INNOVATE CITIES

Accelerating Next-Generation City Climate Action:

Findings from the 2024 Innovate4Cities Conference & Update to the Global Research and Action Agenda on Cities and Climate Change Science (GRAA)

GLOBAL COVENANT of MAYORS for CLIMATE & ENERGY

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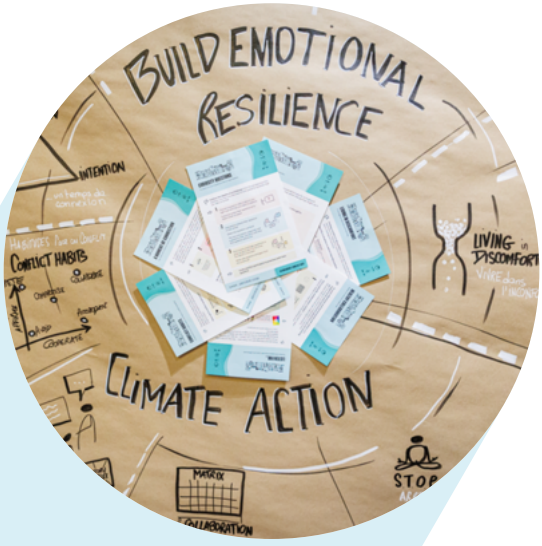

Colophon

Accelerating Next-Generation City Climate Action: Findings from the 2024 Innovate4Cities Conference and Update to the Global Research and Action Agenda on Cities and Climate Change Science (GRAA)

This report has been developed by the Global Covenant of Mayors for Climate & Energy (GCoM) and the United Nations Human Settlements Programme (UN-Habitat) based on the findings from the 2024 Innovate4Cities Conference. It is intended to inform research, policy and public discussions centered on the Global Research and Action Agenda on Cities and Climate Change Science (GRAA).

The authors have sought to ensure the accuracy of the material in this document, but they will not be liable for any ramifications incurred through the use of this report.

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Executive Summary

The Montréal Call to Action on Cities, Climate Research, and Governance—signed by more than 100 individuals at the 2024 Innovate4Cities Conference—echos the 2023 Global Stocktake in forecasting the world falling far short of the goal to keep global warming below 1.5 °C, and heading towards an unpredictable and risk-laden increase of 2.8 °C by 2100. Reversing this trend—and averting increasingly catastrophic impacts of climate change—requires resolute action and collaboration between subnational and national governments for implementation at a pace and scale that the world has never seen before.

Since 2018, Innovate4Cities—the Global Covenant of Mayors for Climate and Energy (GCoM) initiative focused on urban research and innovation, and home to the biennial conference co-hosted by GCoM and the United Nations Human Settlements Programme (UN-Habitat)—has responded to the climate crisis with a commitment to co-creating knowledge, generating collaborative partnerships, and empowering cities and local governments as the conduits for action and progress at the heart of a necessary systems transformation towards a safe, just, low carbon and climate resilient future.

The 2024 Innovate4Cities Conference (I4C24) was the latest milestone in the evolving engagement between cities, climate change science, and innovation, convening nearly 2,000 experts, leaders, and advocates across research, government, business, and civil society at the nexus of the climate change challenge. Hosted in Montréal, Canada from 10-12 September 2024, I4C24 delivered three game-changing evolutions to accelerate urban climate action:

1. **An updated Global Research and Action Agenda on Cities and Climate Change Science (GRAA)**, ushering the next generation of knowledge and innovation synthesis built to inform broader processes like the IPCC Special Report on Climate Change and Cities. Founded on evidence from Innovate4Cities Conferences and Marketplaces since 2018 and the 226 sessions that were facilitated as part of the formal I4C24 Schedule, the GRAA also aims to infuse cutting-edge practice, research, and innovation into each step of the city climate action journey—while tackling knowledge gaps and action priorities surrounding the new **pillars of justice and equity, systems approaches, and city-level models, data, and knowledge**;

2. **The AI x City Climate Action Hackathon**, carving out a new pathway to unlock the data and evidence needed to help cities and local governments convert climate plans into action implementation at speed and scale through artificial intelligence (AI), machine learning, and emerging technologies. The 140+ inspired participants—exemplified by the excellence of the winning submission, **DUCTExplorer**—highlighted the AI-assisted opportunities for local action prioritization, especially in the context of adaptation to climate risks and hazards;

3. **The Climate Innovation Readiness Navigator for Cities and Local Governments (CIRN)**: a methodology to help cities and local governments—and the myriad of stakeholders working and living amongst them—assess and enhance their readiness to engage each other in innovative climate action. Developed in partnership with Arup, the CIRN offers an opportunity to catalyse existing and new partnerships across all gaps and priorities of the GRAA—as well as provide regional and national policy-relevant profiles of climate innovation readiness to inform fit-for-purpose actions.

I4C24 placed the knowledge and innovation spotlight on four overarching themes: **1) multi-level governance and partnerships**, **2) biodiversity and climate resilient development**, **3) digitalization**, and **4) finance**. These themes provided the backdrop against which over 300 abstracts were submitted for the conference schedule, and simultaneously represent crucial knowledge gaps and action priorities that need to be addressed in order to successfully accelerate research-informed, evidence-based city climate action implementation. This multidisciplinary, cross-sector structure informed three days of plenary sessions from leading experts and practitioners as well as deep dive discussions across each of the parallel sessions and helped solidify the renewed purpose and structure of the latest update to the GRAA: a systems approach to delivering justice and equity in urban planning and design for climate resilient development in cities. The conference featured both in-person and virtual sessions, promoting inclusivity and ensuring a wide range of perspectives.

Accelerating Next-Generation City Climate Action: Findings from the 2024 Innovate4Cities Conference and Update to the Global Research and Action Agenda on Cities and Climate Change Science (GRAA) is formed of three distinct and complementary sections:

1. **Outcomes and Takeaways from the 2024 Innovate4Cities Conference**, featuring a top-level outline of significant learnings across I4C24 themes and immediate next steps for the Innovate4Cities initiative;
2. **The 2024 Innovate4Cities Conference at a glance**, featuring descriptions and summaries of selected elements from the conference schedule as well as outlining the process for I4C24 execution; and
3. **The Updated Global Research and Action Agenda**, featuring a compendium of the latest knowledge gaps and action priorities that form the GRAA—as well as topic-specific insights and anecdotes from sessions that took place at I4C24.

Bolstered by findings, takeaways, and outcomes from I4C24, the Innovate4Cities initiative has reaffirmed its mandate to co-create and drive solutions for a dynamic and inclusive research and innovation agenda. This agenda will bridge crucial knowledge gaps required to meet the goals of the Paris Agreement and Sustainable Development Goals—especially in underserved regions, cities, and local governments across the Global South. Refined to emphasize the importance of emerging topics from Innovate4Cities Conferences and Marketplaces, reinforce relationships between themes, and recognize the value of empowering cities to take action, the GRAA is now a more robust and holistic evidence base to support city climate action planning, implementation, innovation, and research.

This report provides guidance for the continued growth of the Innovate4Cities initiative across the Global Covenant of Mayors alliance—inclusive of the Innovate4Cities Conferences co-hosted by GCoM and UN-Habitat—and the opportunities to inform action with the latest research and innovation—across all levels of government and sectors of society.

Message from the Co-hosts

By 2050, towns and cities are expected to grow by 2.5 billion people. This unprecedented urbanization trend requires an extraordinary response to ensure sustainable, safe, and equitable cities for the people living in them.

Already, more than 13,000 cities and local governments committed to the GCoM alliance are telling us that climate risks are here—and getting worse. From extreme heat and water scarcity to extreme precipitation and floods and storms, urban residents today are at the frontlines of the fight against climate change. People, infrastructure, and ecosystems in urban areas will be further exposed to the worsening effects of global warming in the coming decades.

Recognizing the impetus for urgent, comprehensive, and people-centered city climate action, GCoM and UN-Habitat joined hands for the second time in three years to co-host the 2024 Innovate4Cities Conference from 10-12 September 2024: a convergence of around 2,000 leaders across academia, government, business, and civil society to identify, summarize, and synthesize the knowledge we desperately need to advance on the priorities and gaps that practitioners have said are crucial to meeting the Paris Agreement and Sustainable Development Goals.

Inspired by leaders across disciplines committed to co-generating knowledge for city climate action, I4C24 proved a pivotal moment to shepherd the evolution of our foundational evidence base: the Global Research and Action Agenda on Cities and Climate Change Science, or GRAA. Through the GRAA and its accommodation of both peer-reviewed and gray literature, I4C24 stands as a crucial point of knowledge, research, and innovation synthesis—and remains open for current and future urban-focused actors to exchange insights that can spur action.

Together, Innovate4Cities and the GRAA are built to help inform a string of broader global processes that will impact the future of city climate action—not least including the IPCC Special Report on Climate Change and Cities, the Coalition for High Ambition Multilevel Partnerships (CHAMP) and the broader focus on strengthening multi-level governance, and forthcoming updates to nationally-determined contributions (NDCs) and the UN Climate Change 'COP' process.

The knowledge and innovations synthesized through I4C24—which will accommodate newer, co-generated, and accessible insights in the future—can enable solution uptake across sectors, tear down barriers to action, and catalyze finance flows towards local implementation.

The findings and outcomes from I4C24 serve as a reminder of the urgent, rapidly-evolving, and regionally-diverse knowledge gaps and action priorities that villages, towns, and cities face daily.

With fervent hope and determined conviction, we have purposefully underpinned these insights with an open invitation to government practitioners, researchers, civil society advocates, and private sector trailblazers to join us in ushering a new generation of urban research and action - one that is founded on co-creation, empowerment, and partnership.

There is no time to waste. Join us as we accelerate city climate action—together.

GLOBAL COVENANT of MAYORS for CLIMATE & ENERGY
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SECTION ONE:

KEY TAKEAWAYS FROM THE 2024 INNOVATE4CITIES CONFERENCE

1. Knowledge Gaps and Action Priorities at a Glance

Building on an ever-growing body of knowledge and community of practice, I4C24 served as a key milestone in the Innovate4Cities initiative by amassing—and furthering—the insights gathered from the 2018 International Conference on Climate Change and Cities, Global Research and Action Agenda (GRAA), City Research and Innovation Agenda (CRIA), the 2021 Innovate4Cities Conference, and more than ten Innovate4Cities Marketplaces. Established as entry points for cross-sector, multi-level discussions on how to accelerate and inform city climate action, I4C24 was anchored on four encompassing, non-exhaustive themes: **Multi-level Governance and Partnerships, Biodiversity and Climate-resilient Development, Finance,** and **Digitalization**.

Grounded in agendas and marketplaces for knowledge and action

First produced in 2018 at the International Conference on Climate Change and Cities Conference in Edmonton, Canada, the GRAA was designed to guide local authorities, academia, business and civil society to build the evidence-base needed to support city climate action that goes further and faster and to identify the research needed to inform the Intergovernmental Panel on Climate Change's Special Report on Climate Change and Cities.

The GCoM alliance then developed a complementary City Research Agenda (CRA)—an adaptation of the GRAA driven by the perspective of city practitioners to highlight the priority data, information and technology gaps to which local governments needed urgent responses to enable action. Building on these efforts to drive science-based, technology-driven, replicable sustainable action and implementation, the 2021 Innovate4Cities Conference (I4C21) delivered new updates to the GRAA—including the addition of 'history and cultural heritage' as a topical area—after convening nearly 7,000 participants online across all regions of the world.

Following I4C21 the City Research and Innovation Agenda (CRIA) was developed as an update to the CRA. The CRIA was founded on four policy-relevant priority questions that cities and their partners seek to answer as they develop and implement their climate action plans:

1. **How do we build the evidence base for climate action?**
   Evidence is required to progress decision making in cities and provide a rationale to act.

2. **How-and-for whom should we prioritize?**
   Local context needs to be built into the knowledge generated to enable cities to prioritize and act to reduce impact and increase benefits for vulnerable communities.

3. **What should we do?**
   Research priorities on topical areas that are the most important entry points for city action.

4. **How do we finance and scale climate action?**
   Policy and finance instruments to promote large scale uptake of solutions that account for time-scale differences in local decision-making processes.

More than ten Innovate4Cities Marketplaces facilitated conversations across levels of government, business, academia and civil society in 2023 and 2024 to identify, share and explore knowledge gaps and opportunities to strengthen city climate action. Crucially, these Marketplaces took place in ten different countries amassing more than 600 participants—drawing attention to region—and country-specific characteristics and considerations for accelerating city climate action. This includes the Marketplace at the *ICLEI Global Research and Innovation Symposium, which served as a complementary event that helped inform discussions at—and outcomes from—I4C24.*

The approaches that stood out from the convenings of the I4C Marketplaces included an emphasis on accelerated action and on-going dialogue, thematic champions, and the use of digital technologies to enable partnerships that can scale up local climate action planning and implementation.

Channeling action recommendations through key themes

Supported by a robust evidence and engagement base, I4C24 focused on four key themes: Multi-level Governance and Partnerships, Biodiversity and Climate Resilient Development, Finance, and Digitalization.

These themes served as the foundation for the development of the call for abstracts and the organization of thematic plenaries. Additionally, a focused event titled the 'AI x City Climate Action Hackathon' was held specifically to explore the applicability and feasibility of artificial intelligence (AI) in helping cities and local governments plan for climate adaptation actions.

Panel sessions bringing together leaders from local governments, academia, business and civil society helped gain critical insights that highlight critical knowledge gaps and priorities. The tables below highlight the findings from each of the I4C24 themes.

The knowledge gaps and action priorities presented below are synthesized summaries of discussion and insight from deliberations that took place at I4C24. For further detail, including the full tables on knowledge gaps and action priorities, descriptions of each theme under the updated GRAA, and deeper insights from I4C24, please refer to **Section Three: The Updated Global Research and Action Agenda (GRAA)**.

Multi-level Governance and Partnerships

Number of parallel sessions: 70

Plenary session participants	Gregor Robertson, GCoM Dr. Winston Chow, IPCC Working Group II, Singapore Management University Marie-Andrée Mauger, City of Montréal Aurélie Bonal, EU Delegation to Canada Kirsten Dunlop, EIT Climate-KIC Jacob Martin-Malus, Ministry of Environment, the Fight against Climate Change, Wildlife, and Parks Dr. Myrle Ballard, Environment and Climate Change Canada

The following overarching knowledge gaps emerged:

1. **Governance structures often lack cohesion and remain slow in unlocking finance flows between national and subnational governments.** [Relevant KGs: 8, 18, 17, 49]

2. **While there are signs of progress, siloed efforts on climate action persist at all levels of government**—creating inefficiencies in implementation, slowing communication and collaboration, and reducing overall potential impact. [Relevant KGs: 9, 34, 134]

3. **Inclusive climate action—incorporating local, historical, Indigenous, and generation-sensitive perspectives—remains elusive across levels of government**. [Relevant KGs: 34, 44, 50, 71]

4. **Scaling public-private partnerships—and other forms of cross-sector collaboration—across small and mid-sized cities are paramount to accelerating systemic change.** [Relevant KGs: 34, 49, 70]

5. **There is untapped opportunity for governments to improve action prioritization, monitoring, and procurement processes—including through the sustainable use of artificial intelligence (AI), tools, and emerging technologies.** [Relevant KGs: 67, 72]

The following overarching action priorities emerged:

1. **Facilitate inclusive, flexible, and multi-level governance structures** that encourage—and where possible, institutionalize—collaboration between municipal, regional, national, and international actors. Partnerships should prioritize sustainability, resilience, and low-emission strategies through participatory models that value and consult historically marginalized and vulnerable populations. [Relevant APs: 4, 25, 61, 239, 240]

2. **Mainstream climate change mitigation and adaptation into comprehensive urban planning and budgeting.** This includes prioritizing policies and actions that have multiple feasible financing opportunities—and address urban heat islands, incorporate informal settlements, and integrate nature-based solutions where appropriate and relevant. [Relevant APs: 3, 8, 10, 14]

3. **Lean into local government innovation gaps by testing, piloting, and adopting digital technologies that can support city climate action that goes further and faster.** This includes artificial intelligence-augmented data monitoring and processing, innovative procurement models, as well as increased staff literacy and awareness on climate-relevant processes. [Relevant APs: 30, 233]

4. **Incorporate social science to engage a broad range of stakeholders, from planning to implementation.** Create spaces for co-creation and active consultation, ensuring that residents in informal settlements and marginalized communities are included in decision-making. [Relevant APs: 34, 62, 65]

5. **Continue supporting cities and local governments in the development of climate actions, targets, and implementation strategies that reflect capacities.** Collaborative benchmarking and flexible funding empower local authorities to take ownership of climate strategies, fostering innovative policy approaches that can respond to a rapidly-changing climate. [Relevant APs: 63, 242, 243]

Biodiversity and Climate-Resilient Development

Number of parallel sessions: 45

Plenary session participants	Emilia Tamko, Chamber of Commerce of Eastern Montréal and Co-Founder, Université dans la Nature Georges Youssef, Mayor of Menjez, Lebanon Debra Roberts, Université du KwaZulu-Natal/Université de Twente Nate Echeverria, Resilient Cities Network Eleni Myrivili, UN-Habitat Sarah Bell, Melbourne Centre for Cities

The following overarching knowledge gaps emerged:

1. **To ensure equitable co-benefits from mainstreaming biodiversity, benefits across different socio-economic groups and Indigenous communities must be understood.** [Relevant KGs: 1]

2. **There is a lack of community empowerment in climate resilience and biodiversity initiatives as a result of limited opportunities for public participation.** [Relevant KGs: 4]

3. **Practitioners require evidence-based guidance for sustainable climate resilient development**, and to harness the co-benefits of climate adaptation strategies that leverage urban nature such as Nature-based Solutions (NbS). [Relevant KGs: 1, 5]

4. **Coordination across sectors and fragmented governance structures are a barrier for city actors to align efforts and drive effective climate action** which mainstreams biodiversity initiatives and climate resilience at scale. [Relevant KGs: 27, 69]

The following overarching action priorities emerged:

1. **Address the capacity and resource needs for mainstreaming biodiversity and climate resilient development**—by developing frameworks for investments into initiatives and strategies that leverage urban nature. [Relevant APs: 24, 189]

2. **Integrate climate resilience mechanisms into relevant sectoral climate solutions**—recognizing the co-benefits of strategies such as Nature-based Solutions, Ecosystem-based Adaptation and the knowledge for the uptake of benefits across city sectors. [Relevant APs: 7, 191]

3. **Incorporate biodiversity initiatives into city governance by engaging diverse stakeholders and ensuring inclusive planning for both human and non-human species.** [Relevant APs: 192]

4. **Strategically embed and accelerate the adoption of climate adaptation strategies** such as nature-based solutions (NbS)—including solutions such as mangrove restoration and urban tree management strategies that drive emissions reduction, biodiversity gains and improvement in air and water quality. [Relevant APs: 11, 194]

5. **Increase the capacity and generation of evidence-led climate resilience initiatives in the Global South** leveraging the use of digital technologies such as AI and digital twins where possible to make the case for prioritization of climate action. [Relevant APs: 32]

6. **Biodiversity protection and climate resilient development strategies require adequate capacity and resources for contexts such as the Global South** for prioritization in competing urban agendas. [Relevant APs: 94]

Finance Number of parallel sessions: 21

Plenary session participants	Andy Deacon, Global Covenant of Mayors (GCoM) Savina Carluccio, International Coalition for Sustainable Infrastructure Marie-Josée Parent, Raven Indigenous Outcome Funds Sohaib Athar, World Bank Group Tadashi Matsumoto, OECD Maria Camila Uribe, Inter-American Development Bank (IDB)

The following overarching knowledge gaps emerged:

1. **Limited capacity and coordination between national and local governments present major barriers to cities in accessing climate finance**, hindering their ability to scale up climate action. [Relevant KGs: 17]
2. **Innovation, political alignment and strong collaborative mechanisms are needed to improve access to climate finance and enable climate action at city level.** [Relevant KGs: 106]
3. **While public-private partnerships show potential, their inconsistent integration across cities limits the development of financial strategies and investments which increases the gap between national climate goals and local action.** [Relevant KGs: 20]
4. **The exclusion of marginalized and vulnerable groups in climate finance strategies weakens progress to mainstream justice and social equity** while fragmented fiscal frameworks exacerbate these challenges. [Relevant KGs: 38]
5. **Persistent information gaps present major challenges for cities and limit their ability to access climate finance** by preventing coordinated information flows across relevant city sectors leading to poor decision-making and barriers to streamlining funding processes. [Relevant KGs: 8]

The following overarching action priorities emerged:

1. **Embed climate mitigation and adaptation priorities in city planning, budgeting and governance frameworks.** [Relevant APs: 10]
2. **Adopt innovative financial mechanisms**, such as blended finance strategies and public-private partnerships to generate interest for investments from financing entities. [Relevant APs: 28, 249, 250, 254]
3. **Increase the uptake of digital financing tools and AI-driven policy analysis** to unlock funding sources and effectively allocate resources. Enabling this transition requires an enabling policy environment and sufficient technical capacity to identify and integrate tools and analysis. [Relevant APs: 250]
4. **Incentivize city officials to explore climate innovation** and to take transformative action that could encourage and inform political and public support for climate investments, including through job creation. [Relevant APs: 32, 244]
5. **Leverage the economic, health and societal co-benefits of climate action—including job creation potential—to increase investments in climate initiatives** by positioning these benefits as key motivators for scaling city-level climate solutions. [Relevant APs: 19, 31]
6. **Strengthen capacity and collaboration between city governments and the private and finance sector to develop bankable climate projects**, establishing public-private partnerships to increase cities' creditworthiness and de-risk investments. [Relevant APs: 252]
7. **Promote inclusive governance structures that bring together formal and informal city actors that can drive cross-sector collaboration and co-create key performance indicators**, mainstreaming equity and justice at the core of city climate action to increase attractiveness for investments and unlock climate finance. [Relevant APs: 112]

Digitalization Number of parallel sessions: 90

Plenary session participants	Giorgia Rambelli, Urban Transitions Mission Peter Wilcox, Bell Pooja Mahapatra, Fugro Jacob Koch, Bloomberg Associates Donna Vakalis, MILA Pourya Salehi, ICLEI World Secretariat

The following overarching knowledge gaps emerged:

1 **Cities and local governments need additional clarity on the ways in which digital technologies and AI can be incorporated into each phase of the city climate action journey**. For small and mid-sized cities in particular, understanding where digitalization can add the greatest benefit at manageable cost is critical to ensuring a sustainable transition while safeguarding service provision. Forecasting development scenarios and plans can help renovate and regenerate existing cities while understanding the role and guiding the growth of rapidly urbanizing areas. [Relevant KGs: 19, 54]

2 **A better understanding of the costs and benefits associated with the use of digital solutions and emerging technologies is needed—especially for local governments with limited capacities**. While digitizing processes relevant to city climate action can bring significant benefits to accelerating progress towards implementation, there are concerns on the energy and resource intensity of certain technologies as well as the ability to maintain appropriate privacy standards for residents. Mitigating measures for the latter and stronger visibility on all options are needed. [Relevant KGs: 26, 67, 97]

3 **In general, the digital infrastructures that connect sustainability policy and service provision are fragmented across national, regional, and local governments**. Making systems 'smarter'— incorporating interoperability, real-time updates, and user management features among others—remains elusive and high-cost for individual local governments. [Relevant KGs: 96]

4 **Further knowledge is needed on how to scale public-private partnerships – especially for small and mid-sized cities, who may need to aggregate their demand and capacity**. While digital solutions remain a comparative advantage for businesses, there is an appetite to collaborate with levels of government to pilot and roll out technologies that can augment climate action. Making those options well-known to local practitioners is a priority. [Relevant KGs: 140]

5 **Cities and local governments need further opportunities to showcase real-world examples where digital transformation has led to improved sustainability and livability**. Demonstrating successful initiatives in cities with a similar local context and challenges offers proof of concept and reduces the perceived risks to city leaders and funders. [Relevant KGs: 61]

6 **There is a gap in developing innovative digital finance mechanisms between small-scale crowdfunding and large-scale development bank investments**. Research is needed to explore how digital finance can both be made more accessible to local governments and create "bundled" investment opportunities for small and medium-sized cities, making projects more attractive to investors while reducing risks. [Relevant KGs: 19]

The following overarching action priorities emerged:

1 **Empower cities and local governments to innovate with procurement processes to test, pilot, iterate, and potentially scale digital solutions as part of a broader climate action plan**. Facilitating connection with the expertise of researchers, think tanks, and businesses in the implementation of digitally-enabled climate actions—in a manner that minimizes risk incurred by local governments—can accelerate progress. [Relevant APs: 1]

2 **Ensure that digital transition processes aren't technocentric, but inclusive of community well-being and address vulnerability, history and cultural heritage**. Digital solutions may be a means of implementing actions that secure a sustainable and just future; ensuring they remain people-centered and user-friendly is paramount. [Relevant APs: 97]

3 **Enable and boost collaboration with private sector institutions—including start-ups and incubators— many of whom have access to the data and technical expertise required to infuse digitalization into the climate action journey**. This may also include pre-commercial arrangements that facilitate exchange of information and technical expertise without incurring direct financial transactions. [Relevant APs: 138]

4 **'Transpose' geospatial industry data and tools into city-relevant formats to improve accessibility and actionability for local government practitioners**. Inclusive of digital twins, AI-assisted heat maps, and app-based sustainability tracking, these potentially efficient hubs for data sharing and processing need to be affordable, well-understood—and usable—by their target audiences. [Relevant APs: 134]

5 **Explore digital financing options—including crowd-sourcing, digital green bonds, and AI-powered risk assessment tools—to potentially fund city-scale climate projects**. While nascent, digital finance continues to rise as an option for cities and local governments in their action implementation phases—with more knowledge needed. [Relevant APs: 136, 140]

6 **Establish targeted support programs, including funding and capacity-building initiatives, to help local governments adopt digital technologies holistically**. Create frameworks that encourage policy foresight, promote civic participation, and facilitate collaboration among public, private, and community stakeholders. [Relevant APs: 138]

7 **Develop data-sharing platforms that offer local governments streamlined access to relevant datasets**. Provide training programs and analytical tools to improve their ability to process data and transform it into actionable insights for policy-making and service delivery. [Relevant APs: 134]

8 **Local governments need to take more concrete steps to develop strategic and integrated digitalization roadmaps**, form Digital Transformation Task Forces, and foster multilevel governance approaches that coordinate efforts across various government levels, private sectors, and civil society. [Relevant APs: 30]

9 **Pool knowledge and insights from cities that have implemented digital transformation initiatives**. Networks can offer technical assistance, mentorship, and guidance to cities that are just beginning their digital transformation journeys and facilitate the sharing of best and next practices, policy frameworks, and technology solutions to drive sustainability, livability, and urban development. Pooling insights derived from experimentation is also conducive for sharing weak signals and early insights to inform anticipatory policies and frameworks. [Relevant APs: 65]

10 **Local governments should actively engage with the private sector and academic institutions to foster innovation, research, and development of digital tools**. This multi-stakeholder collaboration can bring in diverse expertise and resources to solve complex societal challenges. [Relevant APs: 51]

2. AI x City Climate Action Hackathon

> If you are running an organization that's thinking about running more AI tools[...] you have to be particularly dialed into where there are opportunities to propagate bias or disparity,

said Beth Blauer, Associate Vice Provost, Public Innovation at Johns Hopkins University as part of the **AI x City Climate Action Hackathon**.

There is significant momentum at the intersection of climate action and emerging technologies, with artificial intelligence (AI) showing immense potential to enhance cities' efforts in tackling climate challenges. However—as reinforced by both plenary and parallel sessions as well as the Hackathon—guiding the development, deployment, and integration of AI and emerging technologies to ensure that they remain people-centered, action-oriented, and policy-relevant remains a paramount priority for cities and local governments.

AI-powered adaptation action planning for Brazilian cities and local governments
The AI x City Climate Action Hackathon—a highlight as part of a broader focus on digitalization at I4C24—was designed to explore AI's role in strengthening the evidence base for climate adaptation planning, while also engaging practitioners in the current challenges and opportunities AI presents. The fully hybrid Hackathon challenged participants to develop an AI-powered methodology that can rapidly assess the risks and vulnerabilities of any Brazilian city to climate hazards like heat extremes, droughts, storms, and floods.

With more than 150 GCoM signatories across the country, many of whom are reporting increasingly concerning data on the climate risks and hazards they face, Brazil served as a demand-driven focal point for understanding the suitability and applicability of AI in the urban context. The country also figures as an endorser of the Coalition for High Ambition Multilevel Partnerships (CHAMP), which provides a pathway to identifying and scaling up opportunities for AI-augmented city climate action planning across the country.

Associate Vice Provost Beth Blauer also led a hands-on session exploring practical ways to integrate AI into climate action at local level - with important takeaways focused on data validation, governance and ethics, as well as transparency and privacy.

The winning finalist: the Digital Urban Climate Twin Explorer (DUCTExplorer)

DUCTExplorer is a proposed solution that seeks to overcome the challenges of mapping urban heat through a 'digital twin' that integrates machine learning-enhanced data sources with physics-based climate models to create a comprehensive representation of urban climates under diverse scenarios. Based at the Singapore-ETH Centre, the team was led by Adelia Ayu Sukma.

Leveraging Greater Rio de Janeiro, Brazil as a case study, the DUCTExplorer team proposed a definition of city boundaries within which a Weather Research and Forecasting (WRF) model is employed—in turn identifying and representing multiple urban surface characteristics. Multiple datasets—both local to Brazil, like **MapBiomas 10m Collection** for vegetation, and globally available, like **ESA World Cover viewer** for land use and **OpenStreetMap** for building footprint—were proposed.

Combining these datasets and others to help create a heat risk map for Rio de Janeiro, the team were then able to provide district-scale analysis to model how airflow, temperature, and the built environment influence each other—providing a strong, policy-relevant evidence base for potential future actions.

A total of 14 teams from 12 countries submitted proposals for the Hackathon, showcasing innovation in AI-augmented climate adaptation planning at local level and providing insights on the present-day opportunities to infuse new models and methodologies into data collection and analysis processes.

Key findings from the AI x City Climate Action Hackathon

1. **The datasets required to support tool-based, and at times AI-augmented, risk and vulnerability assessments for cities already exist today**. While they may differ in characteristics like geographical coverage, spatial resolution, and maintenance/updates, there is enough data for cities and local governments to 'get started' on their climate action journeys. This is especially true for the Brazilian case, with a strong local data provider for adaptation (AdaptaBrasil).

2. **While data exists, small and mid-sized cities and local governments require some level of processing and formatting to ensure maximum actionability**. Local governments with limited capacity for data manipulation are insufficiently equipped to build risk and vulnerability assessments on their own. Technical assistance supporting public sector ability to deliver and utilize fit-for-purpose tools that combine datasets and produce concrete outputs needed by local governments in their climate action journeys, are needed.

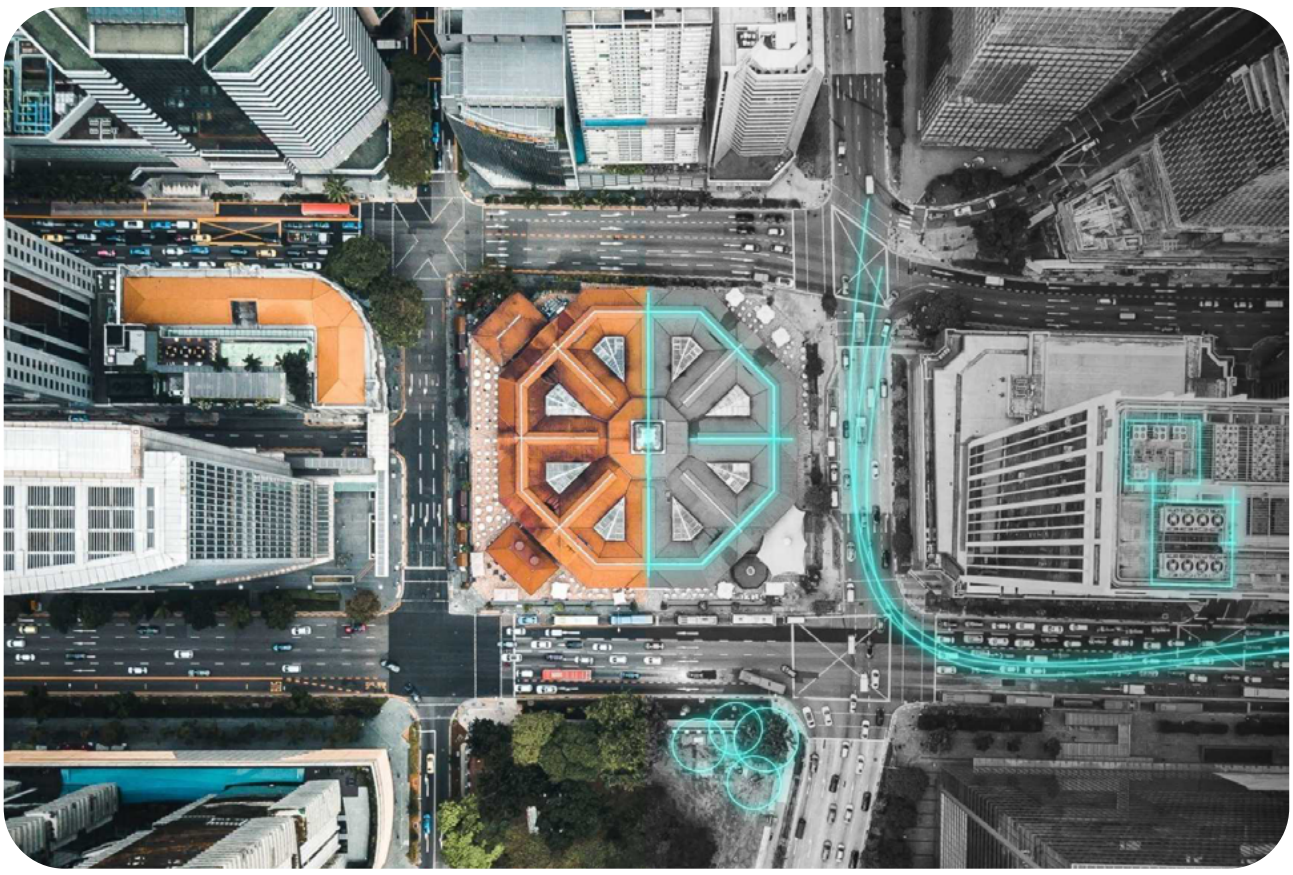
3. **There is a need to collate and showcase tools that integrate datasets and produce fit-for-purpose outputs on adaptation and they need stronger maintenance, updates, and user support to ensure effectiveness**. The GCoM Tools Library already features more than 50 tools endorsed by its alliance of partners on climate mitigation efforts; the Data Portal for Cities, which launched new features during the **AI x City Climate Action Hackathon** to make GHG inventory creation easier for 60,000 communities globally, is one of them.

4. **Supply and demand for AI-augmented tools and datasets is increasing rapidly**. The teams and supporting partners who participated in the **AI x City Climate Action Hackathon** hail from a variety of cities and countries facing myriad risks and vulnerabilities, united by their ability to map, assess, and extract action-oriented insights from regional and global datasets.

5. **Open-source, machine learning-enhanced datasets are growing in number and quality—and need to be made accessible to city users for mitigation and adaptation planning**. Hackathon winner DUCTExplorer utilizes datasets that provide strong spatial coverage that enables the modeling from which insights and action recommendations are taken. Applying this methodology for cities of all shapes and sizes globally requires fit-for-purpose tools that retain action-relevant outputs.

6. **Cities and local governments—especially small and mid-sized—need to be empowered by innovative governance and accelerated capacity to understand and incorporate AI and digital solutions into their climate action journeys**. Significant knowledge is being developed on the supply-side of data and tools, while local governments—who remain tasked with service provision and myriad priorities for their constituents—do not always hold mandates to innovate on data analysis.

› For more information on the process, details, and full results of the **AI x City Climate Action Hackathon**, please refer to Section Two.



3. Outcomes and next steps for Innovate4Cities

I4C24 convened nearly 2,000 registered participants—including around 600 individuals in-person in Montréal—from over 100 countries to advance knowledge at the nexus of cities, climate change science, and innovation. Participants from academia, multi-level government, civil society, and business reaffirmed both the value of convenings that pair policy, research, and practice, as well as the need to leverage this shared momentum to inform broader processes and further catalyze climate action at all levels of government—and across all sectors of society—globally.

An updated, future-proofed Global Research and Action Agenda

At the core of I4C24 outcomes and the forward trajectory for Innovate4Cities are the updates to the Global Research and Action Agenda on Cities and Climate Change (GRAA). Designed as a "systems approach to research & innovation in urban planning & design utilizing city-level models & data to deliver just & equitable action in climate resilient development," the updated GRAA brings together its previous iterations from 2018 and 2021 as well as the City Research and Innovation Agenda into a 'single' agenda focused on both research and action.

The GRAA is now comprised of four distinct and interconnected structural components:

Delivery Approaches
Pillars of Justice and Equity
Systems Approach Levels
City Level Models, Data, and Knowledge

Figure 1: The GRAA visually represented as an integrated structure of interrelated elements

In its updated form, the GRAA is now an improved organizational structure for the knowledge and innovation outputs being co-generated by researchers, governments, businesses, and civil society. Each topic across the GRAA serves as a home for the theoretical, practical, and methodological approaches applied to knowledge and innovation for city climate action. In the future, the GRAA will 'fill' the 'pillars' and 'floors' with new knowledge, the interlinkages between topics, and pathways for implementation. Aiming to help partners across sectors consult and situate themselves in the latest knowledge and innovation, the updated GRAA is primed to complement the city climate action journey as a future proofed evidence base for partnership, research, and action – across levels of government.

› For more information on the process, details, and full insights for the updated GRAA, please refer to Section Two.

Outcomes and next steps for InnovateCities

Benefitting from insights from I4C24 and an updated GRAA, five crucial outcomes have emerged:

1 **Innovate4Cities is now reinforced with a more robust, holistic, and flexible Global Research and Action Agenda on Climate Change and Cities (GRAA)** that allows science and action to inform each other.

2 Bolstered by the next-generation GRAA and cross-sector knowledge inputs, **Innovate4Cities has been reaffirmed as a policy-relevant process built to inform the IPCC Special Report on Climate Change and Cities**—and other broader climate science and knowledge processes.

3 **Innovate4Cities is now the go-to evidence and collaboration foundation to accelerate multilevel climate action** by making science, knowledge, and innovation available to support stronger, more ambitious, and widespread collaboration between subnational and national governments—especially through the Coalition for High Ambition Multilevel Partnerships (CHAMP).

- The Montréal Call to Action on Cities, Climate Research and Governance recognizes and affirms the role of academia, civil society, business, and local practitioners as co-generators, disseminators, and vanguards of knowledge, research, and good practice for innovative, evidence-based subnational climate action through Innovate4Cities.

4 True to its roots from the 2018 Cities and Climate Change Science Conference in Edmonton, Canada and building on its conference and marketplace series, **Innovate4Cities is the ideal initiative for learning and exchange that informs the city climate action required at unprecedented speed and scale—from all sectors of society**.

- The Climate Innovation Readiness Navigator for Cities and Local Governments, developed by GCoM in collaboration with Arup and launched at I4C24 with Concordia University and the Melbourne Centre for Cities, was reaffirmed as an action-oriented method to identify the strengths and emerging opportunities for cross-sector, multilevel innovations on climate at regional and national scale—generating profiles that can help prioritize implementation.

5 Innovate4Cities was recognized as a **catalyzing space for the strengthening of existing partnerships and generation of new linkages** across research, data, finance, policy, and practice.

To fulfill these outcomes at speed and scale, in 2025 and beyond Innovate4Cities seeks to:

1 **Identify, collate, elevate, and promote the co-generation of knowledge** to inform research and action at the nexus of cities, climate change science, and innovation through the GRAA. This includes publishing and sharing targeted 'sector briefs' based on the updated GRAA and takeaways from I4C24 across levels of government, business, civil society, financiers, and academia to inform policy and practice—and continue to grow the body of knowledge and innovation.

2 **Inspire and catalyze the co-generation of knowledge and innovation on multilevel governance**, leveraging CHAMP as an accelerator for implementation and building on the Montréal Call to Action for Cities, Climate Research, and Governance.

3 **Direct and connect cities, local governments, and partners to the knowledge and innovation that meets regionally relevant needs for city climate action journeys**—leveraging insights from the Climate Innovation Readiness Navigator for Cities and Local Governments and the applications of artificial intelligence and emerging technologies, as showcased in the **AI x City Climate Action Hackathon**.

4 **Generate new, and strengthen existing, partnerships and platforms** across research, data, policy and practice. Engaging leading stakeholders at local and regional level—potential 'champions' of accelerating city climate action—can assist the coordination of action implementation across sectors, realizing and activating climate-resilient development pathways.

5 **Strengthen ties between research, innovation, practice, and advocacy**. I4C24 reaffirmed the importance of positive feedback loops between research and practice, especially in the context of the IPCC Special Report on Climate Change and Cities. Demonstrating how Innovate4Cities inherently serves as a global, diverse, and evolving evidence base for global processes like the UN Pact for the Future, Global Digital Compact, and Coalition for High Ambition Multilevel Partnerships can help ensure that knowledge and innovation is converted into impact at scale.

SECTION TWO:

CONVENING THE 2024 INNOVATE4CITIES CONFERENCE

1. About Innovate4Cities

The science is clear: climate change is the crisis of our time and must be addressed by all sectors of society at unprecedented speed and scale. Impactful consensus at the highest levels of international research on climate science have increased recognition of Paris Agreement commitments, the Sustainable Development Goals (SDGs), and the pathways required to achieve them.

Innovate4Cities was catalyzed through the Cities and Climate Change Science Conference held in Edmonton, Canada in 2018—welcoming hundreds of mayors, practitioners, and network partners and rallying them around a shared declaration to reaffirm the need for innovative action, scientific research, and continued city leadership to deliver on the goals of the Paris Agreement. Following this conference, spurred on by the Edmonton Declaration, the Global Covenant of Mayors for Climate and Energy (GCoM) launched its Innovate4Cities initiative to provide a dedicated space for alliance partners to focus on the coordination, generation, and guidance of research and innovation activities in the service of city climate action.

Backed by broad and deep cross-sectoral engagement, Innovate4Cities heeds the call to supercharge efforts towards climate action implementation at local level. The initiative encompasses marquee Conferences and Marketplaces that provide shared spaces for co-creation, opportunities for solution pilots and demonstrations, and the continuous sharing of knowledge that fosters collaboration across the climate action journey—prioritizing both local-to-local and global-to-local partnerships. Through partnership, Innovate4Cities has ushered in a positive feedback cycle of knowledge and convenings that refresh and refine our understanding of priority gaps and accelerate the development of new insights and solutions across levels of government and sectors of society.

The knowledge and opportunities for collaboration that took place throughout 2023 and now follow in 2024 and beyond—as well as how they inform and empower broader processes on policy and science—are crucial next steps towards realizing the full potential of city climate action.

The following sections present the outcomes and findings from the 2024 Innovate4Cities Conference, including a summary of the proceedings and presentations consolidated during the three days of the Conference.

Section 2 outlines I4C24 proceedings, including high-level deliberations alongside a presentation of the various partnerships and participants involved in making the Conference a valuable step towards accelerating climate action at the nexus of cities, climate science, and innovation.

Section 3 details the evolution of the GRAA over the past six years, including the process involved in the iterative review and evolution of the research framework to meet the emergent needs of cities in responding to climate change and help translate topical research into a format easily viewed at a glance and endlessly investigable as it is continually populated with pertinent research. This includes an examination of the theory and methodology behind the approach to updating and redesigning the GRAA structure for 2024, the role of multilateral frameworks in shaping these updates, and a realignment with priorities as shared by participants in the delivery of their presentations at the 2024 I4C Conference. This new rendition allows a succinct representation of the GRAA dimensions, depicted in a way that enables the full breadth of research it encompasses to be situated inclusively within the systems approach-based structure, inclusive of city-level models & data dimensions through a lens of justice & equity.

2. The 2024 Innovate4Cities Conference

The 2024 Innovate4Cities Conference brought together urban policymakers, practitioners, researchers and actors from local governments, academia, businesses and civil society to produce critical knowledge and explore gaps in research and progress at the intersection of cities and climate change. At its core, I4C24 was centered around empowering cities, establishing and enhancing cross-sectoral partnerships and leveraging regional voices to showcase progress and foster the co-creation of ideas and processes for the development of the updated Global Research Action Agenda (GRAA).

Over the course of three days, 752 participants gathered in Montréal, Canada and over 1233 participants gathered from across the globe to be a part of the discussions that highlighted knowledge and research priorities presented as a synthesis of progress in science-informed innovative practices and approaches. The outcomes of which will contribute greatly in streamlining climate action agendas and to the science related to climate change through informing global climate action processes such as the Seventh Assessment Cycle (AR7) of IPCC Special Report on Climate Change and Cities (SRCCC).

415 In-Person Attendee (including City of Montréal, Invited Guest, and Student)

296 In-Person Speaker

5 In-Person Hackathon

20 Press

21 14C Organizer

752 TOTAL IN-PERSON

13 Virtual Hackathon

1220 Virtual Attendee (Including Speakers)

1233 TOTAL VIRTUAL

1985 Registered Attendees

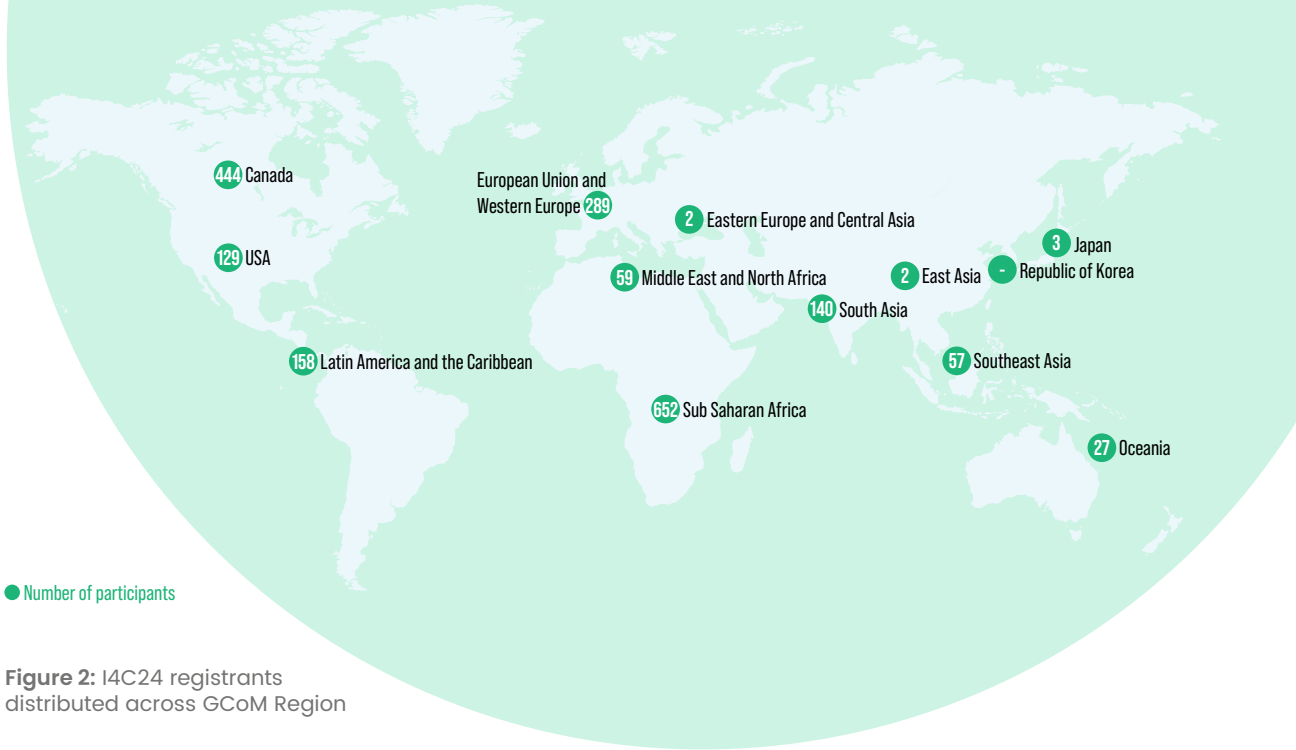


Figure 2: I4C24 registrants distributed across GCoM Region

2.1 I4C24 at a Glance

As a key forum for climate action research and innovation science elevating global, regional and local voices, I4C24 received around 310 submissions to the I4C24 call for abstracts, out of which 260 were selected to be presented as parallel plenary sessions organized across four themes of Multi-level governance and partnerships, Biodiversity and climate resilient development, Finance and Digitalization. These core themes were extracted from the Global Research and Action Agenda (GRAA) and City Research and Innovation Agenda (CRIA) framework which emerged from I4C21.

The four themes were also key topics for moderated plenary sessions that were integrated into the conference program as discussions between leaders from key city sectors who are at the forefront of progress in research and innovation for accelerated climate action. Additionally, two moderated plenary sessions focused on Inclusive climate action and the updated Global Action Research Agenda (GRAA) took place as part of the conference to provide a comprehensive lens to the outcomes of the I4C24. Please refer to Annex A-C for the complete list of abstracts, the conference schedule, and other key components of I4C24.

2.2 Call for Abstracts: Showcasing scientific progress for climate action

Reflecting on the practitioner-led priority gaps identified through the Global Research Action Agenda (GRAA) and the City Research and Innovation Agenda (CRIA) as a result of the 2021 I4C Conference, the call for abstracts for I4C24 was based on four key themes, serving as strategic entry points for impactful, evidence-based, cross-sectoral discussions and knowledge generation. In alignment with the themes, I4C24 sought to incorporate cross-cutting topics, exploring how aspects such as informality, justice and equity, and history and cultural heritage contribute to climate resilient development.

While the conference called for content to review and update the full spectrum of the GRAA wheel, four key themes were specifically highlighted in the call for abstracts. These four themes, Biodiversity and Climate Resilient Development, Multi-level Governance and Partnerships, Digitalization, and Finance were selected as topics of particular concern for cities grappling with decisions on best climate action for their city journey.

The submissions were encouraged to address the complexities of social justice, urban migration, decarbonization, and climate events from both global and regional perspectives. The call for abstracts was also focused on receiving session presentations showcasing innovation in problem-solving, creativity, leadership, multidisciplinary approaches, visioning, policies, processes, and products. Encouraging submissions for best practices and novel projects that take risks, test new ideas, utilize data-driven analytics, engage citizens in innovative ways, and leverage digital technologies and human-centered design.

To ensure the highest quality of the anticipated outcomes, submissions were selected based on scientific rigor that supports the wider goal of I4C24 of synthesizing collective research and measuring progress against the priorities outlined in the GRAA and CRIA with the ambition of an updated and unified GRAA/CRIA agenda.. I4C24's primary objective was to deliver new data and research insights, serving as a catalyst for continually growing dialogue and knowledge exchange between local governments and sustainability practitioners across all communities while demonstrating fresh approaches to interdisciplinary knowledge co-production and multilevel governance, amplified by diverse voices and perspectives.

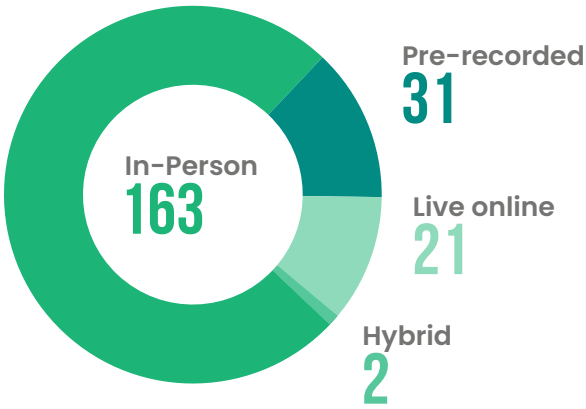


Figure 3: Abstract selection and mode of presentation

Figure 4: GCoM regional distribution of selected abstracts

2.3 Capturing Insights from I4C24

While the submissions to the Call for Abstracts were programmed as parallel plenary sessions, I4C24 was packed with valuable insights and knowledge complemented by plenary sessions that captured progress in climate science from leading practitioners in each of the themes of I4C24. The six thematic plenaries engaged the audience from opening to close of the conference. Starting with the opening plenary that set the scene for I4C24, the 'Accelerating city climate action through multi-level governance and partnerships' panel emphasized the role of Multi-level Governance and Partnerships for accelerating climate action, reinforcing the message behind the CHAMP initiative and the Montréal Call to Action.

The discussion focused on the critical need for vertical and horizontal coordination across different levels of government and highlighted the role of collaboration between public and private sectors to drive emissions reduction. A holistic understanding of innovation was presented, where practitioners were encouraged to incorporate historical, local, and Indigenous knowledge while looking forward in building climate resilience. A reflection on Indigenous knowledge was also made for aspects such as names of spaces, and their relationships to the environment, integrating their experience to establish baseline indicators, highlighting the importance of giving voice to nature within governance frameworks.

Cities were framed as spaces where local expertise and place-based understandings can converge while addressing climate science through the lenses of justice, distributional effects, and origins. There was an emphasis on the need for expanding knowledge competencies across city sectors to comprehend the assumptions embedded in climate policies set from higher tier governance.

The discussion also explored innovation gaps and the potential of leveraging digital technologies to inform partnerships that can lead to whole-city transformations, financial mobilization, systems literacy, and collective action. To undertake these actions, the core design of stakeholder systems and their interests was suggested as a consideration while stressing the urgency to act, plan, implement, and deploy competencies, particularly for climate emergencies. Looking ahead, there was a focus on establishing leadership for the next generations that will face the impacts of climate change.

I4C24 was committed to amplifying the integration of biodiversity and climate-resilient development in city climate action planning and for progress in research and innovation for climate action more broadly. The panel 'Protect, restore, and thrive: nurturing and mainstreaming biodiversity and climate-resilient development' touched on critical aspects that cities can take into consideration. These include establishing cross-sector partnerships that are essential for addressing the multifaceted challenges of climate change and biodiversity loss, especially for local governments, which often find themselves overwhelmed by competing agendas.

There is a need to prioritize agendas that are focused on biodiversity and climate resilience particularly in the context of climate adaptation and mitigation mechanisms that can help tackle climate risks. It was recognized that in the Global South, this is a greater challenge with limited resources and other agendas that often take priority. The urgency is to act now, more than ever, with biodiversity loss causing decline in produce for instance noticeably diminishing Indigenous vegetables. An emphasis was placed in recognizing the co-benefits of protecting and restoring biodiversity for climate resilience that could make the case to track resources towards strategies such as Nature-based Solutions (NbS), Ecosystem-based Adaptation (EbA), Community-based conservation and others.

