

Tomorrow's Nakuru Activities Report



October 2024

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Introduction

This report provides an account of the deployment of the Tomorrow's Cities Decision Support Environment (TCDSE) framework in Nakuru, Kenya, 2nd-30th September 2024. It analyses the deployment by segmenting the key components of the TCDSE framework (Figure 01), outlining the activities undertaken, the outcomes achieved, and recommendations for future work.

The deployment involved key stakeholders from Nakuru, along with team members from the global Tomorrow's Cities team. The initiative was supported and monitored by UN-Habitat.

Tomorrow's Cities is a community of practice¹ focused on reducing disaster risk for poor and marginalised populations in rapidly urbanising areas, where urban growth can trigger new cycles of risk accumulation. The Tomorrow's Cities approach provides city authorities a method to disrupt risk creation. It does this through helping stakeholders understand the future consequences of today's decisions. This shifts decision-making perspectives and urban governance frameworks from responding to existing risk towards long-term risk prevention. The TCDSE approach has a series of core stages: 'City Scoping', 'Future Visioning', 'Urban Scenarios', 'Hazard and Impact Modelling', 'Risk Agreement and Implementation Pathways'. The 'City Scoping' and 'Implementation Pathways' stages in particular are designed to identify opportunities for sustainable and positive impact, by driving changes in urban management, such as improving data acquisition processes, fostering

partnerships, and defining subsequent policy actions.

The TCDSE framework is further supported by a 'Capacity Strengthening' programme. This provides training for local stakeholders (for example city authorities or local universities). The aim is for local teams to be able to own the process and run future deployments as needed.

To account for varying time, budget, and capacity constraints across partner cities, the TCDSE framework has been adapted across four versions. Each version reflects a different level of methodological detail and possibilities for practical application in urban planning frameworks. Versions 1 ('sensitisation') and 2 ('capability transition') are streamlined, producing outputs that illustrate key policy-risk links without being directly applicable to formal urban planning and policy-making. These versions are effective in demonstrating the methodology's potential and highlighting crucial data and capacity gaps, as well as identifying important patterns, such as potential risk hotspots, that can be explored further. Versions 3 ('policy transition') and 4 ('detailed implementation'), on the other hand, offer in-depth, detailed outputs that can directly inform decision-making. Yet these versions are more time-consuming and resource-intensive. For more information on the different TCDSE versions, see our prospectus².

¹ www.tomorrowscities.org

² <https://tomorrowscities.org/tomorrows-cities-booklet-2024>

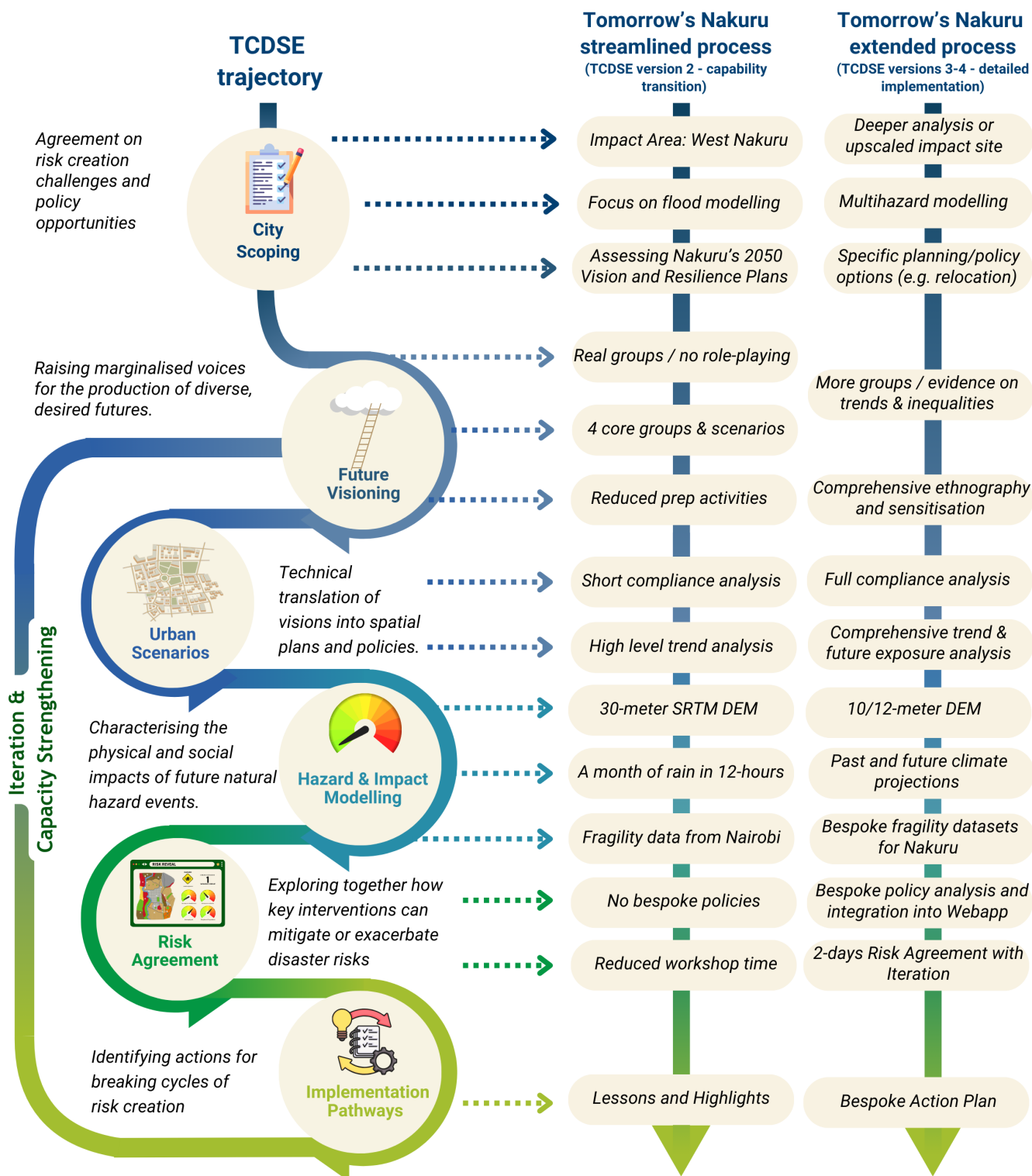


Figure 01: Tomorrow's Nakuru streamlined (current) and extended (potential) deployment.

The deployment in Nakuru represented a mid-level engagement (see Annex 1). Much of the data used for scenario production was context-specific with local stakeholder participation. However, the flood hazard modelling relied on secondary data sources and simplified risk models, producing hazard impact results that were more illustrative than prescriptive. We could only consider rainfall induced flooding so were unable to consider interactions with geophysical hazards, lake expansion or climate change. These hazard elements can be considered but would require some months of effort which was beyond the capacity of the streamlined Tomorrow's Nakuru deployment. Below, we outline the key simplifications made across the core components of the TCDSE to make a rapid deployment possible.

Future Visioning: The inclusion of local participants to produce future visions and urban scenarios, resulted in realistic assessments of desires and expectations for urban development and risk reduction policies. However, the process was streamlined through rapid stakeholder mapping, lack of an iterative process, and absence of an ethnographic and sensitisation stage as part of City Scoping, that would more thoroughly assess local voices and interests, including those that may differ from – or be critical of - those involved in this project. To achieve full value in future deployments, a broader range of social groups and deeper community engagement would be desirable to foster meaningful dialogue between local stakeholders and scientific and institutional teams.

Urban Scenarios: Like Future Visioning, the Urban Scenarios stage used context-specific datasets and produced outputs based on real community input. However, this stage was streamlined by restricting the number of urban scenarios and constraining the granularity of the

analysis. For instance, the team assumed Nairobi building and design standards to produce future exposure datasets for Nakuru. A more comprehensive version of this component would include a review of Nakuru specific building norms and regulations and could even consider alternatives to provide a comparative analysis of outcomes.

Hazard and Impact Modelling: This is the most elastic stage of the TCDSE. If time and resource is available it is possible to undertake high resolution geophysical and hydrometeorological data collection and modelling at the cutting - edge of global best standards. It is also possible to integrate climate change models and so produce high resolution, multihazard and climate change informed risk analysis. There are few cities that can self-fund this level of data collection and analysis. Consequently, the TCDSE can provide outputs based on secondary data and to run on a sub-set of hazards to which a city is exposed, and also to run with or without detailed climate change data. As an exploratory study with limited time and resource, Tomorrow's Nakuru was executed for a single hazard (rainfall flooding) based on a single scenario (see pg. 13) without climate change or lake-level rise being considered. Geophysical hazards and temperature/air quality were also not considered. These hazards and their interactions can be considered in the future.

Risk Agreement: This stage's alignment with the TCDSE versions depend on how streamlined or detailed other stages are. While the social/community engagement in Nakuru was based on real stakeholder groups, the hazard and impact modelling data remained illustrative, making results most suited to assess local capabilities, pilot exploration of potential future policy, and discuss the enabling environment of risk reduction (including issues of data availability and access, organisational

structure and mandate and skill capacity). Greater value can be gained by extending time for workshops, so that local groups can get acquainted with tools and learn with more substantive ways. Future deployments should consider at least 2 days for the Risk Agreement workshops.

Implementation Pathways: This stage turns back to the specific development-risk challenge and policy or project opportunity identified in the City Scoping stage to ask how far these can be moved forward by the TCDSE process (new relationships, new skills, surfacing of data gaps) and outputs (future visions, hazard analysis impact assessments and prospective land-use and policy options). In Nakuru rapid city scoping identified two opportunities for policy impact (1) moving the Nakuru 2050 Vision into a planning phase with some specific local resident inspired options, (2) tangible proposals for managing lake-side flood risk.

1. Capacity Strengthening

A. Overview

Capacity strengthening activities draw from local city authority, local university and civil society groups to provide the skills necessary to (1) deploy the methodology with minimal external input (2) provide skills needed to be critical of the method and have ownership of the process and its findings (3) have the skills in-hand to undertake repeat studies or extend the initial study as desired. In all cases it is likely some external input is desirable based on the wide experience and detailed technical knowledge of the Tomorrow's Cities community – but the aim is to keep this external input to a minimum. The Tomorrow's Nakuru team,

having been trained and deployed the methods are now part of the international community of practice and will be invited to attend follow-on events and even potentially to advise in future deployments in other cities in Kenya and overseas.

