



CLIMATE-RESILIENT URBAN EXPANSION PLANNING: A TOOL FOR ADAPTATION AND MITIGATION OF CLIMATE RISKS IN SECONDARY CITIES

Municipalities in secondary cities in rapidly urbanising countries face grave climate risks. With limited resources, they will be forced to confront sea level rise, storm surge, extreme precipitation, drought, landslide risk, and other geophysical shocks. Social and economic dislocations will change migration patterns and, in some cases, could lead to large forced displacement. These challenges add to existing obstacles, including inadequate service provision, rapid urban expansion, and proliferation of informal settlements.

The Cities Alliance
Cities and Migration Programme

This summary highlights the key findings of a White Paper prepared for the Cities Alliance Cities and Migration Programme by Patrick Lamson-Hall, urban planner and a research scholar at the New York University (NYU) Stern Urbanization Project, and Shlomo Angel, Professor of City Planning at the Marron Institute and head of the NYU Urban Expansion Program, with funding from the Swiss Agency for Development and Cooperation.



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Rapidly growing cities are primarily expanding into peripheral areas, which are often poorly planned and disorderly. Fragmented growth patterns undermine the formation of metropolitan labour markets and can impede socioeconomic progress, particularly for rural-urban migrants.

Adequate resources for adaptation and mitigation are unlikely to manifest, but municipal governments can still take meaningful action to prepare for climate change using the same methodology that is used to help secondary cities plan for rapid population growth – urban expansion planning.

Urban expansion planning is a lightweight technique to organise land in the peripheral areas of cities, where growth is likely to occur, by laying out arterial roads and protecting environmentally sensitive open spaces in advance of development. The approach is focused on acquiring land for infrastructure before development

occurs and can be modified to incorporate data on likely climate risks on the urban periphery.

Municipalities can use urban expansion planning to create a framework for adaptation and mitigation investments by reserving land for drainage and resilient infrastructure, encouraging titling and formalisation of informal settlements, reserving land for flood control, protecting water supply areas, and enhancing connectivity and opportunities for the provision of public transit. Planned investments in urban infrastructure can be made more orderly and climate resilient, and land for future necessary adaptation investments can be reserved in advance of settlement.

In addition, urban expansion planning can help to guide growth away from high-risk areas by offering alternative sites along the arterial road network. This can help promote higher density and more compact development, making future adaptation programmes more cost effective, helping cities attract needed funds, and supporting mitigation targets in the transport sector.

Planning for adaptation on the urban periphery is also a socially inclusive strategy. Low-income residents are more likely to settle in areas where land is more affordable, which is almost always on the edge of cities. Adaptation plans must consider the needs of those residents, not only the needs of the urban core. Urban expansion plans already consider the needs of peripheral residents, including residents of informal settlements.

Urban expansion planning is a rigorous, pragmatic approach to planning that produces results on the ground. Climate-resilient urban expansion planning builds on this foundation by proposing a limited but feasible sectoral agenda. It does not purport to address all the adaptation and mitigation needs of cities or offer a comprehensive framework, but the limited activities proposed in *Climate-Resilient Urban Expansion Planning* allow cities to approach the problem from an orderly foundation and take needed actions in the short term that will support longer-term investments in adaptation and mitigation.



CONFRONTING CLIMATE DEMANDS ON URBAN EXPANSION PLANNING

Some knowledge of how much land a city will occupy in the future is an essential part of preparing to address urban expansion and climate change. The first step in creating an urban expansion plan is to estimate the additional lands that a city will need to accommodate growth for the next 30 years. These estimates consider demographic data, historical growth patterns, migration, natural increase, land availability and suitability, and economic changes that impact land and housing markets.



Estimating migration and dislocation

Climate-resilient urban expansion planning can help provide city leaders with information about likely climate risks in their area, then consider the probability that these risks might lead to sudden inflows of people. This can be supplemented with community consultations and the incorporation of sociologists and other experts, whose local knowledge can take into consideration the sensitivity of surrounding rural areas to drought, the size of the adjacent rural population, and proximity to other urban centres that could attract growth.



Controlling low-density sprawl

Planning for urban expansion requires preparing adequate lands for expansion, and these plans require projecting realistic densities into the future. A major strength of the urban expansion planning methodology is that it proceeds on an empirical basis, and this principle should be extended to forecasts of density. Density estimates produced using this methodology should be revised as new data becomes available to see if climate impacts affect trends.



Protecting high-risk lands from settlement

Urban expansion plans include areas of high environmental risk that are designated as protected from settlement. Implementing arterial grids in expansion areas can also have a positive impact on development in well-located, high-risk areas; it increases the supply of urban land for development in low-risk areas and improves access to good jobs there for households of all incomes.

CONFRONTING CLIMATE DEMANDS ON INFORMAL SETTLEMENTS

Climate change has a disproportionate effect on the urban poor, especially poor households inhabiting informal settlements who are more vulnerable in terms of health, rising food prices in the event of a disaster, lack of savings to rebuild, and cheaply constructed housing. Urban expansion planning may help reduce informal settlement formation, but some will continue to form in expansion areas. These settlements have a key role to play in welcoming rural-urban migrants and making room for new urban natives. Municipal governments can use urban expansion planning to ensure that residents of new peripheral areas (formal or informal) have access jobs and services.