Cities can no longer afford to compartmentalize climate action and with the understanding that extreme climate events often intersect with other urban crises, a more integrated approach for climate action across different city sectors is necessitated. However, local governments frequently lack the capacity and knowledge to effectively mainstream biodiversity into their climate action strategies. One suggested way to tackle this gap is to leverage community values and momentum that can drive action to empower local governments.

With the likelihood of overshooting the 1.5 °C temperature threshold for the next 39 to 40 years, the world faces a generational crisis without the necessary tools for survival. This is where advancements in research and innovation need to draw their attention. Communication, translation, and coordination across sectors, along with the integration of digital technologies are key to accelerating climate action and creating cohesive governance frameworks for a resilient future.

To facilitate the acceleration of climate action, finance is a critical need for cities. In the panel 'Raising, accessing and finding finance to implement city climate action' the urgency of addressing gaps in current climate flows and the investments needed to meet global climate action was recognized. Urban climate finance flows are met with challenges in the coordination required to improve access to finance from national to local level governments where existing capacity is limited and innovation has an essential role to play in improving this coordination alongside political will to mitigate the existing barriers for cities to access finance. Consequently, the private sector comes at the forefront to enable cities by developing strategic public-private partnerships.

Co-creating climate finance strategies by including vulnerable and marginalized groups is one way forward for cities to ensure justice and equity while enhancing social cohesion. However, it was highlighted that financial instruments often overlook the effectiveness of community-led initiatives. These aspects contribute to the silo-ed and weak fiscal frameworks that cities rely on for climate action. There is a role for national governments here to increase communication and awareness to cities in accessing the various sources of climate funds that are available, as well as in increasing the bankability of cities through promoting an integrated approach that can align national climate objectives with local urban strategies while addressing barriers and improving coordination between governance levels.

Information gaps were identified as a significant challenge, emphasizing the growing importance of innovation for cities to access the necessary data, knowledge and tools needed to strengthen their mandates and enhance their ability to secure available funding. These points were further extended in the panel that focused on digitalization. The 'Inspiring smart, data-driven and user-friendly cities' panel highlighted several significant considerations of digitalization as an important enabler of accelerating sustainable climate action and climate resilient development in cities. Digital tools and advancements can support the streamlining of climate action efforts, help cities break silos, enhance informed decision-making processes and foster a cross-sector appreciation of applying digital solutions that can support climate action planning. Governance structures play an important role here by providing the enabling support for cities to adopt digital climate solutions for instance through licensed public data that the private sector can leverage.

Cities must adopt digital strategies that communicate the quality of data and enable city actors to make informed choices about their needs, and a consideration for a continuous, longitudinal use of technology to track data over time rather than using it compartmentaly for one-time data was proposed to support monitoring progress of climate solutions. It was recognized that digitalization can greatly support up-skilling programs for governments, climate-relevant industries and civil society, recognizing its ability to help cities build human capital. A focus was placed on the cost vs benefit implications on cities to adopt digital solutions and the creation of a trusted ecosystem for climate solutions with technology such as AI could help ensure a balance between private and public access to scalable solutions that meet cost limitations.

A holistic approach to digitalization was discussed by the panel that can support the integration of technological advancements in climate action agendas and processes. A systems-thinking approach is essential to understand the environmental and social impacts of data, capacity building, green public purchasing, and in fostering old and new voices. Through digitalization cities can enhance trust, transparency, and long-term resilience by leveraging technological advancements for systematic assessments in city sectors, increased economic opportunities, co-production of knowledge, and co-generation of data that can increase trust between citizens and the public sector.

Some points echoed in the Inclusive Climate Action panel, 'Making city climate action inclusive, fair, and just' that highlighted the inclusion of social and economic dimensions in technological advancements to be effective for city wide climate action. As the closest level of government to people, cities have a crucial role in integrating the needs of their communities. The discussions urged cities to understand the consequences of climate action that could potentially exacerbate inequalities such as through green gentrification, displacing vulnerable communities and further excluding informality.

Overcoming silos to deliver climate action, including the most marginalized into decision-making processes and taking their needs and risks into consideration across city sectors was particularly highlighted in the context of adopting innovation while recognizing that innovation has the potential to create shared social value and present inclusive approaches to governance of climate action. Establishing community leadership, leveraging the potential of youth who are passionate about just and equal transition for climate action were seen as opportunities for effective, equitable and sustainable climate solutions.

The conference culminated with the flagship panel of I4C24, highlighting its most pivotal findings and discussions, the 'Prioritizing knowledge and action: the next-generation Global Research and Action Agenda' panel which recognized several critical aspects for the updated Global Action Research Agenda such as the importance of identifying the linkages between research fields to uncover the critical questions that remain unanswered. This approach to deliver the updated GRAA fosters an ongoing dialogue between research and action, where iterative implementation can help bridge the gap between scientific knowledge and practical application.

This effort must also embrace the co-production of knowledge, incorporating wisdom from previous generations, Indigenous perspectives, and the enthusiasm and forward-thinking provocation of the youth. Cities, with their unique structures and capacities, play a key role in accelerating the absorption of science to inform decision-making for accelerated climate action and building the capacity to absorb research and apply it effectively is essential. The updated Global Research Action Agenda can be found in the subsequent sections.

3. Conceptualizing the AI x City Climate Action Hackathon

There is significant momentum at the intersection of climate action and emerging technologies, with artificial intelligence (AI) showing immense potential to enhance cities' efforts in tackling climate challenges. The 2024 Innovate4Cities Conference aimed to explore AI's role in strengthening the evidence base for climate adaptation planning, while also engaging practitioners in the current challenges and opportunities AI presents. AI x City Climate Action Hackathon focused on how AI can drive and shape the future of climate action, empowering cities to take pivotal steps on their sustainability journey.

The fully hybrid Hackathon challenged participants to develop an AI-powered methodology that can rapidly assess the risks and vulnerabilities of any Brazilian city to climate hazards like heat extremes, droughts, storms, and floods. The selection of Brazil as the test-bed country was based on it being a significant representative of the Coalition for High Ambition Multilevel Partnerships (CHAMP). The challenge was delivered in partnership with city networks (C40 Cities, ICLEI), leading organization in AI (Open Earth Foundation, Viegand Maagøe) and geospatial technology (Picterra, Esri), and local data providers (AdaptaBrasil).

In the two months leading up to the Conference, the Hackathon team hosted seven webinars to help over 140 participants understand the challenge, explore available datasets, and develop cutting-edge AI-powered solutions. More than a dozen applications were submitted, each offering creative and innovative approaches to assist cities in assessing climate hazards. Our panel of judges evaluated each submission based on four criteria: innovation, impact, feasibility, and presentation. After careful assessment, three finalists were selected to present their solutions at the Conference.

The DUCTExplorer team from the Singapore-ETH Centre, led by Adelia Ayu Sukma, was chosen as the winner of the Hackathon. The two other outstanding finalist teams were ResSolv, led by Haripriya Kesavan from Resilience AI, India, and ComuniClima, led by Jaqueline Nichi from the University of Campinas, Brazil.

The session on the third day of the Conference featured Beth Blauer, Associate Vice Provost for Public Sector Innovation at Johns Hopkins University, who delivered a beginner-friendly, hands-on session exploring practical ways to integrate AI into climate practice. Timon McPhearson, Director of the Urban Systems Lab and Lead Author of IPCC AR6, also presented ClimateIQ, a next-generation AI tool designed to help communities prepare for climate threats using hyperlocal data. Finally, the GCoM Secretariat launched exciting new features with focus in Brazil to the Data Portal for Cities, the portal for local governments globally to access third-party datasets and develop greenhouse gas (GHG) inventories under international standards.

Please follow this link to view the AI x City Climate Action Hackathon that took place at I4C24.

4. Partnerships

Building on ties established through I4C21 and previous Marketplaces, I4C24 further strengthened partnerships with cities, businesses, academia and civil society representatives for city climate action - reaffirming its foundational role in the GRAA. The partnerships were built on shared core objectives from the practice of partners in alignment with the Global Research Action Agenda (GRAA) to ensure GRAA priorities are elevated across sectors with local impact.

1. **Host Partners** included **Tourisme Montréal, the Government of Quebec, Espace pour la Vie Montréal**, and the **City of Montréal**, providing not only the logistical foundation but also a strong commitment to local and global climate action.

2. **Knowledge Partners**, such as **ICLEI**, the **Journal of City Climate Policy and Economy**, and the **Melbourne Centre for Cities at the University of Melbourne**, were instrumental in shaping the conference's intellectual framework by aligning urban climate research with actionable policies.

   › *The ICLEI Global Research and Innovation Symposium served as a complementary event that helped inform discussions at—and outcomes from—I4C24.*

   Generating complementary knowledge through the Marketplace at the ICLEI Global Research & Innovation Symposium

   The centerpiece of day one of the ICLEI World Congress in São Paulo in June 2024 and held in the context of ICLEI serving as an I4C24 Knowledge Partner, findings from the associated Marketplace and Symposium were carried forward to I4C24, directly shaping discussions and fostering a continuous exchange of knowledge and innovation.

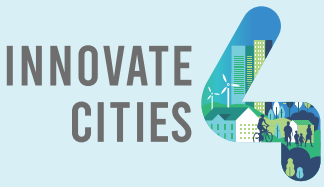
   The close partnership between GCoM, ICLEI, UN-Habitat, and Innovate4Cities helps ensure that local and subnational governments, city networks, researchers, and innovators are better equipped to respond to climate challenges. These in turn help guide the evolution of the Global Research and Action Agenda – facilitating action and collaboration on the most up-to-date knowledge.

3. **Sponsoring Partners** such as **GeSI, The Nature Conservancy**, and **Bell**, played a key role in fostering innovation and securing financial support to ensure the delivery of the conference objectives.

The 2024 Innovate4Cities Conference demonstrated how partnerships between governments, businesses, academia, and civil society are pivotal to drive accelerated climate action to meet global climate ambition. These collaborations will be key to advancing the new GRAA and supporting Innovate4Cities vision.

SECTION THREE:

THE UPDATED GLOBAL RESEARCH AND ACTION AGENDA ON CITIES AND CLIMATE CHANGE (GRAA)



1. The Global Research & Action Agenda on Cities and Climate Change Science (GRAA)

The Global Research and Action Agenda on Cities and Climate Change Science (GRAA) – developed at the 2018 International Conference on Climate Change and Cities Conference in Edmonton, and updated at 2021 Innovate4Cities Conference – provides strategic guidance for national governments, local and subnational authorities, researchers and scientists, planning and design communities, private sector enterprises, international organizations (including international cooperation and development banks), and civil society including Indigenous peoples, to develop action plans to develop new evidence-based research and knowledge for effective climate action strategies in cities. As a culmination of critical discussions and prioritization of urgent city needs, the GRAA signposts key issues for cities to research and develop effective policies for climate action.

The GRAA serves as a strategic framework for international organizations to operationalize in their own work. By identifying research gaps and priority topics, it provides a foundation for city networks to align their efforts with the GRAA and provide local and subnational governments with information, tools, and policy recommendations to address climate challenges more effectively at their specific levels.

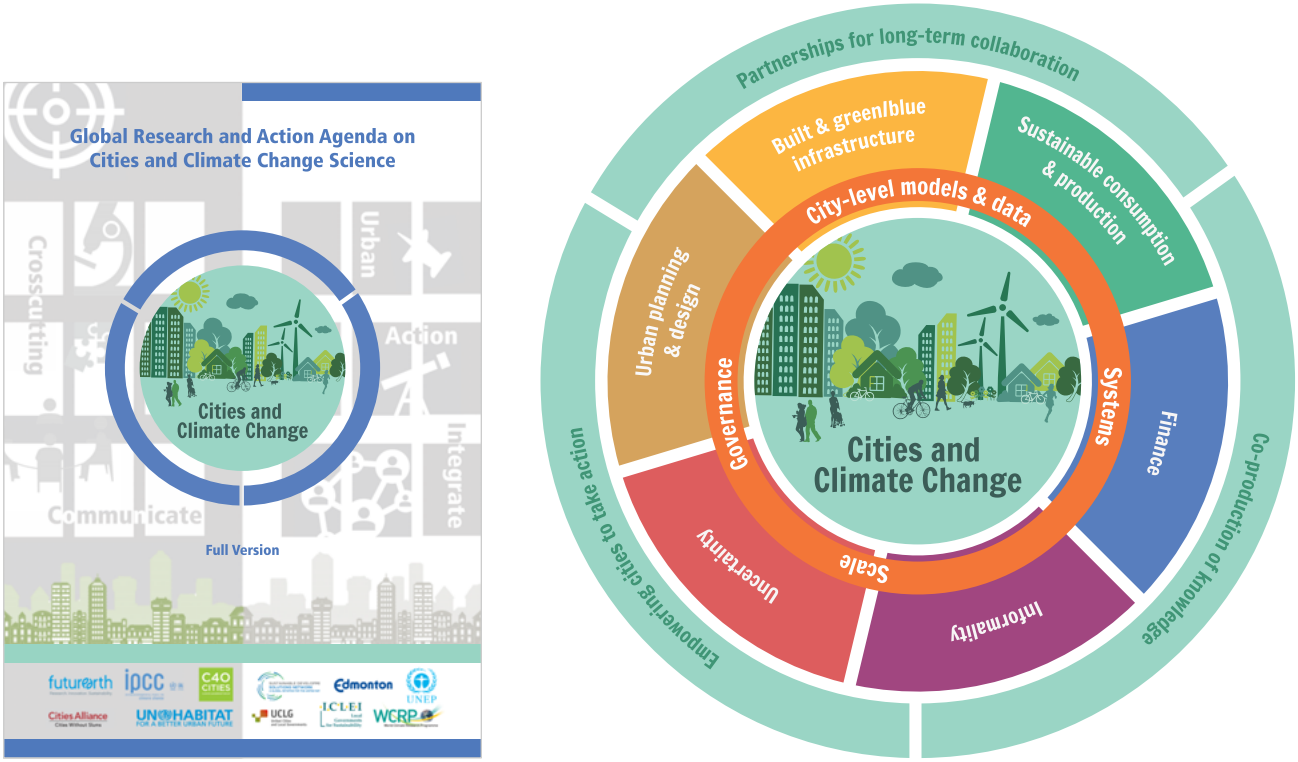


Figure 5: GRAA 2018 – Report and "Wheel" Diagram
Graphic design by Amanali Cornejo V

The City Research and Innovation Agenda (CRIA) 2021 builds on the City Research Agenda (CRA) released in 2019 as an iteration of the 2018 GRAA from the perspective of city practitioners—identifying the data, information, and technology gaps that cities have prioritized. The CRA was intended to drive science-based, technology-driven, replicable sustainable action and implementation at the scale the world needs and cities demand. The CRA was updated in 2021 using the GRAA as a guide to ask four priority questions that cities and their partners seek to answer as they develop and implement their climate action plans:

1

HOW DO WE BUILD THE EVIDENCE BASE FOR CLIMATE?

Evidence is required to progress decision making in cities and provide a rationale to act.

2

HOW – AND FOR WHOM – SHOULD WE PRIORITISE?

Local context needs to be built into the knowledge generated to enable cities to prioritise and act to reduce impact and increase benefits for vulnerable communities.

3

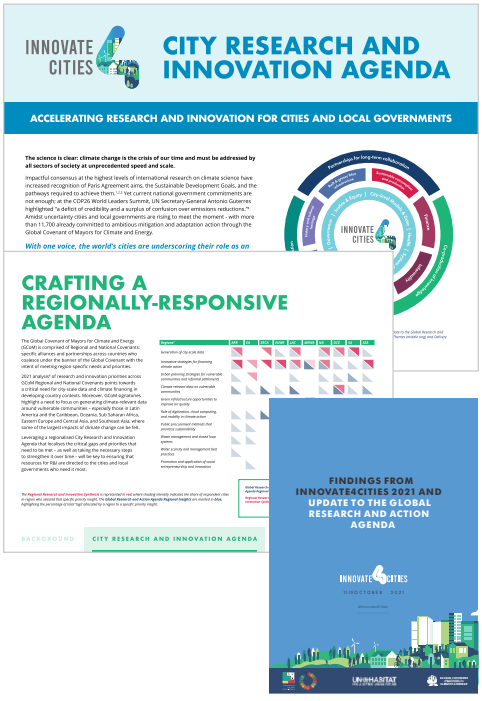
WHAT SHOULD WE DO?

Research priorities on topical areas that are most important entry points for city action.

4

HOW DO WE FINANCE & SCALE CLIMATE ACTION?

Policy and finance instruments to promote large scale uptake of solutions that account for time-scale differences in local decision-making processes.



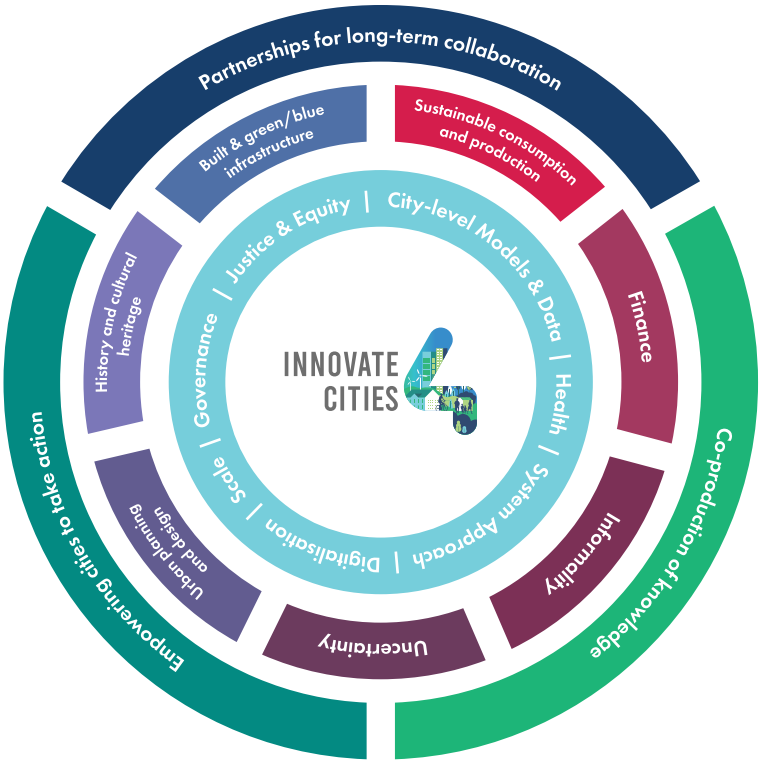


Figure 6: GRAA and CRIA 2021 – Insights and Outcomes Report and update "Wheel" diagram

1.1 Steps to the Updated GRAA 2024 - the Single Agenda

For the 2024 iteration of the GRAA, the I4C research partners decided to bring both the GRAA and CRIA together in a single agenda. To update the themes and topics of the "wheel" alongside the prioritization questions, a similar methodological approach to the previous priority and knowledge gap gathering exercises in 2018 and 2021 were followed (see methodology below). Devising a single agenda required an organizational structure enabling practitioners to monitor progress and accelerate the impact of meeting the knowledge needs of cities for climate action in a communicable manner.

This process began with an updated GRAA visualization, highlighting comparative analyses between GRAA and CRIA in 2021. A key step in aligning the two agendas was identifying 64 research gaps and aligning them with 39 CRA priority areas for research and innovation. Emphasis was also placed on examining the regional priorities of I4C 2021 Conference participants. The new GRAA offers a deliberately integrated presentation of the interrelations between themes, topics and cross-cutting issues, and delivery approaches developed over the previous versions of the GRAA and CRIA. A three-dimensional model has been used to allow for a representation of how each of these dimensions of the GRAA and CRIA are situated in the new research agenda structure.

A Draft 2024 GRAA was brought to the I4C Conference, and using Miro - the online whiteboard collaboration tool, participants and rapporteurs taking notes of the sessions supplied input over three days. The goal was to review, revise, and improve cohesive inclusion of necessary aspects of the city-climate intersection in a framework for research and innovation, ensuring all dimensions are captured and aligned with the relevant multilateral global agendas.

1.2 Methodology

The GRAA development has resulted from an iterative process including a series of reviews of the various iterations of the GRAA and CRA/CRIA between 2018 and 2021, including supplemental input from the regional and global marketplace events held in 2023, and updates on the state of city climate science from the Conference Advisory Committee of the I4C and GCoM's Research and Innovation Technical Working Group.

These dialogues in the interim between conferences led to emphasis of *climate resilient development* as a key goal of action informed by the GRAA. *Climate resilient development* constitutes **the process of implementing greenhouse gas mitigation and adaptation measures to support sustainable development for all**. The comparative textual analysis of the 2021 GRAA and CRIA demonstrated the overlap in dimensions of consideration, as seen in Figure 7.

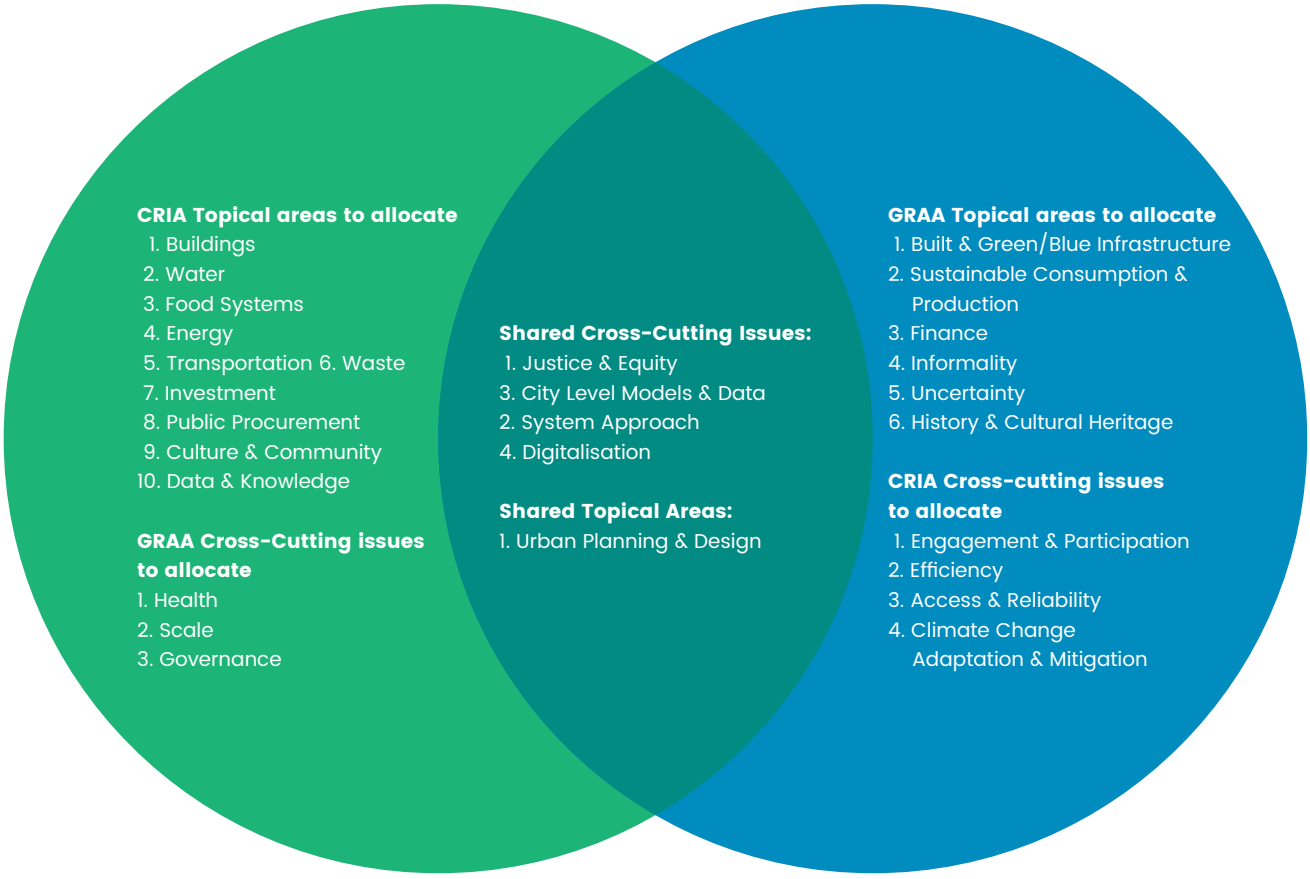


Figure 7: Shared dimensions of 2021 GRAA & CRIA

Given the thematic reiteration, the central question of incorporating all the other elements of the GRAA/CRIA asks how they may be aligned into utilizing a **systems approach** towards **city-level models & data**, inclusive of **digitalization**, to deliver **justice and equity** in **urban planning and design to achieve climate resilient development.**

The next step was to evaluate the GRAA/CRIA content and determine relationships between the various dimensions to create functional groupings (see Figure 8 below). The "wheel" diagram was unable to capture in two dimensions the interconnected manner in which a systems approach could be examined in the context of both city-level models & data (representing what we need to *know* about sustainability in cities) and justice & equity (what we need to *do* about sustainability in cities) to determine climate-resilient development pathways and effective undertake urban planning & design with informed intent.

This was then mapped to a three-dimensional structure (see Figure 9), recognizing the delivery approaches remained unchanged in purpose, but distinction was made between the foundational nature of *Empowering Cities To Take Action*, and the facilitative nature of **Co-Production of Knowledge** and **Partnerships for Long-Term Collaboration**, which have been reinforced since 2018 and through to I4C24 as important enabling components for each dimension of the GRAA.

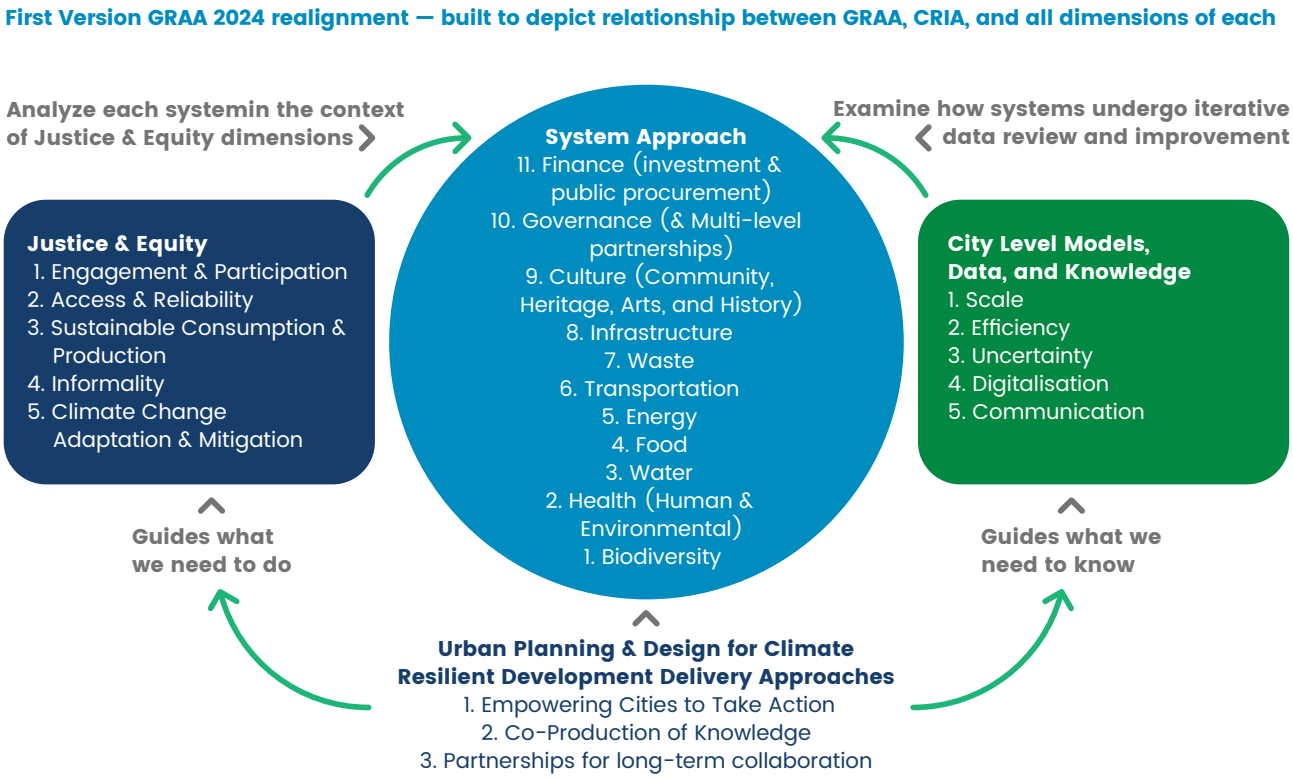


Figure 8: 2021 GRAA/CRIA dimensional relationship mapping (2024)

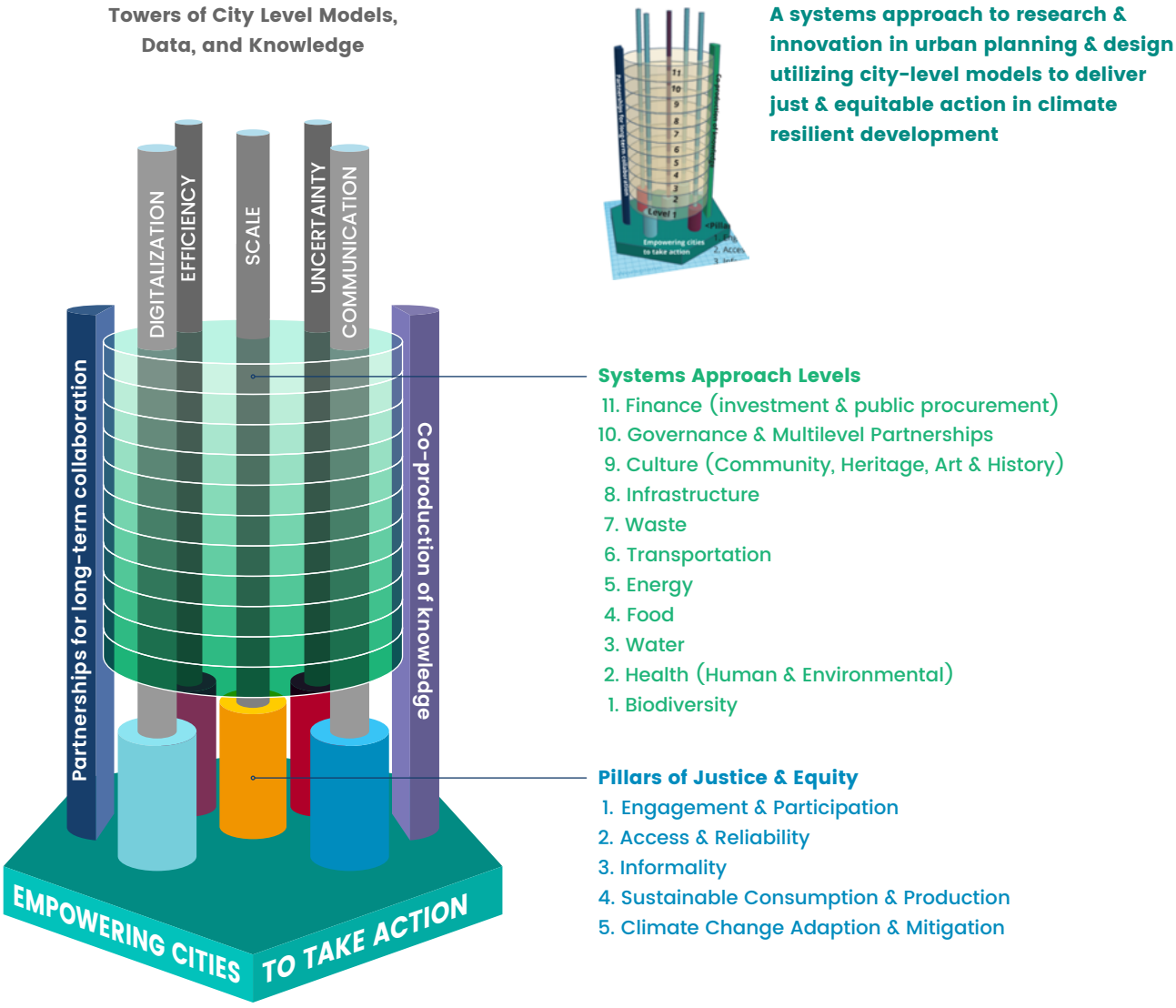


Figure 9: Preliminary 3D rendering of GRAA data stack structure & vision statement

Conversations within the I4C dialogue were shifting toward emphasizing the growing need for financing a systematic methodology for rapidly understanding the challenges cities face. Being able to draw upon parallel scenarios at local level across a variety of national contexts is what Innovate4Cities can contribute to informing both the IPCC Special Report on Climate Change and Cities (SR Cities) alongside the broader delivery upon the Sustainable Development Goals (SDGs) and Nationally-Determined Contributions (NDCs). National governments are concerned about hitting the targets and delivering beyond commitments, and city-level action is essential to countries achieving their sustainability objectives. I4C has identified the value in solutions emerging from a bottom-up understanding of the systems in which society operates on a daily basis. As such, textual analysis was undertaken to evaluate alignment of the SDGs (including targets and indicators), the IPCC Summary for Urban Policymakers, and the outline of the SR Cities against the content of the GRAA.

At the I4C24, the GRAA work undertaken in preparation for public consultation was presented to the participants through a Miro board on Day 1, and was reviewed again in the closing plenary session to discuss additions, omissions, and pressing issues for inclusion in the newly unified single agenda structure. The conference proceedings were documented in accordance with lessons learned from the 2021 session capture and analysis process. This included; two lead editors, a group of student volunteers from related Canadian university programs, responses to questionnaires from these students and responses to those questionnaires supplied to session chairs and individual session presenters for feedback.

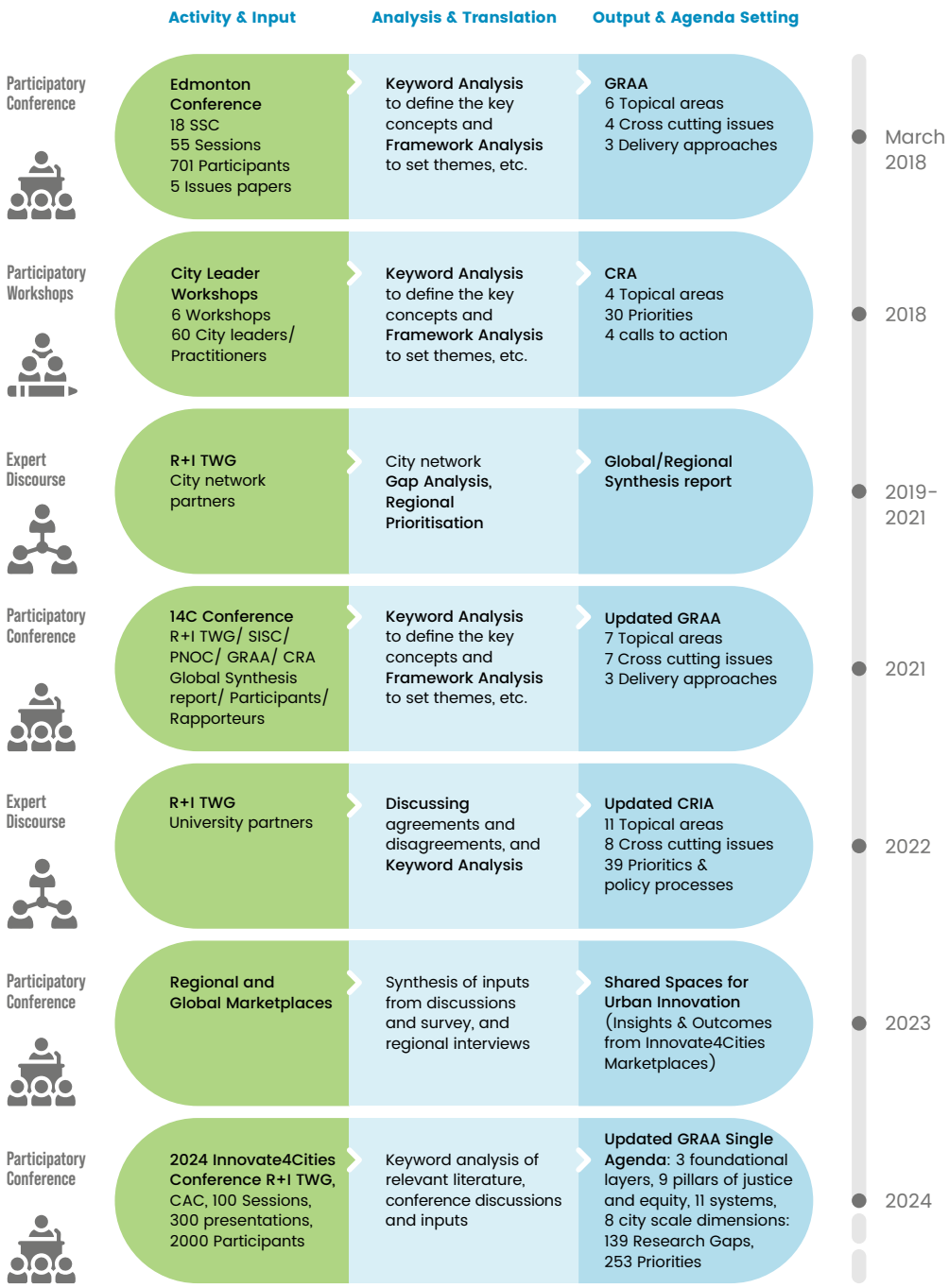


Figure 10: Iterative Review Process for GRAA/CRIA development, 2018-2024

These mechanisms were deployed again to aid the writing process, supplemented by reflections on the session from the student rapporteurs, who proved instrumental in facilitating the sessions and ensuring data collection took place through recorded, automated transcription sessions and individual notes.

Supplementing the rapporteur notes by the student writing team, an analysis of the text of the submitted session abstracts was undertaken to identify the issues and dimensions of city-scale research being undertaken by participants. The pre-submission abstract details (initially analyzed in the context of the preliminary 2024 GRAA restructuring) have been supplemented by the questionnaire responses collected from participants in the wake of the conference to provide an understanding of the position(s) each contribution lends to populating the GRAA and addressing research gaps & priorities. The iterative process of review shown in Figure 10, typified in this form of broad participatory action research (Vaughn & Jacquez, 2020) has continued unabated, and further improvement is expected through ongoing use and critique of the GRAA in its current form.

1.3 Initial Findings

The Global Research and Action Agenda, developed in 2018, was updated and supplemented with the City Research and Innovation Agenda in 2021, including 39 priority areas for research & innovation.

The shared language of the frameworks most strongly emphasizes the dimensions of:
i. **Governance**, and ii. **Infrastructure**, underpinned by, iii. **Urban Planning & Design**, iv. **Systems Approaches**, and v. **City-level Models & Data**, delivered through, vi. **Empowering cities to take action**.

Building upon comparative analysis of the GRAA/CRIA texts, the updated GRAA additionally synthesizes review of:

- The Innovate4Cities – A Global Climate Action Accelerator Edmonton Declaration,
- The Innovate4Cities 2021 Conference Proceedings, and
- The 64 research gaps identified and included in the I4C21 summary, Findings from Innovate4Cities 2021 and Update to the Global Research and Action Agenda.

These findings informed the Innovate4Cities Marketplaces in 2023, the findings of which were discussed in Shared Spaces for Urban Innovation: Insights and outcomes from Innovate4Cities Marketplaces.

This recent update with stakeholders in the urban research & innovation space provided the following insight:

Three overarching themes emerged from Innovate4Cities Marketplaces, through which several topical areas and cross-cutting themes from the GRAA featured:

- The need to strengthen the provision of **city-scale data**;
- The challenges of a rapidly-evolving **governance** landscape; and
- The growing importance of **biodiversity** and **resilience** in urban contexts.

Recommendations from the Innovate4Cities Marketplaces include the following:

- Expand and streamline the Global Research and Action Agenda and City Research and Innovation Agenda (CRIA) by:
  - Identifying urban knowledge gaps in the topical area(s) of **biodiversity**, **resilience**, and **youth**;
  - Unifying gaps in **research**, **policy**, and means of **implementation**; and,
  - Including and supporting the co-generation of **non-English language knowledge**, especially in **Global South** contexts.

- Accelerate knowledge on **finance** and implementation mechanisms for **city climate action**.

- Better communicate research and innovation at the nexus of cities and climate change science:
  - To **researchers** and **academics**;
  - To **practitioners** and **policymakers**; and
  - To **business leaders** and **civil society**.

- Recommendations for Innovate4Cities convenings:
  - Strengthen the inclusiveness of convenings at the nexus of cities, climate change science, and innovation;
  - Bolster the interactive digital presence of Innovate4Cities to facilitate dialogue and knowledge generation beyond single events; and,
  - Partner with media and 'champion' figures to mainstream research and innovation at the nexus of cities and climate science.

To improve alignment with external frameworks also addressing the nexus of research into climate and cities, the following documents received textual analysis for appearances of key GRAA terminology beyond the CRIA:

- The UN Sustainable Development Goals (SDGs) - multilateral national-level development framework;

- The Summary for Urban Policymakers - urban-focused analysis of the IPCC 6th Assessment Report, and;

- The Outline Document of the IPCC Special Report on Climate Change and Cities - informed the report outline expected to accompany the IPCC 7th Assessment report.

The external urban research-related documentation has been supplemented by an analysis of the session abstracts submitted by participants and selected for the I4C2024 Conference program. This informs our understanding of the lexicon employed to address urban R&I realities.

An initial Innovate4Cities Impact Citation Scan based upon Innovate4Cities keywords has been undertaken for both academic and grey literature leading up to the I4C24. While not exhaustive, a summary of the collected works is provided below (with all provided in the Reference list of this report):

Type	Academic publications	Books	Conference Presentations	Journal Articles	Reports	Theses	Grey Literature
Search Returns	103	2	1	47	3	1	55

Table 1: Citation Scanning Search Results (September, 2024)

As a result of the work since 2021, these steps led into the I4C24 with overarching questions:

- What does mainstreaming the GRAA in the research & innovation lexicon of climate and cities-focused research look like from 2024 onward?
- How may Innovate4Cities strengthen the multidisciplinary approach to urban R&I with a cross-dimensionally aligned, updated GRAA structure?

	Sustainable Development Goals	Summary for Urban Policymakers	IPCC SR Cities Scoping Outline	I4C2024 Session Content
City-Level Models, Data, and Knowledge				
Communication	7	2	1	61
Decentralization	0	3	1	62
Digitalization	0	4	1	88
Efficiency	11	19	7	64
Information Integrity & Transparency	17	11	0	80
Risk	9	43	9	109
Scale	7	35	19	175
Uncertainty	0	4	6	47
Systems Approach Levels				
Finance (Investment & public procurement)	31	39	8	183
Governance & Multi-Level Partnerships	37	46	17	360
Culture (Community, Heritage, Art & History)	9	37	8	296
Infrastructure & Housing	35	71	23	231
Waste	6	6	3	74
Mobility	2	22	9	122
Energy	7	45	16	143
Food	14	13	3	39
Water	25	24	6	85
Health (Human & Environmental)	37	46	14	92
Biodiversity	10	9	5	135
Geography	32	46	16	27
Pillars of Justice & Equity				
Access & Reliability	68	15	3	153
Climate Change Adaptation & Mitigation	9	141	20	263
Conflict & Crisis Response	26	13	3	60
Engagement & Participation	8	13	1	202
Gender	6	6	1	33
Indigenous knowledge and decoloniality	3	6	2	36
Informality	3	12	10	51
Intergenerationality	8	1	0	42
Sufficiency	6	9	4	58
Sustainable Consumption & Production	20	39	21	111
Delivery Approaches				
"Empowering" Cities to Take "Action"	32	9	8	290
"Partnerships" for Long-Term "Collaboration"	32	13	6	287
Co-production of "Knowledge"	8	69	11	163

Table 2: Text Analysis of Key Multilateral Urban Research Framework Documents

A review of Conference abstracts submitted to the conference – 296 number reviewed, 254 data sheets from the Conference were reviewed, and all combined abstracts and feedback from the proceedings of the conference were reviewed alongside the key multilateral framework documents against the new GRAA for a quantitative textual analysis of how GRAA dimensions and affiliated language appears in each text.

Through the comparative analysis of the previous iterations of the GRAA and its overlap with the CRIA, it was clear that unifying all elements of the GRAA & CRIA requires **utilizing a systems approach towards city-level models & data, inclusive of Digitalization, to deliver justice and equity in climate resilient urban planning, development & design.**

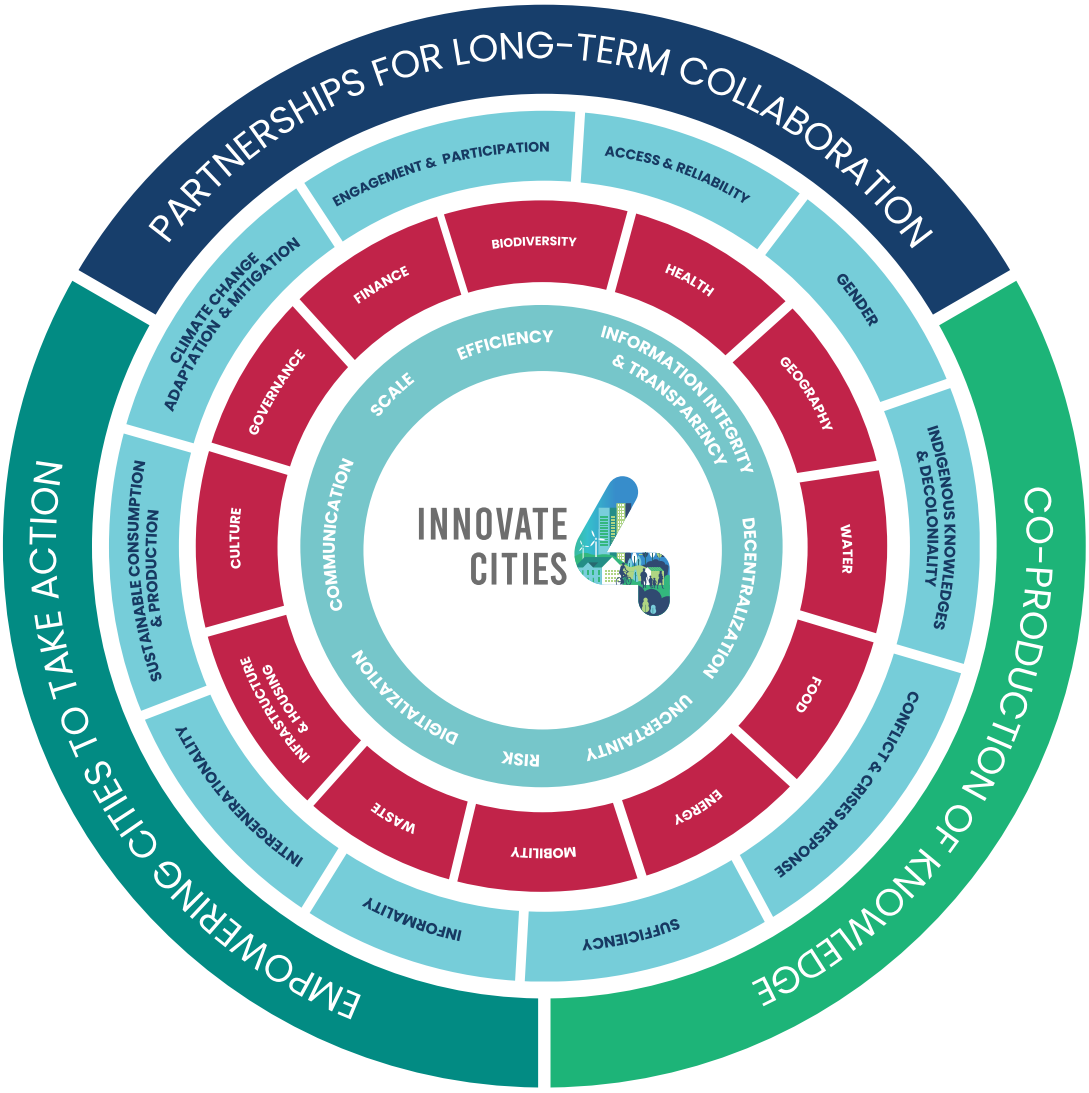
The content in the Figures and Tables above represent the organization and initial synthesis of the GRAA and CRIA content following 2021, informed by the regional and global marketplace activities of 2023. This set the stage for interpreting information presented by I4C24 partners and participants.

Data collection leading into the I4C24, and during the sessions, included the following activities:

- Abstract review was conducted by the research partners involved in the conference organization. Keyword analysis of the Abstracts and other data collected from session submissions was conducted prior to the Conference, and additional data was collected from each presentation during the Conference by our rapporteur team. The full list of abstracts submitted is found at the DOI file for this Outcomes Report.

- A total of 310 abstracts were reviewed prior to the conference. Given the logistics involved in attending and presenting during the conference, not all abstracts were presented as submitted over the three days of sessions. A total of 254 data sheets were collected from rapporteurs and speakers. The insights into gaps and actions were extracted from this data to provide the updated GRAA, inclusive of the CRIA, in the following section of the report.

1.4 New City Structure GRAA — The 'wheel' representing the updated GRAA



Legend:
1st (outermost) ring: Delivery Approaches
2nd ring: Pillars of Justice & Equity
3rd ring: Systems Approaches
4th (innermost) ring: City-Level Data, Models, and Knowledge

Figure 11: Iterative Review Process for GRAA/CRIA development, 2018-2024

Figure 11 depicts an evolution of the GRAA 'wheel' diagram, now including four concentric rings, representing the added dimensions of consideration which emerged from the previous iterations in conjunction with the multilateral climate dialogue. However, a two dimensional rendering of these city climate dimensions precludes a full and accurate positioning of research across and between considerations within each segment of each ring. To create an additional level of orientation at a glance, in preparation for the I4C24, a 3D structure was selected to demonstrate the complexity of city climate research in a way the 2D Wheel can not.

As depicted below in Figure 12 as a preliminary example, the floorplan may be populated with data endlessly, stored and organized as it relates within the structure. This is designed to help capture and simplify the complexity of research gaps and research and innovation priorities – from the GRAA/CRIA alignment to the UN SDGs, IPCC SUP of AR6 and SR Cities of AR7. Situating the content from this conference in synthesis is the first step towards better situating and communicating how our collective understanding of cities and climate change affects everyone on every level. The linkage of graphic representation and semantic value has been a valuable tool for facilitating translation of concepts and language (Piccinini, 2010, p99). Given the need for rapid identification and dissemination of solutions to city-scale challenges, this provides cities around the world a recognizable structure for working across languages with a visual shorthand for bridging research concepts.

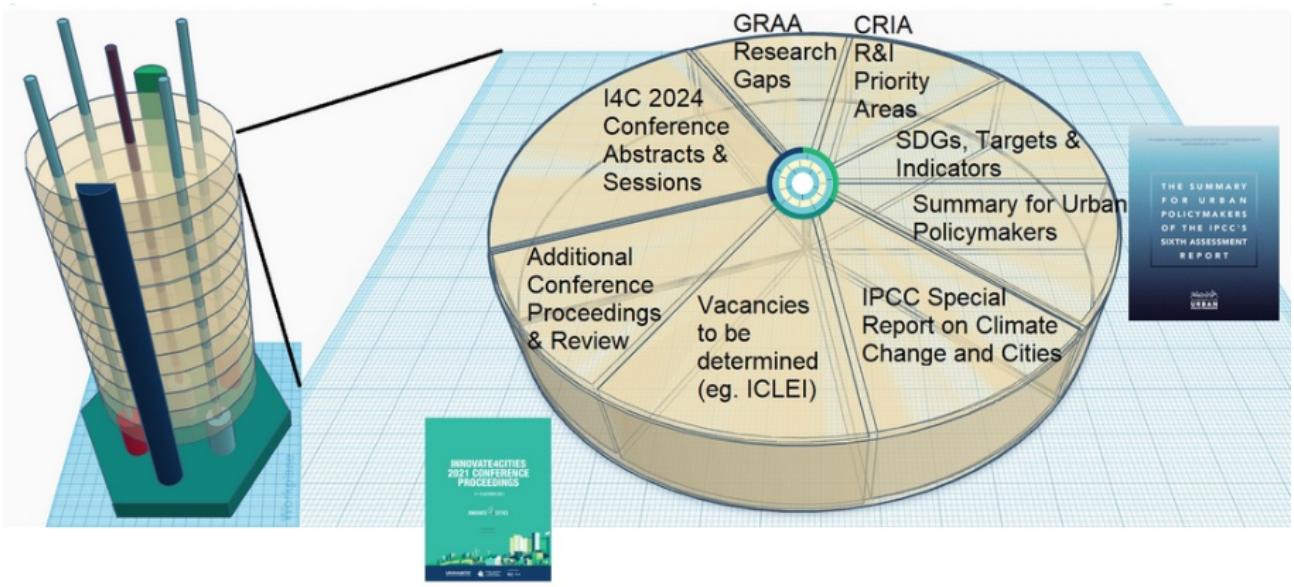


Figure 12: Representative visualization of intersection in city & climate research frameworks

For the I4C community, a city-related structure was selected to relate the complexity of urban research considerations and activities. In this instance, a building was selected (e.g. – an analogous model could be depicted using a tree with soil, roots, rings, and branches, etc.). Each of these floors, pillars, and towers of the structure, (i.e. – where the research gaps and research and innovation priorities will be located) allow cities and their partners to easily situate their work, or locate the knowledge they need. This structure offers means for better communication across disciplines, situating and understanding research and action efforts. Employing the metaphor of offices and floors within a building, and the delivery approaches as lifts to move between levels, this reorganization of the GRAA will help practitioners know who is tackling similar issues and provide a way to identify all research and innovation being conducted within the global research structure.

Critically, urban planning and design is elevated within the articulated purpose of the GRAA. Systems have been singled out from earlier layouts (2018+2021) of individual sections of the wheel format, in part to reaffirm the work already done and show the core intent of research considerations and activities to fit within a systems approach – wholly represented by the structure.

Thus the overall vision of the GRAA is **a systems approach to research and innovation in urban planning and design utilizing city level models to deliver just and equitable action in climate resilient development.**

These three foundation layers structure the intent of the GRAA:
1. **Empower Cities to Take Action** through
2. **Co-production of knowledge**, and
3. **Partnerships for long term collaboration.**

The expanded pillars of justice and equity, show researchers how to connect their work across different dimensions beyond the system they are working on - understand potential impacts and consequences of action or inaction in their field. The intent is to enable researchers to easily consider the discipline(s) in which they specialize, and consider the ramifications of their work through the lens of justice and equity, in the context of other systems that impact their various dimensions and metrics.