A continuous effort to strengthen local capacities based on the TCDSE framework requires an assessment of baseline skills:

Future Visioning demands knowledge of social sciences, community engagement, and participatory urban planning methods. Urban Scenarios necessitates familiarity with formal urban planning and design methods, and Geographic Information Systems (GIS). Hazard and Impact Modelling requires an understanding of different natural hazards, along with advanced skills in modelling techniques and physical vulnerability assessments - ideally grounded in engineering expertise. Risk Agreement, being a hybrid stage, draws on skills from all the previous components.

For the most in-depth deployments of the TCDSE, capacity strengthening involves a comprehensive course that provides an in-depth overview of the methodology and its various aspects. These courses can span several days depending on the component being covered. They are complemented by a "learning by doing" approach, where local teams work closely with the Tomorrow's Cities international team to prepare workshops and develop the necessary materials for each component.

In more streamlined deployments, capacity strengthening is more focussed. The local teams receive a simplified overview of the methodology, and the learning by doing elements are accelerated. Nonetheless, all capacity strengthening materials are provided (booklets, lectures), allowing local teams

to deepen their understanding at their own pace as required.

In Nakuru, capacity strengthening was closer to a streamlined deployment, conducted over two weeks. In week one all Nakuru County and UN-Habitat partners were provided access to the Tomorrow's Cities learning resources from the Tomorrow's Cities website. This was to enable self-led familiarisation and encourage more focussed learning in week two. Week two learning was built around live, online webinars. Each core component of the TCDSE was introduced through rapid remote sessions lasting between 1-3 hours. Following this, the 10-day TCDSE deployment in Nakuru was itself a learning opportunity. This provided colleagues a hand-on experience of deploying the TCDSE methods. A key feature of the "learning by doing" approach is that local teams are responsible for delivering workshops in local language, ensuring that the process is context-appropriate and that local stakeholders take ownership of the engagement.

B. Recommendations

Thanks to the dedication and commitment of the Nakuru team and UN-Habitat partners, the capacity strengthening activities were largely successful. However, due to time constraints, the training inevitably remained limited in some areas. While the in-person engagements provided valuable opportunities for further learning, not all participants had prior exposure to key tools and methods, particularly in the use of GIS and modelling techniques - both of which are essential for the full implementation of the TCDSE.

Addressing these capacity gaps should be a key factor in ensuring Nakuru's continued progress towards preventing risk accumulation, and in preparing local teams to lead the TCDSE independently in future iterations.

As a follow-up to this engagement, we recommend that the Nakuru team undertake a comprehensive mapping of its personnel, identifying key skills related to the TCDSE that may also be applicable to other risk assessment frameworks. Notably, Tomorrow's Cities, in partnership with United Cities and Local Governments, will soon³ offer a MOOC course that can assist with this skills mapping and support further discussions on the tools and skills that should be prioritised moving forward.

Finally, a notable success in the capacity strengthening efforts was the interaction between the Nairobi and Nakuru teams. Nairobi, as one of Tomorrow's Cities' "learning cities", played a key role in testing and refining the methodologies that led to the TCDSE. The Nakuru engagement provided an opportunity to further consolidate the skills of the Nairobi team members, positioning them as champions of the TCDSE framework. Importantly, the in-person activities were almost entirely led by Kenyan nationals, which reflects the successful localisation of the methodology and ownership by global south actors.

³ The launch of the course, in partnership with United Cities and Local Government, is estimated to take place by the end of 2024.

2. City Scoping

A. Overview

This first stage of the TCDSE aims to identify the key characteristics of the partner city and its alignment with the Tomorrow's Cities focus and offer. Partner cities ideally must present a multihazard context, rapid urbanisation patterns, entrenched inequalities and poverty (which can deepen cycles of risk accumulation), and political willingness to engage with long-term future thinking and rethinking urban governance – as is the case in Nakuru.

B. Choosing an impact area

The City Scoping stage is also critical for identifying a unique site and opportunity for impact where the Tomorrow's Cities tools and processes can catalyse and reorient urban development. Ideally, this stage aligns with ongoing urban changes or processes, ensuring that the learning generated about potential future consequences of decision-making directly informs urban planning tools, strategies, and informal processes that shape the city's growth.

Given Nakuru's existing engagements and projects with UN-Habitat's Mobility and Planning groups and its increasing focus on addressing flood risk and climate change, it was decided to focus on rainfall flooding as the primary hazard for analysis. A multihazard analysis was not feasible within the available timeframe but could be helpful to improve future work.

Flooding in Nakuru is a pressing concern, exacerbated by rising water levels in Lake Nakuru and rapid urbanisation, which has

increased the exposure of both buildings and infrastructure to flood risks.

Considering this context, the chosen impact area for this deployment (Figure 02) was located on the west side of the city, incorporating a major watercourse, periodic streams and land adjacent to the rising Lake Nakuru. This area is frequently affected by flooding and includes the lake's edges, consolidated urban zones, and regions currently experiencing urban growth. The site also features critical road networks that could be associated with future flood resilience infrastructure. Additionally, significant government-owned lands in this area offer the potential for adaptive land change/reuse and development of flood mitigation strategies. The land is also dissected by known faults which interact with drainage patterns.



Figure 02: Impact Area chosen for the first TCDSE iteration in Nakuru.

Crucially, the selected impact area spans multiple income levels, which presents an opportunity to adopt a deeper equity-

oriented approach to flood risk reduction in the future. The presence of informal land-use within the selected area also highlights the urgent need for flood mitigation through creative strategies.

C. Recommendations

Future work in Nakuru should consider broadening the scope to include other areas around Lake Nakuru that are also vulnerable to flooding. Expanding the analysis beyond the current impact area would allow for a more thorough understanding of the flood risks affecting the city as a whole. Additionally, it is essential to explore the interactions between flooding and other hazards which could exacerbate the overall risk in these regions; seismic activity, land subsidence, and other climate-related hazards such as heat. A comprehensive multi-hazard assessment would provide a fuller picture of Nakuru's risk profile, enabling more informed and strategic urban planning decisions. This could also usefully explore up-stream land-uses that could offer some mitigation to flood risk closer to the Lake Nakuru.

Given the environmental sensitivity of Lake Nakuru, it is crucial to evaluate how relocation strategies and the protection of ecologically sensitive areas from polluted flood waters impact ecology and equity in the long-term. Future work should examine how these interventions can contribute to supportive urban development and housing strategies that prioritise social inclusivity for present and future generations. Relocation efforts, if designed properly, should balance the need for environmental protection with the socio-economic realities of equity-deprived and vulnerable communities, ensuring that these are not disproportionately burdened. Might it be that allowing lake encroachment and enhanced water management can provide for the shallow lagoon ecosystems

needed by flamingo populations and so support eco-tourism activity? If so how might any relocated households be compensated?

In this vein, it is vital to also assess how traditional urban development and risk reduction strategies (new infrastructure and residual land) can unintentionally create the conditions for new homelessness and informal settlements to emerge, particularly if these actions are not accounting for future housing needs and other market-related imbalances. Integrating social housing strategies that accommodate future population demands should be a key recommendation in any future urban resilience work in Nakuru. This opportunity can be seen in some of the future urban scenarios proposed by the community groups.

The Nakuru 2050 Vision proposes the building of an alternative vision; developing a change narrative; and undertaking catalytic projects. The Vision builds on the Nakuru Municipality Integrated Development Plan (NMIDeP) 2019-2023 and the Nakuru Municipality Regeneration Plan (2019). Having established these foundations, the TCDSE has been identified as a methodology to help provide an inclusive and science-based approach for surfacing prospective projects for catalytic work.

3. Future Visioning

A. Process Overview

The Future Visioning stage in Nakuru adhered to the standard TCDSE procedures and was considered by the team a successful deployment. One necessary simplification was related to preparatory ethnographic and sensitisation activities⁴ - which set the ground for Future Visioning group selection and workshops. Ideally, this step involves a thorough engagement with civil society, advocacy groups, and marginalised communities to complement the views of institutional actors and experts on what impact looks like in the city. This helps ensure that the choice of groups and impact sites reflects the concerns and agendas of those most affected by urban risks and development initiatives. In this deployment, expert judgement led by Nakuru City was used to identify participants.

A deeper engagement with society makes the process more inclusive - encompassing groups that are often overlooked or critical of institutionally-led processes – and it also provides a more nuanced understanding of how common social characteristics approached in participatory processes (gender, age, income) intersect with other power imbalances related to environmental, spatial, and knowledge inequalities (e.g., migration, access to land and housing).

Furthermore, such early-stage engagements help facilitate the in-person workshops, allowing participants to arrive

more familiar with the TCDSE framework, its tools, and key concepts.

Another simplification was that the Nakuru deployment convened only four groups and so developed only four scenarios. The TCDSE usually works with six or seven groups and scenarios for a more comprehensive perception of desired development alternatives from different points of view. Yet, even a more detailed deployment would not depict a full representation of all aspirations on the ground. A constant revision of the process is recommended to recognise and value local social and spatial diversity. Ultimately, the aim of this process is to work with representative voices – with an emphasis on marginalised ones - to surface a diverse set of views on urban development that can stimulate creative and inclusive risk prevention.

While the Tomorrow’s Nakuru group composition (Table 01) was modest, it still served to highlight diverse views on desirable urban development and risk reduction and to reflect on gaps – voices, needs, perspectives – that must be included in future deployments.

Group Title	Justification and further notes
Faith Based Organisations	Influential stakeholder groups with interest to participate in public discussions and helpful to sustain future actions.
Residents	Local residents, diversified by economic activity and capacity.
Special Needs Group	Residents with experience of physical disability
Women’s	Emphasis on gender-based needs and aspirations, and gender equity for future Nakuru

Table 01: Selected groups with justification

⁴ For more information on this, see the Future Visioning protocol.

B. Data / Inputs

The majority of Future Visioning outputs are generated from workshops. Yet some baseline datasets/inputs are still required:

Data and trends capturing key inequalities (gender, age, income, disability, informality, housing gaps) to inform the selection of stakeholder groups and enrich future visioning engagements.

Baseline maps for co-mapping and co-design exercises, ideally including (i) satellite imagery, (ii) current land use, (iii) Susceptibility to key hazards to be modelled (e.g., floodplain projections).

Supporting imagery or maps that provide additional insights, such as informality trends or common urban typologies, to contextualise discussions.

In Tomorrow's Nakuru, only satellite maps were used as baseline datasets. While an existing land use plan would typically be considered essential, the Nakuru team decided not to include it in the workshop because the available land use map contained outdated information, and its inclusion could have created confusion among participants. This decision reflects the importance of ensuring that the datasets used in workshops are both current and relevant to avoid misinterpretation. Also, it is important to note that the selection of stakeholder groups did not reflect an analysis of sociodemographic and urban data. Incorporating such data could be considered an improvement towards future deployments.

