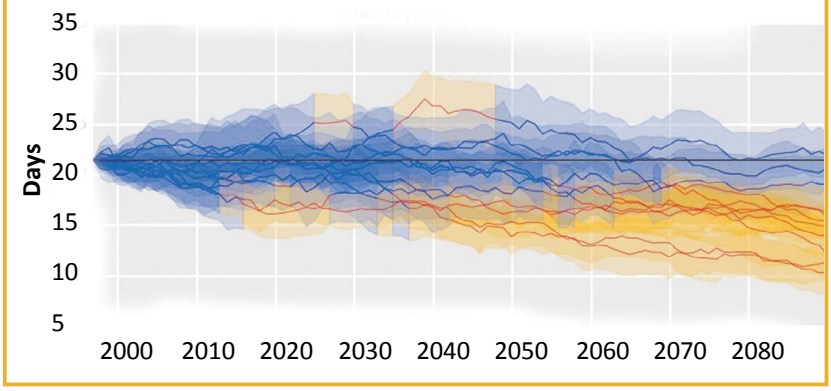
Taking Dar es Salaam as a case study, 1.5°C globally could occur between 2012 and 2044. At this global warming level, Dar es Salaam is projected to experience between 0.36°C and 2.0°C of warming. So decision makers need to plan for somewhere in this range of warming at some point between the present and 2044. This aligns poorly with long-term planning approaches that target particular periods in the future.

In the context of African cities, there is a lot of concern as to how this climate science might be integrated into decisions. The reality is that currently climate variability is only integrated in limited ways in decision making. Finding ways to integrate climate change scenarios is hard. We argue that the framing of 1.5°C might make it even harder to integrate climate science in decisions due to the conflation and confusion of uncertainty in a context where communicating and engaging with uncertainty are already extremely challenging.

Conclusions and recommendations

The argument and supporting cases presented above are not intended to undermine or challenge the value of global narratives and framings of the risk of climate change impacts. On the contrary, we argue that these global narratives are critically important. Rather, we are asking for a clearer and more considered interrogation of the value and role of different types of climate risk information within different contexts.[10]

Heavy rain days (95th percentile) per year



Statistically downscaled projected changes in heavy rainfall days per year under the Representative Concentration Pathway (RCP) 8.5 for Dar es Salaam. This figure indicates that under the present-day climate, Dar es Salaam experiences about 22 days per year of very heavy rainfall (horizontal black line). The figure also indicates that various global climate models from the CMIP5 model archive, when downscaled to the spatial scale of Dar es Salaam, project a range of changes in heavy rainfall frequency into the future. However, towards the end of the century, many of these models indicate a decreasing frequency of heavy rainfall days, while others indicate no significant change. While all modelling involves uncertainties and statistical downscaling has a number of limitations, these results constitute defensible evidence contrary to the dominant narrative of increasing extreme rainfall intensity and frequency. Importantly, these projections should not be used in isolation, but should be integrated into a comprehensive locally relevant interrogation of diverse evidence.

In particular we raise the issue of climate adaptation decision making in developing nation urban areas. The strong drive from international development agencies, NGOs and researchers to assist these urban areas to become more climate resilient is placing significant pressure on decision makers to figure out what climate resilience means in their contexts.[11] Additionally, most of these urban areas face significant development deficits with large proportions of populations unserviced with water and electricity in extensive informal settlements or peri-urban areas. Limited budgets have to be allocated to a diversity of operational and development demands.

Urban adaptation decision makers need support in many forms, ranging from capacity development through to science-based

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evidence. It is critical that this support deeply interrogates the decision context, including non-climate stressors and factors, and that climate risk information is framed and contextualised in a way that responds to real world decision making at local scales and the complexity of urban change.

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Notes

1. Steynor, A, Padgham, J, Jack, C, Hewitson, B and Lennard, C (2016) Co-exploratory climate risk workshops: Experiences from urban Africa. *Climate Risk Management*, 13, pp.95-102. https://doi.org/10.1016/j.crm.2016.03.001; Taylor, R, Butterfield, RE, Bharwani, S, Taylor, A and Devisscher, T (2017) Research Methods for Understanding and Supporting Decision Processes in African Cities. *FRACTAL Working Paper 5*. Stockholm Environment Institute Oxford Centre, Oxford, UK.