Where the GRAA Wheel diagram lays out in separate spaces the different themes that need to be addressed, the city structure shows that research is part of a whole, and that whole process involves everyone collectively contributing, demonstrating that nothing happens in isolation.

There is an intended system hierarchy to the levels of the GRAA structure- and this was updated with input over the course of the I4C24. It was imperative to build the system from the ground-up (.i.e starting with geography), again showing the need for all participants (and their broader sectors/nations) to ensure they understand the shared Earth systems and natural resources upon which civilization is built. In city stakeholders' own research spaces, awareness of how everyone works across the structure will enable easier communication of the way in which their work relates to the efforts being undertaken by individuals and organizations the world over.

The GRAA Structure – a functional visual metaphor

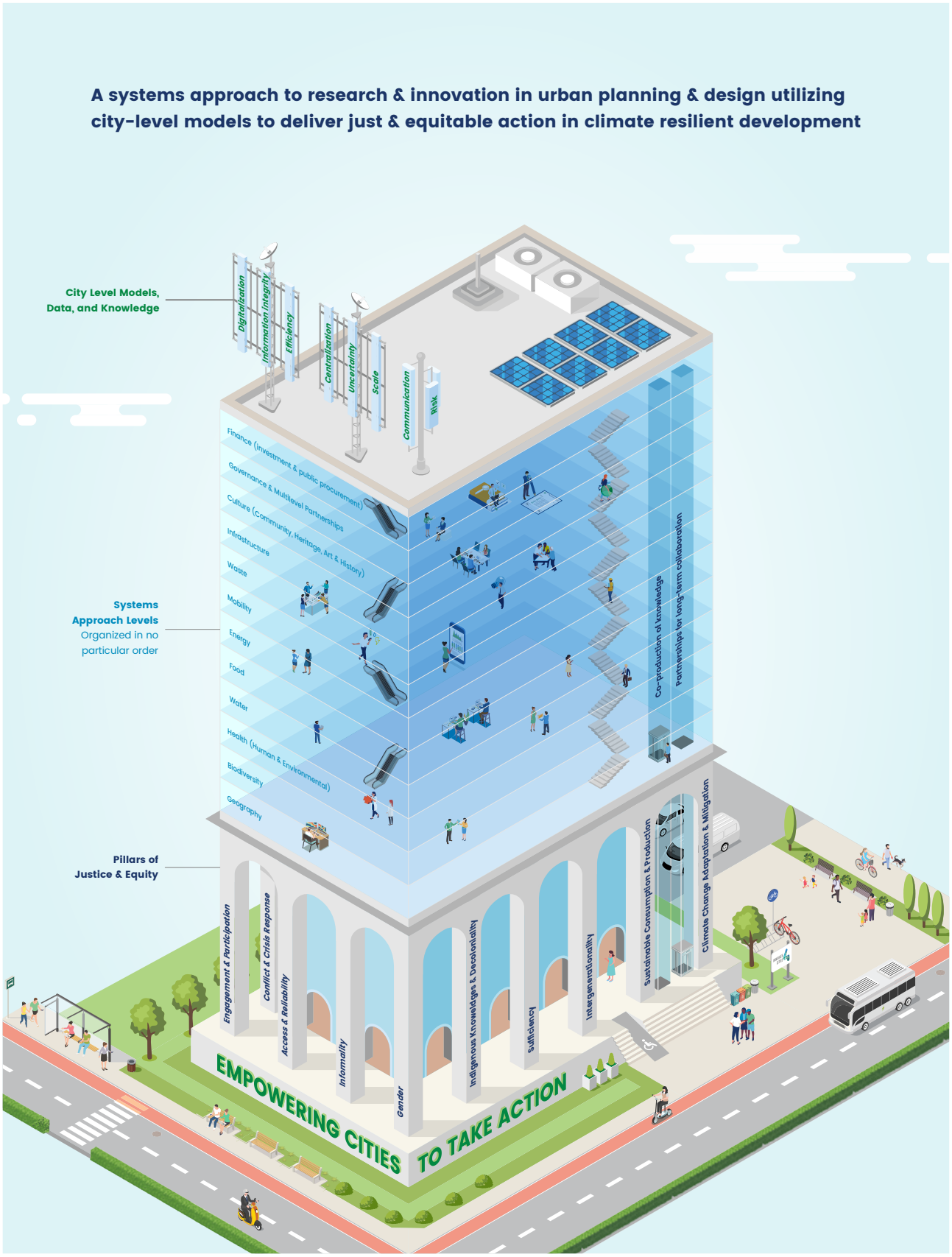


Figure 13: The GRAA Structure – a functional visual metaphor

The updated GRAA is now conceived as a spatial organization tool for researchers, public sector, private sector, and civil society.

This rendition represents the key dimensions of the structure in a 2D side view, in-line with the existing I4C visual branding.

For maximum utility, it should be presented when static as a 3D model isometrically configured viewing the top, left, and right sides, at less than 100% object opacity to allow a view of all components. This view will allow visibility of the elevators on each side, where the delivery approaches – "Co-production of knowledge" and "Partnerships for long-term collaboration", leaving "Empowering cities to take action" as the broad foundation of intent on which the GRAA is built.

The GRAA may now function as an interdisciplinary positioning device to explain the theoretical and methodological approaches being applied across the various different spaces of local-level research.

1.5 2024 GRAA – Research Gaps and Action Priorities

In this section we synthesize the knowledge collected prior and during the 2024 Innovate4Cities conference that inform and underpin the research gaps identified in the updated 2024 Global Research and Action Agenda, including for the first time the priorities as described in the 2018 & 2021 City Research and Innovation Agendas. This "Single Agenda" includes all elements of the GRAA and CRIA to clearly demonstrate the collective knowledge cities and local governments require to meet their decarbonization, adaptation, and sustainability challenges in the face of accelerating climate change. The most useful, salient aspects of the previous iterations of the GRAA andCRIA have been elevated in the overarching Vision of the GRAA, reiterated below:

> A systems approach to research & innovation in urban planning & design utilizing city-level models & data to deliver just & equitable action in climate resilient development.

The topics Urban Planning and Resilience were previously part of the GRAA themes, but were not adequately addressed in their broader context. Ultimately they underpin the approach taken through all other GRAA dimensions and form the structure and purpose. As such they have been brought out to articulate the purpose of the GRAA as a whole.

In the context of the GRAA, this means we seek climate resilient development through better urban planning, design, and implementation. Doing so requires co-generating knowledge and solutions alongside marginalized and vulnerable populations and ensuring inclusive, accessible public spaces that cater to diverse community needs. The need for innovative urban planning is critical, particularly in decarbonizing energy systems, enhancing housing resilience, increasing adaptive capacity, and integrating sustainable practices and nature into urban redevelopment.

The 160 number of research gaps and 259 action priorities identified as of the 2024 GRAA update build upon those included in the 2018-2021 GRAA and 2021 CRIA. This illustrates the deeper understanding of the complexity of city-scale climate response and the need for investment from academia, business, all levels of government and all city stakeholders, to incorporate more nature into urban environments to improve health and well-being, enhance adaptation capacities, explore zero-carbon energy solutions, and address the impacts of rapid urbanization and increased energy demand. They include actions to address energy inefficiencies, fostering collaboration, and utilizing new digital technologies.

The GRAA is focused on supporting infrastructure that supports both climate adaptation and mitigation, addressing extreme weather impacts, and supporting community-driven resilience initiatives, mindful of urban-rural dynamics. To this point, due to the land-intensive nature of these practices and the disconnect between urban and regional areas, addressing these challenges requires equitable solutions that consider the social and economic impacts on both urban and rural communities in the transition to renewable energy, sustainable food systems and those noted in the IPCC's Sixth Assessment Reports. The GRAA identifies that current approaches to urban design and infrastructure development often lack the necessary support, standards, and community involvement to achieve long-term sustainability. As such many of the research and action priorities identify collaboration, coordination and communication as key to success.

Future iterations of the GRAA will include a detailed full page per level, with indications on how to and who to connect the levels, and pathways for implementation. Partners for implementation (i.e. cities, other levels of government, industry, research institutes) will be able to locate their role within the research gaps and action priorities, including via sector specific briefings and an online version will be updated regularly. The intention is to also facilitate municipalities to map their city journeys to the GRAA, and cities can use the GRAA to find partners to help fill the gaps, and to also demonstrate to national governments how the gaps and priorities of their NDCs and other national-level commitments cannot be achieved without keeping city stakeholders fully engaged.

Knowledge Gaps and Action Priorities by GRAA level are presented in Table 3 below. Research gaps 1-61 are from 2021, 62-139 are newly identified in 2024. Action Priorities 1-39 are from 2021, 40+ are newly identified in 2024.

Global Research & Action Agenda (GRAA)		GRAA Research Gap (What is missing?)	Action Priority (What is important?)
Towers City-Level Models, Data, and Knowledge			
I	**Communication**	63, 103, 104, 121, 160	4, 22, 29, 35, 39, 40, 41, 81, 97, 168, 169, 170, 171, 172, 173, 174, 188, 259
II	**Decentralization**	105, 106, 107	175, 176, 177, 178, 257
III	**Digitalization**	19, 26, 54, 55, 96, 97, 124, 140, 141, 142, 143, 144	2, 17, 26, 74, 129, 134, 135, 136, 137, 138, 139, 140, 151, 188, 206
IV	**Efficiency**	54, 99	2, 3, 15, 149, 150, 151, 152, 153, 154, 155
V	**Information Integrity & Transparency**	14, 21, 27, 35, 46, 61, 108, 109, 131, 136, 144	52, 53, 124, 169, 179, 180, 181, 182, 183, 184
VI	**Risk**	21, 22, 63, 101, 102, 146	23, 32, 35, 161, 162, 163, 164, 165, 166, 167, 259
VII	**Scale**	2, 4, 26, 35, 43, 46, 48, 61, 100, 111, 149, 154	26, 33, 37, 156, 157, 158, 159, 160, 177, 256, 259
VIII	**Uncertainty**	7, 21, 23, 98	35, 38, 141, 142, 143, 144, 145, 146, 147, 148, 259
System Approach Levels			
12	**Finance (Investment & public procurement)**	2, 8, 17, 18, 19, 20, 24, 29, 38, 40, 106, 137, 138, 139, 144, 145, 146, 147, 148, 149, 151, 159	10, 12, 19, 23, 24, 25, 26, 27, 28, 29, 31, 32, 124, 147, 165, 166, 249, 250, 251, 252, 253, 254, 256, 257, 258, 259
11	**Governance & Multilevel Partnerships**	9, 17, 18, 24, 34, 44, 47, 48, 49, 61, 107, 134, 135, 136, 139, 140, 143, 145, 150, 156, 157, 158	3, 4, 5, 8, 10, 14, 25, 27, 30, 32, 34, 164, 128, 176, 177, 240, 241, 242, 243, 244, 245, 246, 247, 248, 257, 258, 259
10	**Culture (Community, Heritage, Art & History)**	4, 11, 13, 26, 29, 30, 31, 32, 38, 43, 58, 132, 133, 155	1, 4, 5, 9, 12, 39, 236, 237, 238, 239, 258, 259
9	**Infrastructure & Housing**	2, 3, 74, 129, 130, 131, 148	1, 2, 3, 7, 17, 53, 123, 127, 129, 149, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235
8	**Waste**	14, 25, 54, 126, 127, 128, 153	11, 20, 22, 222, 223, 224, 225
7	**Mobility**	11, 75, 123, 91, 124, 125, 129	17, 18, 149, 215, 216, 217, 218, 219, 220, 221, 256, 259
6	**Energy**	29, 54, 60, 120, 121, 122	1, 2, 3, 6, 15, 16, 123, 149, 206, 207, 208, 209, 210, 211, 212, 214, 256

5	**Food**	27, 118, 119	12, 13, 203, 204, 205
4	**Water**	54, 75, 115, 116, 117	6, 11, 123, 199, 200, 201, 202
3	**Health (Human and Environmental)**	1, 5, 38, 39, 40, 41, 110, 113, 114, 153, 155	18, 195, 196, 197, 198, 259
2	**Biodiversity**	1, 4, 5, 27, 59, 62, 112, 130	7, 11, 24, 75, 167, 190, 191, 192, 193, 194
1	**Geography**	11, 27, 34, 44, 47, 48, 52, 110, 111, 124	22, 25, 94, 185, 186, 187, 188, 189
Pillars of Justice & Equity			
i	**Access & Reliability**	17, 29, 49, 60, 92, 93, 141	16, 25, 122, 123, 124, 125, 126, 127, 128, 129, 259
ii	**Climate Change Adaptation & Mitigation**	2, 8, 10, 15, 17, 21, 24, 27, 35, 41, 42, 45, 54, 55, 73, 74, 75, 101, 102, 155	1, 2, 7, 8, 9, 10, 12, 13, 14, 36, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 190, 258
iii	**Conflict & Crisis Response**	1, 51, 71	259
iv	**Engagement & Participation**	4, 13, 31, 36, 51, 53, 94, 95, 140, 147, 152, 158, 159, 160	1, 4, 5, 25, 26, 31, 32, 36, 40, 41, 81, 97, 130, 131, 132, 133, 223, 255, 257, 258, 259
v	**Gender**	51, 55, 88, 89, 90	25, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114
vi	**Indigenous Knowledges & Decoloniality**	1, 33, 46, 51, 85, 86, 87, 158, 159, 160	25, 39, 99, 100, 101, 102, 102, 103, 104
vii	**Informality**	12, 13, 14, 15, 16, 91, 149, 150, 152, 153	5, 25, 39, 115, 116, 117, 118, 119, 120, 121, 255
viii	**Intergenerationality**	5, 13, 31, 33, 51, 55, 78, 79, 148, 149, 157	25, 39, 89, 90, 91, 92, 93, 255, 258
ix	**Sufficiency**	80, 81, 82, 83, 84, 149	94, 95, 96, 97, 98, 256, 258
x	**Sustainable Consumption & Production**	3, 4, 26, 27, 28, 29, 37, 42, 55, 60, 76, 77, 145, 147, 149, 151, 152, 154, 157	6, 19, 20, 21, 22, 27, 84, 85, 86, 87, 88, 229, 255, 256, 257, 259
Delivery Approaches			
Foundation	**Empowering Cities to Take Action**	4, 19, 34, 44, 48, 52, 53, 56, 59, 60, 65, 66, 154	8, 9, 10, 29, 36, 37, 40, 41, 42, 43, 45, 46, 47, 49, 50, 257, 258
Elevator	**Co-Production of Knowledge**	33, 59, 67, 68, 69	39, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 138, 255
Elevator	**Partnerships for Long-Term Collaboration**	16, 30, 46, 61, 70, 71, 72, 142	39, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 254, 255, 259

Table 3: Knowledge Gaps and Action Priorities by GRAA level

2. Knowledge Gaps and Action Priorities

The full listings of research gaps and action priorities presented in summary through the high-level GRAA Structure illustration (Figure 13) and the summarizing directory provided in Table 3 are detailed in Tables 4 and 5 below.

Table 4

	GRAA 2024 Priority Knowledge Gaps (#1-64 derived from I4C21, #65-138 added from I4C24 synthesis)	Corresponding GRAA topic(s)
1	Research is needed to better understand the benefits and diverse values of urban nature, including for health and wellness, and how these vary by socio-economic groups, including Indigenous peoples, within and across cities. Then building from this understanding further research is needed on how utilizing nature-based solutions can maximize benefits for climate, nature and people as well as how improving this understanding can reduce conflicts that may arise around approaches to conservation and restoration.	Biodiversity Conflict & Crisis Response Health (Human & Environmental) Indigenous Knowledges & Decoloniality
2	Further research is needed to develop full cost benefit analysis of the built, blue and green infrastructure solutions to adaptation and mitigation, that includes financial and economic implications and social/societal co-benefits (e.g. – green jobs (C40, 2021), economic savings, reduced energy bills, cleaner air/water, etc.), at scale and across different urban environments.	Scale Finance (Investment & public procurement) Infrastructure Climate Change Adaptation & Mitigation
3	An improved understanding of lifecycle costs of blue/green infrastructure is needed to support planning for projects, better justify additional measures for green and resilient design and ensure maintenance can be sustained throughout the project lifetime to maximize outcomes and benefits.	Infrastructure Sustainable Consumption & Production
4	Research is needed on ways in which communities can be empowered to lead on nature-based solutions for wide scale public participation and long-term support and sustainability of projects.	Scale Culture (Community, Heritage, Art & History) Biodiversity Engagement & Participation Sustainable Consumption & Production Empowering Cities to Take Action
5	Further research/guidance is needed from urban ecologists that helps planners, designers and architects to mainstream urban nature in a way that is scientifically robust and leads to specific species and urban ecosystem regeneration and/or specific health or air quality benefits.	Health Biodiversity Intergenerationality
6	Further research and understanding are needed on how synergistic, and systems based urban planning and climate resilient development and design have been and can be enacted in cities, especially in different city contexts and planning practices, with a view to future urban growth.	Infrastructure Governance & Multilevel Partnerships Engagement & Participation Climate Change Adaptation & Mitigation Empowering Cities to Take Action
7	Further exploration is needed of how possibilities of ten- and 100-year weather/climate events should shape overall planning strategies of cities. Additionally, with climate hazards becoming more frequent, it is also important to gain a better understanding of how short-term uncertainty can be better incorporated into long-term planning.	Uncertainty

#	GRAA 2024 Priority Knowledge Gaps (#1-64 derived from I4C21, #65-138 added from I4C24 synthesis)	Corresponding GRAA topic(s)
8	Further research into how climate change can be mainstreamed into city decision making, particularly within the context of integrating mitigation and adaptation considerations into comprehensive planning, and into capital investment plan/capital improvements programming of a city is needed.	Finance (Investment & public procurement) Climate Change Adaptation & Mitigation
9	Research is needed on best practices for how local government budgets can be climate smart, aligned and sensitive, and how this would vary based on the context of different cities.	Governance & Multilevel Partnerships
10	There is a need for documentation and evaluation of early attempts to adapt cities to the impacts of climate change, including efforts at both fortification and retreat and different approaches to adaptation. This could include models for successful relocation from areas that will be uninhabitable due to climate change as well as methodologies for assessing and evaluating the effectiveness of adaptation options with the changing severity of impacts.	Climate Change Adaptation & Mitigation
11	Better understanding is needed of the relationships between urban form and urban design and transportation systems in the context of greenhouse gas emissions. Land use patterns drive what is possible in terms of vehicle miles traveled, transit modal split, and bikeability/walkability. The implications of different density patterns, subdivision regulations, and street/corridor design in terms of transportation behaviors must be understood in different cultural and climate contexts as well as projected urban growth.	Culture (Community, Heritage, Art & History) Transportation Geography
12	More research is needed, using evidence from the ground, based on experiences during the COVID-19 pandemic, on how informal work can be more vulnerable and more resilient to shifts in the global and urban context like those seen during the COVID-19 lockdown periods and successive economic downturns and how this resilience may be translated to shocks and stresses caused by climate change.	Informality
13	Further study is needed on cases of effective community participation and models in informal settlement planning in the context of climate change, especially involving youth and children who make up a large proportion of populations in cities in developing countries.	Culture (Community, Heritage, Art & History) Engagement & Participation Informality Intergenerationality
14	Further information and data are needed on how the work of informal waste collectors contributes to low-carbon and resilient cities and the costs and benefits of these systems.	Information Integrity & Transparency Waste Informality
15	Research is needed to understand and document how potential technologies, for example drones, can inform planning within informal settlements, especially self-enumeration, and incorporate current and future impacts of climate change to improve adaptation efforts.	Informality Climate Change Adaptation & Mitigation

#	GRAA 2024 Priority Knowledge Gaps (#1-64 derived from I4C21, #65-138 added from I4C24 synthesis)	Corresponding GRAA topic(s)
16	Further understanding of how partnership networks that are inclusive of informal settlers and those working in the informal economy can be designed so that implementation and data collection are done from the bottom up and top down, and how methods and planning informed from the bottom up and top down could result in design solutions that are equitable and people-centered, support development needs and build resilience to climate change.	Partnerships for Long Term Collaboration Informality
17	Further research is needed to better quantify the adaptation finance gap in cities and understand issues of finance accessibility at the local level. This could include an analysis of useful metrics for classifying and identifying urban adaptation finance at the local level for comparability of adaptation finance across cities, regions and globally, and best practices for financial mechanisms to effectively distribute across various levels of governments.	Finance (Investment & public procurement) Governance & Multilevel Partnerships Access & Reliability Climate Change Adaptation & Mitigation
18	Further exploration of best practices for public procurement, and other available tools as well as the potential for tools that would unlock finance for local governments to increase implementation is needed.	Finance (Investment & public procurement) Governance & Multilevel Partnerships
19	Scoping for a better understanding of the potential for digital finance, crowdsourcing and digital green bonds for urban climate change projects is needed. Analysis is needed on how the availability of climate finance in developing and developed countries has been affected by the COVID-19 pandemic and the subsequent impact on climate plans and climate actions taken in cities.	Digitalization Finance (Investment & public procurement) Empowering Cities to Take Action
20	Investigation and further understanding of business models that could make innovation possible is required. How to enhance the confidence of potential investors in climate initiatives in cities should be considered.	Finance (Investment & public procurement)
21	Research is needed on how to maximize the use of already existing local data and information within climate models, as well as the identification of additional localized data and information that are critical to understanding locally specific risks and uncertainty and tailoring locally appropriate adaptation measures.	Uncertainty Risk Information Integrity & Transparency Climate Change Adaptation & Mitigation
22	Increase understanding about how risk management and disaster planning data can best be used and developed by and within cities in the face of constantly changing conditions.	Risk
23	More research is needed on innovative climate models and the emissions (savings) potential in each model as well as uncertainties in these emissions projections.	Uncertainty
24	Further research is needed on how to best develop national government policy to fit the needs of local governments to maximize the potential for public procurement in building urban climate solutions. Exploring what options exist in terms of evaluation criteria that are not only based on lowest cost, for example, indicators to quantity mitigation and adaptation co-benefits included in project requirements/assessments.	Finance (Investment & public procurement) Governance & Multilevel Partnerships Climate Change Adaptation & Mitigation
25	There is a need for a better understanding of waste value chains and how they can contribute to low-carbon and circular economy transition, particularly in developing cities.	Waste

#	GRAA 2024 Priority Knowledge Gaps (#1-64 derived from I4C21, #65-138 added from I4C24 synthesis)	Corresponding GRAA topic(s)
26	Further research is needed on how sustainable consumption habits can be fostered, and how local availability and potential for sharing can be better understood and supported through digital platforms. This could include how digital platforms can support growth of sustainable consumption habits from an individual scale to influence the community and city scales and beyond through personal relationships, friendly competition with neighbors etc.	Scale Digitalization Culture (Community, Heritage, Art & History) Sustainable Consumption & Production
27	Further research and information are needed to determine locally specific plans and the benefits of urban agriculture for climate mitigation, food security, local production, ecosystems and biodiversity.	Information Integrity & Transparency Food Biodiversity Geography Sustainable Consumption & Production Climate Change Adaptation & Mitigation
28	Research is needed on how circular economic principles have affected consumption and production in regions where this concept is most prevalent, and how this framework may need to be tailored for best impact in addressing climate change in cities where it has not been integrated in climate planning.	Sustainable Consumption & Production
29	There is a need to further investigate the potential of community based sustainable energy production to identify the best source(s) of energy production for the contexts of particular cities and communities, the impact that energy production can have in reducing emissions as well as the contributions it could have to other social and development dimensions at the local level (employment, community resilience, securing access to energy and reducing energy poverty).	Finance (Investment & public procurement) Culture (Community, Heritage, Art & History) Energy Access & Reliability Sustainable Consumption & Production
30	Research across fields and disciplines to bring together experts on past and current culture and heritage of a particular city with urban planning and climate experts for collaborative research is needed.	Partnerships for Long Term Collaboration Culture (Community, Heritage, Art & History)
31	Further understanding is needed on how urban participatory planning processes to devise and implement climate change solutions can be shaped by culture, heritage and history and how these inputs can be considered in the participatory process to ensure that traditionally marginalized communities are included and past injustices recognized.	Culture (Community, Heritage, Art & History) Engagement & Participation Intergenerationality
32	Research is needed on how culture and heritage can better inform place-based responses to climate change which better serve the needs of the community.	Culture (Community, Heritage, Art & History)
33	Further incorporation and representation of oral histories—inclusive of Indigenous oral traditions—in research and the generation of urban climate knowledge and data.	Co-Production of Knowledge Indigenous Knowledges & Decoloniality Intergenerationality
34	Research is needed to better understand how to effectively design urban climate goals and actions that take on a systems approach by incorporating the multiple, locally specific climate and societal problems and pressures and the perspectives of different actors in cities.	Governance & Multilevel Partnerships Geography Empowering Cities to Take Action

#	GRAA 2024 Priority Knowledge Gaps (#1-64 derived from I4C21, #65-138 added from I4C24 synthesis)	Corresponding GRAA topic(s)
35	Further information is needed on how city systems and systems of cities operate at different scales from the neighborhood scale to metropolitan regions and how this impacts regional and national scale decision-making and the implementation of climate change mitigation, adaptation and resilience solutions.	Scale Information Integrity & Transparency Climate Change Adaptation & Mitigation
36	Further work is needed to bring together different ways of thinking which currently contribute to how cities are built and shaped such as ecological placemaking, design and participatory planning to build new creative approaches and ways to think and plan a city system which increase resilience to climate change while also providing important co-benefits particularly for marginalized and vulnerable groups.	Engagement & Participation
37	Exploration of how thinking using a circular economy and systems approach framework can open new possibilities, and allow for conceptualization about the future city, the different ways it may operate and the necessary solutions to achieve sustainable and resilient cities is needed.	Sustainable Consumption & Production
38	Further research is needed on ways to account for benefits to health and wellbeing of urban greenspace, including urban regeneration projects, in financial and other terms and there is a need to explore how accounting for these benefits can influence urban planning, especially in cities under-represented in existing research. Particular attention should be paid to effects on traditionally marginalized and vulnerable communities as they may have distinct benefits and trade-offs.	Finance (Investment & public procurement) Culture (Community, Heritage, Art & History) Health
39	Further assessment of the benefits and best practices of integrating local air quality and climate change plans is required to understand how to maximize impacts and benefits for health and climate.	Health
40	Research is needed on which innovative financing mechanisms can be utilized by cities to advance health and climate solutions.	Finance (Investment & public procurement) Health
41	Research is needed to better understand the co-benefits of climate and health policy, and a further understanding is needed on how to mitigate misalignment of these policies to promote synergies.	Health Climate Change Adaptation & Mitigation
42 43	Further research is needed on how to calculate short- and long-term benefits of climate solutions and how factors such as cost, inclusivity, difficulty of implementation, effectiveness in increasing mitigative and adaptive capacity and sustainability of solutions should be weighed against the timelines for benefits (or the consequences in not acting) in order to prioritize implementation options.	Sustainable Consumption & Production Climate Change Adaptation & Mitigation
	Increased learning from effective small-scale projects with significant community support is needed to better understand how community support can be built for projects with larger scale implementation potential.	Scale Culture (Community, Heritage, Art & History)
44	Further understanding is needed of the implications of delaying or accelerating climate action in cities, both within the city and how local government decisions would impact on territories and people outside of city boundaries.	Governance & Multilevel Partnerships Geography Empowering Cities to Take Action

#	GRAA 2024 Priority Knowledge Gaps (#1-64 derived from I4C21, #65-138 added from I4C24 synthesis)	Corresponding GRAA topic(s)
45	Further understanding is needed of upstream and downstream impacts of adaptation projects in cities and how regional approaches could be employed to create more effective climate solutions.	Climate Change Adaptation & Mitigation
46	There is a need for information and research to support the co-creation of new models of collaboration at the urban scale, bringing in local and Indigenous experiences, as well as those with potentially different perspectives such as the private sector and industry.	Partnerships for Long Term Collaboration Scale Information Integrity & Transparency Indigenous Knowledges & Decoloniality
47	Further research is needed on innovative governance models which are most effective for cities who are prioritizing circular economic principles.	Governance & Multilevel Partnerships Geography
48	There is a need for further research on how land governance is influenced by extractive and exclusionary principles and models, and how this affects decision making on climate change action at the local scale. Exploration of alternative models which include innovative ways to address property tax, different forms of property rights regimes, ways to de-fiscalize land use and enable broader horizontal distribution of resiliency are needed.	Scale Governance & Multilevel Partnerships Geography Empowering Cities to Take Action
49	Research is needed on the barriers and blockages that prevent local governments from accessing capital to implement climate change initiatives as well as potential changes to governance models and other societal structures that could facilitate that access and how to address political issues and corruption, to facilitate flows of capital.	Governance & Multilevel Partnerships Access & Reliability
50	Increased understanding of how overlapping jurisdictions and agencies, adjacent jurisdictions, and special-purpose districts interact to devise strategies to move climate change policy.	Communication Centralization Governance & Multilevel Partnerships Engagement & Participation
51	There is a need to understand the best tools for public consultation and consensus building, public participation, and conflict management as well as potential new, inclusive organizational structures. In particular, it is important to know how these methods work in varying contexts of gender, age, race, ethnicity, religion, Indigenous status, and (dis)ability.	Conflict & Crisis Response Engagement & Participation Gender Indigenous Knowledges & Decoloniality Intergenerationality
52	Further research is needed on how national level climate change and regional development policies and strategies can incorporate a territorial or landscape perspective to support urban climate change action.	Geography Empowering Cities to Take Action
53	Deep analysis of structural barriers preventing action are needed – for example examining short term political cycles, budget allocation, autonomous cities lacking engagement with the regional level etc. and how combinations of these factors prevent action, and how overcoming barriers or changing paradigms could enable it.	Engagement & Participation Empowering Cities to Take Action
54	Further research is needed on how Digitalization of city-level data and solutions can improve key urban functions (water, waste, electricity management) increasing efficiency and contributing to mitigation, in addition to building adaptive capacity and resilience and providing other societal co-benefits.	Efficiency Digitalization Waste Energy Water Climate Change Adaptation & Mitigation

#	GRAA 2024 Priority Knowledge Gaps (#1-64 derived from I4C21, #65-138 added from I4C24 synthesis)	Corresponding GRAA topic(s)
55	Exploration of how digital technology can support the creation of a co-produced database with innovative solutions and a function to sort and prioritize solutions according to criteria such as, transferability, scalability, replicability, circularity, sustainability, timeliness, mitigative and adaptive potential, evidence-based, inclusivity, gender and age-sensitive and fit for purpose in the context of a particular city to learn from past experiences and best practices in order to select the best solutions for local needs.	Digitalization Gender Sustainable Consumption & Production Intergenerationality Climate Change Adaptation & Mitigation
56	Research is needed on how dynamic climate action planning, which relies on crowd sourced, tailored and real time big data can be effectively used, and streamlined for the contexts of different cities around the world.	Empowering Cities to Take Action
57	A better understanding of how historical inequities and intergenerational issues of justice and equity in cities are compounding current climate and environmental justice issues is needed.	Communication Culture (Community, Heritage, Art & History) Engagement & Participation Gender Indigeneity & Decoloniality Intergenerationality
58	Further research is needed on how inequality is built into current urban planning cultures and norms and how reorienting towards an urban planning framework which takes a human rights approach could impact justice and equity issues in urban climate change planning and ensure a just transition.	Culture (Community, Heritage, Art & History)
59	Knowledge is needed on how interspecies impacts can be better included in urban climate action. Further understanding and knowledge to inform who should speak on behalf of other species in urban climate change decision making is also called for.	Co-Production of Knowledge Biodiversity Empowering Cities to Take Action
60	Research is needed to better understand the synergies between climate action, development and poverty reduction in cities, especially access to sustainable energy that would increase energy security as part of a low-carbon development pathway.	Energy Access & Reliability Sustainable Consumption & Production Empowering Cities to Take Action
61	Further support is needed for local governments and partners to capture small scale case studies and research is needed on how these can be integrated and shared to inform decision making, providing information on best practices, barriers, failures, challenges and innovations in individual solutions which may apply across different contexts within different cities.	Partnerships for Long Term Collaboration Digitalization Scale Information Integrity & Transparency Governance & Multilevel Partnerships
62	Further research is needed on the potential for urban forests to contribute to mitigation efforts, inclusive of location, species specificity and how future climate conditions will affect growth and sequestration potential.	Biodiversity
63	Research is needed on how mobile phone data can be used to understand exposure and citizen response to climate disasters and risks and inform policy to reduce future risk.	Risk | Communication Scale Uncertainty Digitalization Information Integrity Geography Climate Change Adaptation & Mitigation

#	GRAA 2024 Priority Knowledge Gaps (#1-64 derived from I4C21, #65-138 added from I4C24 synthesis)	Corresponding GRAA topic(s)
64	Location specific data are needed on how the integration of particular topographical, geological, structural, social contexts influence the risk from climate hazards and how they may affect potential to respond to risk.	Scale Uncertainty Risk Digitalization Information Integrity Geography Climate Change Adaptation & Mitigation
65	Rapid urbanization and associated challenges are not adequately understood in the context of how risk is being centralized in cities without corresponding capacity to mobilize effective response to increasing system demands.	Empowering Cities to Take Action Scale Uncertainty Risk Centralization Access & Reliability
66	Decentralized access to context-specific tools for dealing with scenarios faced by cities in developing regions, including knowledge/resource-sharing tools and adaptive regulatory review/revision processes for underserved populations.	Empowering Cities to Take Action Communication Access & Reliability Empowering Cities to Take Action
67	Methodologies are needed that harmonize varied perspectives and ensure inclusive, data-informed climate action strategies for systems approach considerations and multi-sectoral collaboration between stakeholders.	Co-Production of Knowledge Digitalization Information Integrity & Transparency Communication Governance & Multilevel Partnerships Empowering Cities to Take Action
68	Existing international research and funding partnerships have not effectively bridged the knowledge gap between research findings and local implementation to support urban transitions.	Centralization Communication Governance & Multilevel Partnerships Infrastructure Engagement & Participation Empowering Cities to Take Action
69	Current efforts to scale urban climate and biodiversity projects often fail to consider system dynamics, resulting in isolated successes rather than broader, integrated impacts.	Co-Production of Knowledge Scale Centralization Biodiversity Climate Change Adaptation & Mitigation
70	Transitions to sustainable consumption patterns require innovative governance structures and understanding of challenges faced by existing public-private partnerships (PPPs) to design effective PPPs going forward.	Governance & Multilevel Partnerships Partnerships for Long Term Collaboration Sustainable Consumption & Production Climate Change Adaptation & Mitigation
71	Cities experiencing ongoing disruptions, such as human conflict, suffer from poorly coordinated regulation of formal policies, necessitating robust formal and informal partnerships to prioritize immediate and long-term climate challenges.	Climate Change Adaptation & Mitigation Communication Conflict & Crisis Response Governance & Multilevel Partnerships Partnerships for Long Term Collaboration

#	GRAA 2024 Priority Knowledge Gaps (#1-64 derived from I4C21, #65-138 added from I4C24 synthesis)	Corresponding GRAA topic(s)
72	Understanding how the size and design of cross-sector partnerships impact their effectiveness in achieving net-zero climate goals, and integrating green transition policies with workforce development across all sectors to enable local decision-makers to effectively utilize climate data and maps for enhancing resilience and disaster adaptation.	Scale Partnerships for Long Term Collaboration Climate Change Adaptation & Mitigation
73	There is a significant need for rapid adaptation measures, integration of local knowledge, and support for community-led initiatives, especially in regions where current adaptation tools fail to address broader complexities, preventing disadvantaged communities from accelerating climate adaptation through better integration of scientific evidence, and targeted approaches to vulnerabilities in rapidly growing regions.	Climate Change Adaptation & Mitigation
74	Understanding forced migration, housing deficits, urban heat islands, and declining green spaces as consequences of climate change requires comprehensive, dynamic approaches that integrate both climate adaptation and mitigation strategies, moving away from static emission reduction efforts.	Climate Change Adaptation & Mitigation Infrastructure & Housing
75	Discrepancies between data sources may inhibit data-driven decision making in formulating/prioritizing climate action plans concerning; urban flooding, improving pedestrian accessibility, and developing tools for integrated urban planning that enhance resilience and spatial justice.	Climate Change Adaptation & Mitigation Mobility Water
76	Improved lifecycle analysis of the place-based value of biodiversity/natural capital in supply chains both within and between cities is needed to operate local economies within sustainable environmental and social system parameters.	Sustainable Consumption & Production
77	Understanding circularity of material resource utilization requires innovative methodologies to link productive use of all resources to a 100% recovery model of all post-consumption waste materials, in consideration of impacts on water and energy systems.	Sustainable Consumption & Production
78	Urban design, planning, and policy do not adequately consider impacts on future generations, and methodologies for quantifying avoided future costs must be strengthened and mainstreamed to replace current regulatory environments which still allow profit extraction-driven practice.	Intergenerationality
79	Inadequate climate change education for youth leads to a lack of preparedness for designing effective adaptations in both environmental and social contexts.	Intergenerationality
80	Sufficiency measures aimed at both reducing natural resource demand and ensuring adequate, equitable resource access by all are often overlooked in climate policies, without measures to prevent social and economic injustices and ensure long-term sustainability of societies both within and across cities globally.	Sufficiency
81	Current land demands for sufficient resources complicate cities' efforts to equitably manage the sustainability transition, and sufficient system capacity surrounding cities must consider urban sprawl and degradation of urban ecosystems in designing comprehensive management approaches that balance urban expansion/development with the preservation of natural resources and ecosystem services.	Sufficiency

#	GRAA 2024 Priority Knowledge Gaps (#1-64 derived from I4C21, #65-138 added from I4C24 synthesis)	Corresponding GRAA topic(s)
82	Traditional climate solutions often emphasize emission reduction, neglecting broader systemic changes and cross-sectoral innovations required for long-term sustainability, effective decarbonization, and climate justice.	Sufficiency
83	In rapidly growing cities, increasing demand for resources is not met with necessary research on sufficiency in consumption patterns and growth management, with sustainable practices in urban planning and community involvement to achieve environmental sustainability.	Sufficiency
84	Cities require comprehensive evaluation of resource consumption patterns for optimization, as existing frameworks lack the depth needed to effectively assess sufficiency and resource utilization/distribution inefficiency/inequality.	Sufficiency
85	Ineffective and culturally insensitive solutions persist through failure to adequately recognize and integrate Indigenous knowledge into policy and practice across sectors at all levels and fully address historical injustices through promoting decolonial approaches that enhance resilience and sustainability.	Indigenous Knowledges & Decoloniality
86	For First Nations communities, barriers such as institutional constraints and lack of control can impede the implementation of renewable energy projects. Incorporating Indigenous perspectives into energy policies and projects is essential for overcoming these challenges and ensuring community benefits.	Indigenous Knowledges & Decoloniality
87	Most current formal top-down governance praxis inadequately acknowledges or values indigenous perspectives, which are vital for developing inclusive, diverse climate strategies and emissions regulations, creating gaps in effective community-level governance.	Indigenous Knowledges & Decoloniality
88	In the context of climate-smart practices, particularly in agriculture, women and youth often face barriers in accessing knowledge and education – these disparities limit their participation and effectiveness in climate resilient farming and other adaptive practices.	Gender
89	Methodologies for recognizing and resolving gender disparities in climate action and urban development are required for effective participation in unequal outcomes where gender-sensitive policies that ensure equitable participation in climate adaptation strategies and urban sustainability effort is assured.	Gender
90	Marginalized groups encounter barriers in accessing safe and inclusive public spaces, further emphasizing the need for gender-specific considerations in urban design of all systems to resolve persistent inequities through targeted strategies and community engagement.	Gender
91	Informal mobility modes, common in informal/underserved settlements, contribute to poor/dangerous working conditions and high emissions, and research into solutions requires local knowledge and community engagement to devise socially appropriate sustainable solutions which reduce hazard and cost burdens on individuals in informal mobility arrangements.	Informality Mobility

#	GRAA 2024 Priority Knowledge Gaps (#1-64 derived from I4C21, #65-138 added from I4C24 synthesis)	Corresponding GRAA topic(s)
92	Insufficient monitoring and feedback systems affect cities' ability to assess and improve the effectiveness of access & reliability for ongoing evaluation, informed decision-making, and successful climate adaptation efforts required of their infrastructure and services.	Access & Reliability
93	Enhancing access to actionable, high-quality data is necessary for addressing these urban challenges and ensuring that climate initiatives are both efficient and equitable.	Access & Reliability
94	Highlighting the need for structured frameworks to foster meaningful engagement and communication with local governments, youth and marginalized communities often excluded from decision-making processes, innovative tools and methodologies must facilitate greater participation in climate action, urban planning, and sustainable development.	Engagement & Participation
95	Key stakeholders in the private sector, such as real estate developers and other actors, require collaborative, active roles in implementing climate resilient practices with policymakers, and communities to support sustainable urban growth and resilience to climate impacts.	Engagement & Participation
96	"Smart city technologies" and their impact on urban management are not fully understood, and this underscores the necessity for further research into how digitalization can influence urban governance and sustainability outcomes, highlighting the need for systematic evaluation of how digitalization influences value creation, resource management, and climate adaptation efforts.	Digitalization
97	Current digital transformation strategies often fail to prioritize citizen well-being, raising social and ethical concerns, and addressing the need for empathetic, human-centered technologies is essential to ensure digitalization benefits all urban residents.	Digitalization
98	Spatial and dynamic modeling, including exploratory scenario planning of multiple potential futures, were highlighted as essential tools for managing uncertainty in climate strategies.	Uncertainty
99	Inefficiencies in both data-driven decision-making and operational requirements overwhelm local authorities and lead to human and environmental and health risks. There is a pressing need for improved resource/energy management and recovery mechanisms and explore viable community awareness initiatives to address these issues with utility providers and consumer good producers.	Efficiency
100	Climate initiatives in sectors like housing, transportation, and urban greening often struggle to scale due to fragmented project-based planning and insufficient data, financial access, and coordination where a shift to a portfolio approach could attract diverse funding sources and facilitate broader implementation.	Scale
101	Comprehensive risk assessments, disaster management tools, and innovative technologies, such as digital twins, are needed to address exposure and vulnerability of cities, for example in coastal regions facing greater climate risks which are often exacerbated by urbanization.	Risk Climate Change Adaptation & Mitigation

#	GRAA 2024 Priority Knowledge Gaps (#1-64 derived from I4C21, #65-138 added from I4C24 synthesis)	Corresponding GRAA topic(s)
102	Understanding uniquely urban vulnerabilities requires tools that integrate complex data for informed, strategic risk management and climate resilience planning to ameliorate the concentration of risk that occurs in centralized habitats.	Risk Climate Change Adaptation & Mitigation
103	Poorly coordinated formal and informal policies require cross-sectoral communication mechanisms to bridge gaps and enhance cities' ability to tackle both immediate and long-term challenges in the face of prevailing consumption-driven communication.	Communication
104	Urban rewilding efforts face challenges around conveying goals and outcomes due to socio-cultural and ecological perceptions which inhibit greater community participation and support for urban climate initiatives which improve long-term environmental/human health and socio-economic performance.	Communication
105	Urban development initiatives often overlook the complexities of integrating tribal perspectives into planning frameworks. There is a pressing need for decentralized approaches that incorporate governance and partnership dynamics to allow ontological and epistemological diversity to rapidly respond to local needs.	Centralization
106	Research is required to better understand how access modalities for international climate finance—currently challenged by issues such as inadequate sovereign guarantees, high-interest rates, and inflexible multilateral mechanisms—can be overhauled for local governments to engage with finance in the same manner as national governments.	Centralization Finance
107	Addressing the constraints posed by fragmented governance structures is crucial for enhancing urban resilience - research into organizational design must examine how to successfully decouple decentralization efforts from disorganized results, particularly where centralized decision-making doesn't bring disparate issues into collective focus.	Centralization Governance & Multilevel Partnerships
108	Research and action plans are required concerning the role of advertising in information systems and the degree to which sustainable consumption and production models are being undermined by profit-driven practices, and mechanisms for regulating and modifying marketing behavior with local-level regulations to prevent perverse incentives from resulting in unsustainable outcomes.	Information integrity & Transparency
109	The role of information integrity & transparency in actor theory requires significant examination for city stakeholders to understand how origination and transmission of ideas can either aid or inhibit climate response, and how accountability mechanisms may be structured to curb negative outcomes associated with bad faith actors misusing information transmission systems.	Information integrity & Transparency
110	Targeted research on urban geography is needed for effectively redesigning green spaces to enhance microclimatic conditions for local biodiversity and system health, involving evaluation of the effects these redesigns have on thermal comfort and air temperatures to optimize urban environments across diverse geographic contexts.	Geography Health (Human & Environmental)

#	GRAA 2024 Priority Knowledge Gaps (#1-64 derived from I4C21, #65-138 added from I4C24 synthesis)	Corresponding GRAA topic(s)
111	Understanding how geographic factors significantly influence urban climate vulnerabilities and adaptation strategies underscores the need for geographically informed approaches that account for local conditions and variations, which must be communicated to allow comparison of similar conditions across locales globally in the interest of identifying common challenges and potential solutions.	Geography
112	There is a need for further research to assess the effectiveness of green buildings and nature-based solutions in understanding the interplay between urbanization, land-use patterns, and green infrastructure.	Scale
113	Urban areas are increasingly facing health risks associated with climate change, and existing heat action plans have shown varied effectiveness due to differences in governance, implementation, and capacity across cities, so vulnerable populations require strong early warning systems, an understanding of effective water management regimes, and beneficial agrobiodiversity practices.	Biodiversity Health (Human & Environmental) Governance & Multilevel Partnerships
114	Strategies that enhance community well-being while preserving ecological integrity are essential, requiring development and integration of avoided cost methodologies to prevent profit-driven development impacts from undermining city health.	Health (Human & Environmental)
115	Sustainable, decentralized methods for effectively managing water resources are urgently needed in cities, where water scarcity and the inadequacy of water and sanitation systems in peri-urban areas create significant challenges.	Water
116	A unified approach is essential to address water-related vulnerabilities, including supply, treatment, and distribution challenges, furthered by an understanding of how maintenance and enhancement of green infrastructure amidst declining urban forests and increasing urban heat is critical for supporting water systems for urban resilience.	Water
117	Understanding subsurface water dynamics, concerning both aquifers and freshwater lens extraction boundaries and thresholds, must be better documented and communicated to prevent overharvesting of water resources and prevent intrusion from saltwater, mineral deposits, and other contaminants or depletion threats.	Water
118	Research is vital into examining/developing methods for abandoned/underutilized sites which may be remediated and utilized for sustainable food production facilities to support urban food security, particularly given threats urban green spaces face from both climate change and human development demands.	Food
119	Understanding successful integrated approaches and strategies that include gender inclusivity in urban farming will improve local food systems and support sustainable urban development, ensuring that food systems contribute to the overall resilience and health of urban communities if properly documented and replicated.	Food

#	GRAA 2024 Priority Knowledge Gaps (#1-64 derived from I4C21, #65-138 added from I4C24 synthesis)	Corresponding GRAA topic(s)
120	Research regarding accelerating the energy market transition and properly capturing externalized costs to completely phase out fossil fuels in city economies across the world must be consolidated and communicated to governance and finance professionals suffering from aversion to institutional/infrastructural transitions.	Energy
121	Communicating the robust findings around the sunk costs of how heavy reliance on fossil fuels exacerbate greenhouse gas emissions, increase risk, and deplete natural capital, and which energy sector actors are culpable for inaction enabling our current 1.5°C overshoot scenario.	Energy Communication
122	Indigenous communities face barriers to implementing renewable energy projects due to institutional, financial and systemic capacity constraints, where policies and support mechanisms require collaborative empowerment of these communities to overcome obstacles and benefit from renewable energy initiatives.	Energy Indigenous knowledges & decoloniality
123	Research into the negative health and productivity impacts of mobility systems in cities must be coupled with innovative solutions in alternative mobility methods and effective urban design to reduce congestion, emissions, sedentarism, and improve accessibility and reliability within cities.	Mobility
124	Inefficiencies and high pollution levels in urban mobility systems highlight the need for effective GIS-based indicators to improve spatial efficiency and equity through design of public and active transport initiatives to enhance mobility while devising incentives for the rapid drawdown in private vehicle use within cities globally.	Mobility Digitalization Geography
125	The role of airports and seaports in the connectivity between cities—and distribution of land use within their boundaries—requires further consideration concerning decarbonizing mobility systems, including the sustainability of the aircraft and vessels they accommodate.	Mobility
126	Research into the most effective management of diverse waste streams from various industries necessitates effective policies and cross-sector Extended Producer Responsibility (EPR) mechanisms to enhance recycling efforts and reduce environmental impacts.	Waste
127	As urban areas contend with preserving and expanding green spaces amid population growth and land use changes, innovative methodologies must be researched and deployed for quantifying and valuing waste reduction and resource recovery practices at a community level that allow compensation for engaging in circular economy practices within cities.	Waste
128	Research into unlocking sustainable waste through Multilevel governance reforms is needed.	Waste

#	GRAA 2024 Priority Knowledge Gaps (#1-64 derived from I4C21, #65-138 added from I4C24 synthesis)	Corresponding GRAA topic(s)
129	There is a huge research & development application gap between what we know of energy-efficiency technologies for affordable individual/multi-person active/electric vehicle (EV) energy economy and the land transport infrastructure required with the current paradigm in overdeveloped economies being inequitably deployed in cities globally (i.e. – many cities afford disproportionate space for automobiles of increasing size despite their existence being at odds with all sustainable design principles); decarbonized private transport can be regulated into being, ensuring equitable participation in the e-mobility transition if current knowledge is synthesized and applied across sectors with regulatory guidance.	Infrastructure & Housing Mobility
130	A lack of structured methodologies for effective environmental management persists, with preservation and expansion of urban green spaces challenged by land-use changes, population growth, and inadequate management, which threaten ecosystem services and urban resilience. Land is still being developed/degraded without appropriate research being undertaken as due diligence prior to its utilization/exploitation – effectively integrating ecosystem services into urban planning at cultural, governmental, and financial levels.	Infrastructure & Housing Biodiversity
131	City-level participatory action research case studies are needed in which urban infrastructure zoning, land use allocation, design, construction, maintenance, decommissioning, and site renewal are examined in the context of delivering justice & equity across the various city systems for transparency around good governance in cities' sustainable development process.	Information Integrity & Transparency Infrastructure & Housing
132	The depth of cultural context required for effective community engagement and motivation towards climate action requires sensitivity to worldviews, motives, and methodological practices in each locale.	Culture (Community, Heritage, Art & History)
133	Research is needed on regulatory and planning mechanisms to intercede in peri-urban planning & design typified by homogeneity and sprawl outside of urban centres, undermining just & equitable access to sufficient cultural engagement within sustainable systems parameters.	Culture (Community, Heritage, Art & History)
134	Current governance structures are often fragmented, with insufficient coordination between national and local governments, between formal policies and informal practices, hindering effective urban management and sustainability efforts without coherent systems-focused methodologies.	Governance & Multilevel Partnerships
135	Cities frequently grapple with fragmented governance structures and a lack of integrated academic resources, necessitating improved governance frameworks across sectors and multilevel partnerships to tackle urban resilience, equity, and biodiversity challenges, fostering transformative change through strategies that build trust and collaboration among policy actors.	Governance & Multilevel Partnerships
136	Research investigation and analysis of policy incoherence, capacity support issues, and structural governance barriers (i.e. - lack of capability/motivation, or corruption) need to be addressed to improve governance frameworks and multilevel partnerships, ultimately supporting transparent, integrated, and effective climate strategies.	Governance & Multilevel Partnerships

#	GRAA 2024 Priority Knowledge Gaps (#1-64 derived from I4C21, #65-138 added from I4C24 synthesis)	Corresponding GRAA topic(s)
137	Further research is needed to understand the functions and features of cities' systems in the context of annual internal rate of return (IRR) and long-term return on investment (ROI) in the context not only of operational profitability but avoided cost attributable to the investment annually and over the project lifespan of the investment, as accessing climate finance, securing investments, and scaling up infrastructure projects require methodologies to avoid externalizing costs and fully integrate the economics of ecosystems & biodiversity (TEEB) into funding decisions.	Finance (Investment and Public Procurement)
138	Cities must build upon the body of research concerning grassroots financing models to provide appropriate methodologies supporting financial literacy across sectors, with individuals in communities provided opportunities to design and structure funding proposals independently or in partnerships to create an index of climate-related projects for cities to offer in their portfolios for investment, increasing exposure of otherwise unstructured attempts at critical access to climate financing, enabling municipalities to both take action and gather findings on the most effective way to manage and implement their sustainability initiatives through delegated deployment of investments.	Finance (Investment and Public Procurement)
139	Within the limited ambition of the Paris Agreement and current NDCs, cities are not being equipped with finance and governance instruments at national level to prepare at local level for 1.5°C overshoot.	Finance (Investment and Public Procurement) Governance & Multilevel Partnerships
140	Local governments need guidance and support to incorporate digital technologies into broader, systemic approaches that include anticipatory policies, civic engagement, and multi-stakeholder collaboration. In this way, the goal is to support cities with digital transformation rather than the implementation of single point digital solutions.	Digitalization Engagement & Participation Governance & Multilevel Partnerships
141	Many digital initiatives are isolated, with limited exploration on how these technologies can be embedded into broader urban systems that address multiple sustainability goals, including environmental, social, and economic dimensions.	Access & Reliability Digitalization
142	Research is needed on how local governments can ensure interoperability between various digital platforms and tools used across city departments and services to create integrated systems for sustainable development.	Digitalization Partnerships for Long-Term Collaboration
143	AI has the potential to optimize urban systems, but research is needed to understand how it can be responsibly deployed in public governance, especially in balancing technological solutions with public interest and sustainability goals. There is a research gap in exploring how local governments can effectively use AI and machine learning to enhance decision-making processes for sustainable urban development.	Digitalization Governance & Multilevel Partnerships
144	There is a research gap in understanding how digital finance can enhance transparency, efficiency, and accessibility in funding urban climate action, particularly in improving resource flow and risk management in cities.	Digitalization Finance (Investment and Public Procurement) Information Integrity & Transparency