C. Outputs

The Future Visioning workshop in Nakuru followed all required steps, successfully

delivering the key outputs required for an ideal TCDSE deployment. These included:

Individual Storylines: Personal narratives based on participant's lives in the city, outlining their past, present, and visions for the future.

Collective Storylines: Group-based narratives (one per group), describing the past, present and future of Nakuru with an emphasis on desired futures.

Wheel of Urban Assets: One per group, illustrating desired assets across different categories. See sample in Figure 03.

Visioning Statements: Clear statements from each group, outlining their ideal future for Nakuru.

Sketched Plans: Visual representations of the groups' future urban visions, mapping out desired land use, urban form and hazard mitigation strategies.

Three Policy Priorities: Based on previously-prepared themes (policy cards), each group identified three key policy areas that should be prioritised to support their envisioned urban future.

Visioning Statements of each group (Table 02).

Group Name	Visioning Statement
Faith Based Organisations	A friendly, safe, orderly and fully informed city by 2048
Residents (marginalised)	An 'eco city' that is safe, user friendly, economically vibrant, accessible and connected, that is beautiful and unique by 2050
Special Interest Group	An inclusive, safe, green and operational city by 2035
Women's	A safe, well-governed, inclusive, resilient and eco-friendly city that is economically vibrant by 2050

Table 02: Visioning Statements

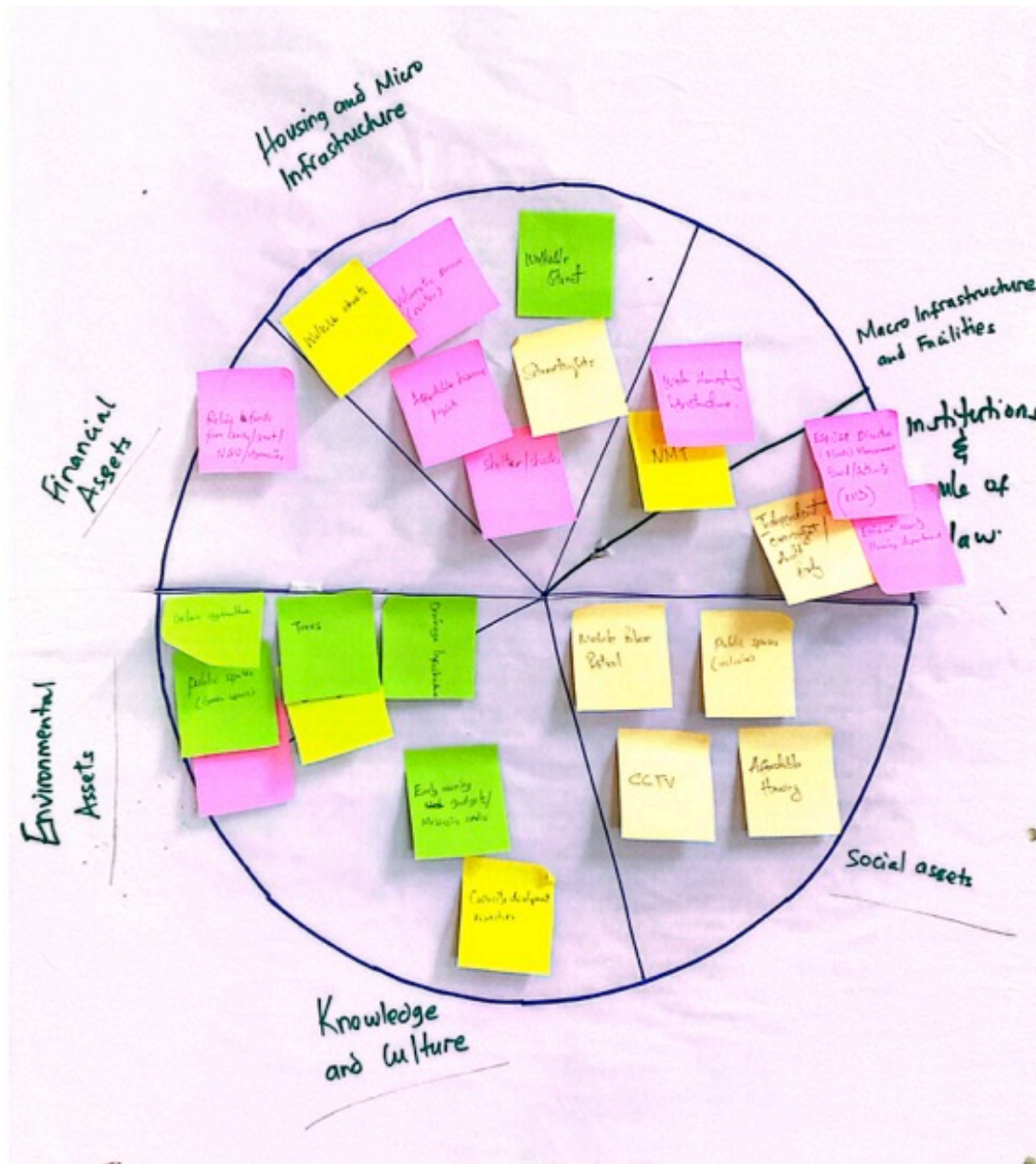


Figure 03: Example of 'wheel of urban assets' produced by one of the groups (Special Needs).

The spatial vision of the **Faith-Based Organisations** group (Figure 04) highlights the role of advanced technological solutions in promoting sustainable development. Their plan emphasises agricultural land uses, which are intended to create a buffer zone within the floodplain between the two arms of the

river. Policies encouraging technological innovations should be implemented to mitigate soil erosion caused by the proximity of cultivated land to the river channel. Additionally, this plan places significant emphasis on high-density residential areas to accommodate Nakuru's growing population.

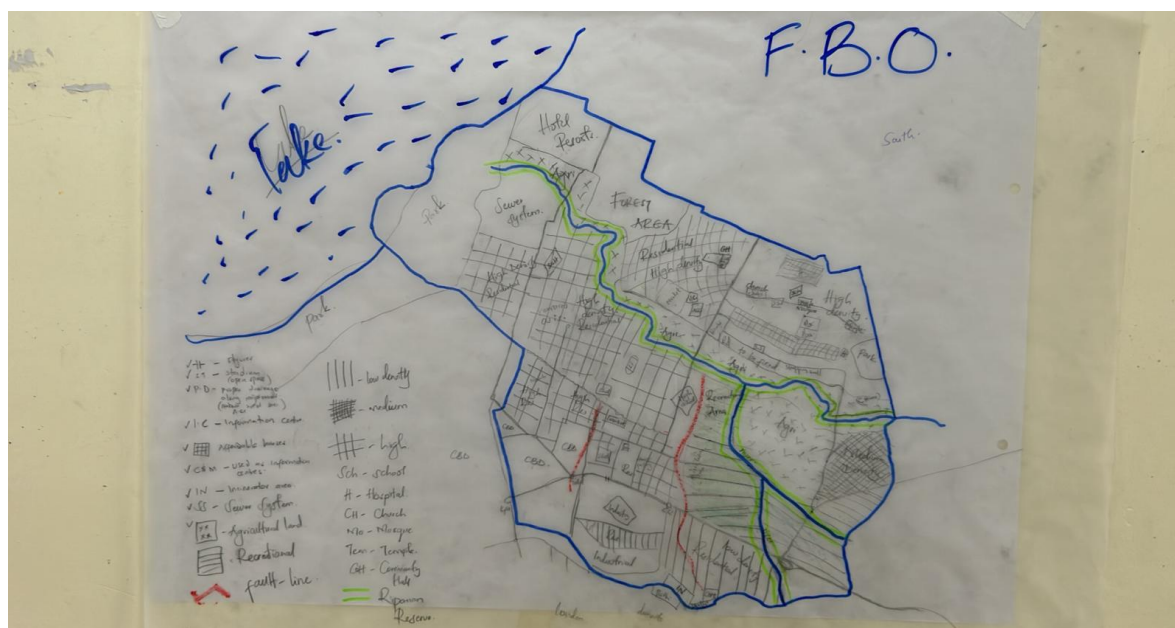


Figure 04: Sketched future plans proposed by the Faith-Based Organisations.

The **Residents** group's vision (Figure 05) places significant emphasis on environmental assets. It proposes a green belt that helps preserve water sources and mitigate pollution, and an Ecological Park close to Lake Nakuru. The group pitched policies that entailed storm and run off water collection through the local drained system, and implementing comprehensive sewer and water treatment facilities that

can later help supply the whole city. This group provided useful inputs for equity-oriented analyses, by providing correlations between land use, urban form and income distributions in the future city. A notion of mixed land uses was also approached by the group.



Figure 05: Sketched future plans proposed by the Residents (marginalised) group.

The **Special Needs** group (Figure 06) emphasised the importance of both residential and commercial or industrial land uses, advocating for a mixed-use approach. They proposed relocating populations from the southern area near

the lake to higher ground, reserving flood-prone areas for parks, nature reserves, and hospitality amenities. Their plan also prioritised water management strategies to ensure sustainable development.