2. IPCC (2012) Summary for Policymakers. In: Field, CB, Barros, V, Stocker, TF, Qin, D, Dokken, DJ, Ebi, KL, Mastrandrea, MD, Mach, KJ, Plattner, G-K, Allen, SK, Tignor, M and Midgley, PM *(eds) Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change*. Cambridge University Press, Cambridge, UK, and New York, NY, USA, pp.3-21.

3. For example, Bartholy, J and Pongrácz, R (2018) A brief review of health-related issues occurring in urban areas related to global warming of 1.5°C. *Current Opinion in Environmental Sustainability*, 30, pp.123–132; Yu, R, Zhai, P and Chen, Y (2018) Facing climate change-related extreme events in megacities of China in the context of 1.5 °C global warming. *Current Opinion in Environmental Sustainability*, 30, pp.75–81.

4. Taylor, R, Butterfield, RE, Bharwani, S, Taylor, A and Devisscher, T (2017) Research Methods for Understanding and Supporting Decision Processes in African Cities. *FRACTAL Working Paper 5*. Stockholm Environment Institute Oxford Centre, Oxford, UK.

5. See also for example World Bank (2018) Tanzania Urban Resilience Programme: Annual Report 2018 (English). Washington, DC: World Bank Group. http://documents.worldbank.org/curated/en/402541542394008047/Tanzania-Urban-Resilience-Programme-Annual-Report-2018

6. For example World Bank (2018) Tanzania Urban Resilience Programme: Annual Report 2018 *(English)*. Washington, DC: World Bank Group. http://documents.worldbank.org/curated/en/402541542394008047/Tanzania-Urban-Resilience-Programme-Annual-Report-2018; Kiunsi, R (2013) The constraints on climate change adaptation in a city with a large development deficit: The case of Dar es Salaam. *Environment and Urbanization*, 25(2), pp.321–337.

7. Latif Dahir, A (2 June 2017) These are the African cities most vulnerable to climate change. Quartz Africa. Accessed 16 January 2019. https://qz.com/africa/997384/lagos-abidjan-durban-dar-es-salaam-among-coastal-african-cities-most-vulnerable-to-climate-change/

8. For example Harlan, SL and Ruddell, DM (2011) Climate change and health in cities: impacts of heat and air pollution and potential co-benefits from mitigation and adaptation. *Current Opinion in Environmental Sustainability* 3. pp.126-134; Watts N, Adger WN, Agnolucci P, Blackstock J, Byass P, Cai W *et al.* (2005) Health and climate change: policy responses to protect public health. *Lancet.* 2015;386(10006):1861–914.

9. See https://cmip.llnl.gov/cmip5/

10. Taylor, R, Butterfield, RE, Bharwani, S, Taylor, A and Devisscher, T (2017) Research Methods for Understanding and Supporting Decision Processes in African Cities. *FRACTAL Working Paper 5*. Stockholm Environment Institute Oxford Centre, Oxford, UK.

11. Steynor, A, Padgham, J, Jack, C, Hewitson, B and Lennard, C (2016) Co-exploratory climate risk workshops: Experiences from urban Africa. *Climate Risk Management*, 13, pp.95-102. https://doi.org/10.1016/j.crm.2016.03.001; Romero-Lankao, P. *et al.* (2018) Urban transformative potential in a changing climate. *Nature Climate Change*, 8(9), pp.754–756.

Urban Africa Risk Knowledge

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Urban Africa: Risk Knowledge (Urban ARK) breaking cycles of risk accumulation in sub-Saharan Africa

A three-year programme of research and capacity building that seeks to open up an applied research and policy agenda for risk management in urban sub-Saharan Africa. Urban ARK is led by 12 policy and academic organisations* from across sub-Saharan Africa with international partnerships in the United Kingdom.

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