#	GRAA 2024 Priority Knowledge Gaps (#1-64 derived from I4C21, #65-138 added from I4C24 synthesis)	Corresponding GRAA topic(s)
145	There is a need for more research on how local governments can better engage the private sector in urban sustainability efforts. Specifically, understanding the conditions that attract private capital to sustainable urban development projects remains underexplored.	Digitalization Finance (Investment and Public Procurement) Information Integrity & Transparency
146	Research is lacking on effective strategies and financial models to de-risk investments in urban sustainability projects, particularly in high-risk regions and sectors.	Finance (Investment and Public Procurement) Risk
147	Most financial research focuses on environmental or economic returns, while the social impacts of financial mechanisms, especially in ensuring inclusivity and social justice, are often overlooked. There is limited research on how finance mechanisms can be designed to address social equity concerns in urban sustainability. Studies are needed to explore how financial models can ensure equitable distribution of benefits across urban populations, particularly marginalized communities.	Engagement & Participation Finance (Investment and Public Procurement) Sustainable Consumption & Production
148	Understanding how to align financial interests with long-term sustainability goals is a key challenge. Research is needed to develop and evaluate long-term financing models that support urban resilience projects, particularly those that span decades, such as infrastructure for climate adaptation.	Finance (Investment and Public Procurement) Infrastructure & Housing Intergenerationality
149	There is a research gap in understanding how frugal innovation, driven by necessity in informal settlements, can inform sustainable urban development processes. There is a lack of longitudinal studies on the sustainability and scalability of these innovations. Research is needed to determine whether such innovations can contribute meaningfully to long-term urban sustainability goals or if they are simply temporary survival strategies.	Finance (Investment and Public Procurement) Informality Intergenerationality Scale Sufficiency Sustainable Consumption & Production
150	There is limited research on how informal settlements can be systematically integrated into formal urban planning and governance frameworks. While there is recognition of informality's significance, more studies are needed to explore the mechanisms by which cities can incorporate informal systems into formal decision-making processes without marginalizing communities.	Governance & Multilevel Partnerships Informality
151	While the informal economy is recognized for providing livelihoods to many urban residents, more empirical research is needed to quantify its economic contributions to urban sustainability and development. Studies that link informal economic activities to sustainability metrics are still limited.	Finance (Investment and Public Procurement) Sustainable Consumption & Production
152	There is a gap in understanding how the strong social networks and mutual support systems in informal communities contribute to urban resilience. Further research could explore how these informal systems can inform the design of more inclusive, community-centered sustainable development strategies.	Engagement & Participation Informality Sustainable Consumption & Production
153	More research is needed on the intersection of health, environmental sustainability, and informality. Studies on how informal settlements can address public health risks, waste management, and environmental degradation in the context of sustainable development are still relatively sparse.	Health (Human and Environmental) Informality Waste

#	GRAA 2024 Priority Knowledge Gaps (#1-64 derived from I4C21, #65-138 added from I4C24 synthesis)	Corresponding GRAA topic(s)
154	Most innovation in cities focuses on optimizing existing systems, but there is limited understanding of how cities can effectively adopt transformative approaches that shift the paradigm of urban development and sustainability. There is a need for research on how cities can move beyond incremental improvements to adopt transformative, agenda-driven innovation that addresses systemic challenges and reshapes urban sustainability.	Empowering Cities to Take Action Scale Sustainable Consumption & Production
155	Much of the focus on innovation has historically been driven by economic or technological factors, but there is limited research on how a human-centered approach can reshape the goals of innovation for sustainability and equity. Research is required to explore how grounding innovation in human needs can lead to more equitable and sustainable outcomes in areas such as health, environment, and climate adaptation.	Climate Adaptation & Mitigation Culture (Community, Heritage, Art & History) Health (Human and Environmental)
156	While local governments play a crucial role in shaping climate policies, there is limited understanding of how they can implement transformative governance frameworks that enable systemic change rather than incremental improvements.	Governance & Multilevel Partnerships
157	Many studies on multilevel governance focus on short-term coordination and policy implementation, but there is limited understanding of how these governance models contribute to sustained, long-term urban transformation. More research is needed to examine the long-term impacts of multilevel governance models on urban transformation, particularly in the context of sustainability and resilience.	Governance & Multilevel Partnerships Intergenerationality Sustainable Consumption & Production
158	While Indigenous knowledge holds valuable information on local ecosystems and climate patterns, there is limited research on how to systematically incorporate it into formal climate policies and strategies. While Indigenous knowledge is valuable, policy frameworks often do not recognize or make provisions for incorporating this knowledge into formal governance processes, leading to its exclusion.	Engagement & Participation Indigenous Knowledge & Decoloniality Governance & Multilevel Partnerships
159	Indigenous knowledge is often excluded from financial systems because it does not fit into existing frameworks of asset representation, leading to a lack of funding for initiatives based on this knowledge. Research is lacking on how financial mechanisms, such as climate finance or asset-based funding models, can be adapted to include Indigenous knowledge and its value in climate resilience efforts.	Engagement & Participation Finance (Investment and Public Procurement) Indigenous Knowledge & Decoloniality
160	While there is recognition of the value of Indigenous knowledge, there are limited models for fostering meaningful collaboration between Indigenous and scientific communities to jointly develop climate solutions.	Communication Engagement & Participation Indigenous Knowledge & Decoloniality

Table 5

	Action Priorities (#1-39 derived from 2021 CRIA Priorities, #40-254 onward newly added from I4C2024 Conference)	Corresponding GRAA topic(s)
1	Identifying a strategic approach to retrofitting city building stock based on building typology to reduce emissions.	Culture (Community, Heritage, Art & History) Infrastructure & Housing Energy Engagement & Participation Climate Change Adaptation & Mitigation
2	Quantify emissions and energy savings potential for deep energy retrofits of all buildings within the municipality and incorporation of digital tools to support emission reduction and boost systems' efficiency.	Efficiency Digitalization Infrastructure & Housing Energy Climate Change Adaptation & Mitigation
3	Develop policy to set new building standards and accelerate uptake of efficiency benchmarks.	Efficiency Governance & Multilevel Partnerships Infrastructure Energy
4	Use of social science in engaging a broad group of stakeholders in new initiatives from planning through implementation.	Communication Governance & Multilevel Partnerships Culture (Community, Heritage, Art & History) Engagement & Participation
5	Incorporate informal settlements and their residents in urban planning strategies through active consultation and co-creation.	Governance & Multilevel Partnerships Culture (Community, Heritage, Art & History) Engagement & Participation Informality
6	Explore connections between water, energy, and materials to develop sustainable solutions in urban areas.	Energy Water Sustainable Consumption & Production
7	Quantify potential and chart implementation pathways for blue/green infrastructure and nature-based solutions to reduce emissions, build adaptive capacity and resilience, provide co-benefits, and address issues of biodiversity.	Infrastructure & Housing Biodiversity Climate Change Adaptation & Mitigation
8	Assess planning policies and prioritize action to help mitigate urban heat island effect.	Governance & Multilevel Partnerships Climate Change Adaptation & Mitigation Empowering Cities to Take Action
9	Explore adaptation and resilience in cities through culture and history to better understand their impact on climate action today.	Culture (Community, Heritage, Art & History) Climate Change Adaptation & Mitigation Empowering Cities to Take Action
10	Mainstream climate change action planning into city decision making, integrating mitigation and adaptation into comprehensive planning and budgeting processes.	Finance (Investment & public procurement) Governance & Multilevel Partnerships Climate Change Adaptation & Mitigation Empowering Cities to Take Action

#	Action Priorities (#1-39 derived from 2021 CRIA Priorities, #40-254 onward newly added from I4C2024 Conference)	Corresponding GRAA topic(s)
11	Assess solutions to address the urgency of water-scarcity, pollution, and allocation in cities and their related ecosystems.	Waste Water Biodiversity
12	Support community-based and entrepreneurial innovation in climate smart food systems.	Finance (Investment & public procurement) Culture (Community, Heritage, Art & History) Food Climate Change Adaptation & Mitigation
13	Further understanding is needed on potential for urban agriculture in terms of climate change mitigation and local food security.	Food Climate Change Adaptation & Mitigation
14	Understand the impact of scope 3 emissions, urban mitigation planning, and how this can be best incorporated into local and subnational climate plans.	Governance & Multilevel Partnerships Climate Change Adaptation & Mitigation
15	Assess energy efficiency increase through use of micro grids.	Efficiency Energy
16	Evaluate balance between connected vs. distributed renewable systems based on access and reliability.	Energy Access & Reliability
17	Explore how digital infrastructure can be built into transit systems to connect public and private transit technology.	Digitalization Infrastructure Transportation
18	Explore how urban plans can be shaped to reduce vehicle miles traveled and support active/shared transit.	Transportation Health
19	Explore potential for a circular economy approach throughout city systems, and how these may differ in developed and developing cities.	Finance (Investment & public procurement) Sustainable Consumption & Production
20	Evaluate benefits of diversion and recycling considering supply and demand.	Waste Sustainable Consumption & Production
21	Better understand how sustainable consumption habits can be fostered.	Sustainable Consumption & Production
22	Communicate community benefits of controlled landfilling to build understanding and buy-in of waste collection systems.	Communication Waste Geography Sustainable Consumption & Production
23	Collaboration and capacity building to develop bankable projects and increase creditworthiness to de-risk investment.	Risk Finance (Investment & public procurement)
24	Increase focus on understanding the finance adaptation gap for cities, including short- and long-term financial needs for nature-based solutions.	Finance (Investment & public procurement) Biodiversity

#	Action Priorities (#1-39 derived from 2021 CRIA Priorities, #40-254 onward newly added from I4C2024 Conference)	Corresponding GRAA topic(s)
25	Governance landscapes (considering formal and informal actors) to support greater generation of local and subnational revenue and which support groups marginalized due to gender, age, race, ethnicity, religion, indigenous status and disability.	Finance (Investment & public procurement) Governance & Multilevel Partnerships Geography Engagement & Participation Access & Reliability Informality Gender Indigenous Knowledges & Decoloniality Intergenerationality
26	Increase understanding of potential for digital financing—including crowd-sourcing, digital green bonds, and others—to fund city-scale projects.	Scale Digitalization Finance (Investment & public procurement) Engagement & Participation
27	Strategic methods for awarding projects which prioritize sustainability, circular economy, and resilient low-emission roadmaps in urban solutions.	Finance (Investment & public procurement) Governance & Multilevel Partnerships Sustainable Consumption & Production
28	Develop flexible and distributed/networked solutions that can be expanded or changed as innovation progresses or financing allows.	Finance (Investment & public procurement)
29	Calculation and communication of economic and health effects of action vs. inaction.	Communication Finance (Investment & public procurement) Empowering Cities to Take Action
30	Evaluate combinations of high-tech and low-tech innovation.	Digitalization Governance & Multilevel Partnerships
31	Measures to evaluate a wide range of climate and societal co-benefits of climate solutions.	Finance (Investment & public procurement) Engagement & Participation
32	Explore incentives for local and subnational employees to innovate and take risks with transformative decisions.	Risk Finance (Investment & public procurement) Governance & Multilevel Partnerships Engagement & Participation
33	Investigate emerging social innovations in cities that could be exported globally to scale solutions.	Scale
34	Explore effective governance frameworks to facilitate city-led research and innovation, including creating space for learning-by-doing and learning-from-failure.	Governance & Multilevel Partnerships
35	Communication of uncertainty and risk of climate hazards for cities.	Uncertainty Risk Communication

#	Action Priorities (#1-39 derived from 2021 CRIA Priorities, #40-254 onward newly added from I4C2024 Conference)	Corresponding GRAA topic(s)
36	Understand the mitigation and adaptation potential of city actions, including implications for social equity and justice.	Climate Change Adaptation & Mitigation Empowering Cities to Take Action Engagement & Participation
37	Generate city scale data for development of specific observation, models, and scenarios/ Develop and implement an interactive mapping platform to assess and improve urban natural infrastructure, focusing on benefits, risks, and equitable access across cities.	Scale
38	Reduce the gap in climate relevant data on vulnerable communities.	Uncertainty
39	Equitable development and dissemination of knowledge and data inclusive of co-design and co-production through collaborative partnerships across public and private sectors, and civil sectors (including youth, indigenous populations, residents of informal settlements, and other marginalized individuals).	Communication Culture (Community, Heritage, Art & History) Engagement & Participation Informality Indigenous Knowledges & Decoloniality Intergenerationality
40	Open innovation challenges/inducement initiatives to engage communities and encourage cities experimenting with new governance/resource management models.	Empowering Cities to take Action Communication Engagement & Participation
41	Support design of gamification and monetization tools for public participation in sustainable resource management, fostering greater awareness in residents and institute benefit-sharing mechanisms based upon avoided costs.	Empowering Cities to take Action Communication Engagement & Participation
42	Institute both cross-departmental and cross-sectoral fora to effectively incorporate systems approach thinking, city-level data (geospatial, climate downscaling, etc.), and justice & equity into dialogues and decision-making, supported by mayors and public sector personnel.	Empowering Cities to take Action
43	Empower and incentivize cities, showcasing successful practices through media content to inspire others.	Empowering Cities to take Action
44	Empower and incentivize cities by showcasing successful practices through media content to inspire others, with a focus on promoting people-centered development principles.	Empowering Cities to take Action
45	Neighborhood Adaptation Plans to empower local communities to respond to climate challenges effectively, with special attention to the needs of vulnerable populations to extreme climate, like heat and flooding.	Empowering Cities to take Action
46	Capacity building, training programs for local communities to acquire new skills & jobs related to a local impacts of climate change, especially marginalized communities, allowing them to lead conversations and projects most relevant to them.	Empowering Cities to take Action
47	Regional hubs to provide support and guidance, develop tools and guidelines, build capacity, and enhance local and subnational climate action plans for significant emissions reduction and climate resilience.	Empowering Cities to take Action

#	Action Priorities (#1-39 derived from 2021 CRIA Priorities, #40-254 onward newly added from I4C2024 Conference)	Corresponding GRAA topic(s)
48	Advocacy support for cities' roles in national and multilateral forums, e.g. multilevel governance.	Empowering Cities to take Action
49	Strengthen partnerships between cities and other civil society groups – e.g. youth, workers, unions, businesses, and other organizations for city climate action.	Empowering Cities to take Action
50	Support or establish boundary spanning organizations to bridge scientific evidence and decision-making, supporting cities make better investments for climate resilience and adaptation.	Empowering Cities to take Action
51	Find opportunities to bridge the gap between research and practice inclusive of diverse knowledge types and cross-sectoral/intersectional insights into urban planning and policies.	Co-Production of Knowledge
52	Utilize participatory planning methods and stakeholder-facing web platforms for system modeling, complemented by simplified, graphic representations to enhance transparency and encourage community involvement.	Co-Production of Knowledge Information Integrity & Transparency
53	Integrating socio-demographic indicators into assessment tools for housing affordability and climate resilience empowers communities to play an active role in urban renewal if transparently managed to avoid further unsustainable capture and commodification of housing markets.	Co-Production of Knowledge Information Integrity & Transparency Infrastructure & Housing
54	Co-design, with local communities and governments digital base maps to address local climate challenges supported with targeted training and support.	Co-Production of Knowledge
55	Utilizing real-world living lab research and challenge-based learning fosters collaboration among stakeholders, enhancing the collective knowledge on urban sustainability.	Co-Production of Knowledge
56	Highlight the importance of collecting, filtering, and recording non-scientific knowledge, fostering dialogue, and co-creation of knowledge based on community experiences, including unsuccessful experiences.	Co-Production of Knowledge
57	Engage in joint action research, focusing on specific urban challenges through data-driven processes.	Co-Production of Knowledge
58	Launch a Community of Practice, utilizing university campuses as testbeds for innovation, and organizing interdisciplinary research projects.	Co-Production of Knowledge
59	Facilitate discussions among local governments, experts, and Indigenous peoples to develop localized knowledge frameworks and explore community-centered responses.	Co-Production of Knowledge
60	Knowledge integration is critical, combining soft skills (communication, collaboration) with technical expertise (data analysis, technology). This capacity-building approach empowers communities in climate action.	Co-Production of Knowledge
61	Analyze and integrate individual mindsets and capacities into urban coalitions, using case studies to develop gender-responsive and inclusive approaches.	Co-Production of Knowledge Partnerships for Long Term Collaboration

#	Action Priorities (#1-39 derived from 2021 CRIA Priorities, #40-254 onward newly added from I4C2024 Conference)	Corresponding GRAA topic(s)
62	Facilitate a workshop on innovative methodologies, demonstrate the use of open-source digital technologies, gather feedback from stakeholders, and enhance the UESI tool for improved practical application.	Partnerships for Long Term Collaboration
63	Open innovation challenges/inducement initiatives to engage communities and encourage cities experimenting with new governance/resource management models.	Partnerships for Long Term Collaboration
64	Public-Private Partnerships (PPPs) and other financing mechanisms, such as green bonds, energy performance contracting, and crowdfunding may be vital in ensuring cities have the necessary resources for sustainable transitions.	Partnerships for Long Term Collaboration
65	Expand the tripartite consultation model involving local governments, provincial governments, and universities to facilitate collaborative management, flexible governance, and knowledge sharing allowing municipalities to benefit from broader networks capable of delivering locally tailored key performance indicators (KPIs) in climate planning.	Partnerships for Long Term Collaboration
66	Flexible funding models must be designed in response to limitations of existing procurement systems, designing open training programs that foster continuous engagement and knowledge transfer to enable civil society partnerships with the public and private sector.	Partnerships for Long Term Collaboration
67	Foster regional cooperation for climate action through a single-data system for climate monitoring and cross-sector collaboration. Ensure strong support from key actors in collaborative partnerships, and establish multi-tiered structures for local climate action planning with political buy-in.	Partnerships for Long Term Collaboration
68	Conduct a qualitative cross-case comparison of various partnership types to design effective cross-sector partnerships for equitable climate mitigation.	Partnerships for Long Term Collaboration
69	Effective strategies must focus on energy-efficient building solutions, cooling systems, and sustainable urban resilience methods tailored to local conditions and resources available across the systems in place.	Partnerships for Long Term Collaboration Climate Change Adaptation & Mitigation
70	Key actions emphasizing coordination between mitigation and adaptation efforts within urban areas include water harvesting, promoting solar energy, preventing soil erosion, and developing hydroponics for endangered plants.	Partnerships for Long Term Collaboration Climate Change Adaptation & Mitigation
71	Nature-based solutions (NBS), including mangrove restoration, urban tree management, daylighting buried urban streams, are critical for climate adaptation, carbon sequestration, and increasing biodiversity.	Partnerships for Long Term Collaboration Climate Change Adaptation & Mitigation
72	Participatory and bottom-up methods for quantifying GHG emissions and other environmental impacts yield more precise data, and should be incorporated into city-level practice to guide climate action that reflects local needs.	Partnerships for Long Term Collaboration Climate Change Adaptation & Mitigation
73	Develop and implement improved measurement systems and standardized indicators to advance local and subnational monitoring and disclosure for climate budgets.	Climate Change Adaptation & Mitigation

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74	Utilization of GIS and AI to integrate socio-economic variables into climate vulnerability assessments, enhancing adaptation strategies.	Climate Change Adaptation & Mitigation Digitalization
75	Increase the use of nature-based solutions to reduce heat stress, improve water management, and increase urban biodiversity, to reduce climate inequality and increase resilience in frontline communities.	Climate Change Adaptation & Mitigation Biodiversity
76	Use the 'Return of Experience' approach to gather data on past floods, creating resilient development scenarios to enhance local and subnational resilience projects. Utilize "stretch and transform" strategies to challenge energy institutions and implement the UN Declaration of the Rights of Indigenous Peoples (UNDRIP) in energy policy.	Climate Change Adaptation & Mitigation
77	Consider co-benefits of initiatives that incorporate both adaptation and mitigation, and require governance and finance to be part of decision making for these projects.	Climate Change Adaptation & Mitigation
78	Conduct research on place-based decarbonisation approaches and develop the Place-Based Retrofit & Regeneration Models project.	Climate Change Adaptation & Mitigation
79	Implementing targeted greening initiatives, including pocket greens, vertical greening, and roof greening, in interstitial open spaces to mitigate urban heat and support climate adaptation in vulnerable urban areas.	Climate Change Adaptation & Mitigation
80	Implement climate resilient drainage and flood mitigation measures, improve solid waste management, and upgrade targeted communities.	Climate Change Adaptation & Mitigation
81	Put boundary organizations in place to help communities accelerate adaptation to climate change, including training and workshops to develop community adaptation strategies through participatory approaches.	Climate Change Adaptation & Mitigation Engagement & Participation Communication
82	Analyze city and energy strategy documents to identify equitable models of energy development.	Climate Change Adaptation & Mitigation
83	Develop and implement climate resilience strategies that include diverse groups, such as local policymakers and marginalized communities.	Climate Change Adaptation & Mitigation
84	With appropriate training and oversight, advanced data analytics and AI-driven data extraction and textual analysis from documents can effectively monitor city policies, enabling governments at all levels to refine place-based approaches and manage sustainability initiatives more efficiently, improving their capacity to address consumption and production challenges.	Sustainable Consumption & Production
85	Reimagining consumption of space in terms of positional value and occupancy may enable sustainable management of community spaces through sustainable practices catering to both environmental and social needs.	Sustainable Consumption & Production
86	Strengthen policies, promote sustainable practices, and support community-led initiatives to combat plastic pollution.	Sustainable Consumption & Production
87	Implement interlocal and subnational consortia for efficient solid waste management, allowing economies of scale to reduce costs.	Sustainable Consumption & Production

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88	Implement strategic measures for sustainable agriculture, including installing heaters for greenhouses and using biomass for production.	Sustainable Consumption & Production
89	The emphasis on long-term partnerships and coalition building for climate action inherently involves future generations, highlighting the importance of including diverse age groups in decision-making processes.	Intergenerationality
90	Creative expression through storytelling and art in both traditional and new media serve as powerful tools for intergenerational education and mobilization in addressing climate change and grappling with long-term planning on narrative timelines beyond the scope of conventional policy discussions to ensure future generations can articulate what resilient systems they require to inherit.	Intergenerationality
91	Designing upskilling/training environmental civil employment programs to prepare youth and other insufficiently supported groups for climate action jobs will ensure those most affected by the transition have critical capacity for ensuring climate policies support individual and societal needs across generations.	Intergenerationality
92	Use the (GCOM / Student Energy) Youth Impact Framework to engage youth in climate and energy solutions, fostering their participation through pilot projects, and to measure the success and impact of their involvement through the indicators of this framework	Intergenerationality
93	Establish Urban Youth Councils, ensuring gender equality, followed by capacity-building workshops and mentorship to empower youth in governance.	Intergenerationality
94	There is a significant inadequacy in the funds allocated under the Paris Agreement for vulnerable regions like Africa, the Middle East, and Latin America, highlighting the urgent need for sufficient, well-targeted funding to address climate change challenges in the Global South in recognition of disproportionate distribution of benefits under the existing market paradigm.	Finance Sufficiency Geography
95	Innovative approaches focused on 'sufficiency' must emphasize resource efficiency at all societal levels – particularly targeting the incompatibility of overdeveloped economies and unsustainable cultural consumption practices which undermine sufficient resource access in locales across developing economies – requiring methodologies to guide consumption reduction, promoting minimalism, in fostering sustainable communities able to meet their needs without generating unnecessary losses.	Sufficiency
96	Incorporating resource-efficient urban tree management and soil improvement into city planning exemplifies how sufficiency can be integrated into urban resilience strategies. Such measures reflect an adaptive, bottom-up approach that prioritizes resilient infrastructure over extensive urban redevelopment.	Sufficiency
97	Raise awareness about sufficiency, identifying existing measures and opportunities in cities climate action plans.	Sufficiency Engagement & Participation Communication

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98	Developing business models that focus on providing what people need with lower or no emissions emphasizes the importance of sufficiency in urban planning.	Sufficiency
99	Initiatives focused on land and sea-based climate resilience and long-term sustainability that emphasize the integration of Indigenous knowledges into urban governance and sustainability practices.	Indigenous Knowledges & Decoloniality
100	Institutionalize Indigenous knowledge, particularly regarding ocean preservation, to strengthen climate resilience through cultural practices providing invaluable insights into sustainability with a decolonial approach to climate action, highlighting the importance of restoring and maintaining cultural and environmental integrity.	Indigenous Knowledges & Decoloniality
101	Emphasize the need for tools that encourage community participation and ensure local voices are heard in planning and compliance processes related to sustainability, with the integration of Indigenous knowledge systems into decision-making processes promoting equity and resilience in the face of contemporary challenges.	Indigenous Knowledges & Decoloniality
102	Implement and evaluate the LCR Approach through Phase I and II pilot programs involving municipalities and First Nations communities.	Indigenous Knowledges & Decoloniality
103	Integrate Indigenous Knowledges into curricula and policies to promote climate change adaptation and recognition of indigenous rights in governance.	Indigenous Knowledges & Decoloniality
104	Collaborate with Indigenous cultural and design representatives to integrate their knowledge into development guidelines.	Indigenous Knowledges & Decoloniality
105	The theme of inclusivity and equity is integral to the discussions around community-based solutions and ensuring that climate action benefits all members of society, with gender dimensions specified and participatory processes that actively involve women and marginalized genders may contribute to the development of more inclusive and equitable climate adaptation strategies.	Gender
106	Engaging women and marginalized groups of varied gender identities in ecological restoration and urban planning ensures that diverse perspectives shape the future of cities to safely accommodate all community members	Gender
107	Urban resilience planning that integrates socio-demographic indicators, including gender, allows cities to address the diverse needs of their populations, with a specific focus on jobs, re-skilling, and the equitable distribution of benefits among women and vulnerable groups across the gender spectrum.	Gender
108	Empower women's collectives to assess home resilience and advocate for climate resilient urban planning.	Gender
109	Recognizing diverse forms of leadership, including the prominent role of women in communities, is crucial for fostering collective climate action.	Gender

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110	Acknowledge the challenges of extreme heat, particularly affecting women in vulnerable communities, and support their needs through research and action initiatives.	Gender
111	Address gender-sensitive issues in governance and capacity building, empathetic neighborhoods also consider gender perspectives, ensuring that women's voices and needs are central in planning and decision-making processes.	Gender
112	Promote inclusive design principles to demonstrate benefits for market expansion and societal equity, integrate different mindsets and capacities into urban coalitions to develop gender-responsive approaches to local finance initiatives.	Gender
113	Enhance access to climate finance for local and gender-responsive adaptation by employing collaborative approaches and strengthening knowledge brokers' capacity.	Gender
114	Analyze and iCo-create and implement the Gender Responsive Resilience Planning Framework, utilize innovative techniques such as photovoice, integrate local perspectives, and develop tailored resilience strategies to foster sustainable development and disaster preparedness.	Gender
115	Address informal systems through formalization pathways for access to essential resources, involving informal communities in decision-making to achieve more equitable and sustainable resource management practices which recognize and integrate practices to enhance the resilience and inclusiveness in city systems.	Informality
116	City officials must acknowledge the role of informal community initiatives, formalizing and supporting their development, to ensure lasting benefits can be achieved. Informal community efforts, such as self-organized environmental clean-ups, play a significant role in promoting urban sustainability. Therefore, cities need to recognize and support these grassroots initiatives by providing formalized resources and assistance.	Informality
117	Collaborative Neighborhood Networks facilitate informal engagement between communities, planners, and city stakeholders in mediation to foster social inclusion in decision-making processes and provide models for coordination across cities.	Informality
118	Develop mechanisms for equitable access to funds supporting informal settlement communities in achieving New Urban Agenda commitments.	Informality
119	Establish informal, virtual mediation spaces for community engagement in emission reduction strategies. Support informal solutions and leverage community engagement to ensure inclusive responses to urban challenges.	Informality
120	Investigate and apply scenario planning in informal communities to improve disaster management and resilience.	Informality

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121	Highlight the reality of climate impacts on informal settlements, discuss the central role of informality in urban climate action, and explore ways to reframe the narrative and improve action, finance, and research on climate change and informality.	Informality
122	Making climate-related data accessible to the public and cities is crucial for fostering effective climate action.	Access & Reliability
123	Ensuring reliable access to resources such as clean energy and water is vital for sustainable development; therefore, cities must prioritize the creation of infrastructure that is resilient and accessible to all, particularly marginalized communities.	Access & Reliability Infrastructure Water
124	Governance innovation plays a significant role in the process of establishing monitoring systems that track the implementation and consequences of local climate action plans. These systems utilize both publicly available data and information reported by municipalities, ensuring transparent and reliable access to climate information.	Access & Reliability Governance
125	Improving access to reliable data on climate action remains a priority. Digital platforms that deliver real-time information on environmental indicators and climate performance across cities enable more informed decision-making, ultimately supporting the development of robust climate strategies.	Access & Reliability
126	Develop a joint monitoring system using publicly available data to support local governments in fulfilling reporting obligations and enhance decision-support.	Access & Reliability
127	Develop site-specific recommendations for charging infrastructure to enhance accessibility and reliability for low-income communities.	Access & Reliability Infrastructure
128	Discuss and implement multi-level climate action through policy actions and integration into NDCs.	Access & Reliability Governance
129	Develop inclusive digital infrastructure and enhance digital capacities to support local innovations.	Access & Reliability Digitalization Infrastructure
130	Putting local communities at the forefront of climate projects ensures that initiatives are sustainable and grounded in cities' real needs. Tools such as creative storytelling and residential community building initiatives can enhance engagement and participation at the grassroots level.	Engagement & Participation
131	Community engagement, bottom-up participatory approaches that integrate local knowledge and GIS technologies into urban planning processes must provide citizens ownership of projects, such as managing urban green spaces, fosters active participation and long-term commitment.	Engagement & Participation
132	Gamified engagement tools and digital platforms enhance public participation in climate actions, further supporting the development of inclusive and effective climate strategies.	Engagement & Participation

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133	Involve diverse groups in developing climate resilience strategies, emphasizing peer-to-peer learning and citizen participation, participatory approaches to risk mapping inclusive of diverse voices.	Engagement & Participation
134	Digital tools, such as app-based sustainability tracking and geospatial data simulations, can support the monitoring and implementation of climate action at both the individual and city levels. By providing a platform for efficient data sharing and communication, digitalization enhances decision-making processes.	Digitalization
135	Innovations in digital tools, including Lidar data, GIS, and AI-driven analytics, significantly improve climate action planning. By automating greenhouse gas calculations and policy assessments, cities can streamline decision-making and adopt more accurate, data-driven approaches to sustainability.	Digitalization Co-Production of Knowledge
136	Digital tools like AI-powered climate risk assessments and platforms that track greenhouse gas emissions index data allow cities to integrate advanced technologies into urban planning, enabling effective monitoring, assessment, and adaptation of climate strategies.	Digitalization
137	Create digital base maps and utilize open-source technologies for local decision-making.	Digitalization
138	Develop a Knowledge and Innovation Exchange, a digital marketplace that matches climate innovation projects with investors.	Digitalization
139	Focus on digital tools, such as Digital Twins for data collation, can enhance coastal resilience strategies. Utilize GIS and geo-information modeling to analyze spatial-temporal data for assessing urban sprawl impacts and develop comprehensive greenhouse gas inventories.	Digitalization
140	Develop AI models to revolutionize urban planning, such as AI-assisted textual analysis methodologies to policy, planning, and reporting documents while ensuring ethical use.	Digitalization
141	Scenario modeling and data-driven simulations may further assist cities in navigating uncertainties related to climate change impacts, particularly when incorporating climate-morphological modeling for various future scenarios.	Uncertainty
142	Cities grappling with uncertainty, particularly during post-disaster recovery, must adopt flexible frameworks that facilitate adaptive and participatory planning.	Uncertainty
143	The integration of climate risk assessments and monitoring mechanisms is vital, ensuring cities are better equipped to handle uncertainties associated with climate change. Together, these strategies create a robust framework for addressing the complexities and unpredictabilities of climate impacts.	Uncertainty
144	Embrace uncertainty and complexity by adopting a mindset that welcomes experimentation, failure, and continuous adaptation.	Uncertainty
145	Utilize Dynamic Risk Assessment (DRA) methodology to analyze risks and interdependencies in urban contexts.	Uncertainty

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146	Employing spatial network analysis and local datasets helps urban planners understand uncertainties in transportation systems, guiding future developments.	Uncertainty
147	Innovative financial instruments can help address uncertainties related to climate financing.	Uncertainty Finance
148	Utilize environmental scanning, scenario planning, and community engagement methods to develop resilient and inclusive urban living environments.	Uncertainty
149	Cities must prioritise the optimisation of resource demands across all systems to minimize waste, particularly focusing on integrating renewable energy into transit and active transport solutions (which build upon water, food, and energy systems), including simplified graph-based transit modeling to efficiently design and test projects, ensuring cities can implement proven improvements with minimal delays.	Efficiency Infrastructure Energy Mobility
150	Develop the CityRetroFit tool to ensure efficient energy usage and stakeholder engagement.	Efficiency
151	Implement Green BIM in architectural projects to optimize resource usage and promote energy-positive design.	Efficiency Digitalization
152	Smart grids allow for greater efficiency and resilience in energy networks, requiring closer collaboration between businesses and regulators.	Efficiency
153	Standardize data collection and analysis processes to improve the efficiency and quality of emission monitoring and climate action plans.	Efficiency
154	Implementing enhanced monitoring systems for drought and land use changes improves the efficiency of resource allocation and management in urban environments. Develop advanced mobility modeling methodologies to enhance urban mobility solutions.	Efficiency
155	Develop and implement a carbon budget framework, including emissions quantification, reporting, and adjusting budgets based on equity and accountability principles.	Efficiency
156	Scaling approaches such as the clustering framework, which identifies urban typologies based on climate-morphological peers, allows cities with similar characteristics to implement replicable models, enhancing the scalability of local projects.	Scale
157	Research on, and deployment of, nature-based solutions, such as mangrove restoration and ecological restoration projects, offer scalable options for cities adapting to climate change, and expanding initiatives across regions requires interdisciplinary collaboration to ensure that they are effectively tailored to different urban contexts at the relevant scale necessary.	Scale
158	City-to-city knowledge transfers and resource pooling are also critical for scaling climate adaptation strategies. By sharing best practices and solutions, cities can collectively enhance local-level efforts to address climate challenges on a larger scale.	Scale

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159	Aggregate and analyze global city climate project data, assess project needs, provide technical assistance and matchmaking support, and collaborate with city networks and other organizations to enhance project readiness and implementation.	Scale
160	Differentiating the scale of interventions between cities and regions enables tailored responses to urban challenges, addressing specific local needs. Scale up the Carbon Monitor Cities 2.0 approach to multiple cities, particularly in low-and-middle-income countries, for real-time emissions data.	Scale
161	Innovative risk modeling, such as integrating climate data with urban tree growth predictions, helps cities anticipate and manage long-term risks. Incorporating risk management into participatory, community-driven city planning is crucial, particularly when addressing climate risks.	Risk
162	Cities must implement monitoring frameworks like the Sendai Framework and align with the Sustainable Development Goals (SDGs) at the local level to track and reduce climate risks, ensuring that vulnerable populations are adequately protected.	Risk
163	Risk must be viewed in the context of the threat posed by inaction, not in the context of risk to existing institutional structures and practices, which has previously created a dialogue of aversion to risk when it means taking on the responsibility of tackling transformative change.	Risk
164	Address political risks by fostering cooperation among different municipalities and political leaders for shared infrastructure projects.	Risk Governance & Multilevel Partnerships
165	Unlock financing by addressing the logics behind risk perceptions, leveraging place-based transition funds with a holistic understanding of risk and impacts.	Risk Finance (Investment & public procurement)
166	Blended finance can reduce investment risks, making climate action projects more viable.	Risk Finance (Investment & public procurement)
167	Developing a management framework using the Ecosystem Services Provision Index (ESPI) helps in assessing and managing risks associated with ecosystem services.	Risk Biodiversity
168	Innovative approaches, such as storytelling through art, film, music, dance, and writing, are needed to help simplify complex climate challenges and counter unsustainable narratives, making solutions accessible and engaging for diverse audiences beyond the scientific community.	Communication
169	Participatory planning processes and collaborative governance structures ensure transparency, build trust, and create open dialogues that support the success of climate actions – achieving transparency around the money behind unsustainable messaging and who is benefiting from inequitable unsustainable systems will help target which levers of change require more force to move.	Communication Information Integrity & Transparency

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170	Gamified tools and public-private partnerships further enhance engagement by breaking down complex climate goals into understandable actions for communities, facilitating a shared understanding of urban sustainability efforts.	Communication
171	Protocols that curate case studies and web-based platforms/fora for stakeholder engagement are needed to promote knowledge sharing and best practices across regions, strengthening collaborative efforts to share solutions and build solidarity.	Communication
172	Implement positive communication strategies to engage and collaborate with communities in contextually appropriate climate resilience initiatives.	Communication
173	Utilize podcasts to facilitate discussions and share innovative solutions and policies among urban leaders and other stakeholders to promote climate resilience and action.	Communication
174	Strengthen communication with citizens to enhance understanding of flood risks and involve them in resilience planning.	Communication
175	Better coordination among city teams responsible for climate mitigation and adaptation requires centralized structures, such as cross-departmental committees, provide a coordinated approach to sustainability planning of decentralized stakeholders, checking alignment of adaptation, mitigation, and sustainability strategies and ensuring that climate actions are consistent and cover all relevant sectors and their interactions with each other.	Centralization
176	Multi-level governance models are another form of centralization that support coordination between municipalities, national governments, and various sectors to allow localized flexibility, fostering an environment of shared responsibility and empowerment.	Centralization Governance
177	While central governance can help organize large-scale climate actions, cities benefit greatly from decentralized initiatives involving grassroots innovation, balancing centralized coordination with local-level engagement. This dual approach ensures that climate strategies are both scalable and deeply rooted in community needs.	Centralization Governance Scale
178	Decentralizing decision-making processes enables local authorities to tailor solutions to their unique social and economic conditions.	Centralization
179	Ensuring the accuracy and reliability of climate-related data emerged as a key priority, particularly for smaller municipalities that face challenges in managing and analyzing sustainability documents effectively. Accurate, verifiable, replicable information is critical for informed decision-making, transparency, and accountability in climate action.	Information integrity & Transparency
180	Tools like net-zero trackers and climate scorecards further support the integrity of data by offering transparent, accountable records of climate plans and progress. Technologies such as IoT and digital twins also play a crucial role in ensuring data accuracy, enabling cities to monitor climate impacts and base their policies on solid, reliable information. These advancements ensure that climate actions are grounded in trustworthy data, allowing cities to track their progress effectively and respond to emerging challenges with confidence.	Information integrity & Transparency

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181	Information integrity should continually be examined in the context of its manipulation, and the potential beneficiaries and victims of this manipulation, understood in the context of how justice & equity are inhibited by existing/ emerging information systems and the ways in which bad data can take hold in the perspectives and practices of communities in cities globally.	Information integrity & Transparency
182	Enable the use of grey literature on urban action in the development of the AR7 IPCC Special Report Climate Change and Cities to enhance the policy relevance of the report.	Information integrity & Transparency Information integrity & Transparency
183	Explore the integration of AI and machine learning tools in climate data analysis to improve information integrity and transparency.	Information integrity & Transparency
184	Develop a clear definition and guidelines for NPCs, reviewing methodologies for implementation to ensure information integrity.	Information integrity & Transparency
185	Cities need tailored strategies to reflect their distinct geographical and ecological realities, with geographic information systems (GIS) enabling understanding of what climate actions may be suited to unique physical environments, helping cities develop place-based resilience strategies that are more effective and contextually relevant.	Geography
186	Coastal areas, in particular, face unique vulnerabilities, such as rising sea levels and ecosystem degradation, which necessitate targeted nature-based solutions like mangrove restoration. Inland cities, on the other hand, may prioritize water conservation strategies that reflect their own geographical challenges. In all instances, bespoke solutions must be built around geographic system constraints.	Geography
187	Utilizing geo-referenced data allows for better understanding of the spatial scales of studies related to urban sustainability, linking local actions to broader regional goals.	Geography
188	Integrate mobility modeling into infrastructure planning to develop accessible web applications.	Geography Digitalization Communication
189	Utilize high-resolution geo-data to conduct detailed coastal hazard modeling and vulnerability assessments. Conduct comparative analyses of land-use patterns and green infrastructure to identify opportunities for enhancing urban biodiversity and resilience.	Geography
190	Innovations in nature-based solutions, such as the daylighting of streams, demonstrate how cities can mitigate climate impacts while simultaneously enhancing the resilience of urban ecosystems – restoring natural waterways not only supports biodiversity but also improves urban environments by creating greener, more adaptive spaces.	Biodiversity Climate Change Adaptation & Mitigation
191	Ecological restoration and urban forest management are key strategies for bolstering biodiversity. By prioritizing soil health and tree canopy growth integrated within infrastructure planning, cities can create thriving ecosystems that are better equipped to adapt to climate change and remain biodiverse and sustainable.	Biodiversity

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192	Incorporating advocates for biodiversity into governance structures, such as civic assemblies, ensures that ecological considerations are fully integrated into urban planning and climate action – agency for non-human species must be elevated in city-level stakeholder dialogues.	Biodiversity
193	Develop and rehabilitate eco-friendly tourism trails, such as the Bee Trail, to enhance biodiversity and local livelihoods.	Biodiversity
194	Implementing nature-positive engineering focuses on integrating biodiversity considerations in urban planning, promoting sustainable practices that protect local ecosystems.	Biodiversity
195	Urban planning efforts must demonstrate how to incorporate clean air, water, and green spaces into directly improving public health and mitigating the adverse effects of climate change on communities, and environmental impact assessment of developments must involve valuation of ecosystems services.	Health (Human & Environmental)
196	Cities restoring natural ecosystems, such as mangroves and urban forests, support biodiversity and promote public health by improving air and water quality – investment in ecological restoration sees return through multiple health benefits for their residents alongside environmental gains.	Health (Human & Environmental)
197	Promoting clean fuel alternatives, such as using coconut for cooking, reduces health risks associated with traditional fuels while contributing to environmental sustainability.	Health (Human & Environmental)
198	Enhance community-based initiatives to improve health outcomes while addressing climate resilience, such as heat action plans, mental health benefits from water sensitive, nature based solutions.	Health (Human & Environmental)
199	Managing urban water systems through measures such as the restoration of natural waterways, ecological landscape design, and micro-catchment designation, is critical for climate adaptation and mitigation, as water resilience strategies must be centralized in city planning.	Water
200	Rainwater harvesting and similar water-sensitive urbanism techniques are vital for ensuring sustainable water use. They allow cities to manage water supply during droughts and mitigate the risk of flooding during periods of heavy rainfall, offering a comprehensive approach to urban water resilience.	Water
201	Implement strategies for improving access to potable water and address related vulnerabilities in urban communities.	Water
202	Develop digital solutions for climate resilience, including smart water meters and flood scenario modeling.	Water
203	Sustainable food systems are crucial for climate resilience, and cities can encourage local food production and consumption through community involvement in urban agriculture, forestry and land management, which reduces the carbon footprint of food supply chains and enhances food security.	Food

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204	By integrating food security into urban planning, cities develop shared platforms for evaluating food sustainability to track local supply chains and ensure resilience against climate impacts through practices that require local production and waste reduction.	Food
205	Facilitate local and sustainable food access initiatives through improved transportation systems for food delivery.	Food
206	City-scale understanding of decarbonized energy systems, diversified power generation strategies, and passive design standards are critical for achieving fully decarbonized energy, and grid reliability will be contingent upon improved research and application of digital technologies and demand-side management strategies to address these reliability and resilience challenges.	Energy Digitalization
207	Maximizing renewable energy, efficiency, and distributed energy systems to decrease reliance on centralized power grids and enhance energy resilience.	Energy
208	Develop neighborhood-scale emission-based tools for community governance and compliance.	Energy
209	Digitalization of the electric grid is essential for resilience and efficiency in energy transition.	Energy Digitalization
210	Adapt regulation to phase out fossil fuel use and promote clean energy solutions.	Energy
211	Develop a global dataset of renewable energy clusters to identify effective transitions.	Energy
212	Use cost optimization models to evaluate impacts on renewable energy investments.	Energy Finance
213	Supporting the use of solar panels in urban communities through partnerships with local NGOs encourages renewable energy adoption and reduces reliance on fossil fuels.	Energy
214	Develop and implement ecodistricts focusing on zero-carbon energy transition and energy efficiency standards, including smart lighting, innovative collaborations with building owners or tenants.	Energy Partnerships for Long-Term Collaboration
215	To effectively reduce emissions in urban areas, cities must prioritize the development of multimodal transport systems that decrease reliance on cars, maximize road utilization while minimizing land use, requiring significant investments in public transport, cycling, and walking infrastructure.	Mobility
216	Utilize innovations in transit systems, such as simplified graph-based modeling, enable cities to efficiently design, test, and implement transportation projects aimed at reducing emissions.	Mobility Energy Infrastructure

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217	Examine potential impacts of fleet downscaling and electrification across modes, utilizing technological advancements for modeling transit systems, facilitating stakeholder engagement and creating efficient, decarbonized mobility options.	Mobility
218	Expand railway systems to encourage sustainable transportation and reduce reliance on private vehicles.	Mobility
219	Develop methodologies using traffic models to calculate GHG emissions, improving transportation-related emission reduction strategies.	Mobility
220	Establish and manage a public bike-sharing system, develop cycling infrastructure, leverage big data for planning, and implement a Training of Trainer approach to promote safe cycling and engage youth in climate action.	Mobility
221	Identify neighborhoods for EV charging infrastructure and engage residents in capacity-building.	Mobility
222	Efforts to reduce waste, particularly through community-driven initiatives, play a significant role in enhancing urban sustainability. Zero-waste programs and the promotion of circular economies should be central to waste management strategies, ensuring that both energy and material resources are used efficiently to minimize environmental impact.	Waste
223	Sustainable waste management practices are crucial for urban resilience, necessitating the implementation of systems that reduce waste and promote recycling, particularly inducing participatory processes that engage private sector operators to reduce waste materials in their supply chains and compensation communities for engaging in waste management as consumers of what they produce.	Waste Engagement & Participation
224	Working with waste management companies to localize and quantify methane emissions is crucial for effective waste management.	Waste
225	Scale up infrastructure for waste treatment and establish interlocal and subnational consortia for efficient management.	Waste Finance
226	Building resilient infrastructure that can withstand the impacts of climate change across its lifespan under local conditions is essential for long-term urban sustainability.	Infrastructure & Housing
227	Using sustainable and local materials in construction reflects a commitment to eco-friendly infrastructure, sustainable construction practices and creating spaces that serve multisystem purposes, built to deliver within local system capacity.	Infrastructure & Housing
228	Long-term infrastructure planning, informed by strategic foresight and cross-sectorally inclusive urban design, is critical for building resilient cities capable of adapting to climate risk under a holistic systems approach aligned with sustainability goals and every community's needs.	Infrastructure & Housing
229	Implement circular and bio-based building technologies using sustainable materials.	Infrastructure & Housing Sustainable Consumption & Production

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230	Transform campuses into living laboratories for experimentation and testing of new sustainable technologies.	Infrastructure & Housing Co-Production of Knowledge Partnerships for Long term Collaboration
231	Analyze tree line and urban forest data to develop indicators for sustainable forest management, enhancing urban livability.	Infrastructure & Housing Biodiversity
232	Use the Climate Innovation Readiness Navigation (CIRN) encourages the development of innovative infrastructure projects.	Infrastructure & Housing Energy
233	Propose innovative infrastructure solutions that integrate community needs and resilience strategies, like self-sovereign land approaches to support regenerative urban communities.	Infrastructure & Housing Co-Production of Knowledge Partnerships for Long term Collaboration
234	Developing a Green Cities Guarantee Fund to attract capital for urban infrastructure projects ensures long-term sustainability and climate resilience.	Infrastructure & Housing Finance
235	Enhance existing environmental audit systems to regulate heat emissions from buildings.	Infrastructure & Housing Energy
236	Cultural expressions, such as storytelling and art, play a pivotal role in educating communities about climate action, and cities must incorporate cultural heritage into their sustainability strategies to preserve local identities while addressing climate challenges. By engaging in participatory planning and storytelling, cultural and community engagement strengthens local resilience. This integration ensures that climate action solutions are grounded in local identity and history, fostering community ownership and long-term success.	Culture (Community, Heritage, Art & History)
237	A city is only sustainable as long as it remains an active, vibrant community, so governance models must recognize cultural values, advocates, and contributors to sustainable discourse that ensure the diversity of community values and heritage are represented in urban planning and efforts to create a more inclusive and resilient urban landscape across all systems and inclusive of all local species.	Culture (Community, Heritage, Art & History)
238	Facilitating interdisciplinary research tours, eco-tourism, and collaborative art projects promotes heritage sites, cultural engagement and raises awareness about sustainability issues within communities.	Culture (Community, Heritage, Art & History) Finance
239	Integrate cultural philosophies into sustainability practices, fostering community engagement.	Culture (Community, Heritage, Art & History) Co-Production of Knowledge Partnerships for Long term Collaboration Indigenous knowledges & decoloniality
240	A shift is needed from traditional top-down governance models to participatory and inclusive systems that engage all societal stakeholders, particularly marginalized groups, in decision-making processes under a lens of just & equitable participation in systems with equitable access to information.	Governance & Multilevel Partnerships
241	Models of decentralized control are required to navigate the complexities of multilevel governance, promote equity, and support the integration of nature-based solutions into urban planning, especially in rapidly urbanizing areas.	Governance & Multilevel Partnerships Centralization

#	Action Priorities (#1-39 derived from 2021 CRIA Priorities, #40-254 onward newly added from I4C2024 Conference)	Corresponding GRAA topic(s)
242	A strong focus on governance highlights the need for better coordination among teams responsible for climate mitigation and adaptation. Partnerships across multiple levels of governance, including regional and international collaboration, are crucial for cities like Macul and Menjez to effectively address climate challenges.	Governance & Multilevel Partnerships
243	Establishing an ongoing forum to facilitate multi-level governance structures that allow cities to coordinate across different sectors with national governments, regional organizations, and international institutions.	Governance & Multilevel Partnerships
244	Flexibility in governance, such as permitting municipalities to develop their own key performance indicators (KPIs) supported by collaborative benchmarking, empowers local authorities to take ownership of their climate strategies and foster collaboration between city governments, communities, and non-profits, prioritising flexible funding and adaptive policies that can evolve with changing climate conditions.	Governance & Multilevel Partnerships Finance
245	Intranational committees are essential for policy development and financial strategies across governance levels.	Governance & Multilevel Partnerships Finance
246	Employing a multi-level governance approach to analyze urban development processes ensures collaboration and coherence in addressing sustainability challenges.	Governance & Multilevel Partnerships
247	Investigate multilevel diplomacy through international conferences to enhance environmental governance.	Governance & Multilevel Partnerships
248	Facilitate multi-level governance through experimentation and agility.	Governance & Multilevel Partnerships
249	To support large-scale climate projects, innovative financing mechanisms such as green bonds, public-private partnerships, and energy performance contracts are essential to offer blended finance across sectors.	Finance (Investment & public procurement)
250	AI-driven policy analysis can enhance city-level climate action by providing data-driven insights into emergent patterns for effective planning of funding allocations to generate the greatest climate response with targeted investment to reduce climate risk and potential losses across city systems.	Finance (Investment & public procurement)
251	Sustainability of financing options should be evaluated against system impacts under a lens of justice and equity, with flexible public procurement tools to support the adaptive nature of climate projects, ensuring they are both inclusive and sustainable.	Finance (Investment & public procurement)
252	Sharing financial resources across departments and ensuring procurement alignment with climate goals will facilitate the effective implementation of action plans, and provide avenues for collaborating with community organizations over dimensions of any city-level systems.	Finance (Investment & public procurement)
253	Workshops focused on concept note development and funding opportunities to secure climate finance and improve project plans.	Finance (Investment & public procurement)

#	Action Priorities (#1-39 derived from 2021 CRIA Priorities, #40-254 onward newly added from I4C2024 Conference)	Corresponding GRAA topic(s)
254	Continued engagement with private companies for technology solutions is vital for conducting feasibility studies and completing projects.	Finance (Investment & public procurement) Partnerships for Long-Term Collaboration
255	Collaboration between governments, businesses and training institutions to design upskilling/training environmental employment programs to prepare the population (youth, disadvantaged groups, unemployed, people working in the FF sector, etc.) for climate action/green jobs. This is important not only to ensure those who needs the jobs the most are able to access them, but also to ensure that climate action is not further delayed because of an unprepared workforce.	Co-Production of Knowledge Engagement & Participation Informality Intergenerationality Partnerships for Long-Term Collaboration Sustainable Consumption & Production
256	Quantify the workforce gaps across sectors (e.g. building electrification, retrofits, electric vehicles, etc.) and cities, and the investments needed on training and skills development to prepare the workforce for the transition.	Energy Finance (Investment & public procurement) Infrastructure & Housing Mobility Scale Sufficiency Sustainable Consumption & Production
257	Examine policy design for a just transition in decentralizing and distributing job creation in climate action across the population, understanding associated unsustainable job losses to ensure opportunity for participation in the transition and inequalities are not being increased.	Decentralization Empowering Cities to Take Action Engagement & Participation Finance (Investment & public procurement) Governance & Multilevel Partnerships Sustainable Consumption & Production
258	Local governments should plan all action in accordance with 1.5°C overshoot scenarios expected within the next generation, financing local level development across all sectors at speed and scale exceeding that of the national-level multilateral dialogue.	Climate Change Adaptation & Mitigation Culture (Community, Heritage, Art & History) | Engagement & Participation Empowering Cities for Action Finance (Investment & public procurement) Governance & Multilevel Partnerships Intergenerationality Risk | Sufficiency | Uncertainty
259	An understanding of the implications of civil conflict and crisis of both natural and anthropogenic origin in terms of both economic, social, and environmental cost (including displacement, loss and damages, and misattribution of resources towards unsustainable practices) is imperative in fostering sustainable local governance free of conflict-related losses.	Access & Reliability | Communication Conflict & Crisis Response Culture (Community, Heritage, Art & History) Engagement & Participation Finance (Investment & public procurement) Governance & Multilevel Partnerships Mobility Health (Human & Environmental) Partnerships for Long-Term Collaboration | Risk Sustainable Consumption & Production

2.1 Foundation & Delivery approaches

The three delivery approaches initially identified in 2018 have remained central to framing the coordination and discussion examining research efforts at the intersection of cities and climate change throughout each iteration of the GRAA. The distinction has now been made between **Empowering Cities to Take Action** as the foundational enabler for fulfilling the GRAA Vision and the delivery approaches of **Co-Production of Knowledge** and **Partnerships for Long-Term Collaboration** as ways to elevate and connect the GRAA structure.

As such, we have situated **Empowering Cities to Take Action** as the foundation of the GRAA structure, and **Co-Production of Knowledge** and **Partnerships for Long-Term Collaboration** as elevators connecting the various spaces of the GRAA.