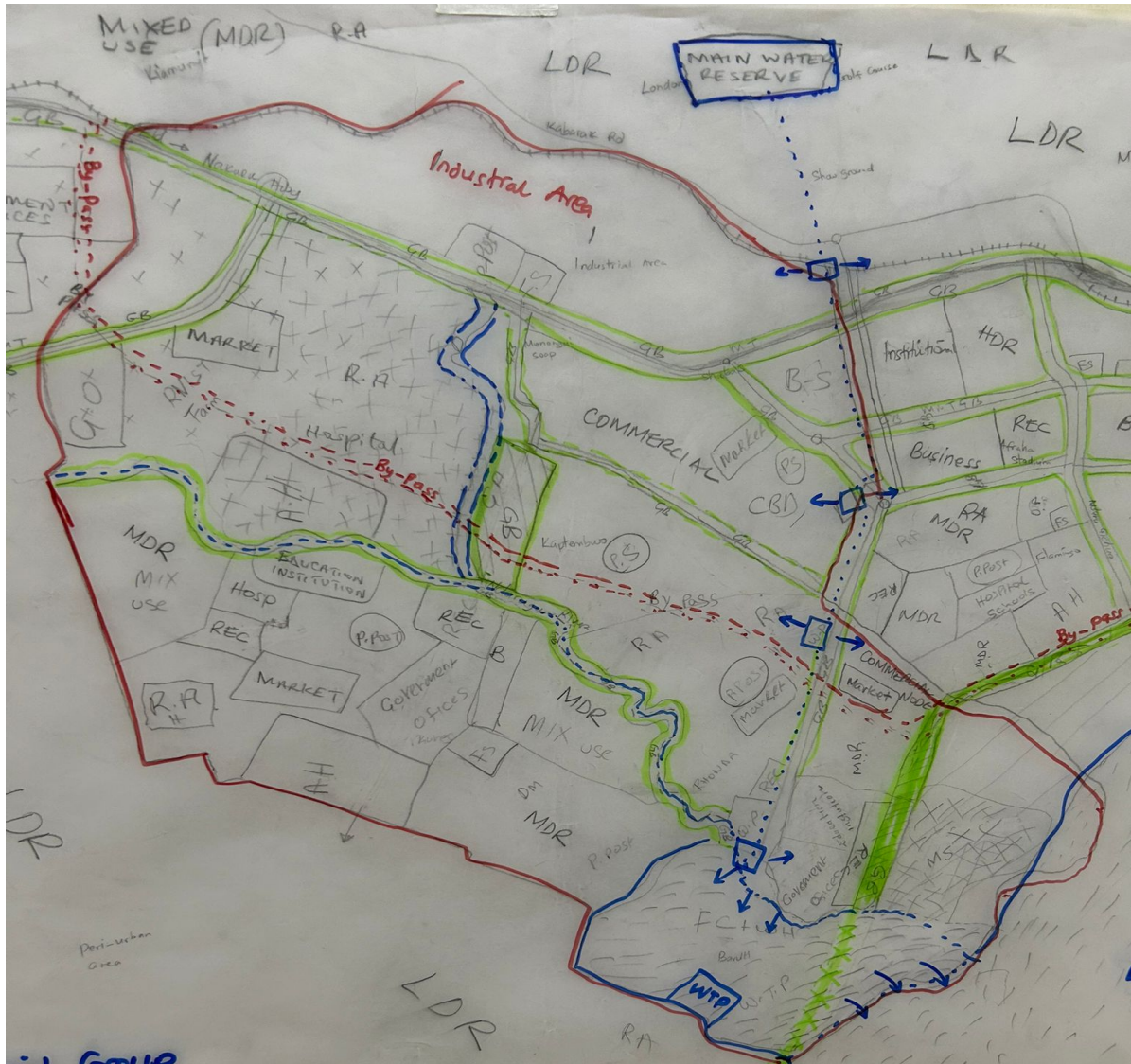


Figure 06: Sketched future plans proposed by the Special Needs Group.

D. Recommendations

Based on the steps that were streamlined or omitted during the Nakuru deployment, several recommendations for future TCDSE deployments have been identified:

Deeper community engagement: future deployments should focus on engaging a broader range of stakeholders to include diverse factors, identities, and voices. This approach will ensure more inclusive representation of Nakuru's population in shaping urban development and risk management strategies.

Improved representation of elderly participants: elderly individuals were underrepresented in the Nakuru workshops. Future engagements should include this demographic to capture their perspectives on urban resilience, accessibility, and long-term planning.

Engage with hard-to-reach identities and communities: many workshop participants appeared accustomed to participatory activities, potentially leaving out harder-to-reach or less visible groups. It is important to ensure that marginalised voices are not excluded in future engagements.

Use of updated Land Use plans and consideration of urban informality: the availability of an updated land use plan and discussions on urban informality could significantly enhance future workshop outcomes. These elements would provide a more accurate foundation for discussions and support the development of more effective urban resilience strategies.

Deeper study of policy preferences highlighted by the groups: these indicate investments that are considered relevant and impactful by the population of Nakuru, and therefore deserved of further

studies that assess in more detail the impact of those policies in the future and required investments.

4. Urban Scenarios

A. Process Overview

This stage of the TCDSE successfully covered all its core methodological components. However, time constraints constrained scope and granularity of the results, leading to the production of more illustrative urban scenarios rather than fully detailed urban plans stemming from the visions.

One of the main challenges encountered was the size of the impact area, which was large given the limited timeframe. This made it difficult to conduct a thorough assessment of key details, such as building footprints and the relationships between the built environment and income levels - critical for the TCDSE's equity assessments. As a result, general assumptions had to be applied (e.g., assuming a standard 50-square-metre building footprint), and important nuances in the data may have been overlooked during the translation of sketched visions into urban scenarios.

Another challenge related to future exposure data. Because of the nature of this deployment, there was no opportunity for in-depth validation of assumptions regarding urban form with participants. Instead, the process relied on generalised assumptions, which may not have fully captured the complexity of Nakuru's likely future urban environment. While this was a necessary compromise, it did limit the resolution of the urban scenarios produced.

The regularisation of the scenarios presented another significant difficulty. This stage typically ensures that the

participants' visions are feasible and aligned with construction regulatory norms and land-use policy guidance, with flexibility for future changes. However, due to the area's size and time constraints, the groups produced scenarios with varying assumptions, leading to some inconsistencies.

For example, some groups assumed that existing facilities, such as schools and hospitals, would remain in the future, while others designed entirely new facilities. This reflects a minor misunderstanding of the methodology, likely stemming from a rapid capacity strengthening process, where participants should have clearly identified which infrastructure they wished to preserve. This issue could have been better addressed during the Validation Workshops.

Nevertheless, the Validation Workshop played a critical role in allowing participants to correct and challenge the team's translations and assumptions. For instance, when the special needs group proposed a buffer zone around the river to mitigate flood risks, this was not fully captured in the initial digital translation. Although this caused some frustration, as participants expected to see their plans fully digitised, the workshop ensured that significant elements of the visions were not lost.

Despite all challenges, participants were enthusiastic about the urban scenarios they helped create and felt empowered by seeing their visions consolidated.

In summary, the streamlined deployment meant that many of the corrections and adjustments, which would typically be discussed with participants, were instead handled by the Tomorrow's Cities team.

Additionally, the short intervals between the Future Visioning, Validation, and Risk Agreement workshops led to a simplified

translation and analysis of the visions. In a longer deployment, iterative discussions would typically address these gaps in a more participatory and detailed manner, ensuring that the process remain closely aligned with participants' visions and expectations.

B. Data / Inputs

For this stage to operate optimally, several layers of data are required. These are available as templates upon request through the Tomorrow's Cities Capacity Strengthening programme. It is worth noting that the Nakuru team successfully provided all the essential datasets, including: (i) land use information, (ii) building and construction data (such as footprints, materials, and heights), and (iii) road and utilities networks.

However, the challenge in this stage arose from the limited time available to fully integrate these data layers into both the urban visions and the backend system of the Tomorrow's Cities Webapp. For instance, road networks were only partially integrated, and power networks were not

included in the modelling at all. Though both can be integrated in future model runs.

Overall, the data was satisfactory. However, some datasets lacked the ideal level of detail, particularly those relating to socioeconomic variables and their connection to physical infrastructure. This gap became particularly evident during the exposure modelling phase, where a more granular understanding of these variables would have improved the accuracy and depth of the impact analysis by social group.

C. Outputs

As it is possible to see in Figures 08 to 11, The digitally translated and revised plans enable a clearer visualisation of the contrasts across the different spatial strategies proposed by the groups. Also, in more in-depth deployments, these would open more discussions on the equity trade-offs that each plan entail.

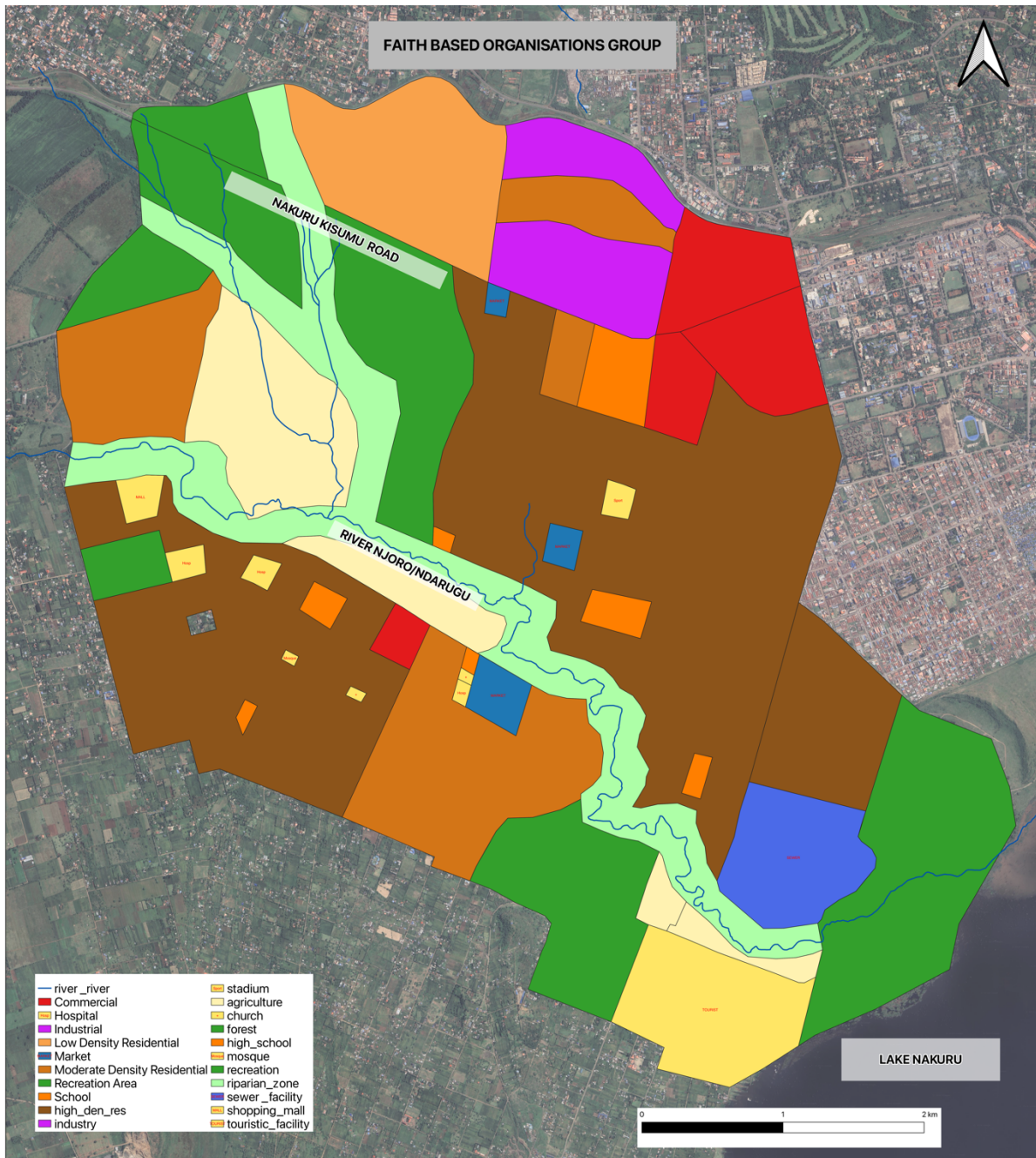


Figure 08: Faith Based Organisations' Urban Scenario.