Assessing the vulnerability of informal settlements

City leaders should identify areas with good access to the job market and provide arterial roads even in high-risk areas if there is a possibility the land will be settled, including by informal settlers. Those areas should be provided with urban infrastructure and formalised through the provision of land tenure. When local disasters such as flooding, landslides, and storm surges occur, the arterial grid connections in those areas can serve as evacuation corridors to rapidly move residents who are in danger to higher elevation areas, minimising loss of life.



Limiting extreme temperatures

Heat-related public health issues are particularly acute in developing countries, but the dangers of excessive heat are often neglected by governments. Climate-resilient urban expansion planning can address excessive heat by supporting the planting of shade trees and by easing the provision of piped drinking water and electricity.



Improving building quality

Climate-resilient urban expansion planning can help address the quality of construction in expansion areas by creating conditions for greater investment in buildings. It does this by reducing the cost of land for construction, encouraging formal development over informal development, and by supporting the regularisation of informal settlements.

CONFRONTING CLIMATE DEMANDS ON URBAN INFRASTRUCTURE IN EXPANSION AREAS

Secondary cities in rapidly urbanising countries are facing enormous spatial expansion, and much of it is occurring without adequate public services or infrastructure. Urban expansion planning keeps options open for future leaders and conserves resources by reserving land for future infrastructure. The arterial road rights-of-way establish corridors in the urban expansion area that can carry public transportation, pedestrians, cyclists, private vehicles, and trunk infrastructure. Investing in the arterial road rights-of-way in the short-term is much cheaper than attempting to acquire these corridors gradually over the next three decades.



Planning for water supply shortages

Climate-resilient urban expansion plans can highlight new areas where growth is likely to occur and add predictability and scope to the long-term urban growth process. In some cases, this includes areas of water extraction and storage, and the planning exercise can highlight existing water supply areas and consider future water storage and extraction needs. The plans can also be used to protect surface water supplies as one component of protecting environmentally sensitive areas and support access to piped drinking water supplies.



Managing flooding

Arterial road grids in expansion areas can carry major drainage lines that ferry water away from neighbourhoods. Road rights-of-way and environmentally sensitive zones in the expansion area can be aligned to accommodate existing drainage patterns and promote infiltration of stormwater to help recharge groundwater sources. Arterial road rights-of-way near water bodies can eventually be developed as levees, embankments, or other water management infrastructure.



Improving infrastructure resilience

Urban infrastructure of all types is highly vulnerable to climate change. With urban planning, municipal governments can reduce that vulnerability by using forecasting and climate risk data to improve assessments of future needs and risks and by directly controlling the locations of infrastructure corridors through deployment of the arterial grid. If done in consultation with local experts, this can help protect water supplies, improve drainage, and safeguard other vital links, reducing flooding and maintaining connectivity and basic services during extreme events.



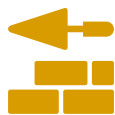
Competition for adaptation investments

Climate-resilient urban expansion planning helps municipalities anticipate where urban growth is likely to occur, based on the simple idea that development follows roads. Urban expansion planning initially only provides road rights-of-way, but growth will follow the construction of the arterial roads over time. Thus, it becomes possible for municipalities to consider the urban periphery in conversations about adaptation and to develop a pipeline of investments to service new areas.



MITIGATION ON THE URBAN PERIPHERY

The compact growth and higher density enabled by urban expansion planning can have a real impact on mitigation. Climate-resilient urban expansion planning can help secondary cities in rapidly urbanising countries make structural preparations for low-carbon development. This mainly comes down to the benefits of a gridded street network to reduce vehicle kilometres traveled and the complementary effect of encouraging compact, contiguous development. Cities can also attend to building construction standards in expansion areas, improving the efficiency of building operation.



Building efficiency

Municipalities can improve the efficiency of buildings in both formal and informal settlements by providing useful information on appropriate, affordable, and resilient building technologies and demonstrating them with real examples whenever possible. Municipalities can also help create markets for local, energy-efficient building materials by adopting such materials in municipal infrastructure projects and civic buildings, both in existing and expansion areas.



Greenhouse gas emissions from transport

Orderly arterial road grids from urban expansion planning reduce travel distances, lower vehicle congestion, and have differential modal shifts, making them a core investment in sustainable mobility that can result in lower GHG emissions from transport compared to the disorderly or unplanned growth patterns that proliferate on the fringes of many cities today.

Climate-resilient urban expansion planning is not a new and untested methodology. It builds on a successful existing approach that has produced results on the ground in rapidly growing secondary cities in rapidly urbanising countries. It is designed to be quickly implemented by local officials on the ground in cities with limited resources, with technical support from international partners and the engagement of regional and national government bureaus.

The approaches outlined in *Climate-Resilient Urban Expansion Planning* differ from most adaptation proposals in that they explicitly target the areas of cities which have not yet been built. This addresses a real and, to our knowledge, unmet need in rapidly growing secondary cities. If successfully implemented, climate-resilient urban expansion planning can lay the groundwork for long-term resilience, sustainability, productivity, and inclusiveness in the future city.