Empowering Cities to Take Action

GRAA Heading	**Empowering Cities to Take Action**
Description	The foundation of the 2024 GRAA structure, empowering cities to take action is the central imperative of the GRAA enabling actors at local level to engage in utilizing a systems approach towards city-level models & data, inclusive of Digitalization, to deliver justice and equity in urban planning and design to achieve climate resilient development.
Reference in previous GRAA	Included as one of the three delivery approaches in 2018, retained in 2021. Found in the outer circle of 2024 GRAA wheel, and the foundation layer of the city building.
Knowledge Gap/ issues described	Integrating social and political dimensions into planning through participatory processes is essential for empowering cities to take action. Current urban development practices frequently fail to integrate diverse cultural perspectives, particularly Indigenous values, which could significantly enhance community connections and improve planning outcomes. Without practical guidance on how to incorporate these perspectives into urban design and transit planning, cities miss out on opportunities to drive more inclusive and effective climate action. Research is needed to better understand effective mechanisms for devolution of control from higher levels of governance to municipalities, strengthening mechanisms for cross-sectoral engagement in civil discourse and decision-making.
Knowledge Gaps	4, 19, 34, 44, 48, 52, 53, 56, 59, 60, 65, 66, 154
Action Priorities	8, 9, 10, 29, 36, 37, 40, 41, 42, 43, 45, 46, 47, 49, 50, 257, 258

Quotes / Insights / Case Studies from I4C24 Conference for this topic:

- "Our global fight to combat climate change begins with local actions that are coordinated and focused." – Jacob Ngock Nwachan
- "Urban areas create opportunities to increase resource efficiency and decarbonization through the systemic transition of infrastructure and urban form towards net-zero emissions. Empowered cities can impact future trajectories at multiple levels. Currently, 39% of NDCs have moderate urban content, 34% have low or no urban content, and only 27% include strong urban elements." – IPCC Mitigation of Climate Change and UN-Habitat (2024), Local Action for Global Goals: An Opportunity for Enhancing Nationally Determined Contributions.
- Development and expansion of the railway network in Ghana would be expected to reduce greenhouse gas emissions and integrate climate action strategies with transportation.
- Guelph, Ontario's Greener Homes initiative, which provides zero-interest loans for home retrofitting, aligns with broader climate goals.
- Durban's representative emphasized the importance of expanding research beyond cities like British Columbia and Montreal to include others, such as Toronto and Ottawa.
- Solutions like the Bubble Barrier technology, which captures plastic debris in waterways, demonstrate the potential of technology to prevent environmental damage and monitor waste.
- Establishment of Community Benefit Funds (CBFs) can drive local engagement and urban sustainability. Inclusive decision-making processes, supported by mayors and civic assemblies, ensure that diverse voices are heard.
- The role of the Chief Administrative Officer (CAO)—or its equivalent—is pivotal in municipalities, as they can lead the creation of working groups, supported by environmental and climate staff, to tackle barriers to urgent action.
- A promising model involves the creation of sustainable transition teams, which use app-based tracking and coaching to engage communities in addressing sustainability challenges.
- Facilitate collaboration and innovation through the MARC Partnership and Enterprise Evolution Program to evolve strategic practices.
- Financing and building plans, ScenaDaptation model.
- "Living Lab" or "Urban Lab" concept, where challenges and solutions are defined by the communities themselves, ensuring local ownership of initiatives.
- Traditionally, innovation in cities has been driven by economic and technological factors. However, a growing focus is on how a human-needs centered approach can reshape innovation goals. By grounding innovation in human needs, research is showing that cities can achieve more equitable and sustainable outcomes, particularly in critical areas like health, environment, and climate adaptation. – ICLEI World Secretariat

Co-Production of Knowledge

GRAA Heading	**Co-Production of Knowledge**
Description	Retained as a delivery approach connecting all spaces of the GRAA structure, an elevator of the entire structure.
Reference in previous GRAA	Included as one of the three delivery approaches in 2018, retained in 2021.
Knowledge Gap/ issues described	While knowledge exists to address many of the largest issues facing the global community at a local level, sustainable development education is not sufficiently mainstreamed to drive behavioral change on the necessary

	scale. International, decentralized collaboration, especially across low-income communities, could foster innovative co-production of knowledge to address socio-environmental challenges if properly enabled. Co-production of knowledge is vital to ensuring that local communities are actively involved in conception, realization, and continuation of sustainability practices. Evidence-based decision-making, supported by bottom-up approaches, aids cities in mainstreaming climate action.
Knowledge Gaps	33, 59, 67, 68, 69
Action Priorities	39, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 138, 255

Quotes / Insights / Case Studies from I4C24 Conference for this topic:

- "The reality of climate change challenges new approaches in city or urban governance. Urban development processes must be climate resilient, and this also implies decisions around urban planning must be climate-informed and led by local people." – Dr. Bob Manteaw
- "We need to move beyond one-dimensional solutions for a multidimensional problem." – Katie Momber
- The absence of a clear definition and typology for renewable energy clusters hampers understanding their role in energy transitions and local issues of equity, justice, and governance, necessitating a framework for analysis to inform place-based strategies.
- The discussion emphasized the critical need for collaboration between academic support and local and subnational needs, exemplified by the City of Macul's initiatives to finance sustainability projects beyond traditional local and subnational budgets. This collaboration underscores the importance of integrating community feedback and considering both human and non-human elements in decision-making processes. By focusing on location-specific strategies, municipalities can enhance engagement and drive better outcomes. This approach highlights the necessity for local, detailed studies, broken into manageable parts for progressive realization, which fosters deeper community involvement and ownership of initiatives.
- Collaborative efforts between local governments, universities, and community members, as illustrated by Urban Data Climate Workflows (UDCWs), enable the testing of climate actions in specific contexts, leading to more grounded and effective solutions.
- Tools such as the Climate IQ, developed by Urban Systems Lab, facilitate the assessment of climate risks and guide urban planning, particularly in vulnerable areas.
- The post-disaster recovery efforts in Homs exemplify the importance of leveraging local initiatives and supporting changes driven by communities.
- Interdisciplinary partnerships, such as those fostered by the Comple-X.NET network, contribute to vital projects like mangrove restoration and other nature-based solutions. Community involvement in data collection, demonstrated by a global website tracking environmental performance across 300 cities, provides valuable insights for decision-makers.
- The Indigenous Solutions Lab serves as a prime example of how co-production can empower communities to lead the theory of change, thereby producing more effective design outcomes.The collaboration between cities, communities, and researchers is essential in creating shared platforms that blend community perspectives with technical knowledge. Participatory approaches ensure that stakeholder insights are woven into climate adaptation strategies, resulting in contextually relevant solutions. Mixed research methods, which combine quantitative and qualitative data, are crucial for capturing bottom-up knowledge.
- Use the Clean Air Catalyst program as a model to enhance source awareness and apply design principles that improve collaboration and outcomes.

Partnerships for Long Term Collaboration

GRAA Heading	**Partnerships for Long Term Collaboration**
Description	Retained as a delivery approach connecting all spaces of the GRAA structure, an elevator of the entire structure.
Reference in previous GRAA	Included as one of the three delivery approaches in 2018, retained in 2021.
Knowledge Gap/ issues described	Effective long-term partnerships are critical for addressing complex urban and environmental challenges, but there is a significant gap in frameworks and models that support sustained collaboration among diverse stakeholders. Current strategies often fail to provide the necessary tools, training, and support.
Knowledge Gaps	16, 30, 46, 61, 70, 71, 72, 142
Action Priorities	39, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 254, 255

Quotes / Insights / Case Studies from I4C24 Conference for this topic:

- "One of the things that holds us back the most, although there is tremendous will, is coordination problems." – Jayne Engle
- The need for partnerships to enhance sustainability efforts was highlighted through Macul's initiatives to strengthen alliances at both regional and international levels. Mayor Georges Yousseff of Menjez, Lebanon, emphasized the importance of transparency with donors, particularly for municipalities in the Global South, to secure essential funding. Building strategic coalitions is critical to effectively addressing long-term climate challenges.
- Partnerships across multiple municipalities support circularity initiatives, such as the Circularity Assessment Protocol and the Debris Tracker app, which promote cooperative environmental efforts and drive sustainable practices.
- Collaboration between local, regional, and international partners is essential for tackling climate challenges. For instance, mangrove ecological conservation requires interdisciplinary collaboration among governments, researchers, and communities. Collaborative frameworks also enhance cities' data management practices for tracking climate actions and greenhouse gas (GHG) emissions. Websites that provide environmental performance data for cities exemplify effective long-term partnerships where governments, organizations, and citizens work together.

2.2 Pillars of Justice and Equity

Justice and Equity represent the lens of values through which social dimensions of the GRAA may be addressed, both in the local-level research undertaken across the systems approach and city-level data dimensions. Justice & equity themes included in the GRAA have been situated as pillars in the structure, as the systems and data that allow the maintenance of our society must acknowledge the social dimensions which underpin actions that impact both cities and climate change. The pillars of justice and equity underscore the importance of dismantling barriers faced by marginalized individuals and communities, ensuring the appropriate questions are asked in the city climate research process to avoid creating further disadvantage with city-scale action. Justice & equity-inclusive approaches in urban planning & design are essential to foster equitable climate solutions and address existing challenges.

Access and Reliability

GRAA Heading	**Access and Reliability**
Description	As a pillar of Justice & Equity, access & reliability provides a lens for analyzing the degree to which stakeholders across research areas are able to participate in the various systems and data dimensions, understanding the consistency and prevalence of these dimensions, their distribution, and barriers to each.
Reference in previous GRAA	Included in the 2021 CRIA as a cross-cutting issue.
Knowledge Gap/ issues described	It is imperative that cities understand the requirements to provide equitable access to reliable infrastructure and services. Data is critical for determining how to provide a public standard of access and reliability in urban areas, particularly for communities disadvantaged under existing systems who are not achieving sufficient quality of life. Obtaining accurate information across fragmented systems to surmount institutional trust issues and limited technical capacity across sectors is key to delivering goods and services. There is a pressing need for improved access to reliable data and resources to support sustainable function of cities, especially in the context of disaster management and climate adaptation.
Knowledge Gaps	17, 29, 49, 60, 92, 93, 141
Action Priorities	16, 25, 122, 123, 124, 125, 126, 127, 128, 129, 259

Quotes / Insights / Case Studies from I4C24 Conference for this topic:

- "Every city has a story to tell. It all starts with the community that captures the spirit of a place." – Ima Yusmanita
- As highlighted by Sidney Ribaux, Director of Montreal's Resilience and Ecological Transition Office, automating the analysis of sustainability documents can alleviate the burden on smaller municipalities, allowing them to focus on their specific needs.
- Reliable access to tools like Climate IQ and other digital platforms enhances a city's ability to assess sustainability and address climate risks. Providing accessible data on environmental performance empowers cities to refine their policies for more effective action.
- Assess and address factors affecting inclusiveness and resilience to enhance access to education and information for women and youth, improve formal and informal knowledge networks, and implement strategies to overcome vulnerabilities and constraints in scaling up climate-smart dairy practices.

Climate Change Adaptation and Mitigation

GRAA Heading	**Climate Change Adaptation and Mitigation**
Description	Included within the Pillars of Justice & Equity in the 2024 GRAA structure, adaptation in response to the effects of climate change and mitigation of the causes of climate change must be considered as a response to prior actions taken without full consideration of justice & equity dimensions.
Reference in previous GRAA	Included as a cross-cutting issue of the 2021 CRIA, but not the 2018 or 2021 GRAA.
Knowledge Gap/ issues described	Achieving climate adaptation and mitigation goals requires the development and implementation of targeted technologies and strategies, addressing specific issues across all systems to reduce GHG emissions. Resolving incongruity between urban development and climate response requires recognition of not only emissions but biodiversity loss across species. Across human populations, the distribution of resources and attention to adaptation and mitigation efforts require increased analysis and evidence-based coordination to integrate interventions where possible and resolve disparities in the equity of response delivered both within cities and across regions.
Knowledge Gaps	2, 8, 10, 15, 17, 21, 24, 27, 35, 41, 42, 45, 54, 55, 73, 74, 75, 101, 102, 155
Action Priorities	1, 2, 7, 8, 9, 10, 12, 13, 14, 36, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 190, 258

Quotes / Insights / Case Studies from I4C24 Conference for this topic:

- "Energy system models should evaluate local currency depreciation impacts and dynamics under different economic scenarios; this can help energy system planners formulate more resilient sustainable energy and climate change mitigation plans." – Mashael Yazdanie

- "Small-scale, incremental and minimal, but networked and connected nature-based solutions interventions within urban form can be not only cost-effective but also more effective adaptations than mega-scale intervention." – Dr. Luna Khirfan

- "Adaptation to climate change will be achieved not only with facts but also with emotions." – Andrea Ramirez-Agudelo, UNU-EHS

- Additionally, gaps in understanding persist regarding the effects of urban street runoff on green infrastructure, especially the impact of de-icing salts on tree health.
- Tools like MeteoCarbone can monitor CO_2 emissions, facilitating real-time tracking of progress.

- Cities should consider developing climate resilient multimodal transport systems and maximizing the potential of renewable energy in sectors like rail to achieve CO_2-free rapid mass transportation. Essential mitigation strategies involve building electrification policies, endorsing fossil fuel non-proliferation, and fleet electrification. Case studies curated through protocols involving the IPCC and GCoM highlight scalable and adaptable on-the-ground actions for effective climate action across various contexts.

- Tools like Climate IQ provide adaptive measures and context-specific resilient strategies that assist cities in mitigating climate risks. A focus on integrating social indicators and utilizing technological tools such as AI-powered risk assessments enables more informed decision-making regarding urban climate resilience. Urban systems can benefit from innovative, bottom-up approaches that prioritize sustainable adaptation without necessitating complete urban overhauls.

- Cities are increasingly developing integrated digital tools that combine data on climate adaptation and mitigation strategies. Social innovation plays a crucial role in ensuring inclusivity and a just transition, addressing how jobs created through climate action are distributed to prevent exacerbating existing inequalities. Moreover, cities are integrating mitigation and adaptation strategies through tools like the Internet of Things (IoT) and digital twins. Climate risk layers and the adoption of nature-based solutions (NBS) significantly contribute to urban sustainability. It is essential to quantify both mitigation and adaptation efforts, especially for enhancing financial literacy and capacity-building at both urban and national levels.

Conflict & Crisis Response

GRAA Heading	**Conflict & Crisis Response**
Description	Conflict & Crisis Response has been added as a pillar of Justice & Equity to recognize the extent to which crises (both natural and anthropogenic) and conflict between actors demand response. This response can be undertaken through preventative measures such as diplomacy and peacebuilding, or in humanitarian response to crisis and conflict.
Reference in previous GRAA	Not previously included in the 2018 or 2021 GRAA.
Knowledge Gap/ issues described	Research and action by all parties involved in both preventive diplomacy and peacebuilding as well as crisis and conflict response and humanitarian aid is complicated by the struggles involved in addressing compounding crises. The gaps involved across both aspects of this pillar of justice & equity include the intersections of; i. Housing & climate change-related displacement, and ii. climate change-related conflict, which are priorities for UN-Habitat, and factor into the implementation of the Sendai Framework for Disaster Risk Reduction.
Knowledge Gaps	1, 51, 71
Action Priorities	259

Quotes / Insights / Case Studies from I4C24 Conference for this topic:

- The post-conflict recovery in Homs showcases the value of preserving community-driven initiatives and cultural heritage during the rebuilding process, an idea raised is to learn and create an official vision for a post-conflict city after disaster.
- Human-nature conflicts raises concerns for habitat fragmentation, species diversity – in reference to sessions speaking on rewilding of cities.
- In the session – Shifting Horizons: the city as holder of multiple and concurrent truths: a discussion on the role of the mayor and civic assemblies as tools to straddle impact of crises on future generations.
- The concept of urban nomadism and urban acupuncture as concepts driven by local initiatives seem to be of great importance, especially in cities of the Global South, but have not yet been noticed and appreciated as they deserve.
- In session discussion the scale of urban migration as a result of climate change impacts: "Nobody knows better what happens at the local level than those that are dealing with it on daily basis they are the guardians of the soft knowledge they have/ local authorities have the legitimacy regarding the fastest intervention on the ground/ local governments have to be integrated into any process that impacts the loss and damage agenda" – Firdaous Oussidhoum UCLG
- In session Designing Resilient Futures: Climate-Induced Displacement, Spatial Data, and Urban Planning Solutions for Sustainable Development: recommendations learned from pilot project in Paris: mobilize migrants' knowledge and skills as part of a solid disaster risk reduction plan, while taking account of their vulnerabilities.

Engagement and Participation

GRAA Heading	**Engagement and Participation**
Description	As a pillar of Justice & Equity, engagement and participation are dimensions of the degree to which stakeholders are either invited or insistent upon their role as collaborative partners in the research, innovation, and climate action space at the local level.
Reference in previous GRAA	Included as one of the three delivery approaches in 2018, retained in 2021.
Knowledge Gap/ issues described	Enhancing engagement and participation requires integrating diverse perspectives and fostering collaborative approaches to address urban challenges and climate action. Strategies for community involvement must address stakeholder participation challenges, leverage digital tools, and ensure inclusive participation at all levels, across all sectors. This includes developing participatory frameworks for effective neighborhood-level governance and local planning, ensuring compliance with emission standards, and creating resilient, community-driven solutions.
Knowledge Gaps	4, 13, 31, 36, 51, 53, 94, 95, 140, 147, 152, 158, 159, 160
Action Priorities	1, 4, 5, 25, 26, 31, 32, 36, 40, 41, 81, 97, 130, 131, 132, 133, 223, 255, 257, 258, 259

Quotes / Insights / Case Studies from I4C24 Conference for this topic:

- "Engaging our residents is not the be all, end all, but it is a key component in achieving our carbon reduction goals." – N/A
- Community feedback is crucial in shaping sustainable practices, as demonstrated in Lagos, where concerns about the reluctance of coastal communities to adopt new practices highlighted the need for open dialogue and community involvement in implementing sustainable changes.
- Participatory processes enable local populations to co-create solutions tailored to their specific needs, making climate actions more relevant and sustainable. Community involvement is vital for successful urban renewal and climate adaptation, as seen in Colombia, where community planting and maintenance efforts exemplify the power of community-led initiatives in building resilient cities.

Gender

GRAA Heading	**Gender**
Description	As a pillar of Justice & Equity, Gender is a dimension that shapes human relationships and power dynamics, and both perceptions and actions are impacted by the role of gender in stakeholder engagement across all levels.
Reference in previous GRAA	Not previously included in the 2018 or 2021 GRAA (gender mentioned in research gaps and innovation priorities).
Knowledge Gap/ issues described	Gender inclusivity and consideration in urban planning and decision-making is often insufficient, resulting in policies and environments that fail to address the specific needs and contributions of different genders. Climate change disproportionately impacts women and marginalized gender groups, who often have limited access to decision-making processes and material resources. There is a pressing need for platforms and strategies that promote gender equality and ensure the active participation of women and marginalized gender groups in shaping urban environments and policies.
Knowledge Gaps	51, 55, 88, 89, 90
Action Priorities	25, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114

Quotes / Insights / Case Studies from I4C24 Conference for this topic:

- "Access to hygienic water: It is also important to consider that sometimes it is difficult for women in Mexico to go and get hygienic water due to scarcity of reliable water sources." – N/A
- "Women are the key actors in the political and action arena." – Andrea Ramirez-Agudelo, UNU-EHS
- In disaster recovery, women and marginalized groups face unique challenges that are often overlooked, which hinders equitable and effective recovery efforts. Gender-responsive approaches are essential in both urban planning and post-disaster scenarios to ensure that these groups are adequately supported.
- Gender-sensitive heat action plans and climate adaptation strategies are necessary to address these health disparities and protect vulnerable populations.
- Targeted engagement, capacity-building initiatives, and enhanced knowledge networks are essential for addressing these gaps and ensuring equitable outcomes.
- Women's involvement in climate research and action is critical for fostering gender inclusivity in sustainability efforts. Organizations like AWARD support women-led research projects, ensuring diverse perspectives are included in climate adaptation and mitigation planning.
- Addressing gender inequality in climate action is crucial, particularly through the design of policies that consider the differing impacts of climate change on women. For instance, storytelling through video documentation of women's experiences with extreme climate conditions serves to highlight these disparities.

Indigenous Knowledges and Decoloniality

GRAA Heading	**Indigenous Knowledges and Decoloniality**
Description	A previously underrepresented pillar of Justice & Equity in the GRAA structure, Indigenous knowledge represents a recognition of stakeholders linked to specific places with knowledge of and respect for practices predating the colonial/capitalist paradigm. Decoloniality examines the knowledge and actions required to resuscitate, platform, and properly credit those practices undermined by these extractive paradigms of colonialism and capitalism operating globally.
Reference in previous GRAA	Not previously included in the 2018 or 2021 GRAA (Indigenous knowledges mentioned in research gaps and innovation priorities).
Knowledge Gap/ issues described	The lack of integration of Indigenous cultural perspectives in urban design & planning of systems highlights a significant gap in the incorporation of these values into the dominant societal paradigm. This oversight has caused intergenerational disadvantage and trauma, and continues to hinder community connections and diminish the effectiveness of planning outcomes where systemic biases remain unaddressed. There is an urgent need for practical inclusion of indigenous voices in urban planning & design to ensure diversity of values and knowledge support decolonial approaches towards climate resilient development in a manner more inclusive and respectful of diverse cultural contexts.
Knowledge Gaps	1, 33, 46, 51, 85, 86, 87, 158, 159, 160
Action Priorities	25, 39, 99, 100, 101, 102, 103, 104

Quotes / Insights / Case Studies from I4C24 Conference for this topic:

- For First Nations communities, barriers such as institutional constraints and lack of control can impede the implementation of renewable energy projects. Incorporating Indigenous perspectives into energy policies and projects is essential for overcoming these challenges and ensuring community benefits.
- The challenges faced by the Ethiopian Rift Valley, including frequent droughts and land use changes, further illustrate the importance of integrating Indigenous knowledge and practices into land management strategies to enhance community resilience. Additionally, informal settlements experience increased vulnerability due to poorly executed relocations and displacement, underscoring the need for effective community engagement that incorporates Indigenous knowledge to address these impacts on vulnerable populations.

- Incorporating Indigenous practices into climate action is essential, especially in managing natural resources like forests and water. Tools such as Community Forest Associations (CFA), Water Resource Users Associations (WRUA), and GIS-based community mapping play a critical role in managing and preserving ecosystems in a sustainable and inclusive manner. Emphasizing nature-based solutions, such as mangrove restoration, further reflects how Indigenous knowledge can inform urban planning, aligning ecological conservation efforts with traditional practices.
- The Indigenous Solutions Lab serves as a prime example of how communities can directly benefit from climate finance models and urban designs by owning the theory of change and influencing outcomes that impact their environments.
- Collaborate on projects like FreeLand Halifax and FreeHouse Toronto to restore traditional land relationships and promote Indigenous governance in urban contexts.
- More effort must be done to integrate indigenous knowledge into financial systems, especially where conventional frameworks of asset representation are not yet inclusive enough.

Informality

GRAA Heading	**Informality**
Description	Informality is a pillar of Justice & Equity designed to enable evaluation of those aspects of society not formally recognized or included in the existing systems of recognition across culture, governance, and finance.
Reference in previous GRAA	Included in the 2018 GRAA, and included in the Topical Themes of the 2021 GRAA.
Knowledge Gap/ issues described	Informal sectors and settlements face significant challenges due to limited systemic integration, accessibility to resources, obfuscated socio-economic conditions, and inadequate infrastructure. These vulnerabilities often result in environmental degradation and pose difficulties for urban management. Effective strategies are needed to properly understand and address the impacts of informality on resource management, urban systems, and sustainability, while ensuring that informal communities have access to the necessary support to avoid marginalization and disproportionate negative impacts on those individuals not formally recognized fully within their jurisdictions.
Knowledge Gaps	12, 13, 14, 15, 16, 91, 149, 150, 152, 153
Action Priorities	5, 25, 39, 115, 116, 117, 118, 119, 120, 121, 255

Quotes / Insights / Case Studies from I4C24 Conference for this topic:

- "Citizens are not stakeholders but collaborators." – Paul Nelson
- "Think beyond the formal/informal binary: people may be relocated to formal settings but still face similar challenges." – Neel Wiltgen
- Ensuring equitable access to clean energy solutions, as well as fostering the inclusion of informal communities in climate adaptation and urban planning, is essential for building resilience.
- Urban rewilding efforts must also consider the dynamics of informal sectors to prevent exacerbating socio-economic inequalities and to align goals with inclusive outcomes.
- For instance, particularly in post-disaster contexts like Homs, community involvement in activities like wetland conservation and planting contributes to sustainable environmental management.
- Innovations driven by necessity in informal settlements offer valuable insights for sustainable urban development. Exploring whether these innovations can contribute to long-term sustainability goals, rather than serving as temporary survival mechanisms, is an emerging focus in understanding how they can scale and sustain urban growth.
- The informal economy plays a vital role in urban livelihoods. Linking informal economic activities to broader sustainability metrics is critical for inclusive urban development.
- The intersection of health, environmental sustainability, and informality requires more attention. Investigating how informal settlements manage public health risks, waste, and environmental degradation within sustainable development frameworks must become a priority for holistic urban sustainability strategies.
  – ICLEI World Secretariat

Intergenerationality

GRAA Heading	**Intergenerationality**
Description	Intergenerationality has been added as a pillar of Justice & Equity to reflect the need for research & action to be taken on a timescale in consideration of both past and future circumstances and those stakeholders who may be impacted by the activities of the present.
Reference in previous GRAA	Not previously included in the 2018 or 2021 GRAA.
Knowledge Gap/ issues described	Youth engagement in decision-making processes is broadly inadequate, despite the significant population of younger generations, their potential impact on tackling socio-environmental challenges, and the disproportionate burden they carry for the unsustainable practices now underway. Current platforms and strategies frequently fail to ensure their meaningful participation in shaping the systems they are forced to operate within. There is a critical need for mechanisms that promote intergenerational equity and actively involve youth (and the elderly) in decision-making processes.
Knowledge Gaps	5, 13, 31, 33, 51, 55, 78, 79, 148, 149, 157
Action Priorities	25, 39, 89, 90, 91, 92, 93, 255, 258

Quotes / Insights / Case Studies from I4C24 Conference for this topic:

- Educational frameworks must incorporate Indigenous perspectives and emphasize intergenerational equity to build enduring climate resilience among young people.
- Engaging youth in climate action is essential for fostering long-term sustainability and resilience within communities, yet there is a notable lack of focus on how climate strategies impact different generations, particularly regarding education and community involvement.
- Rapid urbanization, climate change, and economic volatility create uncertainties in planning and decision-making, rendering traditional methods insufficient. Innovative approaches, such as exploratory scenario planning (XSP), are needed to address these intergenerational challenges effectively. Frameworks that support long-term thinking and planning in urban environments must consider the needs of future generations alongside those of current populations to build resilient and sustainable communities.
- Addressing climate hazards in cities requires frameworks that account for the varying adaptive capacities of different socio-economic groups. Integrating intergenerational perspectives into urban planning and climate strategies is crucial for creating more equitable and resilient urban environments, ultimately ensuring that both current and future generations can thrive.
- Engaging communities through participatory planning helps ensure that climate resilience actions are beneficial for future generations. Social innovations, such as community involvement in ecological landscape design, particularly in drought-prone regions, provide sustainable solutions that meet both present and future needs.
- Urban renewal and adaptation efforts must consider the needs of future generations. Tools like Climate IQ incorporate socio-demographic indicators to assess current risks while ensuring cities plan for long-term resilience, ultimately benefiting future populations.

Sufficiency

GRAA Heading	**Sufficiency**
Description	Sufficiency is included as a Justice & Equity pillar as a strategy for reducing consumption and production levels through changes in social practices. One crucial aspect of the sufficiency strategy is to operationalise social and environmental sustainability goals by reducing consumption and production in quantitative terms to generalisable levels, and ensuring adequate access to resources across society in accordance with human rights.
Reference in previous GRAA	Not previously included in the 2018 or 2021 GRAA (a dimension related to the sustainable consumption and production and its adequate distribution).
Knowledge Gap/ issues described	The concept of sufficiency focuses on meeting the needs of urban populations without overusing resources or causing environmental harm. There is a pressing need for strategies that prioritize sufficiency over growth, including policies that promote responsible consumption and reduce overall resource use in urban areas.
Knowledge Gaps	80, 81, 82, 83, 84, 149
Action Priorities	94, 95, 96, 97, 98, 256, 258

Quotes / Insights / Case Studies from I4C24 Conference for this topic:

- "Climate action is time-bound, we cannot wait for new inventions only. It is time to look at what we have and maximize utilization to mitigate the rapid depletion of the environment." – N/A
- The challenge of making real estate investment more accessible and affordable, while simultaneously improving urban living conditions, highlights the need for innovative models that prioritize sufficiency and sustainability in housing and urban development.
- Methane emissions from landfills pose significant climate risks due to their high global warming potential, underscoring the need for effective and affordable monitoring methods to manage these emissions and address their impact on climate sufficiency and environmental health.
- By operationalizing social and environmental sustainability goals through sufficiency strategies, cities can reduce consumption and production levels in quantifiable terms, fostering a more sustainable future for urban populations.
- Sustainable construction, using local materials and meeting essential needs, is another practical application of sufficiency. Cities are also focusing on community-driven initiatives such as urban agriculture and water conservation projects, ensuring that resource use remains efficient and sustainable across generations. These initiatives strengthen long-term climate resilience by balancing resource management with local needs.

Sustainable Consumption and Production

GRAA Heading	**Sustainable Consumption and Production**
Description	Included within the Pillars of Justice & Equity in the 2024 GRAA structure, sustainable consumption (and the ability to participate in this action) is highly dependent upon sustainable production activities and the distribution of material resources both within and between parts of society.
Reference in previous GRAA	Included in the 2018 GRAA, included in the Topical Themes of the 2021 GRAA.
Knowledge Gap/ issues described	Promoting sustainable consumption and production involves addressing interconnected challenges related to resource management, material access and utilization, and circularity/recovery of material value from supply chains. Effective strategies must incorporate circular economy principles, and address the gaps in understanding material lifecycles. Sustainable practice requires gaps be closed around understanding unsustainable production models, the ability of consumers to make sustainable choices, and promotion of well-being within ecological limits while enhancing equitable distribution of resources for both consumption and production.
Knowledge Gaps	3, 4, 26, 27, 28, 29, 37, 42, 55, 60, 76, 77, 145, 147, 149, 151, 152, 154, 157
Action Priorities	6, 19, 20, 21, 22, 27, 84, 85, 86, 87, 88, 229, 255, 256, 257, 259

Quotes / Insights / Case Studies from I4C24 Conference for this topic:

- Efforts like Guelph's Greener Homes initiative, which offers 0% loans for retrofitting homes and provides heat pumps to low-income households, illustrate effective ways to encourage sustainable consumption.
- This includes optimizing water supply and treatment across different sectors to improve resource efficiency and sustainability.
- Additionally, urban areas with limited space require effective redesign strategies for green spaces to enhance local conditions, necessitating evaluations of their impacts on air quality and thermal comfort
- Frameworks for urban sustainability often require revision to improve data collection and integrate new thematic areas, which is vital for communities transitioning to sustainable futures and effectively managing urban infrastructure.
- Utilizing sustainable and local materials for construction, as seen in eco-villages, ensures that production practices support long-term sustainability. Techniques such as water harvesting contribute to the irrigation of plantations and gardens, promoting sustainable consumption in both construction and agriculture.
- Cities are also experimenting with new systems to reduce waste and support sustainable food systems. This includes shared evaluation platforms that track food-related initiatives, ultimately improving the overall sustainability of local food production and distribution systems. Circularity and sustainability are further promoted through initiatives like the Circularity Assessment Protocol, the Shores Forward Initiative, and other tools designed to encourage sustainable land use and resource management.

2.3 City-Level Models, Data and Knowledge

City-Level Models, Data, and Knowledge are represented in the 2024 GRAA structure as towers providing city stakeholders with visible, tangible information they may use to inform their positions. Such informed positions are necessary for research to foster innovation in the interest of fulfilling just & equitable action towards sustainable management of the systems involved in enabling cities to function. The collection, analysis, availability, and publicization of climate-related information is an enormous challenge for cities and governments of all scales, across all sectors. Public sector officials need robust and accurate city-level models, data, and knowledge to make evidence-based decisions and shift public perceptions around acceptability of what constitutes sustainable practice.

Communication

GRAA Heading	**Communication**
Description	Communication explores both the internal dialogue of stakeholders engaged in climate research, innovation, and action, and the reach of GRAA-related information beyond the structure of the GRAA itself.
Reference in previous GRAA	Not previously included in the 2018 or 2021 GRAA (a dimension related to all systems and aspects of local-level research & action).
Knowledge Gap/ issues described	Effective communication strategies are essential for engaging communities and stakeholders in climate action and sustainability efforts. Many cities struggle to communicate climate issues and solutions effectively to diverse audiences, highlighting the need for clear and impactful approaches that drive participation and understanding. This need extends to specific stakeholders, such as real estate developers, business owners, and customary landowners, where improved communication methods can motivate the adoption of climate resilient practices. Communication is the key to unlocking widespread behavioral change.
Knowledge Gaps	63, 103, 104, 121, 160
Action Priorities	4, 22, 29, 35, 39, 40, 41, 81, 97, 168, 169, 170, 171, 172, 173, 174, 188, 259

Quotes / Insights / Case Studies from I4C24 Conference for this topic:

- "The more we share our ideas, the more we learn from others, the better the future is." – Savio Rousseau Rozario
- Clear and transparent communication between cities and their stakeholders is essential for driving climate action. As emphasized by Mayor Youssef, presenting solutions and ensuring transparency in the use of funds is crucial to fostering trust and engagement. Effective communication strategies must involve both internal governmental dialogue and public outreach to mobilize action on climate issues.
- By leveraging communication tools and fostering participatory governance, cities can improve their climate strategies and create stronger, more inclusive pathways toward sustainability.

Decentralization

GRAA Heading	**Communication**
Description	As a tower of city-level models, data, and knowledge, centralization pertains to the degree in which control of decision-making is vested in various roles at various levels of governance and systems management, with important ramifications on coordination, transparency, resource access, peripherality, and sense of efficacy and agency by stakeholders.
Reference in previous GRAA	Not previously included in the 2018 or 2021 GRAA (centralization only considered in the context of governance systems and multi-level coordination).
Knowledge Gap/ issues described	Centralized decision-making can significantly hinder effective urban planning and climate adaptation by limiting local input and responsiveness. This necessitates a shift towards decentralized governance models that empower local actors, enabling tailored solutions and adaptive management in urban and environmental contexts. A top-down approach in governance can also impede local participation in climate action, further underscoring the need for decentralized models that facilitate city-level financial independence, community engagement in emissions regulation, and bespoke urban planning unmired by the crawling pace often endemic to centralized bureaucracies. Ultimately, decentralizing control to local authorities and communities should lead to more effective and tailored climate solutions in cities worldwide.
Knowledge Gaps	105, 106, 107
Action Priorities	175, 176, 177, 178, 257

Quotes / Insights / Case Studies from I4C24 Conference for this topic:

- "A city is a complex living system, and is part of other complex living systems. It is time that we manage cities in a way that reflects that." – Tim Posselt
- Having a central champion in local government, such as the Chief Administrative Officer (CAO), supported by dedicated climate and environmental staff, can help streamline priorities and break down barriers to effective climate action.

Digitalization

GRAA Heading	**Digitalization**
Description	In city-level models, data, and knowledge, digitalization is the dimension through which we measure the representation of real-world information in virtual spaces, both in storage of that information and its subsequent manipulation with digital tools.
Reference in previous GRAA	Included in both the 2021 GRAA and CRIA of the 2021 as a cross-cutting issue.
Knowledge Gap/ issues described	Harnessing digitalization for urban climate action requires addressing challenges related to technology integration, accessibility, and equitable application of tools for information acquisition, analysis, and management. There is a need for innovative digital tools that support climate adaptation, mitigation, and sustainability goals while aligning with and improving city governance processes. Ensuring that digital solutions are inclusive and promote social and environmental justice instead of perpetuating inequality is critical for effective outcomes.
Knowledge Gaps	19, 26, 54, 55, 96, 97, 124, 140, 141, 142, 143, 144
Action Priorities	2, 17, 26, 74, 129, 134, 135, 136, 137, 138, 139, 140, 151, 188, 206

Quotes / Insights / Case Studies from I4C24 Conference for this topic:

- "The importance of digital tools in urban-scale energy management, urban planning, and transportation modes modeling."

- The development of AI-powered tools like Climate IQ aids cities in conducting comprehensive climate risk assessments by offering open access to valuable data and models that support evidence-based urban planning. There are increasing efforts to streamline the evidence base building for cities on emissions as well, for example Data Portal for Cities new features launched at the Conference to support GHG inventories for free for any city in Brazil leveraging local data from SEEG. Furthermore, smart applications and digital platforms play a crucial role in governance and community participation, facilitating transparent decision-making and tracking progress on climate initiatives. Together, these digital innovations can enhance urban resilience and drive more effective climate action.

- "Recognizing that these technologies should not be viewed as silver bullets is crucial. Instead, they must be integrated into a systemic approach that empowers local governments to combine these digital solutions into a cohesive stack and with progressive policies, innovative approaches to civic engagement, and robust multi-stakeholder collaboration to ensure that the lag between the emergence of new technologies and how we use them for the public good is reduced."
  – Pourya Salehi, ICLEI – Local Governments for Sustainability

- Regarding digitalization, it's important to recognize that it extends far beyond just data, tools, and tracking climate progress. While those aspects are essential, digitalization is fundamentally about transformation; reshaping business models, systems, and approaches to address sustainability challenges in a more integrated way. Digitalization needs to continue to be viewed in the GRAA as a cross-cutting issue.

- The interlinkage between digitalization and finance is crucial. Digital finance is radically transforming the financial landscape, with innovations like banks issuing bonds using digital platforms. It's essential to acknowledge these connections and leverage them to enhance climate action. By understanding where digital finance and technology intersect, we can encourage more innovative approaches and inputs that accelerate progress towards sustainability goals.
- ICLEI's policy brief entitled "Digitalization: A Game Changer for Local Governments & Communities Enhancing Capacities to Deploy Transformative Solutions" serves as a roadmap for local governance modernization, enhancing efficiency, inclusivity, and responsiveness in our evolving digital era.
  – ICLEI World Secretariat

Efficiency

GRAA Heading	**Efficiency**
Description	As a tower of city-level models, data, and knowledge, efficiency represents a dimension by which the use of resource inputs yields effective outputs in consideration of the resultant loss or waste involved in the process. All other dimensions of the system approaches and pillars of justice & equity can be examined in the context of what is both lost and gained in the process of taking action.
Reference in previous GRAA	Included in the 2021 CRIA as a cross-cutting issue.
Knowledge Gap/ issues described	Enhancing efficiency in urban infrastructure and resource management is essential for mitigating climate change impacts and improving sustainability. Cities must adopt innovative solutions that optimize energy, water, and waste management systems (and integrate where possible) to reduce emissions and environmental harm. This includes evaluating strategies like high albedo surfaces to decrease CO2 emissions and energy consumption, as well as improving the operational efficiency of critical systems like wastewater treatment through cleaner energy options, such as solar power.
Knowledge Gaps	54, 99
Action Priorities	2, 3, 15, 149, 150, 151, 152, 153, 154, 155

Quotes / Insights / Case Studies from I4C24 Conference for this topic:

- "Silos of knowledge are not stars in an interstellar vacuum." – Debra Roberts
- Barriers in energy efficiency, particularly in sectors like rental housing, where integrating clean energy solutions could enhance affordability and collaboration. Public infrastructure, such as lighting, also requires optimization to meet decarbonization goals and address diseconomies of scale in urban projects, particularly Smart City initiatives. A cohesive, cross-sectoral strategy is needed to unify efficiency measures and bolster climate resilience.
- Electrification of local and subnational fleets and heating systems, as demonstrated in cities like Montreal, plays a significant role in enhancing energy efficiency and reducing overall carbon footprints. Incorporating AI and digital tools, such as climate risk assessment systems, further improves efficiency in urban planning. These automated systems streamline data management, emissions tracking, and policy analysis, allowing cities to respond to challenges swiftly and with greater accuracy.
- Innovative technologies like the Bubble Barrier, which both captures waste and collects data, exemplify how cities can adopt solutions that serve multiple purposes. By embracing such tools, cities can optimise environmental management and achieve better ecological and economic outcomes simultaneously.

Information Integrity & Transparency

GRAA Heading	**Information Integrity & Transparency**
Description	Disinformation impacts the environmental conditions/enabling environment which has flow of impacts for all of the action areas. Disinformation impacts climate action by: spreading inaccurate information (which both impairs people's capacity to act, and reduces trust in scientific and other information sources in general); reducing trust in institutions (so people are less likely to do what's asked of them for climate action, and 'switch off'); and increasing polarization and distrust (which reduces communal adaptive capacities). This could sit within the justice and equity space, however we have placed it within the City-level models layer, noting that specific areas of focus within this from a city climate action purpose could be disinformation targeting individual groups; First Nations, LGBTIQ+ communities, gendered disinformation, migrant disinformation, in particular. More broadly, this is about social cohesion when addressing local climate actions.
Reference in previous GRAA	Not previously included in the 2018 or 2021 GRAA (gender mentioned in research gaps and innovation priorities).
Knowledge Gap/ issues described	The broad term of "information integrity" explores the degree of veracity and trust in data, which can encompass the types of deviation (alongside "uncertainty") and exploration of variables that reduce confidence in information and inhibit effective communication of research to induce climate action. "Transparency" indicates the availability to access information and identify its source. Information modifiers (misinformation, disinformation, etc.) should be included to properly identify how perceptions are being

	manipulated, research is being suppressed or discredited, and climate action is being dissuaded by a variety of societal actors undermining the sustainability of city-level systems.
Knowledge Gaps	14, 21, 27, 35, 46, 61, 108, 109, 131, 136, 144
Action Priorities	52, 53, 124, 169, 179, 180, 181, 182, 183, 184

Quotes / Insights / Case Studies from I4C24 Conference for this topic:

- Disinformation Playbook.
- Address complexity through transparency by creating a data repository that maps gender-sensitive climate adaptation projects in Cameroon.
- "There are a plethora of tools developed for city-level climate action, but many of them are discontinued, making it hard for cities to maintain long-term climate strategies." – N/A
- Innovations such as MeteoCarbone provide reliable emissions monitoring, ensuring cities stay accountable to their climate goals. The automation of data management practices enhances the integrity of the information used in urban planning by delivering up-to-date data that guides climate strategies. This streamlines the analysis of policy documents, providing cities with precise and actionable insights for their sustainability initiatives.

Risk

GRAA Heading	**Risk**
Description	As a tower of city-level models, data, and knowledge, risk is tied to uncertainty and scale – risk is the emergent understanding of the threat posed to elements of the GRAA structure based upon the research findings across other dimensions of the GRAA and the analysis of other aspects of models, data and knowledge concerning how systems function, and any potential threat to justice and equity in how these systems continue to function.
Reference in previous GRAA	Not previously included in the 2018 or 2021 GRAA (a dimension related to uncertainty and scale and the probabilistic threat to both systems and justice & equity).
Knowledge Gap/ issues described	Urban areas, particularly those prone to extreme weather events, face increased risks due to inadequate planning and infrastructure. Effective risk management strategies are essential to enhance resilience and reduce vulnerability to climate-related hazards. This includes addressing the rising risks associated with extreme heat, forced displacement, and environmental degradation, as well as integrating nature-positive engineering solutions that consider biodiversity in urban planning.
Knowledge Gaps	21, 22, 63, 101, 102, 146
Action Priorities	23, 32, 35, 161, 162, 163, 164, 165, 166, 167, 259

Quotes / Insights / Case Studies from I4C24 Conference for this topic:

- In regions like the Ethiopian Rift Valley, frequent droughts and land use changes pose risks to agricultural productivity and local ecosystems. Urban sprawl in cities has also intensified the urban heat island effect, disrupting ecosystem services. Risk assessments must address these specific challenges by managing the balance of thermal energy and enhancing the cooling effects of green spaces.
- Addressing climate risks requires a combination of proactive planning and reactive strategies. Insights shared by a representative from Seattle emphasized the role of transportation in mitigating climate risks, showcasing how academic research can inform practical solutions. Tools like MeteoCarbone, which monitor emissions, and nature-based solutions, such as daylighting urban streams to reduce flood risks, are essential for cities to effectively manage climate-related challenges.
- AI-powered tools, like Climate IQ, provide cities with the capability to assess climate risks more accurately, while ensuring that risk management strategies are tailored to the specific needs of the population.
- African cities require cost-effective, data-driven tools to develop comprehensive Risk and Vulnerability Assessments (RVAs) for effective climate adaptation. Enhancing data collection and analysis methods is essential for informed decision-making.

Scale

GRAA Heading	**Scale**
Description	As a tower of city-level models, data, and knowledge, scale represents the magnitude of how other dimensions are being framed, providing a metric of reference for how topics of research may be treated, and the degree to which action may be required to address whatever dimension is under question in a manner appropriate to deal with the issue under consideration.
Reference in previous GRAA	Included as both a cross-cutting issue in the 2018 and 2021 GRAA.
Knowledge Gap/ issues described	Understanding the scale of required urban research and climate action involves addressing barriers to effective collaboration across the various sectors and levels involved in managing cities. Small and medium-sized cities, which often face significant climate change impacts with limited resources, need solutions that work at smaller scales to support adaptation, governance, and resilience. Developing strategies to replicate successful models, particularly in diverse urban settings, is essential. Funding constraints and regulatory hurdles impacting city-scale action are unresolved challenges in the climate research and response journey.
Knowledge Gaps	2, 4, 26, 35, 43, 46, 48, 61, 100, 111, 149, 154
Action Priorities	26, 33, 37, 156, 157, 158, 159, 160, 177, 256, 259

Quotes / Insights / Case Studies from I4C24 Conference for this topic:

- "It's impossible to own nature; that's a human construct." – Delanie Passer
- Barriers to scaling also include resistance to adopting beneficial practices, such as agrobiodiversity in urban savannas, and reliance on fuel-based cars that hinder mobility solutions. By addressing these gaps and fostering innovative partnerships, particularly through initiatives like the MARC Partnership, cities can accelerate transformative change and scale successful climate initiatives across various contexts.
- Scaling climate solutions is essential for amplifying their impact across regions and globally. Cities like Montreal were noted for their successful climate initiatives, and discussions highlighted the importance of expanding these efforts to other urban areas.
- Tools like the GHG Emissions Index provide a scalable approach to emissions tracking, enabling cities around the world to monitor and reduce their carbon footprints.
- The use of tools like the "Case Study Atlas," which documents successful climate actions in various regions, supports cities in replicating proven strategies. By sharing these models, municipalities can foster widespread climate resilience.

Uncertainty

GRAA Heading	**Uncertainty**
Description	Uncertainty, as a tower of city-level models, data, and knowledge, represents the dimension of confidence with which information can be trusted as accurate and utilized to inform the decision-making process across the dimensions of the systems approaches and pillars of justice & equity – any information collected in the research process should be evaluated according to the certainty around its veracity and accuracy.
Reference in previous GRAA	Included in the 2018 GRAA, and included in the Topical Themes of the 2021 GRAA.
Knowledge Gap/ issues described	Managing uncertainty in the formulation of data collection, advanced modeling, and comprehensive understanding of the knowledge required to assess risk and undertake climate action. Addressing climate overshoot and its implications for policy formulation and infrastructure solutions requires accurate measurements and targeted methods for navigating uncertainties. This includes developing adaptive strategies to handle unexpected climate impacts and ensuring that policies and plans are flexible, iterative, and responsive to changing conditions and variables as they come to be identified and understood.
Knowledge Gaps	7, 21, 23, 98
Action Priorities	35, 38, 141, 142, 143, 144, 145, 146, 147, 148, 259

Quotes / Insights / Case Studies from I4C24 Conference for this topic:

- "Risk assessment is also about providing hope to people." – Session Chair

- For example, in Homs, recognizing and formalizing community-driven efforts proved instrumental in helping cities navigate uncertainty and avoid further crises. Urban planning must account for uncertainty in climate action by ensuring flexible governance that can adapt to unpredictable challenges. This involves balancing innovation with practical resilience measures, prioritizing adaptive strategies that allow for continuous reassessment.

2.4 Systems Approach Levels

Taking a systems approach to dealing with city climate research & innovation emerged as a central theme of the GRAA and CRIA in 2021. From the dimensions refined in 2021, a series of systems were identified as instrumental to the function of cities. The identified systems are being approached in the 2024 GRAA structure as levels with a hierarchy of function in mind. Research can now be layered and organized in recognition of the dependence social and economic functions in local-level activity will always have upon the environmental/physical realities of the urban spaces and systems upon which they are built. Systems approach-based urban planning & design will facilitate the move from ad-hoc project-based interventions to coordinated portfolio-based planning, which should enable scalable solutions that may successfully align government efforts with the other sectors involved in activities impacting all systems.

Geography

GRAA Heading	**Geography**
Description	Introduced as the broadest terminology for understanding the positional value upon which cities are built, the Earth systems and confluence of land, sea, and air included under the heading of Geography provide a basis for the biodiversity that inhabits them and the additional systems built upon the geographic features considered in this system approach.
Reference in previous GRAA	Not previously included in the 2018 or 2021 GRAA (referenced in built & green/blue infrastructure, which has been reorganized according to the systems approach).
Knowledge Gap/ issues described	Geographic variations in climate change impacts and resource availability necessitate tailored solutions for effective urban planning, adaptation strategies, and resource management. Understanding local geographical contexts is crucial for developing responsive climate policies, as these disparities require localized approaches to address specific regional challenges. All system parameters are a product of the geographic systems underpinning the lived experience in urban environments, and a baseline understanding of geographic dimensions is crucial to building sustainable systems that work within the parameters of every locale.
Knowledge Gaps	11, 27, 34, 44, 47, 48, 52, 110, 111, 124
Action Priorities	22, 25, 185, 186, 187, 188, 189

Quotes / Insights / Case Studies from I4C24 Conference for this topic:

- "Urbanization is migration, and migration is urbanization." – Elizabeth
- The lack of proper valuation and management of ecosystem services in areas like the Hugumburda dry Afromontane forest threatens local well-being and forest sustainability, highlighting the importance of geographic considerations in ecosystem service management.
- Addressing geography-specific impacts of climate change is crucial, as coastal and vulnerable regions, such as Lagos, face unique challenges in adapting to sustainable practices.
- For instance, in Kufranjah, geographic-specific strategies like water harvesting and solar energy use demonstrate the importance of localised adaptation measures.
- By integrating climate risk assessments and spatial planning through technologies like GIS and remote sensing, cities can address geographic-specific vulnerabilities more effectively, ensuring that climate actions are both targeted and adaptable to local conditions.

Biodiversity

GRAA Heading	**Biodiversity**
Description	A product of its geography, biodiversity represents the natural capital accrued through billions of years of the proliferation, evolution, and resultant variation of life. Establishment of populations of unique, endemic species across biomes – ecosystems – has provided a basis for the emergence of systems with additional complexity that draw upon this natural capital. Every city gains its unique character from its biodiversity.
Reference in previous GRAA	Not previously included in the 2018 or 2021 GRAA (referenced in built & green/blue infrastructure, which has been reorganized according to the systems approach).
Knowledge Gap/ issues described	Urban areas are experiencing significant biodiversity loss due to inadequate land use planning and rapid urbanization. This degradation is exacerbated by environmental stressors and the changes in land-use patterns that come with urban development. To effectively address these challenges, there is an urgent need for strategies that integrate biodiversity conservation into urban planning and development. Such strategies should focus on protecting vegetation, enhancing green spaces, and implementing policies that strike a balance between development and environmental preservation.
Knowledge Gaps	1, 4, 5, 27, 59, 62, 112, 130
Action Priorities	7, 11, 24, 75, 167, 190, 191, 192, 193, 194

Quotes / Insights / Case Studies from I4C24 Conference for this topic:

- Innovative approaches and regional partnerships are crucial for building resilience and mitigating the impacts of urbanization on local ecosystems and biodiversity hotspots. Integrating nature-based solutions and green infrastructure into urban policies is essential for enhancing urban biodiversity and ecological health. These measures not only help in protecting and enhancing ecological systems but also in addressing issues related to plastic pollution and the degradation of green spaces, particularly in peri-urban areas.
- Ultimately, prioritizing ecological preservation and restoration within urban planning is essential to mitigate the significant threats that urbanization poses to biodiversity.
- Efforts to preserve biodiversity, such as Kufranjah's hydroponic initiatives to protect endangered plants, highlight the role cities can play in biodiversity conservation amidst climate challenges. These initiatives are crucial as urban areas face increasing environmental pressures.

Health (Human and Environmental)

GRAA Heading	**Health (Human and Environmental)**
Description	Health, as a system of both human and environmental functionality, is dependent upon the biodiversity and geography that enables the vitality and growth required for additional systems to exist.
Reference in previous GRAA	Included as a cross-cutting issue in the 2021 GRAA.
Knowledge Gap/ issues described	Addressing health impacts in cities requires a holistic approach that encompasses environmental, physical, mental, and cognitive health considerations. This approach should integrate effective health strategies based upon community well-being, system resilience, and tackling the disparities faced by vulnerable groups. Additionally, urban design should support cognitive health and incorporate nature-based solutions, contributing to overall health and quality of life, redressing city-scale functions that undermine healthy outcomes for both humans and the environment in which the city exists.
Knowledge Gaps	1, 5, 38, 39, 40, 41, 110, 113, 114, 153, 155
Action Priorities	18, 195, 196,197, 198, 259

Quotes / Insights / Case Studies from I4C24 Conference for this topic:

- "Equity in emissions reduction isn't just about reducing carbon; it's about ensuring that every community, especially the most vulnerable, shares in the benefits of a low-carbon future." – Harshika Bisht
- Increased waste generation and pollution in rapidly urbanizing areas further threaten human health and environmental quality, highlighting the need for improved waste management mechanisms and community awareness.

- An official from Lagos highlighted the health impacts on coastal communities and the need for adequate facilities, while mental health services for climate-displaced populations were flagged as a priority, particularly in cities in Kenya and the Caribbean. These discussions underscored the intersection between human and environmental health as cities navigate climate challenges.
- Innovations in ecological design and water management solutions, such as micro-catchments, offer dual benefits for human and environmental health. By ensuring cleaner water systems and greener spaces, these strategies enhance overall well-being while reducing public health risks.