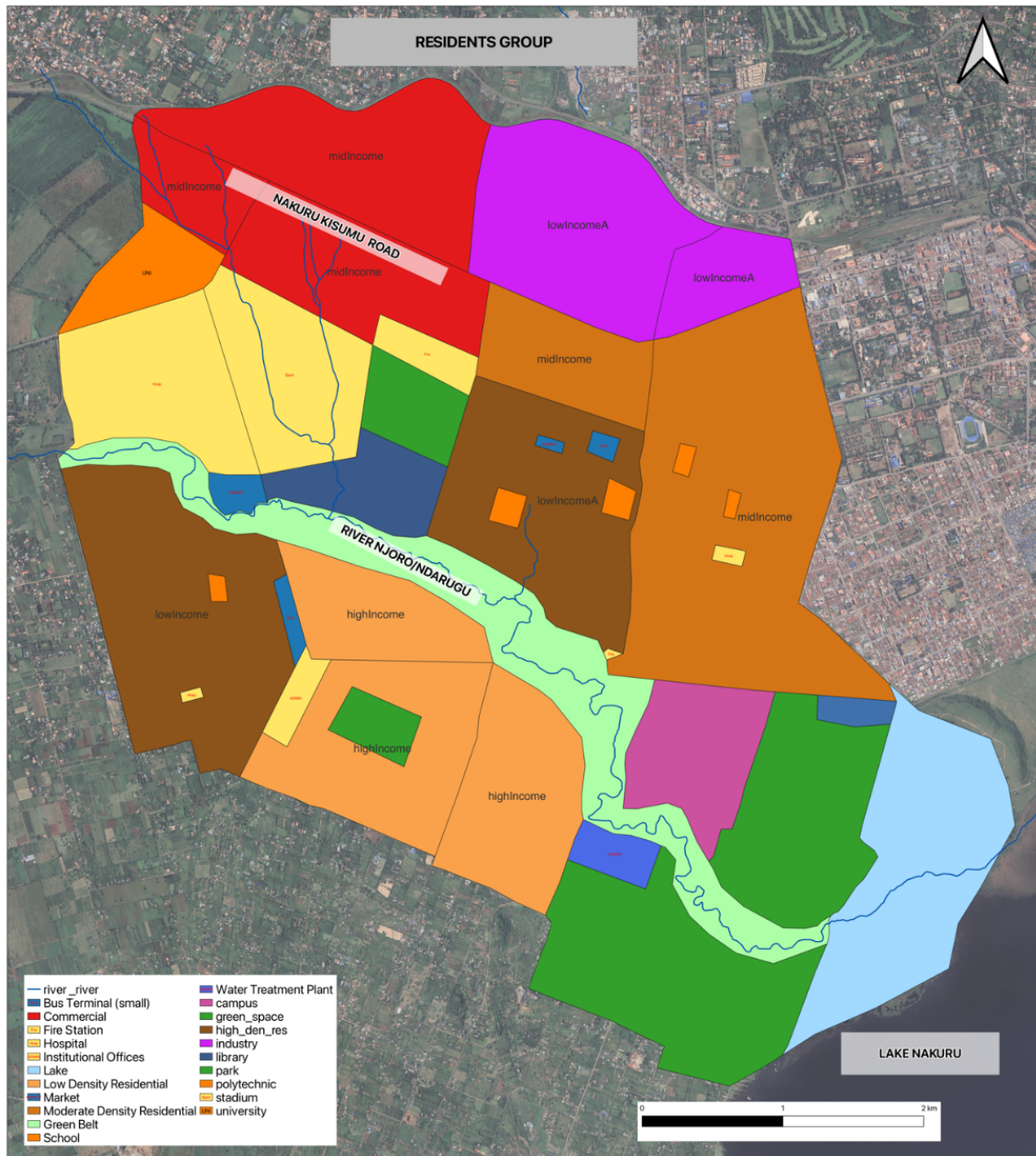


Figure 09: Residents Group's Urban Scenario.

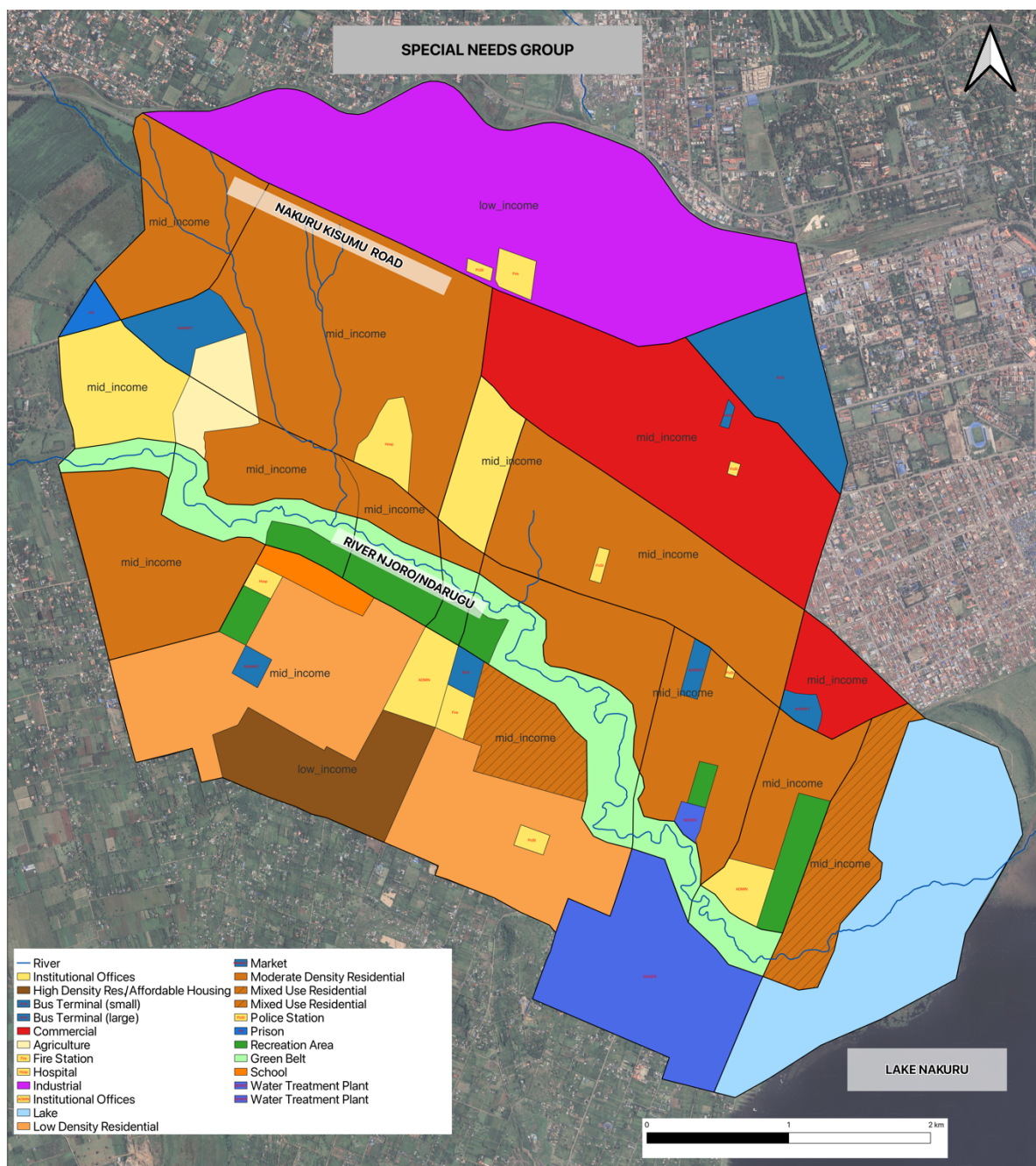


Figure 10: Special Needs Group's Urban Scenario.