Water

GRAA Heading	**Water**
Description	As a system, water circulation is directly dependent upon the topography of the geographic/earth system and biodiversity system that impact the water cycle, which then builds the capacity for other systems to develop greater functionality and complexity.
Reference in previous GRAA	Included in the 2021 CRIA as a topical area.
Knowledge Gap/ issues described	Sustainable water management is critical for urban planning everywhere, but particularly in regions facing water scarcity or contamination. Urban water systems are challenged by pollution and resource depletion, necessitating comprehensive management strategies to enhance resilience and sustainability. Ensuring the sustainable use of water resources while addressing challenges related to water access and quality requires extensive research into not only urban systems, but the peri-urban and rural areas which comprise water catchments upon which cities rely. Urban development must be built upon robust research into the management of water resources and facilitate the replenishment and recirculation of water in a manner that can be managed indefinitely.
Knowledge Gaps	54, 75, 115, 116, 117
Action Priorities	6, 11, 123, 199, 200, 201, 202

Quotes / Insights / Case Studies from I4C24 Conference for this topic:

- Kufranjah identified water harvesting strategies as a key component of their climate action plan, highlighting the importance of sustainable water management in urban planning.
- Design and implement a passive decentralized wastewater and solid-waste system, map habitations with lakes, create federations, develop a demonstration plan, and submit to the Mumbai Metropolitan Region Development Authority for further investment.

Food

GRAA Heading	**Food**
Description	Food systems are a product of the terrain, biodiversity, and water availability of the localities upon which they depend. Food is a product of the flora and fauna reliant upon each other for development, sustenance, and propagation, and serves as a determining limiter for populations.
Reference in previous GRAA	Included in the 2021 CRIA as a topical area.
Knowledge Gap/ issues described	Sustainable food systems are essential for urban resilience and health, requiring strategies that address food security, reduce waste, and promote sustainable production and consumption in cities given their surrounding contexts. Urban food systems encounter significant challenges related to security, sustainability, and access given reliance on production beyond the jurisdictional boundaries of cities. To tackle these issues, there is a pressing need for strategies that support local food production, reduce food waste, and ensure equitable access to nutritious food. Integrating food systems into broader urban planning and sustainability efforts is critical for addressing these challenges effectively.
Knowledge Gaps	27, 118, 119
Action Priorities	12, 13, 203, 204, 205

Quotes / Insights / Case Studies from I4C24 Conference for this topic:

- The vulnerability of smallholder farmers, due to frequent droughts and land use changes, impacts agricultural productivity and local ecosystems. Enhancing agricultural sustainability and food security in this region necessitates improved agricultural practices and support systems. Urban areas also face challenges exacerbated by rapid urbanization, which complicates access to sustainable food systems. Innovative solutions that integrate food security and environmental sustainability are necessary for resilient urban communities.
- While food-related initiatives were not extensively covered, there were general references to community-driven sustainability practices, suggesting considerations for food security and agricultural sustainability.
- Redevelop abandoned factories into a vertical farming facility to enhance local food production.

Energy

GRAA Heading	**Energy**
Description	Systems of energy, as they function in society, are built upon food systems (caloric/metabolic) water systems (hydropower), and biodiversity (biomass, fossil fuels) and geography (wind, solar, tidal, wave, ocean thermal potential).
Reference in previous GRAA	Included in the 2021 CRIA as a topical area.
Knowledge Gap/ issues described	Transitioning to sustainable energy systems is crucial for reducing GHG emissions and enabling continued human activities in cities. Cities are centers of energy consumption, and transitioning to sustainable production faces significant challenges. Uncertainty in financial and governance systems, such as currency depreciation/exchange rates, production and consumption taxation regimes, or extractive policy, affects the scale and timing of renewable energy investments globally and impacts the sustainability strategies through which multi-level actors have viewed the climate crisis since the assent of fossil fuel use early in the industrial revolution. Urban settings must overcome obstacles in their shift to clean energy, particularly the need for finance, policy, and infrastructure supporting equitable, sufficient, reliable access and sustainable use. Strategies must be developed to enhance participation in energy transitions, ensuring that all communities benefit from these changes within sustainable decarbonization trajectories.
Knowledge Gaps	29, 54, 60, 120, 121, 122
Action Priorities	1, 2, 3, 6, 15, 16, 206, 207, 208, 209, 210, 211, 212, 214, 256

Quotes / Insights / Case Studies from I4C24 Conference for this topic:

- "Smart cities are a new paradigm for urbanization in Africa, driven by innovation and technology to meet the needs of growing populations." – N/A
- Renewable energy projects, supported by innovative financial models, enable the integration of green energy sources like hydrogen and solar into urban infrastructures, driving forward their climate action agendas.
- Overall, urban areas must transition to renewable energy sources to address climate change and reduce greenhouse gas emissions. This transition involves navigating the land-intensive nature of renewable energy and ensuring equitable access to energy resources. Strategies that support sustainable energy transitions while addressing related social and economic impacts are essential for achieving long-term sustainability and equity in energy systems.

- Solar energy was identified as a key strategy in Kufranjah's climate action plan, while Guelph's home retrofitting program supports energy efficiency through sustainable home improvements.
- Cities are leading the transition to a low-carbon future by integrating clean energy into transportation networks, exemplified by the electrification of city infrastructure, including local and subnational fleets and heating systems, which significantly reduces carbon emissions. Policies supporting renewable energy in urban systems, such as Montreal's hydroelectric heating, further align cities with climate mitigation goals.

Mobility

GRAA Heading	**Mobility**
Description	Mobility systems are based upon the targeted application of energy to move passengers and/or cargo from one location to another. Mobility systems are integral to movement both within and beyond cities, and represent the bulk of intercity energy consumption, in terms of people, goods and information.
Reference in previous GRAA	Included in the 2021 CRIA as a topical area under the term "Transportation."
Knowledge Gap/ issues described	Understanding mobility within and across systems in, around, and between cities represents one of the most challenging and promising areas of research for effectively achieving sustainability, given the potential for emission reductions and improved connectivity across human civilization. Policy and planning are crucial for safe, equitable urban mobility practices to eventuate, particularly in vulnerable and underserved areas and with marginalized populations. There is an urgent need for creative solutions to address high traffic fatality rates, inadequate transit systems, and the challenges posed by dependence on fuel-based transport systems on the land and the water and in the air. Research and innovation into new mobility initiatives alongside nature-based solutions for mobility infrastructure can accelerate decarbonization and reduce environmental impacts of our necessary mobility activities.
Knowledge Gaps	11, 75, 123, 91,124, 125, 129
Action Priorities	17, 18, 149, 215, 216, 217, 218, 219, 220, 221, 256, 259

Quotes / Insights / Case Studies from I4C24 Conference for this topic:

- "The importance of digital tools in urban-scale energy management, urban planning, and transportation modes modeling." – N/A
- In semi-arid urban areas, the decline of urban forests presents additional challenges, necessitating effective management and redesign strategies to maintain green infrastructure and promote sustainable mobility solutions.
- Sustainable urban mobility solutions are essential for lowering greenhouse gas emissions, with cities actively promoting low-carbon transport alternatives, such as cycling and public transport, while also exploring informal transport networks to enhance access and efficiency.

Waste

GRAA Heading	**Waste**
Description	Waste systems are a product of food and energy systems, and the management of waste materials is dependent upon the system inputs, and shapes the infrastructure systems required. Waste represents the opportunity for efficiency and resource recovery across the various systems upon which cities are built.
Reference in previous GRAA	Included in the 2021 CRIA as a topical area under the term "Transportation."
Knowledge Gap/ issues described	Traditional waste disposal methods significantly contribute to environmental degradation, GHG emissions (particularly methane) and unnecessary system loss, highlighting the need for resource recovery methods to support climate and biodiversity goals. The complexity of waste management in urban areas requires comprehensive frameworks that embrace circular economy principles. Effective management strategies address interconnected challenges of waste management, resource consumption, and urban health.
Knowledge Gaps	14, 25, 54, 126, 127, 128, 153
Action Priorities	11, 20, 22, 222, 223, 224, 225

Quotes / Insights / Case Studies from I4C24 Conference for this topic:

- "The importance of digital tools in urban-scale energy management, urban planning, and transportation modes modeling." – N/A
- Cities are increasingly addressing waste management through innovative technologies, such as the Bubble Barrier, which captures plastic waste before it reaches the oceans. This solution not only supports effective waste management but also aids in environmental monitoring. Projects involving community participation, like wetland restoration, further exemplify the collaborative approach needed to tackle waste reduction and enhance sustainability.
- Community-level initiatives, such as wetland planting and upkeep, highlight the importance of integrating waste management with broader ecological conservation efforts.
- The work that the city of Accra is doing with the informal waste workers is a very good example (linked here).

Infrastructure & Housing

GRAA Heading	**Infrastructure & Housing**
Description	Infrastructure systems represent built environments, utilizing the systems required to modify the environment, and dictate the possibilities of the social systems which are organized, and facilitate continued infrastructure development and social management of its constituent systems.
Reference in previous GRAA	Included in the 2018 and 2021 GRAA as Built & Green/Blue infrastructure (which has been reorganized according to the systems approach), and in the CRIA as a theme.
Knowledge Gap/ issues described	Addressing infrastructure challenges requires a vision of form and function that works within the capacity of each city to design bespoke solutions with innovative technologies and improved methodologies for managing both greenhouse gas (GHG) emissions and interrelated impacts across all systems. Infrastructure must also be designed to enhance resilience against extreme weather events and contribute to urban well-being by incorporating clean energy, sustainable design practices, and effective waste management systems.
Knowledge Gaps	2, 3, 74, 129, 130, 131, 148
Action Priorities	1, 2, 3, 7, 17, 53, 123, 127, 129, 149, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235

Quotes / Insights / Case Studies from I4C24 Conference for this topic:

- "A well-planned city begets sustainability. Without a sustainable urban landscape, land use planning is futile." - Stephen Biliyitorb Liwur
- Strengthening urban infrastructure is essential for coping with the impacts of climate change, including improving resilience to flooding, heatwaves, and other climate-related challenges. There is a pressing need to prioritize infrastructure that supports sustainable and regenerative urban communities, addressing current gaps to create livable urban environments. Infrastructure projects should emphasize positive environmental and social outcomes, overcoming challenges such as developing standardized frameworks and enhancing technical skills to attract investment.
- The urgent need for improved housing infrastructure to accommodate displaced populations affected by climate disasters was highlighted in relation to cities in Kenya and the Caribbean. Additionally, Macul's efforts to secure funding for sustainability initiatives underscore the infrastructure challenges faced by smaller cities.
- Climate action necessitates the integration of new digital tools and technologies, including artificial intelligence (AI), to enhance resilience and sustainability in infrastructure development.
- The rapid growth of urban areas calls for better integration of climate adaptation into infrastructure planning to manage risks from hazards such as flooding and extreme weather events.
- Research on workforce needed for scaling up building retrofits to meet climate targets in the US (linked here).

Culture (Community, Heritage, Art, History)

GRAA Heading	**Culture (Community, Heritage, Art, History)**
Description	Culture systems are enabled by those physical systems that in turn provide the facilitation of connectivity between a population in any locale. Culture systems provide a foundation for behavior and values, which are expressed and guided through additional social systems.
Reference in previous GRAA	Included in the 2021 GRAA as a topical area (under History & Cultural Heritage).
Knowledge Gap/ issues described	Culture is the reason cities exist – for human activity to take place within the proximity of others in the interest of a co-mingled experience. As a consequence, urban planning and design across all systems in a just and equitable manner is a challenge to coordinate amongst the variables each actor in at the city-level creates. Development of communities with distinct heritage, art, and history often forms organically, and heritage preservation only emerges as a consequence of cultivated integration of the combined knowledge, deliberate design, and urban planning practices of a community's constituents. This involves collectively valuing heritage assets while promoting sustainable development, ensuring that urban growth respects and preserves the diversity of cultural values amidst rapid changes. Sustainable cultural development in cities must address the impacts of urbanization on the systems which support all historical and cultural sites,

	incorporate community perspectives in heritage management, and ensure that development projects understand how cultural heritage emerges as a confluence of systems, values, and information.
Knowledge Gaps	4, 11, 13, 26, 29, 30, 31, 32, 38, 43, 58, 132, 133, 155
Action Priorities	1, 4, 5, 9, 12, 39, 236, 237, 238, 239, 258, 259

Quotes / Insights / Case Studies from I4C24 Conference for this topic:

- "Comple-X.NET, the cutting-edge interdisciplinary organization that builds a "collaborative ecosystem" for creative talents by designing nature-inspired collaboration processes" – Xie Wen
- Urban planning frequently overlooks cultural values and heritage, which are crucial for creating sustainable and culturally inclusive environments. Integrating community culture, history, and artistic elements into planning processes can enhance outcomes and foster a sense of belonging and identity. The importance of cultural heritage is often neglected in climate strategies, highlighting the need to integrate community narratives and values into planning processes to enhance stakeholder engagement and support for sustainability initiatives.
- Fred Martin's initiatives in Toronto's Waterfront Secretariat exemplify the importance of integrating Indigenous heritage into urban sustainability practices, highlighting how culture and community engagement are essential for long-term sustainability efforts.
- Engaging communities in participatory planning not only honors local histories and practices but also enhances the effectiveness of urban renewal efforts.

Governance and Multilevel Partnerships

GRAA Heading	**Governance and Multilevel Partnerships**
Description	Governance and Multilevel Partnerships are systems established to guide populations of individuals, providing a basis for community cohesion, where actors respond to issues which emerge regarding the societal function of cities. These systems involve participation in practices involving negotiation of power over dimensions of the various additional systems, values, and information involved in supporting the unique culture of cities.
Reference in previous GRAA	Included in the 2021 GRAA as a Cross-Cutting Issue (which has been reorganized according to the systems approach), and in the CRIA as a theme.
Knowledge Gap/ issues described	Effective multilevel governance and partnerships are essential for meeting the Sustainable Development Goals (SDGs), increasing nationally determined contributions (NDCs), and addressing the IPCC's findings to treat humanity's

	1.5°C overshoot trajectory as the city-level urban planning & design emergency of the moment. This requires balancing global environmental commitments with domestic autonomy, ensuring the involvement of subnational and local representatives in global negotiations, and taking urgent action in commensuration with developing local capability to respond with climate resilient development. Improving frameworks for multilevel diplomacy and enhancing cross-sector collaboration are crucial for achieving climate goals. Furthermore, fostering effective communication and coordination among various levels of government and stakeholders is key to successful climate governance. Strategies must focus on building strong partnerships and aligning efforts across different governance levels for increasing ambition in action to address accelerating change.
Knowledge Gaps	9, 17, 18, 24, 34, 44, 47, 48, 49, 61, 107, 134, 135, 136, 139, 140, 143, 145, 150, 156, 157, 158
Action Priorities	3, 4, 5, 8, 10, 14, 25, 27, 30, 32, 34, 164, 128, 176, 177, 240, 241, 242, 243, 244, 245, 246, 247, 248, 257, 258, 259

Quotes / Insights / Case Studies from I4C24 Conference for this topic:

- "[The COVID-19 pandemic] led to planning beyond silos, such as climate budgeting, which is really hard in the Global South. But Mexico City has done it, and while it is mostly used for planning, it also helps policy makers to sit down and coordinate actions." – Giancarlo Delgado
- "The role of the expert is a really problematic role. There are huge complexities in each context that we have to respect and navigate. Our experience is invaluable, having worked in a lot of different contexts and this means that we are in the weeds in a lot of these communities." – Jeffrey Raven
- Innovative governance models, including doughnut economics, participatory governance, and public-private partnerships, create frameworks for cities to manage climate risks and implement sustainability initiatives. These collaborative approaches enhance the resilience and effectiveness of urban climate actions, ensuring comprehensive responses to the challenges posed by climate change.
- While multilevel governance models are often studied for their role in short-term coordination, consideration should also be given to their longer-term impacts on urban transformation.
- Toolkit for city leaders across the globe on just transition (linked here).

Finance (Investment and Public Procurement)

GRAA Heading	**Finance (Investment and Public Procurement)**
Description	Finance systems (including investment and public procurement) are abstract mechanisms operating upon the governance and cultural systems to dictate the approach to management, access, and distribution of resources involved in other systems.
Reference in previous GRAA	In the 2018 and 2021 GRAA, Finance was listed as a Topical Theme, with Investment and Public Procurement included as Topical Areas in the CRIA.
Knowledge Gap/ issues described	Addressing cities' climate finance challenges requires an acknowledgement of the barriers to city-scale funding modalities. National financing frameworks and the international partnerships and funding mechanisms involved are not being sufficiently directed to close the substantial gap in urban climate finance. Equitable resource distribution must involve decentralized access to climate finance, demanding greater flexibility and responsiveness from the National Designated Authorities (NDAs) of multilateral climate-focused funds (i.e. the Global Environment Facility, Green Climate Fund, Adaptation Fund, Loss and Damage Fund, etc.), including blended finance packages for investment, stipulating debt-free finance for Developing Countries, which under the Kyoto Protocol, are not required to reduce emissions unless developed countries supply funding and technology. Financial strategies must overcome barriers to the operationalization of climate innovations to achieve SDGs and NDCs, with city-focused finance leading decarbonization efforts, particularly in developing countries where urban climate targets may exceed national ambitions and transparent, accountable public procurement processes may inspire confidence in various types of investors. It is critical to ensure financial resources are effectively allocated towards impactful climate initiatives and intergenerational asset stewardship across systems with a focus on transparent models for city-level data management under a lens of justice and equity-focused outcomes.
Knowledge Gaps	2, 8, 17, 18, 19, 20, 24, 29, 38, 40, 106, 137, 138, 139, 144, 145, 146, 147, 148, 149, 151, 159
Action Priorities	10, 12, 19, 23, 24, 25, 26, 27, 28, 29, 31, 32, 124, 147, 165, 166, 249, 250, 251, 252, 253, 254, 256, 257, 258, 259

Quotes / Insights / Case Studies from I4C24 Conference for this topic:

- "Individuals' efforts, innovation, and successful projects are not registered [enough]." – Diana Ürge-Vorsatz
- Local governments face significant challenges in securing financial resources for climate initiatives, emphasizing the need for effective strategies and partnerships to navigate the complexities of climate finance and drive sustainable actions.
- Mayor Youssef of Menjez, Lebanon highlighted the difficulties municipalities in the Global South face when pitching to funders, emphasizing the need for greater financial transparency to build donor trust.
- There is growing interest in how digital finance can transform urban climate action by improving transparency, efficiency, and accessibility in funding. Specifically, exploring how digital tools can streamline resource flow and strengthen risk management in cities is an emerging area of focus.
- Understanding the conditions that attract private investment into sustainable urban development is critical – especially in the broader context of designing finance mechanisms that are distributed justly across urban populations. Engaging the private sector is vital for scaling up sustainability efforts.
- Developing strategies and financial models that reduce risks in urban sustainability projects, especially in high-risk regions, is increasingly recognized as essential.
- Further exploration of best practices for public procurement in Oslo, Norway (linked here).

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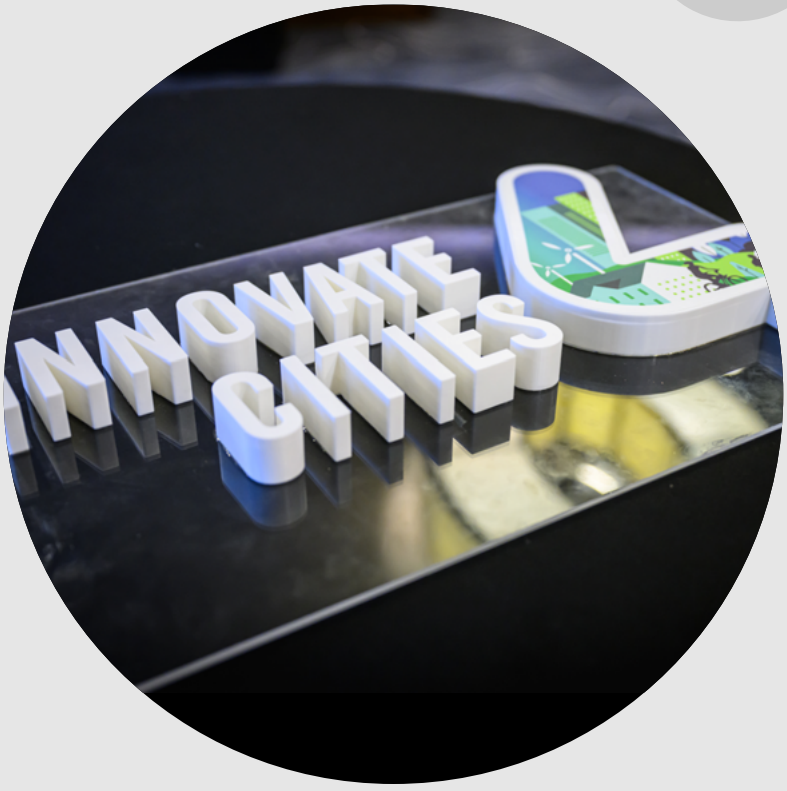
ANNEXES



Annex A. Selected abstracts and selection criteria

Selection and Evaluation Criteria

Abstracts were invited for publications that demonstrate scientific rigor, supporting the conference's objective to synthesize collective research and assess progress against the priorities outlined in the GRAA and CRIA agendas.

Submissions were accepted in the following formats:

- Research papers
- Innovative collaboration
- Interactive panels and showcases
- Creative works
- Innovation methodologies and examples of applied co-creation
- Hackathon
- Video content
- Podcast
- Display poster
- Book or report launch

Abstracts were evaluated by the 2024 Innovate4Cities Conference Organizing team and the Conference Advisory Committee against the following criteria:

- Contribution to conference aim and outcomes – 30%
- Scientific/Technical excellence – 40%
- Relevance, Suitability and Impact – 20%
- Contribution to diversity across global and regional contexts and social inclusion – 10%

The selection and evaluation process thoughtfully incorporated principles of equity and inclusion.

Please explore the full collection of abstracts submitted to the 2024 Innovate4Cities Conference at https://doi.org/10.26188/27147612

Annex B. 2024 Innovate4Cities Conference Schedule

Start Time	Title	Description
Day 1 Tuesday, 10 September 2024		
9:00 am	Formal opening and welcome to the 2024 Innovate4Cities Conference	
9:30 am	Accelerating city climate action through multi-level governance and partnerships	The knowledge needed to accelerate multi-level governance: challenges and opportunities for strengthening ambition and implementation on climate, biodiversity, and energy at all levels.
10:30 am	Morning Tea & Coffee	
11:00 am	Insights for Receiving Communities: Planning Equitable and Positive Outcomes Under Climate Migration	University of Massachusetts Amherst - Climate change impacts are already increasing human mobility both within and beyond country boundaries. Estimates of domestic climate migration vary considerably, with the World Bank projecting that, absent significant climate change mitigation and adaptation, globally up to 216 million persons will be internally displaced by 2050 (Clement et al., 2021). Within the U.S., projections based on sea level rise alone suggest 13 million displaced by 2100 (Hauer et al 2017, Robinson 2016). Preparing likely receiving areas to equitably and successfully welcome in-comers provides receiving communities an opportunity for transformative change. The Lincoln Institute of Land Policy and UMass Amherst faculty gathered a trans-sectoral and multi-disciplinary group of lived and learned experts to illuminate the current state of knowledge and practice in the US related to domestic climate in-migration. Collaboration and diverse perspectives across multiple levels of government, academia, non-profits, and the private sector surfaced new insights, promising policy tools, and knowledge gaps. Importantly, this gathering emphasized the need for innovation and collaboration to accelerate action and ensure that this phenomenon can be leveraged for transformational change. We find that while climate migration so far largely follows existing patterns of general migration, there are heightened needs around modeling within-region movement. Post-disaster pulse-movements of large but mostly temporary populations, versus slow-onset event-driven permanent relocations, suggest the need for differentiated 'fast' and 'slow' event planning and policy tools. Given that most movement will likely occur within, rather than across, regions, planning at the metropolitan or multi-state level may be more effective than municipal planning efforts. Equity concerns for both in-comers and existing residents will be complex and potentially far-reaching. Proactively addressing these planning challenges for receiving communities is timely and essential. Results of this convening have been integrated into a Lincoln Institute report highlighting lessons for receiving communities and practice/research needs on the topic. This conference presentation will launch the report, which focuses on internal migration in the United States but offers lessons to other regions.
11:00 am	A Replicable Model for Community Transition Teams that Deliver Impact	Green Community Catalysts (formerly Path to a Green Home) - In our session we will share a replicable model that has been proven to accelerate climate action within the residential sector of communities. In addition to sharing the model, we will provide two short case studies. One of a community (GreenBeverly.org) that has deployed the model holistically and achieved significant impact over three short years and the other, Lebanon, NH, that has deployed one of the tools of the model, a behavioral change mobile app, to realize significant, measurable impact in a short period of time. One of the key principles of the model is stakeholder collaboration. The key stakeholders within a community (City Government, Educational Systems, Businesses, and NGOs) are brought together to work on impactful programs, projects, and initiatives. This model, created and fine tuned by Green Community Catalysts over the past 6 years, allows a community to create and maintain a transition team that provides measurable impact. This transition team is focused on guiding residents and local businesses in their journey to becoming more sustainable and to dramatically reduce their carbon footprint. The model includes 6 pillars which are: Organizational Structure and Governance, Partnerships, Fundraising/Development, Community Engagement, Community Projects, and Systems & Operational Processes. The transition team can be deployed within the City Government or as an NGO. The model is designed to reach ALL residents within the community - not just the 10-20% that 'want' to be sustainable. Different people have different motivations and the model taps into that premise to shift behavior. Shifting behavior is not easy, but the model has defined tools and approaches that accelerate behavioral change. Our residents account for 65%-85% of our greenhouse gas emissions. The challenge is that most local governments are not staffed or experienced to effectively guide residents in lowering their carbon footprint. An effective, sustainable transition team is needed to bridge this critical gap - a gap that will exist until local governments are able to catch up with sufficient staffing and experience. With our residents controlling the majority of our emissions, we need immediate, effective action. The Green Community Catalysts' model fills that gap.

11:00 am	New environmental management methodology at local level - the experience of the Department of Environmental Management and sustainability of Macul 2024	Ilustre Municipalidad de Macul - This exposition seeks to present to local governments of consolidated urban sectors in developing countries how, through the adaptation and compliance of the Eco-Management and Audit Scheme (EMAS - EU) in addition to working alliances with academic, governmental and civil society institutions; It is possible to successfully apply environmental management at the local level. The experience that we share has its origin in the political decision of the Mayor of Macul, to commit to care and protect the environment as a priority. Decision that, due to urban territorial conditions; goes against the trend of consolidating grey infrastructure, minimizing the contributions and importance of the few ecosystem services that still remains. The above was put into practice through the creation of an Environmental Unit that has grown over to become the Department of Environmental Management that, through a change in the work methodology, which placed the fight against Climate Change as its main axis, today works on: 1) Circular economy, 2) Urban Reforestation, 3) Urban Gardens 4) Urban planning and bioclimatic architecture, 5) Multi-sector alliances. All accompanied by a strengthening of environmental education as a pillar of all actions. This multidisciplinary approach has allowed us to create: 1) Econeighborhoods Fund, accompanied by the IUS Latam that allows territorial organizations to access $5,000 dollars to transform the neighborhood with Biodiversity devices and adaptation to Climate Change 2) School of Environmental Leaders, training course co-founded by the Regional Government as an introduction to the understanding of environmental phenomena. 3) Reestablishment of the Communal Environmental Committee. Instance of joint work with Civil Society, accompanied by the Faculty of Sciences of the University of Chile, which in 6 months has managed to produce a new environmental legal framework for the municipality 4) Workshop of reproduction of native species; open to the community with the guidance of teachers from the Metropolitan University of Educational Sciences that seeks to reproduce native trees for the commune. To which is added the learning and the relationship with other local governments such as the Municipality of Valdivia; being a perfect example of innovative collaboration that we want to present.
11:00 am	Climate Governance in Fast-Urbanizing Geographies: Multi-Stakeholder-Generated Methodologies for Context-Specific Adaptation Planning in Urban in Ghana.	Center for Climate Change and Sustainability Studies, University of Ghana – Impacts of climate change have become increasingly evident across cities and fast-urbanizing communities across Africa. Ghana is no exception as its surge and unplanned urbanization processes have come under the brutish and disruptive impacts of climate change to make urban resilience and disaster risk reduction priority considerations in Ghana's National Adaptation Planning (NAP) process. While current efforts have been on-going and encouraging within the context of the NAP, especially at the subnational levels, approaches have, for the most part, been premised on flawed assumptions of context-homogeneity and faulty understandings of the climate change phenomenon and impact manifestations and in ways that have impeded context-specific methodological processes. This paper foregrounds climate governance in fast-urbanizing communities in Ghana focusing specifically on cities and emerging towns. The paper problematizes homogenized and rigid adaptation planning methodologies, especially as they relate to risk and vulnerability assessments by advocating for multi-stakeholder, participatory and community-led methodological processes that are innovative in addressing place and context-specific climate impact and disaster risk challenges. Thus, using Ghana's NAP process as a context, this paper shares insights into how a team of academic researchers, climate policy leaders, civil society leaders, traditional authorities, youth leaders, women's group and other stakeholders collaborated to create locally-responsive methodological processes that complemented existing approaches and models to reflect unique local needs and particularities. As a team of collaborators and diverse stakeholders, engaged in sub-national climate risk and vulnerability assessments (CRVA) we employed complementary tools in very innovative ways to promote a combination of top-down and bottom-up approaches in the assessment and adaptation planning processes. Key aspects of this presentation will include innovative practices in Participatory Risk Mapping, Seasonal Calendar, Matrix of Function, and Participatory Risk Ranking and Prioritization to inform adaptation solutions: How we used local memories and past climate trends and other weather events and observed current climate to create new knowledge and understanding historical changes and how that contributes to the development of local anticipatory capacity. Ultimately, the approach of combining tools has been effective in facilitating the development of locally-led adaptation solutions, knowledge and the building anticipatory capacity for resilience in urban places.
11:00 am	Fostering Community-Based Research to Advance Equitable Climate Solutions for Renters	American Council for an Energy-Efficient Economy - Addressing climate change begins with meeting the needs of those living in the most climate-vulnerable communities. In the United States, past choices made by governments and investors have resulted in many renters residing in energy inefficient homes that need repairs and upgrades, placing them at greater risk for natural hazards such as flooding, droughts, wildfires, and extreme heat. According to Harvard University's Joint Center for Housing Studies, roughly two out of every five rental homes in the US are exposed to substantial weather- and climate-related threats. Too many of these individuals and families also struggle to afford high energy bills, with one out of every three renters reporting being behind on their energy bills. The American Council for an Energy-Efficient Economy (ACEEE), a nonprofit research organization, created its Energy Equity for Renters initiative to catalyze US local governments, working in partnership with community-based organizations (CBOs), to create or reform initiatives that advance the deployment of clean energy in rental housing while preserving or expanding housing affordability. Since January 2022, the initiative has provided technical assistance in the form of community-based research alongside funding support to 15 teams of local governments and CBOs pursuing the development of new or expanded local policies and programs. In working with these teams, we have learned many lessons about what is needed to foster collaboration across these organizations and agencies that will lead to innovative, research-based, and effective climate solutions for renters. This session presentation will share the stories, outcomes, and lessons learned from these experiences to better inform similar partnerships working to address climate change at the local level.

11:00 am	Multi-level partnership for climate action: Learning from Denmark and the DK2020 collaboration	CONCITO - Almost all Danish municipalities have adopted ambitious climate action plans (CAPs) codifying targets and actions for a transition towards climate neutrality and robustness by 2050. The plans have been developed in a five-year period from 2019 to 2023, through the innovate partnership DK2020. DK2020 was a partnership, establishing an interim countrywide organization aimed at supporting local governments in developing climate action plans. The project utilized a simple and versatile set-up in an initial pilot phase and progressed to a more comprehensive organisational set-up in the subsequent full-scale phase to better accommodate the high number of participating municipalities. The project initially established a national secretariat and knowledge partner function, anchored at the Danish think tank CONCITO, collaborating closely with C40 Cities, providing direct support and guidance for 20 pilot municipalities. In the subsequent full-scale phase, this structure was supplemented with regional hubs of advisors providing support and guidance for an additional 75 municipalities, with the national secretariat developing tools and guidelines, capacity building the regional hubs and ensuring a consistent level of quality. The project has had a significant impact on the landscape of local climate action in Denmark. While many Danish municipalities had worked with climate action previously, only about a third had existing climate targets beyond 2020, when the project commenced in 2019. In a survey conducted among the municipalities at the end of the project, 27% assessed that they wouldn't have had a CAP without DK2020, and another 53% that their CAP would have been less ambitious. If implemented successfully, the CAPs could reduce emissions by 73% by 2030 compared to 1990, helping realise Denmark's national target, and take significant steps towards a more climate resilient society. The partnership was established by the philanthropic organization Realdania, with Local Government Denmark, the association of Danish municipalities, and the Danish regions. As such it is a voluntary, bottom-up multi-level partnership, supporting national and global climate targets without support from national funding or legislation. Several learnings can be extracted from this project, and the session will summarize and share these findings as a basis for similar efforts elsewhere.
11:00 am	The Role of Multilevel Governance and Contestation Paradiplomacy in Times of Domestic Turbulence and Global Uncertainty	Centre d'étude des mouvements sociaux (CEMS) / École des hautes études en sciences sociales (EHESS) / Université du Québec à Montréal (UQAM)
11:00 am	Mayors and Civic Assemblies for the Future concept	Dark Matter Labs - Given the rising threats to democracy and decreasing trust in governments, the ambition for collaborative governance innovation at sub-national levels needs to increase massively. This session therefore explores a form of institutional innovation to go beyond traditional engagement. A Mayor and Civic Assembly for the Future provides bold cities with an opportunity to lead the way, reinforcing public trust, strengthening legitimacy, and broadening the focus for a more holistic approach to the biggest challenges facing our society today and in the future.
11:00 am	Amplifying local Actions to combat Climate change in cities, the Case of Bamenda	BAMENDA CITY COUNCIL - Bamenda City is found within the volcanic zone of Cameroon and has an ecological fragile zone which has been invaded by squatters who in their activities are aggravating the situation. This has resulted to forest depletion, landslides, loss of lives and reduction in the Carbon converting capacity of the city. To combat this the City government's campaign has seen more than 5000 trees planted, budgeted 10million francs CFA yearly for the protection of the escarpment; entered into Agreements of Corporations with stake holders for resource mobilization. With local actions, through the PSUP programme, the Ministry of Housing and Urban Development carried detail studies of one part of this ecological fragile zone invaded by slum duelers with a resettlement component previewed. The Ministry has equally financed green projects within this zone including construction of portable water supply. The local communities on their part especially within the slum areas have constituted a supervisory committee drawn from the neighbourhoods with gender issues considered and the inhabitants are able to assist city efforts to combat climate change and build resilience. Financing of projects here has also come from the Ministry of forestry and wild life which has donated trees worth 15million CFA to the city and joins the City council to combat Illegal fuel wood harvesting. Interventions have also come from UN Habitat which is co- sponsoring a city park green project and FEICOM is sponsoring projects linked to building resilience within this fragile zone. The outcome is measurable in the decrease landslides experience within this zone in the past two years since these interventions started, No death again recorded from the area due to landslide, the steady production of potable water from the springs sources that have been developed, the increase carbon converting capacity of the city and overall contributions to a number of sustainable development goals.
11:00 am	Multilevel Governance and Broadening Representation: Exploring "Multilevel Diplomacy" in Global Climate Governance from a Canadian Perspective	McGill University - In an era of globalization and anthropogenic climate change, nation-states face the complex task of addressing transnational challenges while upholding the principles of federated, regional, and local autonomy and jurisdiction inscribed in their domestic laws and constitutions. Global environmental negotiations, in particular, exert significant pressure on national institutions as state parties must align with global targets by committing to nationally determined contributions and adaptation plans. Central governments are called upon to represent and negotiate on behalf of their constituent units and local authorities, despite often lacking the competences to unilaterally implement environmental agreements within their national territories. From a practical standpoint and the perspective of many subnational and local leaders, the very structure of multilateral intergovernmental diplomacy raises questions of effectiveness, implementation, and legitimacy. This paper delves into the intricate challenge of achieving "unity in diversity" within the context of global environmental governance, focusing on the phenomenon of "multilevel diplomacy," i.e., the increasingly normalized incorporation of subnational and local delegates within national delegations to global summits and organizations. Using the Canadian federation as a case study, this research employs multi-sited ethnography to conduct an in-depth investigation of the political and practical aspects of multilevel environmental diplomacy in the country, particularly in light of the recent call by the UNFCCC Presidency for Parties to join the Coalition for High-Ambition Multilevel Partnerships. The research combines direct participant observation at international conferences, such as the 2023 Adaptation Futures Conference in Montreal and COP28 in Dubai, with interviews of civil servants and elected officials from the federal government, provincial environmental ministries, local authorities, and representatives of national and provincial city networks in Canada.

11:20 am	Contextualising Sustainable Cities in Sub-Saharan Africa: Traditional approaches and The Politics of Climate Change.	TransAfrica Nature Conservancy - The threat of global climate change is one of the most significant scientific and political challenges driving the narratives of sustainability. This has made scientists and politicians alike to constantly bring into public fora, the various concepts of mitigations and adaptations in shaping the narratives and public discourses on sustainability. In fact, more scientific evidences and published literatures have proved the global trend in the public discourse; claiming most environmental disasters as effects of Climate change. In providing solutions to this global threat, the concept of sustainable cities have been promoted as a desirable goal within a variety of policy contexts. In the same vein, critical questions regarding the extent to which local governments and cities can address the challenges of sustainability still remain unresolved. Despite the fact that African local and indigenous communities have been proved to be the most vulnerable and highly impacted with Climate change scenarios, the increasingly international commitments for addressing climate change without more explicit commitments from subnational and local authorities has been counterproductive. Our interactive panel will employ the multi-level governance perspective to examine the discursive and material struggles which takes place in creating sustainable cities in Sub-Saharan Africa. In exploring the politics of climate change regimes in Sub-Saharan Africa, and re-contextualize the concept of sustainable cities, we will present evidence-based case studies of urban development and physical planning approaches. These approaches will obscure how urban governance takes places through processes and institutions operating at and between a variety of scales and a range of actors with different levels of governance - local, state, province, region and federal. In exploring the politics of climate change and building sustainable cities, in Nigeria and neighbouring West African countries, we find that while interpretation and implementation of sustainable cities are shaped by forms of governance, traditional approaches that help in aligning the sustainable cities to real time societal needs of the people are missing. In conclusion, we contend that urban governance of climate protection should involve a multilevel perspective that challenge traditional distinctions between local, state, national and global environmental politics.
11:20 am	Climate crisis and its impact on forced displacement and urbanism in Brazil	Pontifical Catholic University of Rio de Janeiro - Introduction: Forced displacement has reached alarming levels globally, with over 89.3 million people displaced as per the UNHCR Global Trends report for 2021. This figure is projected to exceed 100 million by 2022, largely driven by climate change. The Institute for Economics and Peace predicts that by 2050, around 25% of the world's population, over 2.1 billion people, will become climate refugees. The rise in global population, coupled with increased refugee flows, exacerbates the challenges posed by climate change, particularly in Latin America and the Caribbean, where natural disasters are on the rise. Aim: This work aims to understand internal displacement phenomena, primarily in Brazil, highlighting its multifaceted causes beyond extreme weather events. It seeks to elucidate the role of housing deficits, urban planning inadequacies, and irregular occupation in risk areas in driving displacement. Methodology: The research employs a two-part approach: conceptual and analytical. The conceptual segment elucidates key terms such as "refugee" versus "internally displaced people" and "risk areas" versus "vulnerability." The analytical part focuses on georeferenced analysis of risk areas, with a spotlight on Rio de Janeiro, utilizing bibliographical research and mapping to delineate socio-spatial profiles. Bibliography: BRAZIL A, Report shows progress in climate change in Latin America. Available in: https://brasil.un.org/pt-br/191428-relat%C3%B3rio-mostra-avan%C3%A7o-da-crise-clim%C3%A1tica-na-am%C3%A9rica-latina-e-caribe#:~:text=Al%C3%A9m%20dos%20impactos%20da%20pandemia,origem%20meteorol%C3%B3gica%2C%20climatol%C3%B3gica%20e%20hidrol%C3%B3gica. CARVALHO, LEO. Risk Areas in favelas in Rio de Janeiro: Theoretical Notion, legislation and the Judicialization of politics. Available in:https://www.puc-rio.br/ensinopesq/ccpg/pibic/relatorio_resumo2013/relatorios_pdf/ccs/SER/SER-Leo%20Fontes%20Paes%20de%20Carvalho.pdf. INTERNAL DISPLACEMENT, Countries, Brazil. Available in: https://www.internal-displacement.org/countries/brazil. Accessed on: July 25, 2023. INTERNAL DISPLACEMENT, Global Report 2022. Available in:https://www.internal-displacement.org/global-report/grid2022/#part1. RIVER CITY HALL.Mapping of Social Vulnerability in Residential Areas in the City of Rio de Janeiro.Available:https://www.rio.rj.gov.br/documents/91237/9ee972bf-d1ff-4ad9-84f9-b2be0d05f7a2. UCHCR, Climate change and disasters. Available in: https://www.unhcr.org/climate-change-and-disasters.html. UCHCR, Global trends Report 2021. Available in: https://www.unhcr.org/media/global-trends-report-2021. ZURICH, There could be 1,2 billion climate refugees by 2050. Available in:https://www.zurich.com/en/media/magazine/2022/there-could-be-1-2-billion-climate-refugees-by-2050-here-s-what-you-need-to-know.
11:20 am	Catalyzing effective Social Accountability Systems through Community Participation	SOCIETY FOR PROMOTION OF AREA RESOURCE CENTRES - As cities develop and expand, people living in informal settlements increasingly face displacement infrastructure development or land being considered untenable. When not performed with meaningful participation of the impacted people, such displacements have severe consequences and increase people's vulnerability to climate change. Informal settlements need to build dialogue with government stakeholders and organized action to address the challenges they begin to face due to poorly executed relocation processes. In this presentation, the presenters plan to share the learning from the Accountability and Responsiveness in Informal Settlements for Equity (ARISE) Hub, a partnership between academic institutions and NGOs in Bangladesh, Sierra Leone, India and Kenya. The authors reflect on their work with residents living in slum relocation colonies in Ahmedabad, India, to understand their health and wellbeing and to co-create actions to address challenges they face. The authors will outline how they galvanized community participation in pushing for effective social accountability systems in the community that improve health and wellbeing in the context of climate change. The authors will also highlight actions that were undertaken to build organized community action to seek solutions to their challenges from the accountable duty bearers. The author will also share how these reflections on building community participation and action for social accountability have contributed to bigger slum dweller-led campaigns such as Roof Over Our Heads which looks at the build environment and impact of climate change.

11:20 am	Collaborative Climate Resilience: UN-Habitat's Initiatives in Lao PDR	UN-Habitat - This abstract explores UN-Habitat's efforts in Lao PDR to bolster the resilience of urban communities facing climate vulnerabilities through collaborative endeavors. The initiative involves partnerships with local governments, utilities, and communities, focusing on assessing climate risks and vulnerabilities to inform tailored action plans. The approach emphasizes a blend of scientific data and community input. UN-Habitat contributes research and analytical tools, while government bodies offer policy insights. Communities, local businesses and civil society provide on-the-ground knowledge and stakeholder engagement. The initiative stands out for its ability to integrate diverse perspectives into actionable strategies. By bridging scientific findings with community perceptions, it enables stakeholders to develop solutions that address local needs effectively. Moreover, the initiative goes beyond planning, implementing physical interventions based on action plan findings. These interventions, including infrastructure enhancements and community capacity-building, aim to strengthen urban resilience against climate hazards. In summary, UN-Habitat's work in Lao PDR showcases the power of collaborative innovation in building climate resilience. By leveraging partnerships and aligning scientific and community knowledge, it lays the groundwork for sustainable urban development in the face of climate challenges.
11:20 am	Cities leading efforts on green jobs and just transition	C40 Cities - Climate action and the green transition present an unprecedented opportunity for more resilient and inclusive economies, but it needs leadership and intention - and cities are showing it. An IPCC report also confirmed that integrating just transition policies and green job creation programs is key and will strengthen climate action (IPCC, 2023). However, there is currently a major financial and workforce gap to deliver the climate action needed by 2030 in cities (City Climate Finance Gap Fund). This innovative C40 research estimates green jobs across all sectors of the economy, and highlights the high share of jobs that are not yet considered green but could undergo a transition in the coming years. The methodology, grounded in ILO and UNEP guidance and building upon Circle Economy's method of measuring circular jobs, has been applied across more than 70 world megacities, many of whom had not carried out similar research before. It complements C40 studies on the jobs potential associated with climate investment (C40 Cities, 2021), on specific actions that cities can take to simultaneously reduce emissions, advance equity, and promote economic development in specific sectors such as the building retrofit sector (C40 Cities, 2024), and a collection of case studies on city actions (C40 Cities, 2024). Key insights of initial findings include that approximately 10% of total jobs in cities are green, and that green jobs are higher in sectors that are strongly influenced by local public policy measures, including transport and waste management. Importantly, cities must collaborate with businesses to develop effective workforce development policies to support good green jobs. Programs like the Mayor of London's Green Skills Hubs are working to convene such stakeholders, and build new routes for skills development. This session will guide participants through the analysis, insights and what this tells us about the opportunity to create jobs that are good both for people and the planet. The session will also highlight ongoing data gaps and global challenges that need to be addressed, including closer assessments of the distribution and access to jobs and the skills needed to plan a just and equitable transition.
11:20 am	Cultivating African Youth Leadership for Climate Action and Sustainable Cities	Students for Global Democracy Uganda - In the face of escalating climate threats, it is the young people of today who are most vulnerable to the lifelong effects posed by climate change. With the second youngest population on the planet, Uganda's young people are some of the most vulnerable to the lifelong environmental effects caused by climate change. Uganda is experiencing an increased frequency of extreme weather events like drought and floods whose social economic impacts make urban communities very vulnerable. The Fourth Intergovernmental Panel on Climate Change Assessment Report projects Uganda's regular temperatures to rise by 1.5ºC in the next 20 years and by 4.3ºC in the next 60 years. While all city inhabitants are at risk, urban populaces of the Global South including Uganda are most susceptible because of their significant exposure to changing weather conditions, insufficient early warning systems and limited ability to manage climate threats. The Notre Dame Global Adaptation Initiative ranks Uganda as the 13th-most vulnerable nation in the world to climate change and 160th among 192 nations in preparedness to overcome climate shocks. As a result, the significance of fostering collaborative initiatives in cities to achieve environmental objectives is paramount. Students for Global Democracy Uganda recognizes that the youth have a valuable contribution to climate justice by taking action to address the environmental crisis. We aim to foster change by working with dedicated institutions and individuals to take leadership and use their influence in realizing transformative change. Through collaborations with Jinja City and the Busoga Kingdom, we are co-designing and implementing projects that leverage the creativity, energy and knowledge of young people in taking steps to enhance local biodiversity and address environmental threats in Jinja City. To this end, we have planted over 37,000 trees in 30 locations around Jinja City, revitalized the protection of water banks along the River Nile and Lake Victoria, restored wetlands and promoted urban gardening initiatives in the residential areas of Jinja City.The I4C24 conference will draw pathways to showcase our endeavors in Uganda, inspire young innovators and learn from like-minded leaders whilst amplifying climate solutions to build sustainable cities in the Global South.

11:20 am	Repurposing an emblematic historic site / Redonner vie à un site patrimonial emblématique	SQI - À l'automne 2022, la Société québécoise des infrastructures (SQI), la Ville de Montréal et l'Université McGill ont conclu une entente tripartite établissant les rôles et responsabilités de chaque partenaire pour la requalification de l'ancien Hôpital Royal Victoria, un site emblématique situé sur le flanc du Mont-Royal au cœur de Montréal (Québec, Canada).Cet accord est le fruit de plusieurs années de planification concertée afin de développer une vision d'avenir pour le site ; penser son intégration à la ville ; et relever les nombreux défis (techniques, financiers, environnementaux, etc.) de sa réalisation. Cette vision s'appuie sur des activités de concertation et de conception intégrée à plusieurs niveaux ainsi que sur une large consultation publique mandatée par la Ville de Montréal.Le Plan directeur d'aménagement piloté par la SQI catalyse ces réflexions et vient définir les principes d'une transformation durable pour l'ensemble guidée par la préservation des édifices patrimoniaux ; l'accessibilité publique au site et à la montagne ; ainsi que par la réduction considérable de l'espace dédié à la voiture au profit des espaces verts et des milieux naturels.La transformation est propulsée par l'Université McGill qui réaménage les pavillons d'origine en un centre de recherche et d'enseignement dédié aux politiques publiques et aux sciences des systèmes durables : Le Nouveau Vic. Ce centre accueillera près de 3 000 utilisateurs par jour et offrira des opportunités uniques de collaborations intersectorielles pour relever les défis climatiques contemporains. Notre présentation mettra ainsi en lumière la collaboration unique entre le monde universitaire, les gouvernements, et la société civile dans le réaménagement de ce site historique et montrera comment les partenaires institutionnels en concertation avec les associations et communautés locales ont dessiné dans les 5 dernières années une vision d'avenir pour ce site et ont débuté une première phase de transformation.
11:20 am	Institutionalization, an unexplored approach for advancing policy and governance of climate change in Small and Medium-sized Cities (SMCs) or intermediate cities - evidence from Ghana.	University of Public Service - Small and medium-sized cities or intermediate cities are confronted with the impacts of climate change while having inadequate resources to adapt. Over the past three decades, while the scientific discourse on implementing climate action has grown substantially, there is limited knowledge of SMCs. Addressing the urban climate governance gap in small and medium-sized cities or intermediate cities requires institutionalization as a routine part of decision-making. As a result, this article provides insight into the instruments and procedures that can advance policy and governance of climate action in the routines and practices of urban governments, particularly in developing countries. This qualitative study employed a case study research approach. The selection of the Case Cape Metropolis as a case study contributes to building a rich understanding of how small and medium-sized delta cities adapt to climate vulnerabilities considerably. Cape Coast is a fishing port city in the Central region of Ghana. Home to one of the country's most historic sites, it has a population of 189, 925 inhabitants according to the 2021 Population and Housing Census. Qualitative research methodologies, including workshops and informal interviews with key stakeholders, were utilized to examine the case of Ghana's Cape Coast Metropolis. In the case of the Cape Coast Metropolis, it was found that coastal erosion and rising sea levels were identified as major climate hazards. Research participants expressed that the agricultural and fisheries sectors have been impacted due to extreme weather events, resulting in the reduction of marine ecosystems and fish supply and the extinction of some species. The case study demonstrates how different institutional tools can be found even within the same context. The article concludes by establishing the case that enhancing the use of traditional knowledge, increasing public awareness and education, and maximizing the benefits of multi-stakeholder engagement can all contribute significantly to the fight against climate change. They can also foster innovation, draw attention to the most pressing needs of small and medium-sized cities (SMCs), and advance locally embedded policies and initiatives.
11:20 am	Montréal en commun : innovating together to reimagine the city	Ville de Montréal - Montréal en commun (MeC) is a smart city program developed in 2020 by the City of Montréal, with the financial support of Infrastructure Canada. It was built as an ecosystem of innovative solutions and partnerships that leverages community strengths and knowledge to react to the climate change crisis. This program acts as an incubator for solutions designed and supported by neighborhood stakeholders, building upon existing networks to empower communities. It is also unique in its' production of "commons": shared, adapted, and institutionalized solutions (Critic, 2023). Montréal en commun partners focus primarily on two core urban issues: sustainable mobility and food access. The partner projects aim to achieve the program objectives outlined in the theory of change, including reducing car dependency and transport-related greenhouse gas emissions, making urban mobility more inclusive and accessibility, and improving access to fresh and local products. The MeC team and its partners TIESS and Dynamo would like to propose an presentation for the Innovate4Cities Conference on the subject of innovative collaboration. TIESS and Dynamo are working alongside the MeC team to evaluate the program using an iterative and participative approach. Beginning with the examination of the first year's evaluation results (2021-2022), the focus would be on how the program has had an impact on collaboration among partners. The results reveal a significant increase in collaboration between socio-ecological actors within Montréal's ecosystem, resulting in the development of more impactful and sustainable solutions. The presentation would also delve into the latest evaluation loop (2023-2024), shedding light on the specific contributions made by partner projects towards the program objectives presented in its theory of change. Notably, these results show an increase in the use of shared mobility assets, the simplification of a more sustainable mobility offering, and improvements in access to fresh and local products. These results not only showcase the lasting impacts of the MeC program but also emphasize how effective participatory and iterative methodologies are in driving positive environmental and social change within the community.