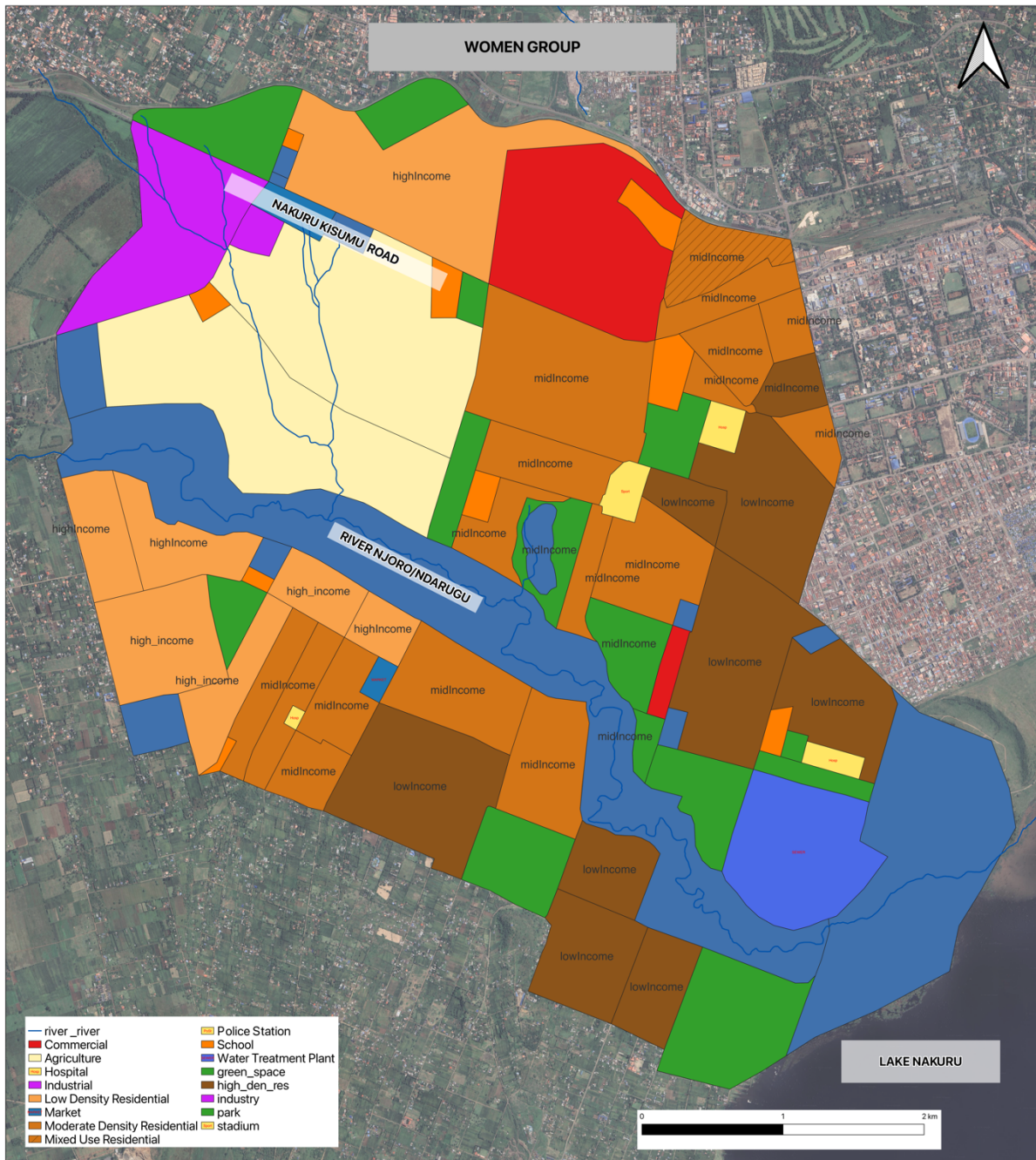


Figure 11: Women's Group's Urban Scenario.

D. Recommendations

To improve future the urban scenario stage in Nakuru or similar contexts, the following recommendations are offered:

- **Investing time in data refinement:** analyse in more detail data that links socioeconomic variables (and other social characteristics) and informality with physical infrastructure. This would enhance the accuracy of the equity assessments in the TCDSE.
- **In-depth training for translation procedures:** allocate more time to train local teams on the translation process – from future visioning to urban scenarios - and its required details and concerns.
- **Discuss trade-offs between urban scenarios scale and depth of results:** need to balance the size of the area with TCDSE version being deployed.

5. Hazard and Impact Modelling

A. Process Overview

The Tomorrow's Cities team conducted flood hazard modelling for Nakuru using a simple model: "Fast Flood Application." This model integrated three key datasets: topographic, rainfall, and land use data. Further documentation for flood hazard mapping is available upon request.

For the topographic component, the team utilised a 30-meter resolution SRTM Digital Elevation Model (DEM) surveyed in February 2000. A higher-resolution

dataset (12.5-meter ALOS PALSAR DEM) was also explored; however, it required some correction processing to adequately represent the river channels and other areas. Therefore, SRTM topographic data was used, as it provides better channel representation (based on visual inspection) compared to other openly accessible topographic datasets.

In terms of rainfall data, monthly averages were sourced from government archives, with the maximum monthly average identified as 140 mm. The team decided to build a hazard scenario where extreme rainfall would be a monthly maximum of rainfall falling over a 12-hour period. With daily rainfall data and more information on past events, that scenario could be even more representative of the future of Nakuru. For now, this can be framed as a possible (not necessarily probable) scenario for Nakuru.

Regarding land use, a 10-meter resolution global dataset from the Copernicus Global Land Service was employed. It is important to note that the 'current' land use plan provided dates back from 2021 and therefore does not reflect the existing land use patterns in Nakuru – this affected Future Visioning and Urban Scenario stages as well.

Some important gaps were identified during the hazard modelling process. First, there was a notable lack of high-resolution and up-to-date topographic data. Secondly, we were not able to find a multi-year archive of rainfall or river discharge data; this hindered the accuracy of the flood scenario modelling. The outdated land use may have further impacted the analysis. Additional information on the nature of land subsidence and its relation to clear fault lines would have enabled better forecast of hydrological responses.

In terms of impact modelling, it is important to note that physical vulnerability data included assumptions adapted from prior work in Nairobi using Joint Research Council (JRC) vulnerability curves, and that the policies selected by the groups during Tomorrow's Nakuru Future Visioning stages were not modelled due to time constraints.

Otherwise, the Tomorrow's Nakuru Webapp functioned well, computing efficiently the connections between the decisions made in each urban scenario and impact metrics produced.

B. Datasets / Inputs

The key datasets used for this WP were:

Topography: 30-meter SRTM Digital Elevation Model (DEM)

Rainfall: maximum monthly average rainfall of 140 mm. Note: the lack of daily rainfall data necessitated assumptions about rainfall duration and intensity.

Land Use: Copernicus Global Land Service, 10-meter resolution data from around 2021. Up to date data is important as it impacts infiltration calculations and surface roughness coefficients, affecting overall modelling accuracy.

Lake Levels: from Existing research/publications (secondary data). There has been lake level rise of approximately 9 meters above original levels. A rise of 8 meters in lake level was recorded between 2010 and 2020, although the trend in lake level rise is not linear. A significant increase occurred between 2018 and 2021, with a rise of approximately 4.5 meters. The DEM used did not account for this lake rise; this will

⁵ The Nakuru dashboard in Tomorrow's Cities Webapp can be found in this link:

have significantly affected flood modelling accuracy.

Physical Vulnerability models: adapted from global models used in Nairobi, based on JRC (Joint Research Centre).

C. Outputs

The full results of the Hazard and Impact modelling work can be found in the Tomorrow's Cities Webapp⁵. Below we provide an image that illustrates the hazard modelling work.

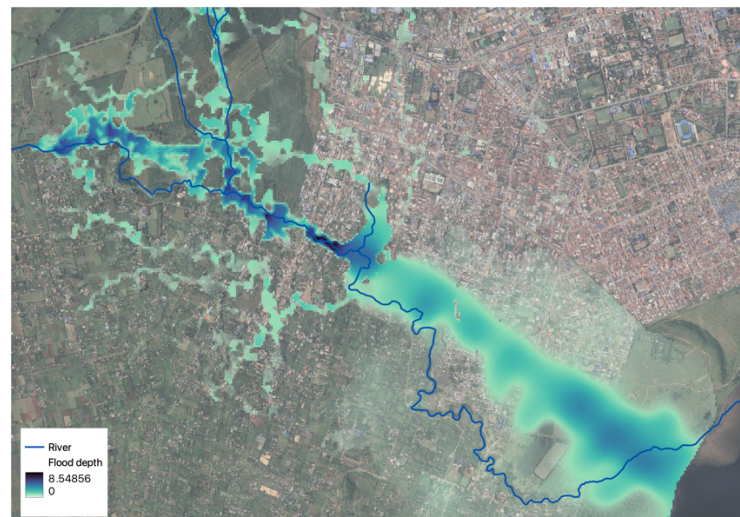


Figure 12: Flood hazard map of Nakuru indicating flood inundation depths due to cumulative rainfall of 140 mm over a 12-hour period.

D. Recommendations

The following recommendations are proposed for more refined hazard and impact modelling:

Acquire high-resolution DEM: obtaining LiDAR or other high-resolution topographic data for the catchment area of the River Njoro/Ndarugu is critical to improve model accuracy, particularly for

https://experience.arcgis.com/experience/df858309a29d4ed5829c025a6448ff97/page/SNG_Flood/

floodplain and river channel modelling. The channel width in the project area is less than 10 meters, and the channel depth is approximately 1 meter. The resolution of future topographic surveys should be sufficient to accurately represent the channel at this scale. Additionally, high-resolution topographic data from such surveys should correct artifacts along the channel, such as road bridges that will otherwise appear as a dam in the channel.

Update Land Use information: collect current land use data to more accurately represent infiltration rates, surface roughness, and other variables that influence flood and hazard models.

Obtain detailed hydro-meteorological records: hourly rainfall data for the wettest days can generate more realistic and detailed flood scenarios. Long-term historical rainfall records can help predict future scenarios, enhancing the accuracy of hazard projections. River hydrograph data (height, discharge, velocity) will be crucial for calibrating the results obtained from the model. Additionally, mapping the springs, their discharge, and monitoring the subsurface water table will help predict lake level rises and potential flood scenarios.

Monitor land subsidence: incorporate land subsidence data to better understand its influence on flooding and the rising levels of Lake Nakuru, improving future risk assessments. There are multiple ways this could be achieved, but an InSAR analysis would provide most accurate spatial and temporal information.

Incorporate multihazard assessments: expand the scope to include other hazards, such as seismic activity, subsidence, and back water effect along the River Njoro/Ndarugu due to lake level rise and other climate hazards (e.g., heat)

to provide a comprehensive risk profile for Nakuru.

Use future climate Projections: assess the long-term impacts of changing weather patterns, ensuring that decision making has a better grasp of future climates in Nakuru.

6. Risk Agreement

A. Process Overview

The deployment of the Risk Agreement stage in Nakuru adhered to the standard TCDSE methodology. However, it is important to acknowledge that the fast-paced nature of the engagement impacted the training process. Facilitators had to train using Nairobi data instead of Nakuru data, as the Nakuru dashboard was completed only the night before the deployment. The workshop itself also had to be streamlined.

Despite these challenges, the workshop was successfully conducted. Both facilitators and participants managed the Tomorrow's Cities Webapp (Figure 13) effectively, demonstrating interest in exploring more of the data in the future. Participants observed that the dashboard contained more information than the workshop allowed them to engage with, indicating that a more in-depth iteration of the methodology in Nakuru would likely be well received by the local stakeholders. The Nakuru Webapp remains active and is open for further consultation at any time.

The workshop successfully produced outputs focused on key modifications to the original urban scenarios for risk reduction. However, there were notable discrepancies between the groups. While some groups focused on direct infrastructural modifications based on data from the Webapp, others concentrated on broader issues such as governance and corruption. Although none of these discussions were irrelevant, the lack of attention to risk factors like exposure and physical vulnerability by some groups

suggests inconsistencies in facilitation or more superficial engagement with the material.

There were also some miscommunications regarding elements of the scenarios – such as road networks – and how they would be modified or not from the Validation until the Risk Agreement stage. That is, the Tomorrow's Cities team used existing roads as the base layer for urban scenarios, but participants, particularly from the women's and special needs groups, had expected future road networks designed, with improved drainage and flood mitigation embedded into these infrastructures and scenarios. This misunderstanding - related to expectations of what would be analysed during the Risk Agreement workshop - led to some frustration, as participants had anticipated more sophisticated infrastructure changes from one to another.

Finally, and connected to the above issue, it is worth noting that the policy cards chosen by participants were not modelled due to time constraints. This limited discussions on the critical role of policy making in mediating processes of risk creation and in trade-offs between development and risk management priorities.

B. Datasets / Inputs

The Risk Agreement stage does not involve independent data collection. Instead, it relies on inputs from other work packages, particularly the Urban Scenarios and Hazard and Impact Modelling stages.

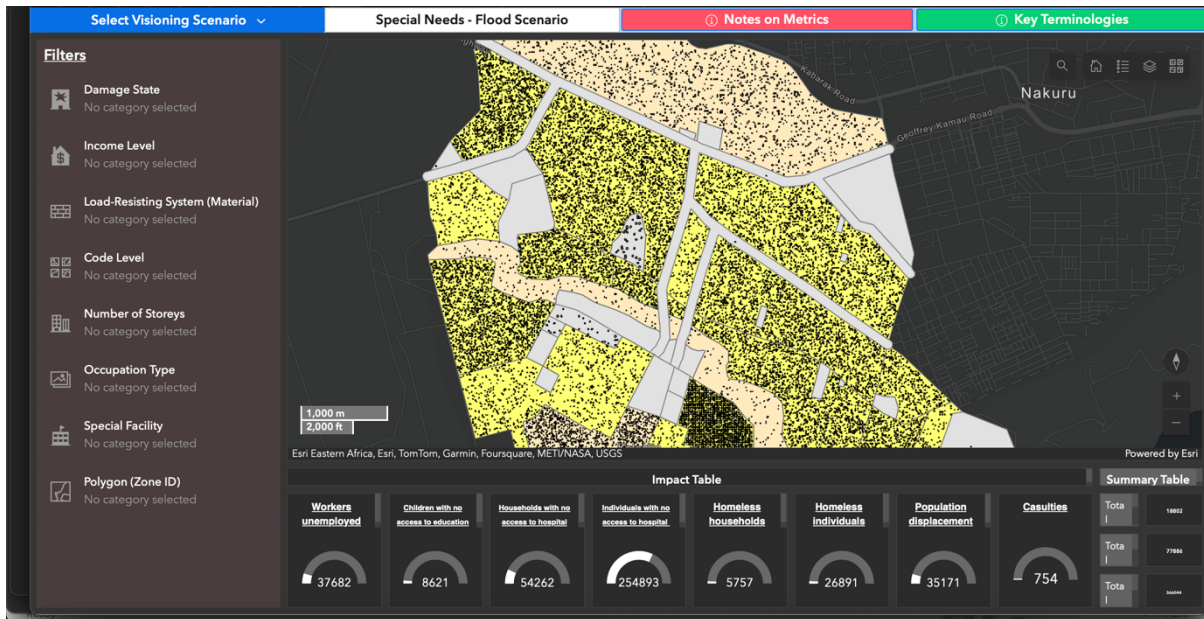


Figure 13: Screenshot of Tomorrow’s Cities Webapp – Nakuru dashboard.

related to the city’s decision-making culture, governance structures, and long-term trajectories.

C. Outputs

The outputs of the Risk Agreement stage consist of key recommendations from each group on tailored interventions for the urban scenarios (Table 04). Unlike the Future Visioning and Urban Scenario stages, which focus on consolidating future aspirations, these modifications specifically aim to reduce risk. Each suggested change must arise from the group’s understanding of the relationship between their decisions and the impacts observed. The goal here is not to rank the scenarios by which one performed best. In fact, it is common to find that certain scenarios perform well for some impacts, but not for others.

When the TCDSE can be iterated, groups also have the opportunity to revisit the visioning process, incorporating new learnings from the links between policy impacts and risks. This enables them to explore ways to integrate aspirations and preferences into a negotiated scenario that can be advanced for implementation.

In addition to exploring interventions, the groups also discuss potential barriers to implementing these proposed measures and identify possible solutions. This shifts the discussions from purely technical and context-specific actions to insights that are

Group	Action/Modifications to Urban Scenario	Implementation Challenges	Solutions
Faith-based Organisations	<ol style="list-style-type: none"> 1. Protect flood-prone areas 2. Building standards for storeys and materials 3. Mixed-use development in low-risk areas 	<ol style="list-style-type: none"> 1. Limited infrastructure 2. Political interference 3. Socio-economic constraints (e.g., relocation) 	<ol style="list-style-type: none"> 1. Civic education and supervision (5+ yrs) 2. Relocation compensation 3. Allocate resources properly
Residents	<ol style="list-style-type: none"> 1. Relocation to higher ground 2. Change to 50m riparian in flood zones 3. Road and drainage improvements 	<ol style="list-style-type: none"> 1. Attachment to ancestral land 2. Corruption and political will 3. Poor infrastructure and governance 	<ol style="list-style-type: none"> 1. Compensation for ancestral land (16-30y) 2. Transparency and policy change 3. Prosecution for corruption
Special Interests	<ol style="list-style-type: none"> 1. Afforestation in flood zone 2. Relocate schools, improve drainage in zones 3. Relocate churches, schools in other zones 	<ol style="list-style-type: none"> 1. Unaccountable process and community funding 2. Misinformation and resistance 3. Long-distance relocation and learning disruption 	<ol style="list-style-type: none"> 1. Form oversight unit 2. Communication systems 3. Environmental Impact Assessment (EIA)
Women	<ol style="list-style-type: none"> 1. Enforce building regulations (e.g., foundations) 2. Resettlement plan for high-risk zones 3. Increase green space in the plan 	<ol style="list-style-type: none"> 1. Corruption and mismanagement 2. Lack of land for resettlement 3. Low prioritisation of green space 	<ol style="list-style-type: none"> 1. Quality control of materials (0-5 yrs) 2. Consultative planning and enforcement 3. Non-conventional greening solutions

Table 04: summary of discussions from the Risk Agreement stage.

D. Recommendations

To improve future deployments of the Risk Agreement stage in Nakuru, the following recommendations are offered:

Extend preparation and training time: similar to other TCDSE stages, more training and familiarity with tools will help deepen the workshop-based engagements.

Clarify concepts, evidence, assumptions, backend procedures and objectives of the workshop to manage expectations: ensure that there is clear communicating regarding aspects of the urban scenarios that were modified by the

team, and those that were not modified due to time constraints or for learning purposes. A key attempt of the TCDSE is to open the decision-making box made by technicians, so that planning and risk reduction practiced. can be democratised.

Focus on policy-impact links for infrastructural and non-infrastructural policies: The policy bundles are an essential element for a discussion of risk reduction, and taking time to model the impact of the policies onto future risk is a time-consuming, but necessary aspect of this engagement.

Promote Iterative Engagements: Encourage multiple iterations of the TCDSE to allow for a more

comprehensive review of urban scenarios. This can eventually lead to an agreement or negotiation of a single scenario that can inform real-world urban planning procedures.

7. Pathways

The Implementation Pathways stage of the TCDSE is a critical point in the process, serving as both a reflective and action-oriented phase where lessons from the deployment are consolidated, and strategies for improving decision-making processes in the present are discussed.

The focus of this stage varies depending on the version of the TCDSE being deployed. For more streamlined versions (the case in Nakuru), the outcomes and evidence are useful, but primarily illustrative, meaning they require refinement before being directly applicable to policy or planning. In more detailed versions, more specific policy recommendations are possible, as it is possible to find evidence to support policy-impact links – that is, evidence on interventions that will most likely reduce risk through an equity-oriented approach. In Nakuru, the data produced allows for general considerations on risk hotspots and policies that seem to be prioritised by different stakeholder groups. Yet additional and more refined data would make those considerations more robust and detailed.

The illustrative results provided by the Tomorrow's Nakuru exercise are valuable opportunities to reflect on key gaps and to define next steps for further engagement and specific policy refinement. These can be aligned with the policy two objectives identified in the City Scoping stage (1) move the Nakuru 2050 Vision into concrete policy priorities, (2) consider policy options for population relocation

and environmental improvement of the expanding Lake Nakuru.

Below, we outline some of the key lessons from this deployment and suggest themes that must be addressed in future discussions. Each theme is accompanied by questions to guide further exploration and suggestions for future action. This section could be read as a Conclusion to the report, although the ultimate objective is to indicate possibilities for this collaborative work to continue.

3 Potential Ways Forward

Mainstreaming Futuring methodologies and equity: The TCDSE's future-oriented approach offers a valuable platform for exploring the consequences of urban planning decisions, but there needs to be more emphasis on capturing underrepresented voices and unpacking equity implications (e.g., through disaggregated impact metrics, which the Tomorrow's Cities could produce in future deployments). Although this experience successfully introduced futuring methodologies, it is essential to dedicate more time and resources to engaging with a broader range of stakeholders, ensuring that decisions reflect the needs of all communities, particularly those typically marginalised in planning processes.

Exploring Land Use discrepancies for informed risk reduction and prevention: A critical next step is understanding how current (*de facto*) land use contrasts with desired land uses proposed by residents, which can serve as a foundation for negotiating risk reduction actions that align with urban development aspirations. An accurate and up-to-date understanding of land use - including trends in informality - is essential for developing sustainable and effective planning solutions that address the needs of present and future populations.

Addressing data gaps and multi-hazard interactions: This deployment identified several data gaps, particularly regarding multi-hazard interactions and climate change projections. While the outputs from this engagement are illustrative, they provide initial insights into critical risk hotspots that could inform future policy. However, a more comprehensive risk profile for Nakuru requires the integration of robust data and a complex analysis that considers the interactions between various hazards, as well as the impacts of climate change on the city's future development.

Key themes for future engagements

Each theme below is accompanied by a guiding question and suggestions for moving forward. These themes reflect critical areas that need to be interrogated to enhance future-oriented planning in Nakuru.

A. Data

Question: What is the most effective strategy for acquiring data on other hazards and producing climate projections? Can this data be obtained through future investments, and what partnerships are needed?

Suggestion: Detailed insights on data to acquire and refine can be found in the Urban Scenarios and Hazard and Impact modelling sections.

B. Urban Planning

Question: How can Nakuru's urban planning processes integrate long-term future thinking more explicitly? What elements from the TCDSE can be mainstreamed into regular planning practices?

Suggestion: Future visioning methodologies and scenario-based

approaches should be embedded into Nakuru's urban planning toolbox provided a few institutional adjustments are made. Regular revision of planning strategies that incorporate multiple development and risk reduction scenarios - reflecting diverse social and private sector views - can help create a more inclusive planning environment that is infused by futuring methods and approaches.

C. Policy Making

Question: What key policy themes and actions should be studied/modelled in future work to enhance equity-based decision making? How can differing policy expectations from community groups and local authorities be reconciled?