11:20 am	Capacity development for transformative urban coalitions: Reframing individual learning for collective climate action	United Nations University - Urban transformations are essential for decarbonising cities and addressing the climate crisis. Urban coalitions involving multiple stakeholders have emerged as a vital strategy to support this goal, especially those combining place-based climate actions with efforts to advance social justice and inclusivity. However, urban coalitions require a mix of processes and tools to achieve meaningful local engagement, generate a joint vision for more desirable urban futures and operationalise sustainable urban transformations. Crucially, previous research has established that the success of these coalitions is influenced by their participants' mindsets, particularly their attitudes and beliefs about climate change. However, evidence focusing on how participants perceive their capacities to learn, such as their potential to be skilled and competent to collaborate and lead urban change, can be further explored. This research paper explores this knowledge gap within the transformative power of such coalitions, providing empirical evidence focused on their effectiveness as leverage space for diverse interests, mindsets and knowledge forms. It examines how different individual mindsets and capacities interact to affect the directionality of collective efforts. It showcases how an integrated capacity development approach, connecting place-based creative expressions and science-based knowledge, can promote socially inclusive urban climate action. This integrated approach emphasises the potential of knowledge mobilisation by developing both soft, transferrable skills and technical expertise to enhance awareness, agency, collaboration and leadership within transformative urban coalitions. These insights result from comprehensive analyses of existing conceptual and methodological approaches for leveraging capacity development toward urban transformations using literature and empirical evidence. Case studies from Latin American projects (www.urbancoalitions.org) illustrate how capacity development can create gender-responsive means, such as recognised learning environments that respect and strengthen local knowledge and lived experiences to support climate action, particularly 'in, with and by' actors of change committed to the transformation of low-income neighbourhoods in five cities of Argentina, Brazil and Mexico. These findings can contribute to a better understanding of creating urban coalitions as leverage spaces to implement and learn from the local efforts to decarbonise cities and reframe the challenge of addressing climate change toward sustainable urban transformations.
11:20 am	Rail Transportation as a means to reduce Greenhouse Gas Emissions	Ghana Railway Development - Climate change in Ghana has received a number of interventions from both national and international bodies however, climate change impacts have escalated the deteriorating rate of the environment and one contributing factor to this menace is the emission of greenhouse gases. Advocates for climate action has revealed that, as a matter of urgency there is the need to reduce human-caused carbon dioxide emissions by 2030. In the midst of solution findings and strategies innovative technologies such as railway development systems have proven to contribute to improved fuel efficiency and less emissions of greenhouse gases. With over 3.2million vehicles registered in Ghana as at 2022, a change of the traditional way of life of the citizenry from the use of private vehicles to public trains is important to strengthen synergies devised for the management of the environment. The use of freight railroads will as well minimize trade-offs in the planning of climate change adaptation and mitigation actions to drive the SDGs goals. In the US, freight railroads contribute 0.5 - 0.6% greenhouse gases and 1.7% transportation related greenhouse gases however, cars contribute 58.5%. The world is lagging in the course of realizing the change needed to hold greenhouse gases, it is therefore an eminent solution to save Ghana and Africa from their over reliance on private car usage and trucks as they pose more risk than rail transportation. Railway development in Ghana dates back to 1901 and by 1957, the country had a total of 947 km rail network that served both passenger and freight traffic. Currently, Ghana has a master plan to develop a total of 3,900km railway to revamp the sector and reduce greenhouse gases emissions to avoid catastrophic loss and damage to the environment. Also, rail transportation decongests traffic, minimize road damages and enhance environmental safety and these all vital to achieve the SDGs by 2030.Ghana agrees that climate change is a global emergency that requires international cooperation and coordinated solutions at all levels of government to achieve the Paris Agreement and the Sustainable Development Goals. To this extent, rail transportation is important to reduce greenhouse gas emissions.
11:40 am	Local Climate Action and the Right to the City	The London School of Economics and Political Science - “...climate change can be the force—the grand push—that will bring together all of these still living [social, labour, and environmental] movements. Climate change is our chance to right those festering wrongs at last—the unfinished business of liberation,” suggested Naomi Klein in her book ‘This Changes Everything’ (2014). This research paper primarily intends to answer the question, ‘How can climate change be the grand push to nurture rights-based urbanisation?’, by investigating the Local Climate Action movement through the urban ideology “Right to the City," popularised by Henri Lefebvre and David Harvey and adopted by policymakers and practitioners across the globe. The UN Climate Change Conference in Dubai, the United Arab Emirates (COP-28), hosted the first-of-its-kind Local Climate Action Summit on December 1, 2023. In the same year, 120 cities with climate action plans made it to the ‘Cities A-List’, published by the CDP-ICELI Track. These two events mark a historic milestone in reinforcing cities’ position as influential non-state actors in delivering science-based carbon targets for achieving the global temperature goal. Meanwhile, academic researchers warn that carbon-led climate urbanism takes a problematic departure from a holistic, ‘three pillars’ approach to sustainable urbanism, further augments the processes of old capitalism, and reproduces spatial, social, and ecological inequalities. Hence, there’s an opportunity to adopt the ‘Right to the City’ lens, which prioritises citizens over capitalism, to review the processes and products of local climate action globally. This research takes a mixed-methods interpretive approach to explore this opportunity, proposes a simplified ‘Right to the City Actions Framework,’ critically reviews ‘Climate Action Planning’ as an exercise and a tool, and contributes to the growing academic literature on climate urbanism and governance.

11:40 am	Systemic Management Innovations - Enabling local governments to adapt in response to complexity	Viessmann Centre for Engagement and Research in Sustainability - In an era where humanity persistently overshoots the Earth's carrying capacity, our public institutions grapple with the repercussions of rapid global change and multifaceted interconnected challenges, at a time of declining public trust in government. Climate change, social inequity, economic volatility, and recurrent global crises disproportionately impact marginalized communities, leaving local governments at a loss. The prevalent strategic management approach, characterized by compartmentalization, linear planning, fiscal centricity, and myopic planning, are ill-equipped for the complex nature of contemporary challenges. This session, led by co-authors of the forthcoming paper titled Systemic Management Innovations - Enabling Local Governments to Adapt in Response to Complexity, and co-delivered by academic researchers and organizations focused on the municipal sector, delves into the necessity for a paradigm shift in strategic management and potential tools and approaches to ideate and implement it. We explore innovative systemic management approaches that equip local governments to navigate and adapt to the complexities of our time. Our research underscores the urgency for transformative practices that transcend incrementalism, spotlighting evidence-based strategies that facilitate a just and equitable transition for all members of the community.
11:40 am	Role of Innovation in Promoting Sustainable Development of Cities - City of Pristina as Green and Smart City	The Capital Prishtina - https://ebrdgreencities.com/assets/Uploads/PDF/Pristina-GCAP_ENG_August-2021.pdf
11:40 am	Tribal Governance and Modified Area Development Approach (MADA)in India: Redefining Multi-Level Governance and Partnerships for Innovative Cities	Department of Public Administration,Dr.Babasaheb Ambedkar Marathwada University - Innovative urban development initiatives increasingly acknowledge the importance of incorporating tribal perspectives and heritage into planning frameworks. However, the complexities of multi-level governance and partnership dynamics within these contexts remain inadequately understood. This research paper aims to fill this gap by proposing a comprehensive approach to tribal modified area development that crucial for fostering innovation in urban landscapes. By exploring the intersection of indigenous Tribal knowledge System (TKS), Tribal governance structures, Urban development stakeholders and urban planning, this research seeks to offer insights into creating more robust frameworks for sustainable urban development. Through Comprehensive case studies analysis, it will help for fostering inclusive and sustainable urban development practices that respect tribal sovereignty and promote innovation. By understanding of multi-level governance and partnership dynamics, this paper contributes to the growing discourse on indigenous-inclusive urbanism and offers practical insights for policymakers, planners, and community stakeholders striving for more equitable and resilient cities apart from that we also analyse the potential synergies and challenges in implementing MADA within tribal regions, ultimately proposing recommendations for policymakers and urban planners. therefore, This paper examines the intersection of Tribal Governance and the Modified Area Development Approach (MADA) in India, with a focus on redefining multi-level governance and partnerships for fostering innovation in urban development. Keywords: Tribal modified area development, multi-level governance, partnership, innovative cities, urban planning, Tribal knowledge system, Tribal governance. References: -1. Tribal Sub Plan (TSP) (icar.gov.in) 2. MADA.pdf (osou.ac.in) 3. Tribal Development Programmes and Welfare Schemes - Tribal cultures of India (inflibnet.ac.in) 4. eco-20_0.pdf (odisha.gov.in)/ WELFARE OF SCHEDULED CASTES, SCHEDULED TRIBES, SOCIALLY AND EDUCATIONALLY BACKWARD CLASSES AND MINORITIES.
11:40 am	The Role of Urban Management in Increasing City Network Flexibility through Corporation and Multi-level Partnerships/City of Homs as a case study	Hama University - As what is happening in many cities around world, centralization of the decision and dealing with different urban projects at studying and implementation very slowly pushed cities' urban management to follow various formal and informal policies (Announced and unannounced) to fix different chronic and acute problems and challenges those cities permanently are facing. This research cares about the role of City's formal urban management in strengthening urban flexibility and urban adaptation ability vacuum ally, functionally, and kinetically to face challenges. It focuses on the Homs City Case, which was through (Syrian War) a field of fierce battles happened in most of City's Neighborhoods and also led to complete paralysis in the main center of the City And the internal displacement of residents of the entire Neighborhoods from the north and east of the City in particular. This research aims to understand the process that enables City Management to deal with acute variables (security, social, economic, demographic) imposed by War and what followed in the City after that time. Research seeks to highlight the Urban flexibility that Homs's City formal urban management followed to face different challenges through the War and after it (2015-Present), which witnessed the use of various management methods that included cooperation with many associations, international organizations, properties developers, and Cooperate for the first time ever with residents and marginalized groups to provide necessary services, in addition to flexible work with various local authorities away from the bureaucracy of traditional administrative dealings that led to a unique case of immediate response to emergencies and unprecedented challenges. Also, the research monitors various official and informal strategies and tactics adopted by the concerned authorities and the levels of coordination with which they cooperated and through which they were able to maintain the most important aspects of life in the City, albeit to a minimum, This is with the aim of identifying the pros and cons of this phenomenon, multi-level ways to deal with it, and the extent of the connection between management and network flexibility to produce a society that achieves aspirations towards participation and sustainability.

11:40 am	Re-imagining Mobility	Training, Education & Empowerment for Neighborhood Sustainability (TEENS) in Uganda - Inclusive transport options are a critical component of sustainable urbanization enabling access to education, healthcare and employment. However, Africa has the highest road traffic fatality rate in the world (26.6 fatalities per 100K population), due partially to poorly planned cities leading to dangerous traffic environments. Over half of all fatalities are among vulnerable groups (e.g. pedestrians, cyclists and public transport users). This devastating loss of life has an impact on family, community and society and particularly effects children who are most at risk.To work towards meeting the United Nations Sustainable Development Goals related to transport and health creative methods (the use of creative arts interventions, including drama, storytelling, creative writing, photography, map making and scenario building, etc.) have a particular contribution to make in revealing vulnerable peoples' needs and desires for urban mobility. They have demonstrated the potential to inform, co-design and co- generate solutions with a range of participants including those typically excluded from these processes .With support funding from agencies such as the the British Academy, www.teensug.org together with partners as I-CMiiST Project Overview - i-CMiiST (wordpress.com), the Re-imagining mobility has been implemented as part of their Cities & Infrastructure grant programme. Our project has explored whether more creative co-design methods can reveal alternative more inclusive streetscape options that would facilitate safer urban mobility. These have include streetscapes that encourage people to use more sustainable and non-polluting modes (walking or cycling) whilst also facilitating safer streets for the vulnerable residents already using these modes (including older people, children or disabled residents) through car free days, Open streets (Open Streets Kampala 2019 | Training, Education & Empowerment for Neighborhood Sustainability in Uganda (teensug.org) as part of our tactical urbanism strategies. The project also facilitated the Distribution of Bicycles in markets during COVID 19 to counter the highly indented transport then caused by mobility restrictions and lockdowns thus limiting access to basic services among the affected communities. This promoted such initiatives such as Bicycle counting to ascertain the potential of the bicycle achieve the required data to inform transport planning and development.
11:40 am	Fostering Sustainable City Development through Interdisciplinary Engagement	Global Peace and Development Organization - In the pursuit of sustainable urban development and effective climate action, the imperative of multisectoral collaboration and innovative methodologies has become increasingly apparent. This abstract delves into the critical role of interdisciplinary engagement and presents insights gleaned from innovative methodologies applied in various urban contexts. Drawing on the Global Research Agenda on Adaptation (GRAA) and the Climate Risk and Impact Assessment (CRIA), this study synthesizes collective research to measure progress against key priorities. It underscores the significance of scientific rigor and evidence-based solutions in advancing urban climate resilience. The study highlights the transformative potential of collaborative projects, where academia, government, business, civil society, and other stakeholders converge to accelerate climate action at the city level. By examining case studies such as the Barcelona Superblock Project and the Copenhagen Climate Adaptation Plan, we illustrate how collaborative endeavors have yielded tangible outcomes, driving sustainable urban development forward. Furthermore, the abstract explores the efficacy of innovative methodologies in facilitating local climate and energy action. Through challenge-driven innovation, foresight and scenario planning, and experimentation/living labs, cities have been able to co-create solutions with cross-sector stakeholders. Case studies such as the Amsterdam Smart City initiative and the Singapore Sustainable Development Blueprint showcase the successful application of these methodologies in real-world contexts. Moreover, the abstract delves into the importance of showcasing creative works that contribute to the cultural vibrancy and sustainable livelihoods of urban communities. By integrating cultural arts and heritage practices into climate action initiatives, cities can foster a sense of place and community ownership, driving collective action towards resilience. In conclusion, this abstract underscore the urgency of embracing interdisciplinary collaboration and innovative methodologies in urban climate action. By leveraging diverse perspectives and harnessing the power of collective intelligence, cities can navigate the complex challenges of climate change and pave the way for a more sustainable and resilient future. References: Barcelona Superblock Project Copenhagen Climate Adaptation Plan Amsterdam Smart City initiative Singapore Sustainable Development Blueprint
11:40 am	Every Jigsaw Piece Ignites Development: Implementing Multisectoral Strategies to Empower Individuals and Communities through Inclusive Growth and Strategic Partnerships for Regional Advancement	BUSarchitektur ZT GmbH - In an era of increasing complexity and uncertainty, traditional approaches to urban resilience and sustainability are often inadequate. To address these challenges, we present an innovative methodology that invites stakeholders to take on pieces of the reality puzzle to horizontalize everyday resilience. Co-created with the support of ERASMUS+"Making Cities Fit for Green Deal," this methodology has been recognized as an OeAD best practice project from 2022/24.Learning and Implementing URBAN MENUS Quick Snoop Navigating Uncertainty with Strategic Planning Our practical experience reveals the necessity of answering crucial questions before investing resources in any project: Are there concerns that the budget will not be sufficient? Are there no partners? Have you considered forming strategic alliances? What other uncertainties exist? What added value does the project bring, and for whom? To address these questions and navigate today's complex landscape, an URBAN MENUS workshop offers invaluable insights. Key Workshop Topics Resilience Level of a System: Assess how well a system can absorb changes and transform for new realities. Evaluations focus on circularity and safety. Key to Consensus: Identify common denominators for stakeholder cooperation to optimize quality of life through multi-sectoral collaboration. Evaluations include happiness and innovation. Chances of Success of a Project: Determine which changes are technically and financially optimal to encourage risk-taking and gain broad stakeholder support. Evaluations focus on profitability. Training for Sustainable Urban and Regional Development Our training program improves skills in sustainable urban and regional development, emphasizing smart setups, stakeholder participation, and Green Deal-oriented, multidisciplinary approaches. It is designed to make cities and regions fit for Green Deal Development by enhancing the green skills of urban and regional development professionals, including decision-makers and investors. Target Groups Our results benefit public developers, private developers, investors, the education sector, and societal organizations. Benefits Our methodology fosters a better understanding of the link between local development issues and the Green Deal. It helps identify key action areas for maximum project impact, guides inclusive and green development processes, and ensures compliance with EU Taxonomy and Sustainable Finance Directives, leading to significant cost savings and more secure project implementation.

11:40 am	Urban Resilience and Adaptation Strategies to Climate Change in Douala, Cameroon	Rohi Foundation Cameroon - Title: “Urban Resilience and Adaptation Strategies to Climate Change in Douala, Cameroon” Sabina Manka Ambe MbuEnvironmental Monitoring and Evaluation Officer Rohi Foundation Cameroon Email :info@rohifoundationcameroon.org Abstract: Cities, particularly coastal cities face significant challenges posed by climate change. This has increased the vulnerabilities of informal settlements due to increased frequency of extreme weather events, rising temperatures, sea level rise amongst others. These factors exacerbate existing challenges such as flooding, urban heat islands, and infrastructure strain. This study, therefore, seeks to explore the current status of urban resilience and adaptation strategies to the effects of climate change. Furthermore, the study examines existing resilience and adaptation measures implemented in Douala. Using empirical evidence collected through data, collected through participatory research methods with informal settlements in Douala communities, it shows that improvements in drainage systems, green infrastructure development, and community-based initiatives will enhance climate resilience. Despite these efforts, gaps in implementation and effectiveness persist due to limited resources, inadequate infrastructure, and governance issues. The study highlights the need for participatory approaches that engage local communities, stakeholders, and government agencies in decision-making processes to ensure the relevance and effectiveness of adaptation strategies. However, gaps in implementation and effectiveness persist due to limited resources, inadequate infrastructure, and governance issues. This study contributes to the broader discourse on climate change adaptation in African cities and underscores the importance of holistic and context-specific approaches to building climate resilience. The study suggests strengthening early warning systems, enhancing disaster preparedness and response mechanisms, promoting sustainable urban development practices, and fostering regional and international partnerships for knowledge exchange and capacity building for enhancing urban resilience in Douala.
11:40 am	Comple-X.NET Interdisciplinary Research Tour for Cross-Cultural and Ecological Connectivity: How to build a global collaboration network in China thro	In post-COVID time, we are facing complexity, conflicts, and weak connections. There is no single actor can provide the solutions to meet the urgency of the climate change challenge. Starting in 2021, Comple-X.NET is connecting China through art to build a worldwide local collaboration network and trying to meet these challenges. We focus on this complex question: How to deliver on local needs and accelerate global action in the symbiotic ecosystem? www.comple-x.net
12:00 pm	Lunch	Conflict Cafe + Participatory Mural by Percolab Coop
1:30 pm	Climate-resilient planning and development for vulnerable populations	This session is brought to you by ICLEI Africa & Covenant of Mayors Sub Saharan Africa (GIZ) These are the original abstracts from each of the organizations: ICLEI Africa - Join us for an engaging session that delves into the innovative approaches of Risk and Vulnerability Assessment (RVA) co-development under the Covenant of Mayors in Sub-Saharan Africa (CoM SSA). This session will showcase how collaborative efforts in various regions are driving climate resilience and empowering local communities through tailored RVA processes. Discover how a dynamic "train the trainer" workshop in Southern Mozambique and a co-development approach in Nyandarua County, Kenya, have become cornerstones for building climate resilience (More information). In Mozambique, the initiative brought together political representatives, municipal leaders, and various organisations to focus on Sustainable Energy Access and Climate Action Plan (SEACAP) development, emphasising RVA components (More information). By adopting this collaborative approach, municipalities are building capacity, ensuring local relevance, enhancing stakeholder engagement, and facilitating knowledge sharing. This empowerment enables city government officials to address climate change proactively, leading to more resilient and sustainable communities. In Nyandarua, Kenya, the power of co-development is evident in the creation of an RVA deeply rooted in the lived experiences and local knowledge of the community. By integrating socio-cultural sensitivities and other key inputs through a co-development approach, the resulting RVA is tailored to the unique needs of Nyandarua’s population. This process equips cities to be proactive and adaptable in their climate actions, ensuring resilience and sustainability in the face of evolving climate challenges.Join us to gain valuable insights into how RVA co-development can lead to tailored, effective climate action plans that empower communities and enhance local resilience. Learn how these collaborative initiatives in Mozambique and Kenya can serve as models for other cities aiming to build their climate resilience through locally-driven, inclusive approaches. Covenant of Mayors Sub Saharan Africa (GIZ) - Africa is anticipated to be the most negatively affected continent on the planet with regards to climate change due to a combination of severe projected impacts and relatively low adaptive capacity. The planning and implementation of adaptation actions require the development of the climate Risk and Vulnerability Assessment (RVA). The RVA assesses the current climate in the area, the associated climate hazards and risks, and how these are likely to change in the future as a result of climate change. It also assesses the extent to which local economic sectors and vulnerable population groups are affected and how they might change in the future. Extensive data collection is often required for getting a reasonably accurate picture of the city’s climate and projected future, however, local governments in SSA often lack the resources and/or the technical capacities to collect and analyse this data. There are currently no tools available for African cities to assist them in developing their RVA in a cost-effective manner that is useful for decision-making. Cities need tools that will not only provide them with science-based data on the risks their cities and communities are facing but also data that will allow them to develop priority actions and policies and access funding for these actions. CoM SSA has worked on a concept for an RVA tool that would be interactive and online, allowing users to select their city area and centralise detailed and specific climate data to inform each step needed to complete the RVA.Currently, CoM SSA cities are producing RVAs based on stakeholder workshops using (where available) historic climate data and anecdotal information. A detailed, data driven RVA requires significant resources (monetary, time, capacities) to be invested into the process, which makes it unfeasible for many cities. This proposed tool would provide the cities with both historical climate data and climate projections that are relevant and detailed to orient a local government to identify necessary actions to take, and in which specific areas of their jurisdiction. The hackathon would help identify the technologies and platforms that could be used to make this tool a reality.

1:30 pm	Exploratory Scenario Planning for Climate Resilient Cities	Lincoln Institute of Land Policy - The extent and nature of climate change are tremendously uncertain, and decision-makers must anticipate the impacts of a changing climate and prepare for a decarbonized economy. Exploratory scenario planning (XSP) is a dynamic tool for devising strategies to anticipate and adapt to future trends and uncertainties and is particularly relevant and powerful in responding to the impacts of climate change. This session will demonstrate how cities can use XSP to plan for and respond to rapid urbanization, the effects of climate change, economic volatility, access to housing, inequity, and other forces within or beyond their control. In contending with far-reaching but varying localized effects, scenario planning can help cities and regions prepare and plan for this uncertain future while also considering factors like demographics, housing, transportation, environmental degradation, technology, and equity that affect a community's ability to manage climate change impacts and still achieve long-term goals. The training will showcase how XSP can be used as an innovative process to help cities and communities identify and scale up successful, locally-led actions and solutions for climate change adaptation and mitigation. Participants will learn how to apply XSP tools in a simple, approachable process, highlighted with case studies from past Lincoln Institute projects with places globally. The session is intended to give participants the tools, skills, and first-hand experience they need to implement a scenario planning process in their own communities. We will provide an overview of trends impacting cities and how XSP can be used to plan for them.
1:30 pm	Collaborative Partnerships to Build Resilience for Home Strengthening in Low Income Communities	Build Change - The first target of SDG 11 states, "By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums." Unfortunately, we are off track to meet this target. Findings from the World Bank's Adequate Housing Index suggest that 1.26-2.8 billion people are living in inadequate housing already. Despite this, housing still falls between the cracks in policy and decision making. Worldwide, we are failing to meet the needs of billions of people for safe, resilient housing that addresses both mitigation and adaptation needs. But solutions exist. A wealth of knowledge and experience increasing access to affordable, resilient housing has been gained since the adoption of the SDGs in 2015. We have real life examples, such as Colombia's "Casa Digna, Vida Digna" resilient housing program and Indonesia's National Affordable Housing Program, that demonstrate that resilient housing can be done at scale with the government and the private sector. This session will explore how we can continue to scale successful resilient housing programs like these and replicate them around the world. With just over 5 years before the 2030 milestone, this is a strategic moment to bring together leading actors engaged in home strengthening work in cities around the world to articulate and push a common agenda, encouraging policymakers and financial actors to focus efforts and resources on breaking down the policy, finance and technology barriers that stand in the way of increasing access to affordable, resilient housing for all. In response to this, Build Change, Harvard's Joint Center for Housing Studies, the World Bank and Lincoln Land Institute are proposing a joint session, convening a dynamic set of key stakeholders across different performance areas in the home strengthening space to share experience, inputs and recommendations. This session will encourage collaborative partnerships between government, development banks, and other urban decision makers to advance policy and increase resources for preventative and post-disaster resilient housing programs. Recommendations will feed into a larger collaborative document calling for a post-2030 agenda that centers the urgent need for safe, resilient housing for all.
1:30 pm	MCAP: A global alliance of regions with a mediterranean climate, working together to adapt to drought, wildfire, and heat	Resilient Cities Catalyst - Accelerating climate change and biodiversity loss is severely impacting regions with mediterranean climates. Our regions, spread across the northern and southern hemispheres, share similar climates defined by distance from the equator and have communities and ecosystems that are especially vulnerable to climate variability. As leaders of subnational governments with mediterranean climates across five continents, we have come together to protect our communities and ecosystems and accelerate action to combat climate change. We recognize that building resilience to climate impacts requires innovative solutions, intensified actions, and newpartnerships. The Mediterranean Climate Action Partnership is established to achieve our work Together towards:1. Expand public awareness of climate impacts and solutions in our regions and around the world, with innovative communications amplified through a commonvoice2. Learn from each other and build capacity around what does and does not work to confront shared climate threats through member convenings, study tours, and expert exchanges3. Exchange approaches on policies, programs and governance, investment and economic development strategies, and foster research collaboration that advances shared knowledge on trends and impacts4. Accelerate concrete actions in mediterranean regions to protect our communities from climate change impacts, while reducing greenhouse gas pollution, conserving ecosystems, halting biodiversity loss, implementing nature- based climate solutions, increasing nature restoration, and accelerating the clean energy transition5. Track and report progress to the global community in appropriate settings The proposed session will share with the global community what are the key enablers identified so far that can lead regions to accelerate and scale common action for climate resilience and biodiversity loss within their constituencies.

1:30 pm	Equitable, Just, and Inclusive Nature-based Solutions (Nbs) in informal and low-income urban communities	Cities Alliance - Nature-based Solutions (NbS) have gained attention as a means to address interconnected crises of biodiversity, climate change, and rising poverty and inequality in cities. While the benefits of NbS are well-established in most urban contexts, further research is needed to examine their potential particularly in historically disadvantaged areas such as informal settlements and low-income communities. The session aims to stimulate reflection on progress in implementing equitable and just NbS, focusing on informal settlements and low-income urban neighborhoods. It seeks to spur further action and research, ensuring the inclusive and just uptake of NbS-A. Insights gained will contribute to advancing the development and implementation of NbS that prioritize equity and justice in the Global South. A) Experience of applying NbS in Freetown, Sierra Leone, Centre of Dialogue on Human Settlement and Poverty Alleviation/Slum Dwellers International a. What types of NbS interventions have been implemented? b. How are local communities engaged in these projects? c. What are the main impacts (benefits and drawbacks) of these projects and challenges to maintaining these impacts? B) Conceptualization of nature and informality - research and theory focused, Francesca Ferlicca, Sciences Po C) Fostering inclusive NbS: Julie Greenwalt, Senior Climate Advisor, Cities Alliance a. What successes have emerged from cities globally? b. How can equity and justice be better incorporated into the development and implementation of NbS? c. What are some further aspects to consider in scaling up NbS in informal areas
1:30 pm	Case Study on Water Demand Management in Pune and Pimpri Chinchwad, India	Centre for Sustainable Development, Gokhale Institute,Pune - The project aimed at determining the cost of water supplied and the cost of treatment of water and wastewater for different consumers including domestic, commercial and industrial. This analysis is based on historical usage data or surveys to understand the varying levels of water usage among different housing categories. Additionally, water quality analysis is conducted to assess the initial quality of water supplied to these houses, ensuring a thorough understanding of the water source's characteristics and potential treatment needs. Another critical aspect of data analysis is the assessment of treatment costs, which involves collecting data on treatment technologies, operational costs, maintenance expenses, and energy consumption for water treatment and wastewater treatment plants in Pune. The project outcomes include:- Industrial water treatment and Cost of Water Supply - Determining the cost of water supplied to industries and each type of house based on consumption patterns, water tariffs, infrastructure costs, and distribution expenses. - Assessing variations in water supply costs based on factors such as metered vs. unmetered connections, water source (e.g., municipal supply, borewell), and water quality standards. Cost of Water Treatment - Estimating the cost of treating water for potable use based on initial water quality, treatment processes (e.g., filtration, disinfection), and compliance with regulatory standards. - Calculating the cost of treating wastewater generated from different types of houses, considering factors like volume, pollutants, treatment technologies (e.g., sewage treatment plants, decentralized treatment systems), and disposal methods (e.g., discharge, reuse). 3. Comparison Across consumers - Identifying cost drivers and recommending strategies for reducing water supply and treatment costs in each housing category, promoting cost-effectiveness and resource optimization. 4. Recommendations - Suggesting policy interventions or incentives for sustainable water management practices and promoting equitable access to clean water across different housing segments. Overall, the project aims to provide comprehensive insights into the costs associated with water supply and treatment for various types of houses, identify areas for optimization and cost savings, and contribute to sustainable water management practices in Pune city.
1:30 pm	Green City Action Plan Methodology	European Bank for Reconstruction and Development (EBRD) - Launched in 2016, EBRD Green Cities is the flagship program to support cities transition to a green, low-carbon and resilient future. It consists of four main components: (i) delivery of strategy and policy support through Green City Action Plans (GCAP), the main tool and key innovation of the program; (ii) facilitating and stimulating infrastructure investments; (iii) providing capacity building, technical assistance, and knowledge sharing to support successful implementation of infrastructure projects and policies; and (iv) supporting cities to access to a wide range green finance to implement actions. The Green City Action Plan (GCAP) is the backbone of EBRD Green Cities and is developed based on the GCAP Methodology. It benchmarks environmental performance such as air and water qualities, identifies the priority challenges based on data and stakeholder consultations, and defines infrastructure investments and policy actions to overcome these environmental challenges and to help cities move closer to the net-zero pathways. GCAP also analyses vulnerabilities from climate and geological risks, considers ways to becoming socially and economically more inclusive, and identifies role of digital technologies that can enhance the quality of lives. In 2024, EBRD is revising the GCAP Methodology based on the experience of working with 60 cities in the network and feedback gained from experts. The revision will include improvements to approaches to data collection and analysis, streamlined action selection and development process that is closely more linked to identified targets, and introduction and broadening of new thematic areas such as biodiversity and logistics of good. The revision of the Green City Action Plan Methodology is expected to be completed by September 2024.

1:30 pm	Empowering Urban Equity: Digitalization and Data for Social Inclusion with the Urban Environment and Social Inclusion Index	University of North Carolina - Chapel Hill - The Urban Environment and Social Inclusion Index (UESI) (datadrivenlab.org/urban) is a groundbreaking tool that harnesses high-resolution, large-scale data to evaluate urban performance at the intersection of environment and social equity. By providing insights at both city and neighborhood levels, UESI aids in understanding and addressing disparities in urban environmental benefits and burdens. The Index now includes nearly 300 cities from every inhabited continent on the planet, tracking how cities are performing on Sustainable Development Goal-11's charge for cities to be both sustainable and inclusive. It allows for stakeholders, from planners to policymakers and advocates, to explore critical questions such as the spatial distribution of air pollution or urban heat and transportation access on various neighborhoods and across different income groups. By integrating on-the-ground statistics and census data from cities with crowdsourced data and satellite remote sensing data, the UESI offers a new and accessible approach for cities to leverage digitalization and data. This enables cities to understand their standing with respect to SDG-11, compare internally and externally, and, for the first time, track their progress or decline on the UESI's various outcomes. In our 2024 update, we find that while many cities have strong environmental performance, nearly half of the UESI cities are failing to achieve these results in an equitable way, disproportionately burdening less affluent citizens with poor environmental quality. Forty-four cities are grappling with higher-than-average income inequality. This situation places a dual burden on these cities' less affluent residents, who have less capacity to manage adverse environmental conditions. Finally, our results show little progress has been made since 2019.Although we flexible on format, we propose facilitating an innovative methodologies workshop that will help cities interpret the high-level findings of the 2024 UESI results and demonstrate how cities can use open-source, innovative digital technologies to efficiently measure and track their performance in achieving equitable and sustainable environmental outcomes, particularly for data-limited cities. We also seek the opportunity to receive feedback from practitioners, other academics and stakeholders, to understand how the UESI can be improved to be a more practical and insightful tool for cities themselves.
1:30 pm	Inclusiveness and resiliency competences of dairy farmers for scaling up climate smart dairy in Ziway-Hawassa milk shed, Ethiopia	Ethiopian Institute of Agricultural Research/National fishery and aquatic life research center - Dairy farming is crucial in providing income, food, and creating job opportunities for many people in Ethiopia. However, the performance of the sector is low compared to its potential (Sintayehu et al., 2008). Climate smart dairy increases productivity, adaptation and mitigation of dairy farmers. Despite its importance, climate smart dairy is not scaled up in, Ethiopia. In order to scale up the climate smart agriculture, increasing access to knowledge and education for women and youth is crucial since involvement of women has great association with mitigation and reduction of greenhouse gases and empowering youth with knowledge and experience help to build strong development (Mungai et.al, 2018). Therefore A descriptive research design was conducted where a case study was carried out to assess in-depth factors that affect inclusiveness and resilience among smallholder dairy farmers and factors that determine the level of information and access to climate smart practices that help in scaling up sustainable climate smart dairy in Ziway-Hawassa milk shed. The study covers 60 urban dairy farmers (men, women and youth), 11 key informants from farmers' knowledge and information network, and 5 focus group discussion. Information on Vulnerability context, Asset, Adoptive capacity, Agricultural knowledge and information network of dairy farmers was gathered. The study showed The Vulnerability context of dairy farmer (Men, women and youth) that affect the dairy farms in the study were feed unavailability and high feed price, price fluctuation of milk, climate change, unavailability of land for pasture or planting forage, and disease and death of dairy cattle. Dairy farmers cope this vulnerabilities through different strategies that are more indigenous. Asset endowment is the main constraint in up scaling climate smart dairy farms. Physical, financial, human, natural, and social capital of women, men and youth in the milk shed is limited where financial, human and physical asset of men is higher compare to women dairy farmers. Informal knowledge and information networks especially friends and family is the main source of information for dairy farmers while the formal network is limited. This is due to formal institutes select farmers who will achieve their goals.
1:30 pm	A 'peer city' framework to support inter-city knowledge transfer on climate action	University of Illinois at Urbana-Champaign - Today's cities face growing climate-driven risks due to urbanization and climate change, navigating a dual reality of vulnerability and potential for climate action. Climate actions, tailored to local risks and context, are often implemented at the local level. However, collaboration and knowledge sharing across cities are crucial for supporting and informing these efforts. Despite this, potential synergies between local climate action and inter-city collaboration have been underexplored. Existing knowledge sharing efforts and networks do not reliably consider relevant local urban contexts, particularly that of urban climates. This limits the efficacy of knowledge sharing on growing climate-driven risks from urbanization and global climate change. We suggest that recent developments in global urban science can enhance synergies between local climate action and inter-city collaboration. These developments include the representation of urban areas within global climate models, allowing the study of dynamic interactions between local urbanization and global climate change, and recent development of novel high-resolution, global urban morphology datasets from remote sensing technologies, improving our understanding of the global urban landscape. To leverage these datasets, we propose a data-driven framework which uses hierarchical clustering to group cities facing similar urban climate risks, for similar climatic reasons, and under similar urban planning contexts. To demonstrate this, we applied the framework to study urban humid heat stress in 4747 global cities under climate change. We identified 27 global urban typologies with distinctive climatic and morphological characteristics, and implications for heat adaptation. We also identified peers for all 4747 cities under three scenarios: current peers for the current climate, projected peers for projected climate under SSP3-RCP7, and current peers for projected climate. These peer identification results reveal peers across diverse locations, cultures, and economic contexts. This diversity can support various goals for knowledge sharing, knowing the identified peers are relevant climatically and morphologically. This framework can be adapted to any user-defined climate risk, providing significant potential for urban climate scientists and stakeholders to shape its application in ways that are scientifically robust and locally relevant. Through this tool, we aim to enhance knowledge sharing and collaboration among cities to address urban climate challenges more effectively.
2:00 pm	Move to next session	

2:10 pm	Nature-positive engineering: protecting, restoring and harnessing nature for urban wellbeing	This session is brought to you by Water department, City of Montreal & International Coalition for Sustainable Infrastructure These are the original abstracts from each of the organizations: Water department, City of Montreal - Montreal, like other major cities worldwide, faces major challenges regarding stormwater management. Montreal's commitment to combating and adapting to climate change is evident in its Climate Plan 2020-2030 and strategic plan Montreal 2030. The implementation of resilient parks and green street infrastructures represents a proactive and innovative approach to stormwater management. Bringing nature back to the city offers multiple co-benefits, including biodiversity promotion and heat island mitigation. The green infrastructure team at the Water department administers funding received from the provincial government's Plan for a green economy. The team provides grants for green infrastructure projects based on infiltrated or temporarily retained volume. The team goes beyond traditional municipal management standards by developing and sharing trainings, guides and standards. It recognizes the crucial importance of knowledge transmission in its initiatives. This innovative approach breaks free from traditional silos and promotes integrated environmental solutions. Supporting stakeholders is at the heart of the team's mission. The team also shares knowledge with the city of Lyon, France, contributes to the development of regulations at the provincial level, and has collaborated in the development of standards at the national level. In addition to practical implementations, the team actively engages in research collaborations to further advance stormwater management techniques. Collaborating with several universities, the team participates in about fifteen research projects. These projects focus on pioneering innovations in stormwater management, such as determining infiltration rates which are crucial for green infrastructure design, a project that is led by the City's laboratory. Another noteworthy project, in collaboration with the ETS university, involves characterizing and evaluating existing green infrastructures. This initiative not only provides a comprehensive assessment of their condition but also fosters the development of maintenance best practices. The project's success is attributed to close collaboration between research teams and field experts, showcasing the importance of interdisciplinary approaches in driving innovation. The presentation will conclude with the presentation of the resilient Place des Fleurs-de-Macadam. Located on the site of a former gas station operated by the Ferland family, from which the renowned quebecer artist Jean-Pierre Ferland emerged, the site boasts strong cultural and artistic components. International Coalition for Sustainable Development - As our cities expand, we need to find ways to halt and reverse biodiversity loss while still meeting the needs of a growing urban population. The built environment is a major contributor to GHG emissions and urbanization comes with high environmental costs, including habitat fragmentation and biodiversity loss. In this context, traditional, one-dimensional engineering approaches that don't consider nature are no longer fit for purpose. Nature-positive engineering (NPE) - including blue and green infrastructure and nature-based solutions - is emerging as an approach to tackle the complex, interrelated risks threatening our communities and natural ecosystems. NPE entails adopting a transdisciplinary, whole-life engineering approach that works in harmony with nature and includes the sustainable management of natural ecosystems with an overall biodiversity net gain. This topic is gaining traction, as evidenced by the recent WEF report Nature Positive: Guidelines for the Transition in Cities, however focus needs to urgently shift to implementation. This interactive workshop will explore the emerging thinking around NPE and its role in preserving biodiversity in our cities, particularly coastal cities. We will explore how NPE can be implemented at a city-scale and its role in advancing ecosystem-based adaptation and resilience in an urban environment. We will address the positive contribution engineers can make to cityscapes through approaches that integrate biodiversity considerations, e.g. through regenerative design approaches, and we will identify opportunities for policymakers to advance scalable action and help cities reach their SDGs and NDCs, thereby supporting global biodiversity agreements like the CBD and IPBES-IPCC report. We will convene policymakers, academics, engineers, civil society and investors to address challenge-driven questions such as: Do we understand the value of Nature as an asset in the context of engineering? How do traditional approaches need to change? What value is created and for whom? What will make me want to buy it? What are the capacity building challenges? What should be prioritized to make a difference? Who is missing? Who should be empowered? L'Université dans la Nature - Restorative Cities: Integrating Nature in Urban Planning for Human Well-being (Abstract) For thousands of years, the human species has thrived in close proximity to the natural world, which has shaped our senses and bodies. However, with the shift towards urbanization in 2008, we became a predominantly urban species worldwide, presenting challenges for our well-being. The proportion of urban population has steadily increased over the past 60 years, with a surge occurring in 92% of countries, particularly in South America and North Africa (Cazalis et al., 2022). Epidemiological studies in recent years have revealed a significant correlation between exposure to green spaces and reduced risk of nine out of the ten leading global causes of death identified by the World Health Organization (WHO), which collectively account for 55% of the 55.4 million deaths worldwide (Potter et al., 2023). Recognizing the multitude of benefits greenspaces offer, the WHO has acknowledged the unique role they play in public health interventions (World Health Organization. Regional Office for Europe, 2016). Beyond the impact on global warming, nature within the urban environment emerges as a crucial element for the mental and physical well-being of residents. This transdisciplinary review aims to explore avenues for urban planning that cater to the psychological and physiological needs of humans. Drawing from research in microbiology, epidemiology, environmental psychology, and practical applications implemented in various cities, this review will present the findings on the impact of the built environment on mental health and the transformative power of nature. By integrating current knowledge of the impact of nature and environmental psychology into urban planning, we can foster the emergence of restorative cities that also prioritize human well-being. This presentation aims to shed light on how the impact of the built environment and the presence of nature converge, providing a foundation for urban planning that aligns with the emerging movement of restorative cities. Together, let us explore the research, engage in dialogue, and pave the way for urban environments that nurture and heal.

2:10 pm	Transforming Public Schools into Hubs for Climate Resilience and Urban Regeneration in Kozani	Resilient Cities Catalyst - Kozani, is a mid-sized industrial city in NW Greece, and an archetypical case of a region in transition implementing the European Just Regions in Transition program. Resilient Cities Catalyst (RCC) is partnering with GCoM and the Climate Change Hub, Greece to bring increased collaboration and support to this smaller northern Greek city- Kozani that is advancing resilience efforts, adapting to climate change, and reducing energy consumption while increasing economic opportunities for local youth. The "Energopolis" project is an innovative initiative aimed at addressing the intertwined challenges of economic transition, infrastructural renewal, and citizen engagement in Kozani, Greece. As the city navigates the phasing out of lignite power stations, Energopolis seeks to revitalize the local economy and enhance quality of life through a participatory approach to energy efficiency and sustainable urban development. Against this backdrop, the proposed conference activity will bring together key local, European and global stakeholders to discuss the multiple dimensions of urban resilience building from the entry point of the just energy transition challenge and showcase initiatives that are accelerating the urban energy transition, increasing resilience and creating green jobsProject Overview: Energopolis focuses on transforming public school yards into vibrant community hubs. These hubs will serve as focal points for sustainable development and climate resilience, mobilizing local public and private actors to collaboratively develop solutions to the resilience challenges they face, including Kozani's net-zero building goals. Key Components: Community Hubs: By converting public school yards into centers for community engagement, education, and sustainable practices, Energopolis aims to foster a culture of climate ethics and civic participation. Capacity Building: The project includes a tailored capacity development program for the municipality, focusing on energy resilience project design and hands-on activities to enhance the skills of both youth and seniors. Stakeholder Engagement: Energopolis actively involves a broad spectrum of local stakeholders—government, public organizations, civil society, and the private sector—in discussions on how energy transition can support long-term projects for urban regeneration and social cohesion. Data-Driven Decision Making: Leveraging digital tools and data analytics to inform targeted interventions and measure their impact.
2:10 pm	Urban Rewilding Transformation: Investigating Challenges, Benefits, and Practical Solutions for Multifunctional Blue and Green Infrastructure Design in the United Kingdom and Poland	University of Gdansk - This project aims to investigate the challenges and benefits of urban rewilding in diverse contexts, considering socioeconomic, cultural, and ecological factors. Collaborations with local authorities, managers, and communities are established to explore practical aspects of rewilding, fostering cooperation and knowledge exchange. The examination of policy challenges and consequences of transitioning urban landscapes towards ""wild"" aesthetics and management objectives involves analyzing governance frameworks. The project also seeks to explore goals set by authorities and obstacles in translating aspirations into outcomes, identifying common barriers and context-specific challenges. Objectives include creating resources to assist local authorities and land managers in making informed decisions regarding urban rewilding initiatives. Guidance is offered for strategically implementing urban rewilding, identifying appropriate locations and approaches that benefit local communities. Practical solutions are provided to address potential adverse effects and prevent the exacerbation of urban inequalities resulting from rewilding projects. The research employs mixed methods including focus groups, design workshops, and an extensive online survey to gather comprehensive insights. Key findings from the United Kingdom (start date: January 2023) reveal concerns over human needs neglect in urban rewilding initiatives, while respondents cherish existing wild areas within familiar green spaces. Preferences lean towards moderate rewilding of vegetation, eliciting the highest well-being responses. In Poland (start date: May 2024), challenges linked to fragmented habitats and species diversity enhancement are highlighted. Preferences lean towards the signature landscape approach, generating positive well-being responses. Expectations for the remainder of the project involve further exploration in both the United Kingdom and Poland. In the United Kingdom, efforts continue to unravel interpretations of rewilding within local authorities, delve into alternative conceptualizations, and understand barriers to implementation. In Poland, the survey work is ongoing with insights to be synthesized from a national survey, integrating wildlife testing alongside vegetation-centric efforts, and exploring community responses towards urban rewilding transformation. Community validation workshops are anticipated to navigate opportunities and challenges posed by rewilded environments in Poland.
2:10 pm	Closing the Loop: Designing and Implementing a Decentralised Waste Water and Sewage Treatment System using Nature Based Solutions in the Peripheries of Mumbai Metropolitan Region	Society for Promotion of Area Resource Centers - Cities are facing increasing pressures to address complex challenges of climate change, equity, and reconciliation as intersecting issues. Working on these challenges discreetly, or solely within dominant, western colonial paradigms and practices of governance, isn't effective or just, and risks further marginalizing and exploiting the people, lands, waters and beings most impacted by a changing climate. In 2022, community members advising the City of Vancouver wrote a powerful Climate Justice Charter for Vancouver, which outlines the vision, guidance, and accountability for a just climate future centered on the perspectives of those disproportionately impacted by climate change, including people who are disabled, racialized, Black, Indigenous, living below the poverty line, young/old, or unhoused. City staff identified the need to learn more about how to shift/share/relinquish power, practice different forms of accountability, and cultivate relationships in service of climate justice. In 2023 the idea for a Climate Justice Field School emerged as a collaboration between City of Vancouver sustainability staff, a design team at Emily Carr University and community members. Walks, site visits, immersive learning experiences, cultural gatherings and co-design workshops formed twenty field school sessions. For Innovate4Cities, we propose two formats for sharing our work: Innovation Methodologies- This unique collaboration used systemic design, social innovation, equity-centered and decolonizing methods as alternatives to standard policy-making and public engagement processes. We will share how orienting towards matriarchal strategies helped us to interrupt the dominant patterns of professionalism that often prop up status-quo power dynamics, creating surprising, joyful, informal and nourishing experiences for participants. Creative Works Field School member Zoë Laycock documented the project in a traditional star blanket that will be shared and displayed at the conference. In her words, the blanket is "a visual representation of the unique conversations, listening and perspectives shared: each individual coming into the discussion carries worlds of learning as we move through place and events. The star blanket lives as a representation of not only the whole of the Climate Justice Field School, but also of all the experiences, communities and those who make up each of us as individuals coming together.

2:10 pm	Participate, participate, participate: putting data and climate in the hands of the people	This session is brought to you by Esri, Inc. & University of Montreal These are the original abstracts from each of the organizations: Esri, Inc. - The YouthMappers, https://www.youthmappers.org/, funded by USAID, and the co-founders at Arizona State University are collaborating with Esri, Inc. to run capacity development activities centered on extreme heat index mapping. YouthMappers leaders (advanced university students) will train at a meeting in Bangkok in June 2024, then roll out a methodology to chapters around the world. The methodology includes the combination of in situ data collection with satellite imagery to provide land surface temperature and global tree cover, with demographic data coming from local census campaigns and local knowledge or a global gridded dataset where necessary. These are combined using a Composite Index method, and an extreme heat index map can be made for most cities on Earth. Vulnerable populations who are affected by lack of tree cover and high heat are identified. This innovative methodology extends the excellent work the YouthMappers have already done to add critical location data to Open Street Map (OSM). These data might include cooling stations, water resources, schools, clinics, and any other heat-related assets in a city. This mapping is executed in an online environment that is being made available to YouthMappers chapters at universities on every continent. This heat index mapping methodology will be demonstrated during a 1-hour facilitated workshop. University of Montreal - Artificial intelligence is rapidly changing how we see and communicate information about our cities. Whereas digital design tools, like AutoCAD, helped automatize the design work of architects, landscape architects, and urban planners in the past, new and emerging AI tools are rapidly changing our capacity to observe and record three-dimensional space. Humans are teaching machines how to observe and propose alternative urban futures; however, the training process must be equitable, establish accessible physical and social spaces, and ensure social and environmental justice. Furthermore, AI must empower community members faced with potential change to their physical space. This session brings together Ph.D. students and professors from the University of Montreal working with machine learning and generative AI to discuss their current research, challenges and opportunities, at the intersection of AI and the design of our cities.L'intelligence artificielle modifie rapidement la façon dont nous voyons et communiquons des informations sur nos villes. Alors que les outils de conception numérique, comme AutoCAD, ont contribué à automatiser le travail de conception des architectes, des architectes paysagistes et des urbanistes dans le passé, les outils d'intelligence artificielle nouveaux et émergents modifient rapidement notre capacité à observer et à enregistrer l'espace tridimensionnel. Les machines apprennent à observer et à proposer des futurs urbains alternatifs ; toutefois, le processus de formation doit être équitable, établir des espaces physiques et sociaux accessibles et garantir la justice sociale et environnementale. En outre, l'IA doit permettre aux membres de la communauté de faire face aux changements potentiels de leur espace physique. Cette session réunit des étudiants en doctorat et des professeurs de l'Université de Montréal travaillant sur l'apprentissage automatique et l'IA générative pour discuter de leurs recherches actuelles, des défis et des opportunités, à l'intersection de l'IA et de la conception de nos villes.
2:10 pm	The Loss and Daylighting of Urban Streams: Tales of Innovative Nature-Based Solutions for Climate Adaptation and Mitigation	University of Waterloo - Small urban streams are among the least studied urban ecosystems and the most sacrificed to make way for urbanization with dire consequences as the climate crisis intensifies due to, among others, flooding from rainwater runoff. Urban stream daylighting is the practice of bringing buried urban streams back to the surface. An innovative and viable nature-based solution (NbS), daylighting addresses both adaption (e.g., flooding, heat, and drought) and mitigation (e.g., carbon sequestration) (Khirfan, Mohtat, & Peck, 2020; Khirfan, Peck, & Mohtat, 2020). But how may already urbanized cities approach stream daylighting? By investing significant financial resources on transformative projects or incrementally? And how do transformative and incremental approaches impact urban life, particularly equity and justice? I address these questions through comparing vastly different daylighting interventions: Seoul's (S. Korea) restoration of the Seongbukcheon and Cheonggyecheon streams where the latter entailed dismantling a major expressway in 2004 and Zürich's bachkonzept policy, initiated in1988, that incrementally daylighted over 24 kilometres of streams. I analyze: 1) how these different approaches to NbS cater to both adaptation and mitigation efforts; 2) how each approach impacts the configuration of urban form, and consequently, how each impacts the way citizens navigate and use the urban spaces around the streams (walking, cycling, and public transit use), and 4) how community inclusion/exclusion manifest in each approach and the equity and justice impacts (the distribution of daylighting's benefits). The methods combine spatial analyses of historic and contemporary maps using geographic information systems (GIS); visual typological analyses through in-situ observations; and content analysis of planning documents. The findings provide crucial takeaways for communities, practitioners, and academics considering innovative NbS to address climate change risks. ReferencesKhirfan, L., Mohtat, N., & Peck, M. (2020). A systematic literature review and content analysis combination to "shed some light" on stream daylighting (Deculverting). Water Security, 10, 100067. doi: https://doi.org/10.1016/j.wasec.2020.100067Khirfan, L., Peck, M. L., & Mohtat, N. (2020). Digging for the truth: A combined method to analyze the literature on stream daylighting. Sustainable cities and society, 59. doi: https://doi.org/10.1016/j.scs.2020.102225

2:10 pm	Nature-Based Solutions for a Climate Resilient Built Environment in Major Canadian Cities	National Research Council Canada - Canada's Climate Resilient Built Environment (CRBE) initiative is a program aimed to provide the knowledge and tools to build a sustainable and resilient future in the face of climate change in Canada's cities. The CRBE's goal is to develop and integrate innovative solutions tailored to Canada's unique landscape, and foster urban environments that can thrive amid the increasing frequency and intensity of extreme weather events, such as heat waves. In the past several years, the occurrence of extreme heat events in Canadian cities has led to the premature death of thousands of people due to overheating conditions within homes and communities. In this study the efficacy of two Nature-Based Solutions (NBS) was investigated - cool roofs and urban vegetation - in mitigating the effects of extreme heat in major Canadian cities; Toronto, Vancouver, Montreal, Ottawa, and Calgary, and across different local climate zones within each city. As such, the advanced climate modeling techniques were used to evaluate the impact of implementing NBS on urban overheating mitigation in cities having diverse climatic conditions. The Weather Research and Forecasting model was coupled with urban canopy models to acquire temperature and relative humidity data at a high spatial resolution of 1km. The results indicate substantial reductions in near-surface air temperature with increased deployment of cool roofs and urban vegetation. The largest cooling effect was found in Vancouver, where a maximum reduction of 3.5◦C in 2m air temperature could be felt, whereas the weakest effect was found in Ottawa at 1.2◦C across the city, when both solutions were implemented. These variances highlight the importance of tailoring NBS to local climates and to specific urban configurations. The findings emphasize the pivotal role of nature-based solutions in adapting Canadian cities to extreme heat events, providing actionable insights for policymakers, and for urban planners to prioritize and implement effective climate adaptation strategies to foster resilient and sustainable cities.
2:10 pm	Living labs for sustainability: Bridging social and technological innovation	Next-Generation Cities Institute, Concordia University - The rapid growth of cities and the increased demand for energy and infrastructure are responsible for a significant portion of greenhouse gas emissions and damage to biodiversity and ecosystems. In addition to the negative impacts of climate change, ecosystems are highly vulnerable to the loss of biodiversity (IPCC AR6, Working Group 2, Chapter 6, 2022). Cities are increasingly recognised as promising hubs for innovation given the diversity of stakeholders and available resources, the proximity to both the impacts and opportunities around climate and other sustainability challenges, and the relative agility of governance mechanisms. Recognising the incredible potential of cities and their diverse inhabitants to lead transformations to sustainability, there have been significant advances in developing innovative tools and approaches advancing more inclusive, evidence-based decision-making aimed at building a resilient future for cities. This interactive panel will build on discussions at the Sustainability Research and Innovation Congress 2024 and discuss how strategies can be co-developed to bridge horizontally - bringing together different sectors, disciplines, stakeholder groups, and knowledge systems - and vertically - integrating governance mechanisms and institutional structures in polycentric arrangements from the municipal to the international levels. Participants will discuss the need to integrate technological innovation with social innovation through transdisciplinary engagement that prioritizes justice and equity for humans and non-humans alike. By sharing concrete examples and use cases from around the world, panellists will highlight the potential of living labs and other participatory approaches. The session will begin with a round of lightning talks and conclude with a workshop-style invitation to co-design a burgeoning global community of practice around living labs.
2:10 pm	Collaborative Innovation & Ideation: A Visual Exploration of I4C Conference themes	Supplement conversation with artistic exchange in a brief action-based creative session.
2:10 pm	Advancing Integrated Sustainable Urban Development with an Assessment for Cities: Insights and Applications from UrbanShift	ICLEI - Integrated urban planning is a participatory and flexible management process that enhances a city's capacity to collaborate across different agencies, jurisdictions, and sectors to address key planning and environmental issues efficiently. It engages diverse stakeholders, including the private sector, citizen groups, and marginalized communities, to create innovative solutions to interconnected challenges. Key components of integrated urban planning include establishing a vision and baseline, integration, co-production, negotiation, valuing co-benefits, implementation and budgeting, and monitoring and evaluation. The Integrated Sustainable Urban Development Assessment (ISUDA) is being implemented in 23 cities across Asia, Africa, and Latin America under UrbanShift, and has been supporting cities in identifying needs and gaps in integrated planning. This interactive panel discussion will give city officials insight into the ISUDA's key components so that they can use the assessment themselves to advance integrated sustainable urban development in their own cities and address the challenges they face in their local context. The session will also showcase selected projects implemented under UrbanShift as we hear from UrbanShift city representatives themselves, and the potential their innovation holds for replication in other cities.
2:40 pm	Move to next session	

2:50 pm	PLAN/NET ZERØ - Concordia's pathway to be a driving force to decarbonize neighbourhoods in Québec	Concordia University - As part of our efforts to combat climate change, we must urgently reduce greenhouse gas emissions. With the implementation of a decarbonisation plan and a reduction in energy consumption, Concordia is taking action. Due to the fact that the path to holistic campus decarbonisation is uncharted, PLAN/NET ZERØ calls for experimentation. As part of its goal to reduce overall energy consumption, Concordia plans to transform the university into a living laboratory. The public campus will serve as a sandbox for exploring, co-creating, and testing new innovative technologies and methods. Researchers, students, and industry leaders will be able to work together to discover and develop new innovative technologies and methods and, redesign space use, redefine campus life, reduce resource consumption, boost experiential learning, and conduct research across disciplines. PLAN/NET ZERØ is about creating knowledge through a living lab process that empowers students, researchers and industry leaders in their net-zero carbon projects. Following its PLAN/NET ZERØ vision, Concordia conducts a comprehensive, holistic and orchestrated overhaul of its two campuses in collaboration with partners from industry, the municipalities, citizen groups and academia in order to find approaches, methodologies and solutions for urban transformation. By partnering with industry leaders and municipal partners, Concordia can tap into their expertise, funding, and resources to accelerate the implementation of innovative technologies and methods. Through transdisciplinary collaboration between academia, the private sector, citizen groups, the municipality and the government, it is possible to co-develop and test new sustainable solutions, such as renewable energy systems, energy-efficient building materials, innovative electrification approaches to whole campus systems, etc. Additionally, through collaboration and co-creation, they can share best practices and lessons learned from their own sustainability initiatives, contribute to the collective knowledge and participate in the success of further net-zero carbon projects. This collaboration creates a powerful synergy, fostering a holistic and effective approach to urban transformation and co-creating innovative solutions within campus settings. By working together and leveraging their resources, higher education institutions can make a real difference in the fight against climate change in their local innovation environment and support local value creation.
2:50 pm	Universities as engine rooms for urban climate knowledge and innovation	This session is brought to you by Concordia University and Simon Fraser University These are the original abstracts from each of the organizations: Concordia University - As a result of the triple planetary crisis of climate change, pollution, and biodiversity loss, as well as modern urbanization, new collaborations between disciplines and sectors are necessary. Efforts are being made to develop new methods and to combine forces with new stakeholder constellations to co-produce targeted solutions. With a research site, process, or network as a living laboratory, universities can have a significant impact on society. Universities can provide a platform for knowledge exchange and collaboration between stakeholders and researchers. They can also create a safe space to test new ideas and solutions before implementation. Finally, universities can provide a platform for training the next generation of researchers, professionals, and policymakers. A Community of Practice was launched at the beginning of 2024 by the International Sustainable Campus Network for member institutions working to accelerate campus as a living lab to exchange knowledge, co-create solutions, and bridge blind spots as they develop their campuses into innovation engines within their unique ecosystems largely linked to cities. The Community of Practice comprises members from all continents dedicated to educating the next generation of city decision-makers, creating experiential learning spaces, and involving all relevant and affected stakeholders. The goal is to share how member institutions are developing unique testbeds that will provide urgently needed pilots to demonstrate innovative solutions. Participants in the workshop will be invited to envision urban transformation processes using university campuses as testbeds to demonstrate trailblazing solutions. We will begin by presenting the background of the community of practice, present different settings and approaches (with potentially virtual participants from international partners), and then switch to a brainstorming mode to explore potential solutions that could include conducting interdisciplinary research projects with students and faculty from different disciplines, organizing hackathons or innovation challenges to foster creativity and problem-solving skills, hosting workshops and seminars to share knowledge and best practices, and collaborating with local businesses and organizations to develop sustainable initiatives and projects. Additionally, creating a platform for community engagement and dialogue can help gather diverse perspectives and ideas for addressing the planetary crisis and urban transformation. Simon Fraser University - Climate change is a global issue, yet its effects are experienced at regional and local scales. Communities are on the frontlines of both adapting to climate impacts while also reducing greenhouse gas sources. Yet resources are limited in local governments, and varied geographies, risks, and adaptive capacities pose challenges for scaling knowledge and solutions from community to community. Despite the varied challenges climate change poses for communities, what remains common is that climate action must be embedded in all community decision-making moving forward. The low carbon resilience approach ensures that climate action is a leverage point for supporting communities in their transition toward resilient and sustainable futures. This is the mandate of SFU Climate Innovation: a community-centred approach. As the top research priority in SFU's Strategic Research Plan, the goal is to support communities in this transition by co-creating more systemic and impactful solutions that multi-solve across diverse issues including societal, health, and justice issues as well as climate science, mathematical modelling, biodiversity, and technological and economic change. With a history in community-centred research, SFU researchers are well-positioned to proactively support in this challenge, working with and for community partners to build more systemic, impactful, and scalable solutions. This will require innovative and interdisciplinary collaboration, co-creation with relevant community partners, and the mobilization of knowledge and innovation to accelerate learning and action. In this session, you will learn about how SFU Climate Innovation, led by Dr. Alison Shaw, is orienting the research community to engage in the global challenge of climate change by working with and for communities. Already key climate action and innovation projects taking place at SFU, including SFU's Hydrogen Hub, the sustainable community-resilient alternative mobility (SCRAM) project, the Serving Rural & Remote Communities Project and the ACT - Action on Climate Team's Natural Solutions Initiative (NSI), are getting the attention of other leading institutions. Dr. Shaw will present the innovative approaches being designed at SFU and share the potential of policy and practice-relevant research in higher education, with aspirations of moving the dial on climate action and innovation in communities and sectors across Canada and beyond.