Suggestion: Future work should explore policy options with an equity lens, especially around relocation and other strategies that impact marginalised groups and their livelihoods. For instance, comparing a policy scenario that ties relocation to social housing with one that relies solely on financial compensation could provide insights into the risk and vulnerability implications of each approach. This could form the basis for modelling different policy bundles and evaluating their long-term impacts on vulnerability and resilience. This reinforces again the need to integrate scenario-based thinking into standard urban planning procedures and discussions.

D. Multi-level Governance & Partnerships

Question: Who are the key partners necessary for advancing the next steps, and how can sustainable governance of future-oriented planning tools be established across different levels?

Suggestion: Revising stakeholder maps based on the learnings from this engagement could identify new potential

partners. Engaging community, local, national, and international actors across sectors will be critical for creating a collaborative governance framework that supports the sustainable use of future planning tools in Nakuru.

E. Management and Finance

Question: What management and financial mechanisms are needed to support and sustain changes informed by future-oriented thinking? How can future-oriented planning become an integral part of Nakuru's governance structures?

Suggestion: Beyond immediate funding for next steps, this stage offers an opportunity to reflect on long-term sustainability. Establishing systems to ensure that future thinking becomes routine in urban planning and risk reduction is essential. Nakuru could explore innovative financial arrangements, such as climate adaptation funds or public-private partnerships, to ensure that future planning is not a one-off exercise but a continuous part of the city's development agenda.

8. Next Steps

The deployment of the Tomorrow's Cities Decision Support Environment (TCDSE) framework in Nakuru represents a significant step forward in strengthening urban resilience planning in the city. However, this is just the beginning of a collaborative journey. To ensure the long-term success and sustainability of the TCDSE approach in Nakuru, we propose the following discussions as next steps:

Community of Practice

Nakuru is now an integral part of the Tomorrow's Cities Community of Practice. Moving forward, we aim to organise regular meetings and informal webinars to discuss how the TCDSE framework is being adopted in our partner cities. These sessions will serve as a platform for exchanging experiences, addressing challenges, and refining methodologies based on practical outcomes. We encourage Nakuru's active participation in these discussions, as this will provide opportunities to share insights and lessons learned from this deployment with a wider network. One potential idea is to host a dedicated session where Nakuru's experience can be showcased, focusing on how the tools and processes have contributed to local urban resilience planning.

Impact, Replication and Scaling Up

One of the key outcomes of this deployment is the potential replicability of the TCDSE framework across other areas within Nakuru and beyond. We recommend initiating discussions on how the tool can be applied to different territories within Nakuru, particularly those with overlapping hazards and additional urban development challenges.

Additionally, there is certainly scope to deepen the analysis in the already selected impact area, allowing for a more detailed, multi-hazard assessment, including geophysical hazards and climate projections.

Alternatively, an upscaling of the analysis could be considered, expanding the tool to cover larger areas of the city, or even neighbouring regions. This expansion or deepening of analysis at regional level will necessitate a recalibration of our collaboration and strategy (with additional data challenges to be considered),

ensuring that future efforts are aligned with the evolving needs and vision of the city.

Capacity Strengthening, Learning, and Sustainability

While the capacity strengthening activities in Nakuru were largely successful, one of the key advantages of this rapid deployment is its capacity to illuminate gaps in skills and knowledge that may support the city in the future. To ensure that the TCDSE approach becomes a routine part of planning in Nakuru, and not just a one-off engagement, it will be essential to continue monitoring learning and providing opportunities for further skill development.

We propose discussing an extended capacity building programme that can address any identified needs. We also suggest that Nakuru's planning teams begin integrating the TCDSE methods into their everyday operations, gradually embedding the ethos and approach of Tomorrow's Cities into the city's planning processes. This will require not only skills development but also ongoing support to ensure that the tools and approaches are fully institutionalised within the city's governance structures.

Funding Opportunities and Future Collaborations

To ensure the long-term sustainability and impact of this collaboration, identifying appropriate funding streams will be crucial. Tomorrow's Cities ended its funded period, so we recommend meetings to explore various funding options, including local government budgets, international grants, and public-private partnerships, to support the continuation and upscaling of this work. We are keen to collaborate with Nakuru in seeking funding for agreed-upon options, such as expanding the scope of the

analysis, enhancing local capacities, or investing in specific urban resilience projects identified during this deployment.

Re-calibrating Local Visions for Urban Development and Risk Reduction

The Future Visioning and Urban Scenario development processes are invaluable in surfacing local aspirations and policy preferences. These processes provided a platform for diverse stakeholder groups to express their visions for a future Nakuru, offering insights into the types of urban development and risk reduction strategies most valued by the community.

These visions can help re-calibrate the city's overarching vision to better reflect the desires and concerns of its residents. We recommend that Nakuru expands this inclusive visioning component so that strategies for long-term and risk-informed future planning are infused with elements of inclusion and equity.

9. References

Below we collate some useful references that provide additional context on the different TCDSE stages that were mentioned in this Report. For more information on Tomorrow's Cities, its methods, procedures, goals and partnerships, please visit: www.tomorrowcities.org.

Comelli, T., Ensor, J., Filippi, M. E., Hope, M., Marchant, R., Pelling, M., & Thorn, J. (2024). Freeing imagination for fair and resilient future cities. *Nature Cities*, 1(9), 536-539. <https://doi.org/10.1038/s44284-024-00099-5>.

Comelli, T., Pelling, M., Hope, M., Ensor, J., Filippi, M. E., Menteşe, E. Y., & McCloskey, J. (2024). Normative future visioning: A critical pedagogy for transformative adaptation. *Buildings and Cities*, 5(1), 83-100. <https://doi.org/10.5334/bc.835>.

Cremen, G., Galasso, C., McCloskey, J., Barcena, A., Creed, M., Filippi, M.E., Gentile, R., Jenkins, L.T., Kalaycioglu, M., Menteşe, E.Y. and Muthusamy, M. (2023). A state-of-the-art decision-support environment for risk-sensitive and pro-poor urban planning and design in Tomorrow's cities. *International Journal of Disaster Risk Reduction*, 85, 103400. <https://doi.org/10.1016/j.ijdrr.2023.103400>

Gentile, R., Cremen, G., Galasso, C., Jenkins, L.T., Manandhar, V., Menteşe, E.Y., Guragain, R. and McCloskey, J. (2022). Scoring, selecting, and developing physical impact models for multi-hazard risk assessment. *International Journal of Disaster Risk Reduction*, 82, 103365. <https://doi.org/10.1016/j.ijdrr.2022.103365>

McCloskey, J., Pelling, M., Galasso, C., Cremen, G., Menteşe, E. Y., Hope, M., Comelli, T., Deshpande, T., Guragain, R., Barcena, A., & Gentile, R. (2023). Reducing disaster risk for the poor in tomorrow's cities with computational science. *Nature Computational Science*, 3(9), 722-725. <https://doi.org/10.1038/s43588-023-00312-4>.

Menteşe, E. Y., Cremen, G., Gentile, R., Galasso, C., Filippi, M. E., & McCloskey, J. (2023). Future exposure modelling for risk-informed decision making in urban planning. *International Journal of Disaster Risk Reduction*, 90, 103651. <https://doi.org/10.1016/j.ijdrr.2023.103651>.

Pelling, M., Comelli, T., Cordova, M., Kalaycioglu, S., Menoscal, J., Upadhyaya, R., & Garschagen, M. (2024). Normative future visioning for city resilience and development. *Climate and Development*, 16(4), 335-348. <https://doi.org/10.1080/17565529.2024.1938547>.

United Cities and Local Governments. (2023). *Co-creating Tomorrow's Cities in Africa* [Peer Learning Note No. 35]. https://learning.uclg.org/wp-content/uploads/2023/12/PLN35_Cocreating-Tomorrows-Cities-in-Africa.pdf

Tomorrow's Cities. (2024). *Capacity Strengthening Introductory Booklet*. https://tomorrowcities.org/sites/default/files/2023-05/Booklet_Capacity%20Strengthening.pdf.

Tomorrow's Cities. (2024). *Tomorrow's Cities Gender Pathway*. <http://tomorrowcities.org/sites/default/files/resources/2024-02/Decision%20Support%20Environment%20-%20Gender%20Focus.pdf>.

Tomorrow's Cities. (2024). *Tomorrow's Cities Prospectus*. <http://dx.doi.org/10.7488/era/4524>

Wang, C., Cremen, G., Gentile, R., & Galasso, C. (2023). Design and assessment of pro-poor financial soft policies for expanding cities. *International Journal of Disaster Risk Reduction*, 85, 103500. <https://doi.org/10.1016/j.ijdrr.2023.103500>.

Annex 1

Below it is possible to see the different versions of the TCDSE and their implications. Nakuru was a bespoke deployment: closely connected to Version 2 (Capability Transition), with some elements of Versions 1 (sensitisation) and 3 (Policy Transition) being used.

City Needs	Sensitization	Capability Transition	Policy Transition	Detailed Implementation
About	Rapid run-through the TCDSE using a synthetic testbed (Tomorrowville) that draws on data from real global south cities.	Role-playing based deployment of TCDSE components using a real-world, bespoke case study and global datasets.	Rapid modelling and participatory works for useful results that flag data, policy and capacity gaps. Data mixes local and global sources.	State-of-the-art impact modelling work with in-depth social engagements for direct inputs into decision making.
Timeframe	1-3 days	1-2 months	4-6 months	18 months
City Inputs & Capacity	No existing capacity needed. Requires ordinary PC's and basic support from Tomorrow's Cities.	No existing capacity needed. Requires local spatial data and global datasets for hazard analysis.	Needs capacity on participatory planning and hazard science/engineering .Local + global data.	Comprehensive local skillsets and robust datasets (or capacity to collect them) are needed.
Expected Outputs	1 Report that maps opportunities for future impact and capability or policy transition.	1 Report + 1 Policy Brief outlining specific policy challenges and opportunities for equitable impact.	1 Action Plan containing detailed datasets & pathways for transformative urban development.	1 Action Plan + ready-to-use datasets (land use plans, policies, risk assessments, etc).
Best used to...	<i>Communicate</i> the value and novelty of risk sensitive urban planning for reviewing enabling environments and fundraising.	Clearly <i>identify</i> the data, knowledge, finance and capacity needed to facilitate future-oriented risk-informed urban planning.	<i>Map</i> policy gaps, opportunities and specific datasets to implement risk-informed urban development strategies.	<i>Up-skill existing capacity and generate high fidelity data</i> for risk-informed urban planning and policy that can reduce future risk.