2:50 pm	Brain Healthy, Climate Positive Cities	HKS - The brain economy is a global goal to stop and reverse the loss of brain capital (social, emotional and cognitive brain resources). The way we think, feel, learn and behave are influenced by our physical context, the built environment that we inhabit. We already know the design of buildings and cites has an impact on occupant health and wellbeing and the natural ecosystems they are constructed in: the Global Alliance for Buildings and Construction, U.S. Green Building Council, International WELL Building Institute, World Green Building Council, Urban Land Institute, American Society of Civil Engineers, American Institute of Architects, and many others have made significant progress in curbing the negative effects our rapid urbanization and highlighting wellbeing and climate benefits of thoughtful and integrated design solutions. It's time to push beyond physical and mental health to also enhance our cognitive health. What if every real estate and capital infrastructure investment was intentional about its regenerative potential for equitable public health, economic development potential, dignity for all, and nature? A mindset shift, from 'less bad' to positive and resilient outcomes, is required and brain healthy cities will help us leverage the stressed and constrained cognitive power of our citizenry to solve the biggest challenges of our time. Our panel will start by introducing the concepts of brain health, brain capital, the brain economy and this holistic approach to thriving cities of the future. We will ask participants to engage in a quick a SMARTTM brain training exercise to demonstrate improved strategic attention, integrated reasoning, and innovation potential. Our team will share a design vision for brain healthy, climate positive cities and ask participants to dream with us: what if my city could [fill in the blank]? We will close by underscoring the economic potential and opportunity costs of business as usual.
2:50 pm	Making cities circular: strategies, practices, and tools for resource efficiency	This session is brought to you by Circularity Informatics Lab, College of Engineering, University of Georgia. These are the original abstracts from each of the organizations: Circularity Informatics Lab, College of Engineering, University of Georgia In a time when we are trying to create resilient, sustainable, viable cities and communities, we have to look at material consumption, waste, and circularity. These are inextricably linked to dependence on supply chains, access to safe and healthy materials, justice and equity, and options for environmentally sound waste management. This is particularly a concern for communities near waterways and coastlines, where waste and pollution can increase the risk of flooding and harm marine and aquatic ecosystems that are relied upon for food and tourism. These are global challenges, but cities and communities are on the frontlines of solutions and driving change. The Circularity Informatics Lab (CIL) at the University of Georgia believes in democratizing data and making tools for measuring circularity free, open-source, and widely available and accessible. These data are collected in collaboration with local partners and are designed to support local, regional, or national decision-making. In this panel, you will hear from four different initiatives where CIL is partnering with cities around the world to deploy innovative tools and identify solutions to holistically address circularity and resilience. This panel will take you to cities in South Asia and South America that are tackling interrelated challenges around waste management and sustainability through the Urban Ocean initiative, to cities in the coastal state of Florida in the United States that are pursuing actionable data and building resilience through the Shores Forward Partnership, to a group of mayors along the Mississippi River who are combatting plastic pollution through citizen science, and finally to sister cities that are deploying a framework to address circularity in plastics, organics, molecules (primarily PFAS), and built environment materials. The goal of this panel is to showcase a wide range of cities around the world that are implementing innovative tools and partnerships to holistically address resilience in economics, environment, and society through circular materials management. The hope is for attendees to come away with ideas for how these models and tools can support their own work in their own local context. Cities bear a large burden of plastic management and pollution, which is not consistently recognized. The 'circular economy' has become an aspiration for reducing pollution and increasing sustainability, though quantification and monitoring methods are not consistent. We compare data from six cities participating in the Urban Ocean® program that utilized the Circularity Assessment Protocol (CAP) in India, Indonesia, Malaysia, Panama, and Vietnam. CAP is a standardized methodology used to quantify circular materials management and collect community-level data to inform decision-making. Results show that plastic items and packaging represent over 90% of fast-moving consumer goods, 78% of to-go items, and 69% of all litter items, presenting challenges to local formal and informal waste management systems. These results support solutions that meet an individual city's needs and reflect the materials and challenges present. City-level data facilitates knowledge exchange between communities, which can lead to an effective network of more circular cities worldwide.

2:50 pm	Organizations bridging climate change science and the needs of cities join forces to amplify their impact to increase adaptation globally	Ouranos - According to Chapter 6 of the IPCC 2022 report on impacts, adaptation and vulnerability, efforts to adapt can be accelerated by closer collaboration between the diverse actors deploying adaptation. To encourage increased collaboration and accelerate adaptation globally, an international network of boundary organizations on adaptation was created during Adaptation Futures 2023 in Montreal. Each member organization is bridging the gap between scientific evidence and adaptation decision-making. Several work with communities and cities. They individually contribute to accelerating adaptation to climate change and long-term change in the decision-making ecosystems by providing tailored information and tools for decision-makers. As a network, they can learn from each other and accomplish even more. The panel will include presentations by network members, including from regions - Asia and Africa - where much of the growth in cities is expected to occur and exposure to climate hazards is particularly high. For example, in densely populated Bangladesh, there is little or no space for retreat from steadily increasing climate change induced river-bank erosion. The large cities can hardly take more people in. A potential solution is to equip smaller towns, so they become climate resilient and migrant-friendly. Bangladesh-based ICCCAD will present its work with a rural development NGO, the Global Centre for Adaptation and local government entities to develop town climate adaptation plans and establish local climate adaptation centers. Senegal-based CSE works with communities in West Africa whose livelihood depend on climate sensitive natural resources and is an accredited entity of the Green Climate Fund. CSE will present its work on the implementation of the Reference Office on Climate Change and Adaptation and Mitigation Strategies, which builds the capacity of local authorities to integrate adaptation and mitigation strategies into local plans and policies and mobilize the necessary financing to support their projects. Canada-based Ouranos will present some of its work with the city of Montreal, including the Montreal Climat Lab, which called on researchers led by INRS-UCS to question and integrate climate change adaptation into concrete urban planning and governance practices, with Lachine-Est as case study. Ouranos, who is currently hosting the INBOA secretariat, will moderate the session.
2:50 pm	A just transition through data and digital solutions	This session is brought to you by Humanitarian Openstreetmap team & UNITAC (United Nations Innovation Technology Accelerator for Cities) These are the original abstracts from each of the organizations: Humanitarian Openstreetmap team - The global Mapping for Climate Ready Cities program of the Humanitarian OpenStreetMap Team (HOT) focuses on creating open-source digital maps of unmapped or under-mapped cities facing severe climate vulnerabilities. HOT specializes in supporting territorial management actors, be they small organized communities or national governmental institutions, in obtaining detailed and up-to-date maps through OpenStreetMap's collaborative mapping to support sustainable development and emergency management. We train and facilitate collaborative mapping campaigns, working collectively to ensure data quality, usefulness, and accessibility. Through our Mapping for Climate Ready Cities program, HOT is collaborating with local communities and governments in 13 countries, as well as with a global online volunteer base of more than 600,000 people, to (1) create a digital base map of cities (2) train local decision-makers to use free and open source technologies that will enable them to improve their data management and maintain and use data to inform policy and planning decisions for climate resilience and disaster adaptation. While HOT facilitates the end-to-end process of needs identification, mapping, and analysis, the installation of technical capacities to assist in long-term local development, training, and empowerment of local communities are at the core of the work. We support their needs and their solutions. In particular, through our projects in Latin America, in collaboration with the Open Government Partnership, we have created an intensive training and coaching program for local governments, as well as a community of practice, focused on territorial problem-solving that mobilizes various replicable skills in the timely processing and management of cartographic data. This 4-month project has been designed and localized to meet the respective governments programmatic needs. It has brought together six local governments from Mexico, Ecuador, Brazil, and Chile to address issues of urban heat bubbles, green infrastructure, improvement of the population data for the health system as well as other public facilities, emergency care infrastructure, and construction conditions in the face of seismic risk. See https://www.hotosm.org/projects/mapping-for-climate-ready-cities-latin-america/ UNITAC (United Nations Innovation Technology Accelerator for Cities) - The project “Just transiton in vulnerable places - digital solutions for more climate resilient informal areas and climate smart urban recovery of communities affected by crisis” aims to build digital solutions for more climate resilience in Namibia and Ukraine. This project is very crucial as building climate resilience in places such as informal areas in Namibia and war-affected communities in Ukraine, have a strong impact due to their high vulnerability on climate change. The project tackles the question of “what is climate resilience for vulnerable places and how to build climate resilience through digital solutions”. Using innovative methodologies developed by UNITAC , results and insights have been obtained. The approach used in Namibia relied on the process of design thinking in which climate resilience was defined by partner towns through series of virtual and onsite workshops, in which concrete problem statement relating to climate issues were formulated and adequate digital solution were co-developed. Building climate resilience was defined as improving processes of basic service of water provision of the partner town Rundu and smart water meters for monitoring water losses and facilitate billing in informal settlements are to be introduced, other digital solutions are being explored in topics of flood and drought in partner towns of Helao Nafidi and Opuwo. The approach used in Ukraine relies on the use of digital solutions in planning for resilient recovery relating to the concept of build back better(for more climate resilient systems),through workshops Makariv municipality expressed solid management including war debris as the main priority for a climate resilient recovery and new digital tools are to be introduced to visualize waste composition for better waste sorting, monitoring waste paying services and monitoring system for illegal waste dumping as solutions for circular economy. The UNITAC´s tool CoSI(cockpit for social infrastructure) will be used in developing flood scenario model for partner municipalities that are facing seasonal flooding such as Drohobych for flood protection measures. Several other digital solutions for building resilience in Namibia and Ukraine are to be explored in this project as a proof of role of data and digitalization in climate action.

2:50 pm	Systemic design: bridging gaps between cities and technology providers	Background: Many digital solutions aim to help cities take smart climate action by enhancing the efficiency of government departments. This occurs against the backdrop of systemic challenges and within the context of city processes that are prone to unpredictability, constantly evolving, and inconsistent across organisations. Systemic design is needed to consider how tools can be designed with consideration of the interconnected factors influencing their use. Recognising there is no silver bullet solution, technology providers need to understand cities' key needs to ensure their tools enable users to thrive. Only then can we support practitioners interested in using creative and participatory methods to improve public policy. Purpose: The purpose of this workshop is to amplify city voices to reveal critical insights for adopting and implementing new tools and systems. Openness is one of our core values; our products are open source, and we are committed to sharing broad findings from the research we conduct with the sector. In this workshop, we aim to explore questions such as: How might we design new tools for climate action which consider the constraints of existing council processes? What challenges do practitioners face when adopting new tools? What issues arise from using multiple tools? What opportunities exist for technology providers to integrate their services? Aim: Build on existing systemic design research to identify practical considerations for developing tools that enhance urban climate action Who is Kausal: Kausal's mission is to build the world's most powerful and easy-to-use tools to help cities take smart climate action.
2:50 pm	Climate by Design: Empowering Cities to Take Local Climate Action Through UCCRN's Urban Design Climate Workshops	Columbia University - The Urban Climate Change Research Network's Urban Design Climate Workshops (UCCRN's UDCWs) serve as a way to bridge climate science and climate action through urban planning and design. UDCWs are a hands-on, capacity-building process that engages urban designers, climate scientists, policymakers, students, and stakeholders to work and evaluate urban climate factors at a neighborhood scale. UDCWs empower cities to take action by developing spatial planning strategies that consider localized governmental, socio-economic, and ecological conditions to strengthen urban resilience, improve energy efficiency (and other mitigation techniques), and enhance livelihoods. UDCWs are iterative and have occurred in New York, Paris, Naples, Durban, Gowanus, Randers, and Rio de Janeiro, leading to long-term city collaboration. During this I4C session, UCCRN will share the UDCWs' multi-disciplinary and multi-scale approach, including the four phases of the UDCW process: 1. Stakeholder Priorities, 2. Urban Systems, 3. Co-Design, 4. Metrics, Policies, and Feedback. The session will present research, planning, and policy outcomes from UCCRN's latest UDCW in São Cristóvão, Rio de Janeiro. Session topics will highlight how neighborhood and city-level models and data can be used to effectively climate-proof cities, how justice can be embedded into climate-informed planning, and why stakeholder engagement and the co-production of knowledge should be prioritized. Following the moderated panel, I4C participants will have an open discussion with presenters and additional UCCRN members. During this I4C session, UCCRN plans to launch the Architecture, Urban Design, and Planning for Climate Action Element of the Third Assessment Report on Climate Change and Cities (ARC3.3).
2:50 pm	Cities & Regions as Champions of an Expanded Climate & Innovation Agenda: Finding and Scaling Solutions	ICLEI - Local Governments for Sustainability - Some emerging initiatives in cities and regions aim to deliver on human needs in globally sustainable ways, rather than only addressing the current structures emitting GHG-emissions. Unfortunately, most "solutions" currently take a static and short-term perspective that threatens global sustainability in the long run and undermines many innovations. Static approaches rely upon a narrow frame of reference - optimizing existing infrastructure and systems towards reducing emissions (carbon tunnel vision). Although emission reduction is essential, it is not the be-all and end-all of climate innovation. Static approaches obstruct scaling the multiple benefits of cross-sectoral innovation and guide action towards superficial carbon accounting rather than systemic changes needed to deliver flourishing lives for all and global sustainability. This unique session, co-delivered by ICLEI and Mission Innovation NCI, will showcase two tools for enabling an Expanded Climate and Innovation Agenda: a scanning tool and the newly launched City Strategy Development and Benchmarking tool (CSDB). The scanning tool uses language processing to assess city and regional strategies according to their human needs and solution leadership based on the findings in IPCCs 1.5 special report. Over 100 strategic documents from cities worldwide have already been analyzed. The four main functionalities of the platform are directly connected to solutions, including self-assessment to identify existing solutions and clustering to share and scale them. The Strategy tool helps cities identify ways forward as solution providers driven by human needs. During this session, we showcase the tools and invite representatives from top-performing cities to share their insights regarding the solutions and approaches that have led to them being leaders in this space. Invited experts will then share how the insights from the tools can be utilized to identify and scale solutions to expand the climate and innovation agenda. Audience members will be encouraged to submit strategies from their cities and regions for assessment in the future.

2:50 pm	How can "Boundary spanners" drive planning and design innovation for climate responsive cities?	University Of Melbourne - New modes of practice in planning and designing cities for people and non-human species are needed to respond to climate change, biodiversity extinction and sustainable development goals. The complexity inherent in socio-ecological systems in cities requires a better integration of scientific research, policy and practice. 'Boundary work' theory is useful in connecting science-policy-action through transdisciplinary engagement, communication, and mediation. The critical role of 'Boundary Spanners' or 'Boundary-Riders' has been increasingly acknowledged in different disciplines. Boundary spanners undertake cross-boundary work to disrupt status quo practices, challenge the norms and collaborate across organisational, sectoral, and disciplinary boundaries. Boundary spanning across the built environment sectors have remained understudied, and there is a lack of in-depth knowledge about how boundary spanners in built environment practices emerge, what capabilities they carry, and within what conditions they operate. The aim of this research is to identify key attributes of boundary spanning in built environment disciplines (e.g., design, construction, and urban planning), and the influencing factors including the role of policy, media, behaviours, internal culture and cross-education knowledge building. We propose an interactive workshop to facilitate dialogues among four speakers including a climate scientist, a policy-maker or politician, and a design/planning practitioner, and chaired by Debra Roberts (IPCC Co-Chair WGII AR6) who advocates the role of 'boundary people' in science-practice exchanges. The aim is to stimulate discussions around conditional factors that support boundary spanning in knowledge co-production, with the view to developing a collaborative research or knowledge as an output (including post-conference collaboration and writing time for those keen to continue after I4C24).The discussions will be framed around the following key questions:· How the invited panel and audience define boundary spanning from their disciplinary/knowledge area perspective? What are the capabilities of boundary spanners? How can boundary spanning lead to transformative climate actions? What are the conditional factors that support boundary spanning? What are examples of boundary spanning practices? The results of this workshop will be synthesized into the development of a framework and a collaborative research output to be published after the conference, which can further inform future innovative modes of practices for climate responsive cities.
2:50 pm	From science to solutions: working at the interface of research and action	There is a long history of collaboration, and a litany of research itself, on the boundary work and collaboration between policymakers and researchers, between science and action. There are fantastic examples of such collaboration at the urban scale especially between local governments and universities. Timely data can improve policymaking and open up new solution spaces. Joint action research can provide new insights for both researchers and policymakers that shape understandings of the problem. Such collaborations are also fraught with challenges of differing perceptions: different time horizons, objectives, quality control requirements, methodologies, framings of the problem and understandings of the process of change - all come into play in such collaborations. This session will explore experiences of scientists and practitioners in collaborating together on tangible and specific local urban/bioregional challenges. This is a hallmark of World Resource Institutes approach to urban change, and so a focus will be on the Clean Air Catalyst, a 5 year programme that seeks to enhance momentum for clean air in Jakarta, Nairobi and Indore by bringing scientists, policymakers and citizens together to enhance source awareness through a data-to-impact process. The session will try to draw lessons learnt and some key design principles for how to make such collaborations work in the face of huge pressure on both policymakers and researchers to deliver solutions to complex urban challenges.
3:20 pm	Afternoon Tea & Coffee	
3:50 pm	Smart, integrated and Sustainable lighting solutions for cities	GCoM - Lighting, a fundamental aspect of urban infrastructure, offers a unique leverage point for cities aiming not only to decarbonize, but also to improve the safety, security, and livability of urban areas. In the quest to create integrated solutions that support the well-being of communities while curbing carbon emissions, the Urban Transitions Mission (UTM) is partnering with Signify, a world leader in lighting, to build knowledge and expand access to integrated solutions for public outdoor and indoor lighting. With this innovative collaboration, UTM aims at shedding light on innovative Energy-efficient LED lighting and smart lighting control solutions and their benefits, as well as tap the social benefits, and cost saving potential of lighting, as part of more comprehensive transformations for cities. The contribution can be embedded into discussion about innovative scenarios for energy usage in cities; innovative and integrated solutions for decarbonisation of the energy infrastructures; new business models; IoT-focused and smart cities sessions.
3:50 pm	What sufficiency brings to local governments?	Sciences Po (Paris) - The last IPCC report on climate mitigation highlighted sufficiency as one of the mitigation strategies to consider in climate action plans. Sufficiency being a set of policy measures and daily practices that avoid the demand for energy, water, land, materials and other natural resources while delivering wellbeing for all within planetary boundaries. Unfortunately, sufficiency is overlooked in climate policies and modeling and only few cities (i.e. Paris) are implementing policy measures to capture the sufficiency potential. This session aims at raising awareness about the high sufficiency potential to deliver on decarbonisation and on climate justice. The objective is to identify the existing sufficiency measures in different cities in the world with the aim to feed a special issue under preparation on sufficiency in cities. Accepted papers for the special issue will be only those co-authored by scientists and city practitioners to address the request of city representatives at the IPCC scoping meeting on cities in Riga. Please note that our proposal has been discussed with the EU-Covenant of Mayors, with whom we will be coordinating a survey on sufficiency measures in European cities.

3:50 pm	Enhancing Climate Resilience Through The Solar Energy Industry For Sustainable Development In Nigeria	UNIVERSITY OF NIGERIA, NSUKKA, NIGERIA - Climate change, global warming and other related environmental challenges which constitute a threat to sustainable economic growth have also created opportunities for youths in the solar energy industry in Nigeria. This study identified that the use of solar energy and a lesser reliance on fossil fuels in Nigeria which is in line with the United Nations Paris Agreement will help to reduce the excessive emission of greenhouse gases which are the major causes of global warming and climate change. Through literature review, participant observation and relevant data collection, this study identified that the use of solar energy is a veritable strategy for enhancing climate resilience in Nigeria. It further identified the socio-economic, health and psychological benefits in the use of solar energy for sustainable development in Nigeria. It recommended more advocacy projects and in-depth research on the innovative use of solar energy in Nigeria by climate change researchers and scholars. This study concluded that there is a great need for individuals, institutions and communities to adopt the use of solar energy which is eco-friendly and has the capacity to provide green skills, green technology and green entrepreneurial opportunities for youths thereby achieving sustainable development in Nigeria.KEYWORDS: CLIMATE ACTION, GREEN ENTREPRENEURSHIP, SOLAR ENERGY, SUSTAINABLE DEVELOPMENT, YOUTHS, ZERO POVERTY. REFERENCESAnabaraonye, B., Okafor, J. C., Ewa, B. O., & Anukwonke, C. C. (2021). The impacts of Climate Change on Soil Fertility in Nigeria. In D. K. Choudhary, A. Mishra, & A. Varma (Eds.), Climate Chnage and the Microbiome. Soil Biology (Vol. 63, pp. 607-621). Cham: Springer. https://doi.org/10.1007/978-3-030-76863-8_31Anabaraonye.B.,Okafor.C.J,Hope.J(2018)Educating Farmers in Rural Areas on Climate Change Adaptation for Sustainability in Nigeria. Springer Nature Switzerland AG 2018. W. Leal Filho (ed.), Handbook of Climate Change Resilience, https://doi.org/10.1007/978-3-319-71025-9_184-1
3:50 pm	Campo do Bomba State Park: an academia-civil society-government integration Water Sensitive Urban Design	PROURB/UFRJ - This paper centers on the experience of a participatory design in the Rio de Janeiro Metropolitan Periphery called APA São Bento, Duque de Caxias, Rio de Janeiro. The design responded to the demand for a Park proposal located in São Bento neighborhood, articulated by some social movements gathered in the Civil Society Articulation Forum (FORAS). The participatory design emerged from the Laboratory of Urban Water Studies' (LEAU-PROURB-UFRJ) engagement with FORAS. The proposal is a response to the social movement's demand. It serves as an instrument for their struggle to preserve Campo do Bomba as an environmentally protected area. Campo do Bomba has 1.36mi² and functions as a floodplain (i.e., a 'sponge' area) absorbing water and minimizing the effects of floods in six municipalities in the region, which tend to worsen in the context of climate change. Due to its natural properties, Bomba was part of a much larger environmentally protected area called APA São Bento, which belongs to the Federal Government. Nevertheless, the city government removed Bomba from APA in 2006, categorizing it as an Economic Interest Zone without previous environmental studies or public consultation, and requesting its ownership. The city's goal was to transform the area into a 'logistic gated community' (condomínio logístico). Fearing the environmental and social effects, FORAS called upon three public hearings in 2021, reuniting all actors involved-such as the residents, social movements representatives, public administration officials, university professors, and researchers-in order to expose the arguments against the municipality proposal. After these discussions, the common understanding among specialists and the community was that the alternative proposal should be a state park, which started to materialize itself in 2021 through Bill No. 4773/2021 for the Quilombo do Bomba State Park. To achieve this, the design employs water-sensitive urbanism as a methodology tailored to the Brazilian peripheral context. It reimagines the metropolitan periphery on its own terms, challenging the traditional triad of precariousness, distance, and dependence.
3:50 pm	High spatial and temporal resolution greenhouse gas (GHG) inventory of road transport for Saint-Laurent borough in Montreal	École de Technologie Supérieure - The project is part of a more global one, which consists in developing a "Carbon Map" for the City of Montreal. This Carbon Map will represent the city's GHG emissions for various sectors, including transportation. In 2021, road transport accounted for 28% of the city's GHG emissions (Ville de Montréal, 2023). In addition to providing a higher spatial and temporal resolution to the urban GHG inventory, this map is intended to be a decision-support tool for decision-makers and an awareness tool for the public, by measuring and showing the impact of potential emission reduction scenarios. This project focuses on the development of a methodology for exploring monthly, daily and hourly temporal resolutions for road transportation emissions. To achieve this, a traffic model of the district of Saint-Laurent, provided by the Montreal Urban Planning and Mobility Department, is used. This model simulates morning and afternoon rush-hour traffic for a typical autumn working day and provides traffic flows at road section level. To obtain hourly and annual traffic flows, traffic adjustment factors are applied to the output of the traffic model. These factors are calculated on the basis of traffic volume counts carried out by the City of Montreal and the Ministère des Transports et de la Mobilité durable du Québec, and represent the proportion of vehicles on the road at a given hour in relation to the daily volume, or on a given day of a specific month in relation to the annual average daily traffic (AADT). The flows thus obtained are used to calculate the Vehicle kilometers traveled (VKT) for each road section. Finally, GHG emissions are obtained by applying the fuel consumption of the Montreal vehicle fleet and the appropriate emission factors to the VKT. The method makes it possible to obtain GHG emissions at road section level at different times of day, for days of a typical week in each month of the year. The first results show different traffic profiles for different road types, demonstrating the need to establish adjustment factors specific to road typologies.

3:50 pm	GIS-Based Performance Indicators for a Public Transport Network: Madrid's Case Study	IIC Technologies Limited - This research focuses on creating innovative GIS-based indicators to evaluate and monitor Madrid's public transport network. Despite various sustainable mobility initiatives, such as enhancing public transport services, establishing low emission zones, improving pedestrian areas, and introducing electric bicycles, Madrid still faces challenges with pollution levels exceeding legal limits and a radial public transport pattern that is inefficient for transversal trips, particularly in peripheral districts. To address these issues, the research proposes using Geographic Information Systems (GIS) to develop indicators for spatial efficiency and equity in the public transport network. GIS enables the analysis of connectivity, optimal routes, and georeferenced transport supply and demand scenarios, as well as the visualization of network access disparities across different areas. The required data is sourced from open geospatial databases. The anticipated outcomes include identifying functional and detrimental elements of the mobility networks and their effects on air pollution and quality of life. These indicators and geospatial analyses are crucial for monitoring the implementation of Madrid's Sustainable Urban Mobility Plan (PMUS) and guiding initiatives to promote active transportation and enhance sustainability. The primary objective is to assess the spatial access, coverage, connectivity, and equity of Madrid's public transport network using GIS-based indicators. Specific goals involve measuring the accessibility of public transport stops and lines within walking distances, quantifying travel time and distance for multimodal networks, and evaluating transversal trips in peripheral districts. The methodology comprises a literature review, data compilation, and spatial analysis using GIS software such as ArcGIS and QGIS. Data sources include national and regional geoportals, city council databases, and statistical institutes. The development of these innovative GIS-based indicators is expected to significantly contribute to the monitoring and evaluation of mobility policies in Madrid. They provide a detailed assessment of the public transport network's spatial efficiency and equity, model future scenarios, and enhance public participation. By leveraging geospatial data and advanced GIS techniques, policymakers can make informed decisions to foster sustainable and equitable urban mobility.
3:50 pm	GHG Reduction Protocol for Cities, through the implementation of sustainable programs such as green corridors, condensation wells, environmental and water transparency and appropriate information and data use	Institute of Transparency, Access to Public Information and Personal Data Protection of the State of Mexico and Municipalities Infoem - The current project has its origin in the Toluca Valley area in the State of Mexico, located in the center of the Mexican Republic with a population density of 2,353,924 inhabitants, after studying the growth given from the year 1969 to the year 2020 (year of the last population census), where due to population growth, all bodies of water a decreased exponentially and the risks of expansion of cracks, pollution, flood, as well as irregular human settlements have increased. We could also observed that green areas have been reduced, and in this way the possibility of reducing light and atmospheric pollution, and access to water and sanitation are less accessible to all people. We have develop a series of sustainable programs that we have proved to reduced GHG in 40 percent and to give back at least 50 thousand water liters daily making life better, as well as to reduced heat and work towards ONE health. We also seek to raise awareness among the population about the great natural resource that is a dark sky, its cultural importance, the value it has for people in their perception of nature and the presence of the earth in the universe. The environment belongs to all of humanity, therefore, and given the potential growth of cities in the coming years, we seek for its implementation to be global, not only in Mexican cities. The Institute of Transparency, Access to Information and Protection of Personal Data of the State of Mexico and Municipalities (INFOEM) in compliance with regulations established in national and international treaties such as the Escazú Agreement, whose implementation must continue to guarantee participation rights, access to information and justice in environmental matters, in addition to human rights defenders in environmental matters and all data protection.
3:50 pm	Canada's cities and Fossil Fuel Non-Proliferation	Stand.earth - The threats of fossil fuels are undeniable - both via the deadly pollution they cause when drilled, spilled, and burned, and because they drive the climate crisis. This means that cities, in particular, have a critical role to play in mitigating both the local and global impacts of fossil fuels. In Canada, many city governments have taken the lead on this issue. By endorsing the global movement to phase out fossil fuels via the Fossil Fuel Non-Proliferation Treaty, and then by following up with concrete actions to limit fossil fuels, our cities are leading the way to a better future. Whether it's passing resolutions that call on the federal government to support the Treaty or policies that ensure future buildings are fossil fuel free, Canadian cities are signaling via word and deed that they understand the threat of fossil fuels. And that they're determined to meet it head on. Vancouver was the first city *in the world* to endorse the Treaty, and its bold action has led to more than one hundred cities and subnational governments to follow suit (not to mention 13 nation states!). Despite heavy opposition from the gas industry, city after city in British Columbia has passed policies Zero Carbon Step Codes to limit gas infrastructure in new buildings. Then earlier this year, 82 municipalities in the Montreal Metropolitan Community adopted a by-law chasing the same goal. Join us, as we talk with experts who are advocating for the Fossil Fuel Treaty and a just transition away from fossil fuels. Learn what you can do in *your* community, and help take the movement to end the proliferation of fossil fuels and usher in a vibrant green economy to new heights.

3:50 pm	Enhancing Solid Waste Management For Climate Resilience In Awka Municipality	UNIVERSITY OF NIGERIA, NSUKKA, NIGERIA - ENHANCING SOLID WASTE MANAGEMENT FOR CLIMATE RESILIENCE IN AWKA MUNICIPALITY Benjamin Anabaraonye1 Usang.N.Onnoghen2 Nzemeka. C. Olisah31. Institute of Climate Change Studies, Energy and Environment, University of Nigeria, Nsukka, Nigeria.2. Department of Environmental Education, University of Calabar, Nigeria. 3. Department of Physics and Industrial Physics, Nnamdi Azikiwe University, Awka, Nigeria. Corresponding Author Email: benjaminshines@gmail.com ABSTRACT The challenges of climate change which have profound health and socio-economic effects in communities and cities around the world, have also created opportunities for green entrepreneurship for youths in Awka municipality in Anambra State, Nigeria. This paper examines the green skills, green jobs and green entrepreneurial opportunities in solid waste management which are readily available especially for the youths and women in Awka municipality which in turn addresses the problems of poverty and hunger in the state and in the nation. Through literature review, participant observation and data collection from relevant agencies, this study identifies the innovative ways of enhancing solid waste management for climate resilience in Nigeria. It further identifies that there is great need for individuals, institutions and communities in Awka municipality to adopt proper solid waste management strategies which addresses the profound socio-economic effects of accumulated solid waste in Awka municipality. This study recommends eco-photography, eco-musicology and eco-poetry as innovative educational tools which can be used to enhance solid waste management in Awka municipality. It highlights that solid waste management has capacity to provide green skills, green technology and green jobs for youths and women in Awka municipality for sustainable economic growth. This paper concludes by highlighting the effective methods of bridging the communication gaps through efficient information dissemination, intensive awareness outreach, use of educational blogs and other social media network to help ensure that individuals and communities are adequately educated and efficient in their task of solid waste management for climate resilience in Awka municipality.Keywords: Awka, Climate Resilience, Municipality, Sustainable Development, Waste Management. REFERENCES Anabaraonye.B, Okafor, J.C &Hope.J. (2018). Educating Farmers In Rural Areas On Climate Change Adaptation For Sustainability In Nigeria. In: W. Leal Filho (Eds.), Handbook of Climate Change Resilience, Springer Nature Switzerland Ag. Https://Doi.Org/10.1007/978-3-319-71025-9_184-1https://projectgreeninitiative.wordpress.com/2024/04/01/world-environment-day-2024-virtual-summit/
3:50 pm	Depreciating currency impacts on local-scale energy system planning: the case study of Accra, Ghana	Empa, Urban Energy Systems Laboratory - Currency depreciation poses challenges to long-term sustainable energy planning, particularly in the context of the Global South and its cities. Yet, energy system models typically fail to assess currency depreciation impacts on sustainability strategies. Our study employs a cost optimization model of Accra, Ghana (developed using the open-source modeling framework, OSeMOSYS) to evaluate a range of depreciation scenarios and their effects on local energy system planning. We find that investments in renewable energy technologies (RETs) (PV and wind energy) are significantly impacted in terms of scale of deployment, technology type, and timing, depending on the depreciation scenario. PV investments are reduced by up to 80% compared to a base case scenario, and total CO2 emissions increase by up to 65% due to reduced RET investment. Total system costs increase by a factor of three in a worst-case scenario as well. However, waste energy power plants appear to be a robust investment decision for Accra under the range of evaluated scenarios. Overall, this study demonstrates the importance of considering currency depreciation scenarios in long-term planning processes due to the financial uncertainty it introduces. Energy system optimization models can serve as a valuable tool in understanding depreciation impacts on investment decisions and local sustainability targets, and should be harnessed to support resilient energy system planning, especially in developing economies.Reference link to this brand new, peer-reviewed paper by the authors: https://www.sciencedirect.com/science/article/pii/S2211467X24000695
3:50 pm	Exploring the Urban Climate Innovation Readiness Navigator for Cities and Local Governments (CIRN)	To accompany the official launch presentation of the CIRN during the opening presentations for the second day of the I4C conference, this session will provide an additional opportunity to showcase the launch of the CIRN output (brochure) and unpack the key components that comprise the assessment. Over the 20 minute session, it is anticipated that there will be light audience engagement and participation through a digital survey to gather insights and feedback on the CIRN. The presentation will also allow for an overview and indication of the rollout of the CIRN over the course of 2024 and 2025 across North America (Canada) and Australasia with university partners.
4:10 pm	Assessment of challenges and constraints of Municipal solid waste management in Kibuye 1-Makindye division, Kampala, Uganda	Mbarara Development Agency (MDA) - Proper municipal solid waste management is a very essential component of sanitation. The increasing urbanization, and rapid development associated with population growth has resulted in increased solid waste generation. However, the capacity of the relevant urban authorities to deal with this environmental problem remains insufficient. Poor waste management continues to threaten the health and quality of life of people especially urban dwellers. The study was carried out to assess challenges and constraints of Municipal waste solid management, management mechanisms, and communities' knowledge about dangers of poor solid waste management. The study was cross-sectional and employed both qualitative and quantitative methods of data collection. It was carried out in Kibuye1 Parish which has an area of 32.20 hectares, with a projected population of 21,669 (2014). Kibuye is mainly residential, with small-scale commercial activities (KCC Makindye division, 2010). Study sample size was calculated using Kish and Leslie formula (1965) for single proportion, with a precision of 10%, at confidence interval of 95% with a prevalence of 49% that represented the proportion of solid waste collected and disposed off by KCC and private companies in 2010. The households were the study units, 100 respondents were sampled proportionate to the population size of the 5 zones in and randomly sampled in each zone. Eight key informants were interviewed.The results revealed that 80% of the respondents stored refuse in sacks, 48% partially sorted refuse before storage, and 88% did not have central collection facilities, 78% had their refuse collected from door to door by three Community Based Organizations (CBOs) and 16% burn the refuse. 86% had problems, with managing their solid waste, while 14% had no problems, apart from high collection costs, lack of enough collection facilities, delayed collection, flies and bad odour. The study recommendations included: - providing proper (leak proof) storage containers, increasing supervision to the (CBOs), looking for more funding to reduce the collection costs, scaling up community sensitization, instituting legal framework on proper solid waste management (SWM).

4:10 pm	Proposal of intermunicipal consortia for solid waste management with analysis of scale-up of complex for treatment and final disposal of this waste	Institute of Planning and Management of Cities - The management of solid waste is a challenge for Brazil, the collect and the environmentally correct disposal of the rejects are a deficit as well as the recyclable waste utilization. Then, the IPGC prepare a scale-up analysis to verify the cost saving that can be achieved with waste treatment based on the preparation of cost spreadsheets for the construction of complexes for treatment and final disposal of urban solid waste - CTFD-USW comprising a landfill, a composting plant and a sorting plant with different capacities. Once it is done, by executing regression equations, it was possible to verify whether there was a gain in scale depending on the size of the CTFD-USW. Then, the creation of consortia for the Brazilian municipalities was proposed for those that still do not provide a correct destination for their wastes, considering a radius of 100 km between them. Finally, with the appropriate regression equation and the masses of waste that can be treated in the CTFD-USW, CAPEX and OPEX of the complex were estimated, as well as the possible generation of employment and the mass of waste that can be treated and saved from the environment. In the analysis, it was possible toperceive the gain in scale in the treatment of waste, it means that the more treated, the cheaper the unit cost of the treatment will be, with the cubic regression equation being the one that best suited the data. With the regionalization, 544 consortia were proposed, potentially impacting 40.76% of the Brazilian population. CAPEX for 35 years was estimated at R$ 31.3 billion (US$ 6.1 billion) and monthly OPEX was estimated at R$ 438.8 million (US$ 85.3 million). It was estimated the generation of 150,621 direct employments, 72,009 indirect employments and 232,171 employments via income effect, totaling more than 450 thousand jobs. With the complex, more than 14.6 million tons of recyclable waste can be treated annually. Therefore, the CTFD-USW brings environmental, socials and economics benefits, being a way of promoting a more sustainable environment and a society more aware of its impact on the environment.
4:10 pm	Stretch and transform for energy justice: Indigenous advocacy for electricity institutional transformation in British Columbia, Canada	University of Victoria - Many First Nation communities in British Columbia view renewable energy as a source of income consistent with their world views. Renewable energy has the potential to provide long term revenue streams and local economic development, alongside consolidating relationships, collective identity and empowerment. In many cases, grassroots energy actors take pragmatic approaches to overcoming challenges and constraints through strategies between two ends: “fit and conform” strategies adapt to existing governance practices, market structures and supply chains, or “Stretch and transform” strategies that influence changes to the institutional structure and energy value chains, leading to a reconfiguration of practices and structures that support grassroot energy initiatives. This study explores the rationale and potential models of Indigenous collective leadership in renewable energy that offers a potential pathway for just policy design. In the pursuit of decarbonization, British Columbia is facing a looming electricity supply shortage by 2030. A collective of First Nations in British Columbia, Canada, are embracing the implementation of the United Nations Declaration of the Rights of Indigenous People (UNDRIP) in law to advocate for the development of a regional scale “First Nations Power Authority” (FNPA), a “stretch and transform” strategy that challenges the incumbent province-wide monopoly utility, BC Hydro. These First Nations have persisted in a context characterized by lack of control, institutional barriers, and lack of access to capital, finding support for their projects, and delivering benefits to their communities. We draw on regulatory, policy, media, and advocacy text analysis about the range of ways the First Nations Power Authority institutional strategy is being characterized in current advocacy efforts. We incorporate findings from interviews with knowledge holders of 14 First Nations in BC with direct experience with renewable energy projects in their communities, drawing lessons and learnings likely relevant for other settler-colonial contexts and for community energy more broadly. Motivations for sovereignty over energy, impacts, institutional and actor barriers, institutional support, specific experiences with the incumbent utility, and the development of relationships and capacities outside of the incumbent utility clarify why the pursuit of this stretch and transform strategy was used as the basis to challenge existing electricity institutions.
4:10 pm	Leveraging the FAIRMODE Experience to improve the efficiency of Climate Mitigation Efforts	EC, JRC - Leveraging the FAIRMODE Experience to improve the efficiency of Climate Mitigation EffortsAs cities around the world grapple with the mounting challenges posed by climate change, the need for innovative and effective mitigation strategies has never been more pressing. The FAIRMODE (Forum for Air Quality Modeling in Europe) initiative offers a wealth of insights and best practices that can be adapted mutatis mutandis to support climate action at the urban level. At its core, FAIRMODE emphasizes the importance of robust and fit-for-purpose modeling to support decision-making in addressing complex environmental issues (on air quality). By integrating advanced modeling techniques, cities can better understand the intricate dynamics of greenhouse gas emissions, energy consumption patterns, and the potential impact of various mitigation measures. The FAIRMODE experience promotes the value of collaborative efforts and knowledge-sharing among stakeholders, fostering a holistic approach to problem-solving, added values that could be profitably translated from air quality to the deeply interconnected issue of climate change mitigation. Indeed, cities can leverage this concept by fostering partnerships between local governments, academia, industry, and community organizations, harnessing collective expertise to develop tailored climate strategies. Moreover, FAIRMODE's emphasis on harmonized methodologies and quality assurance protocols can be adapted to ensure the integrity and comparability of climate data across urban areas. Such a standardization facilitates benchmarking, progress monitoring, and the identification of best practices that can be replicated or scaled. In conclusion, by embracing the lessons learned from FAIRMODE, cities can unlock new pathways for effective climate mitigation, leveraging data-driven insights, collaborative frameworks, and rigorous quality assurance measures to drive tangible progress toward a more sustainable urban future.

4:10 pm	Green Building Concepts as an Essential Component of Sustainable Food Chain and Urban Biodiversity Conservation	TransAfrica Nature Conservancy - Green buildings often refer to the development of ecologically responsible, energy-efficient structures that maximize the use of renewable energy sources, provide high levels of comfort for people, and do not threaten biodiversity. Modern and conventional housing development in major cities in the world are affecting the food value chain and causing loss of biodiversity. The quest for building sustainable cities is currently being faced with the trio of Climate change, biodiversity loss and plastic pollution. This contradictions in urbanization is gradually gaining attention among sustainable development practitioners. In this study, we evaluated the knowledge of the concept of green building and protection of urban biodiversity richness among building and construction engineers in Nigeria. We also investigated how green buildings contribute to food value chains and biodiversity restoration in urban centres. A convenience random sampling method was adopted, and semi-structured interviewer questionnaires were designed with a virtual survey tool - the Google online form - and administered virtually to construction professionals, builders, real estate developers, architects, and surveyors across the six geo-political zones in Nigeria. Data collected were stored using Microsoft excel package version 2021 and further processed with SPSS statistical software package. A five-point Likert scale was utilized to rank the importance of green buildings and the understanding of this concept among the 1198 building professionals that responded. The survey research findings revealed that 23.1% of building and construction engineers are aware of green building concept while 53.9% are not aware of the concept of green buildings but are willing to adopt the techniques and contribute to national agenda on biodiversity restoration and sustainable food chain. According to our study, energy-efficient designs in green buildings are viewed as very important by a considerable majority of respondents (65%), with an additional 25% finding them to be important. This further make us to conclude on the prevailing evidences that though the concept of green buildings in urban development may be new, there is strong prospects in its general acceptability to building innovative cities, and green urban centres that protect urban biodiversity richness and climate change adaption.
4:10 pm	Plugging into Mobility Needs at Lower-Income Multifamily Housing: How to develop electric mobility and charging solutions that reflect community priorities	RMI - RMI proposes a presentation introducing its Multifamily Charging Accelerator Project, which aimed to identify transportation needs and tailor charging solutions for residents of lower-income multifamily housing. The project’s key objective was to drive implementation in three project partner cities - Atlanta, Phoenix, and Portland - diverse in their geographies, built environments, and transportation accessibility. This session will outline the project's novel: 1. site selection analysis, which identified and prioritized specific neighborhoods to promote efficient, accessible charging and mobility connectivity based on socioeconomic background, grid characteristics, scale of impact, and accessibility factors; 2. cooperative process with city partners and community groups for engaging residents in on-site assessments and capacity-building discussions that included EV test rides facilitated by local EV owners and shared e-bike and e-scooter providers; 3. site-specific charging recommendations for each multifamily housing community based on insights from residents about their mobility priorities, as well as safety and cost concerns from building management; and 4. tailored strategies for abating the cost of deploying and maintaining recommended charging infrastructure without passing it on to lower-income residents or building management, such as stacking government and utility incentives and pairing charging with a shared low-cost EV option like participating in a community EV carshare. Using slides and recorded messages from equitable e-mobility champions from each of the three participating cities, this session will present scalable, replicable solutions; lessons learned; and recommendations for policymakers, utilities, and other stakeholders for prioritizing equity in the e-mobility transition, especially for those without access to home charging like residents of both affordable and naturally occurring affordable multifamily housing.
4:10 pm	Promoting Smart City Development among Real Estate Developers for Climate Change Resilience and Adaptation in Nigeria: The Role of Climate Change Communication	Chukwuemeka Odumegwu Ojukwu University, Igbariam, Anambra State, Nigeria - Nigeria's urban areas are vulnerable to climate change impacts, and smart city development has emerged as a crucial strategy for building climate-resilient cities. Real estate developers play a vital role in implementing smart city initiatives, but their engagement with climate change issues remains limited. Effective climate change communication is essential for motivating real estate developers to build smart cities that are resilient to climate change. This study employs a conceptual review to explore the role of climate change communication in motivating real estate developers to build smart cities for climate change resilience and adaptation in Nigeria. The review identifies key factors that influence real estate developers' engagement with climate change issues, including knowledge, attitudes, and practices related to climate change and smart city development in the Nigerian context. The study highlights the importance of effective communication strategies, including framing, messaging, and stakeholder engagement, in motivating real estate developers to adopt climate-resilient smart city development practices in Nigeria. The research also emphasizes the need for policy support, economic incentives, and collaborative platforms to facilitate the adoption of smart city development practices among real estate developers in Nigeria. The findings of this study provide valuable insights for policymakers, real estate developers, and other stakeholders seeking to enhance climate change resilience and adaptation in Nigeria's urban areas through smart city development. The study's results highlight the need for targeted interventions, such as training programs, policy incentives, and collaborative platforms, to facilitate effective climate change communication and promote the adoption of smart city development practices among real estate developers in Nigeria. Keywords: Climate Change Communication, Real Estate Developers, Smart City Development, Climate Change Resilience, Adaptation, Nigeria

4:10 pm	Optimized City GHG Emissions Calculations and Forecasting: A Data Management Solution for Two Colombian Cities	Tachyus Corporation - This paper presents an innovative digital Greenhouse Gas (GHG) emissions management solution implemented for two Colombian cities. A GHG emissions inventory was developed for material emission sources and was automated through data integration into a software platform, where advanced analysis including emissions forecasting scenarios was performed. The digitalization of the GHG workflow supports municipalities of all sizes in quickly assessing decarbonization scenarios and monitoring their progress against emissions reduction targets to reach their sustainability goals. To achieve the automation of GHG emissions calculations and forecasting, models and emission factors were developed for city-specific emission sources, including stationary energy, transportation, waste, land use, and industrial processes. A data pipeline was established and connected to data sources (cloud databases, local files, and tailored forms transferred by secure protocols) to create a centralized repository. After data cleansing and transformation, three years of activity data were mapped to each emission model as inputs. Then, a quality assurance process was performed to validate the emissions calculations, enabling an automated GHG calculation workflow as new data is provided. Finally, emissions forecasts were generated based on a variety of scenarios to assess the impacts of growth and decarbonization plans on future emissions. The result is the successful digitalization of a greenhouse gas emissions accounting and forecasting workflow to support climate action at the city level. The methodology enables automation by gathering all relevant activity data and mapping them to the appropriate models for relevant emission sources. GHG emissions results can be generated regardless of the required frequency. The result is a robust, automated data infrastructure that aids in forecasting and ensures that cities are on track to meet their decarbonization goals. Additionally, the software generates customizable dashboards and reports to support a variety of analyses. This pilot project covered two capital cities and can be scaled nationwide, serving as a benchmarking tool and offering meaningful recommendations to the government. This solution contributes to the adoption of climate change mitigation strategies at the city level. Generating this structured and digitalization-driven approach will provide information to evaluate scenarios and develop reliable plans aimed at climate resilience and sustainability
4:10 pm	New Tools and Methods for Sustainable Mobility Transitions	ORG Permanent Modernity - As cities transition to active and transit based mobility planning a new breed of decision-making tools are needed that replaces the emphasis on traffic simulation with more productive algorithms aimed at transitioning to more sustainable and accessibility mobility options. We will present four nested and interconnected innovations in the urban mobility planning space, developed through real projects at ORG, that aim to help transition cities to low-carbon, accessible non-car-based mobility. First, we have developed a fully integrated design process that incorporates mobility modeling within a broader scope of infrastructural planning expertise in our firm. This integration includes spatial design, cost analysis, risk assessment, stakeholder engagement, project management, and direct political engagement with key decision-makers. Second, we will outline a new mobility modeling methodology that balances accuracy, generalizability, computational speed, and spatial scalability. Accuracy is achieved through validation with current mapping tools, while generalizability is ensured by robustness to data errors and sources and future demographic shifts within cities. Computational speed is achieved through a combination of algorithm design and parallelization. Spatial scalability, of the expansion in area that can be simulated, is addressed through hardware scaling and intelligent sampling methods. Third, we will demonstrate a front-end web application that provides all stakeholders with equal access to our model, its assumptions, and its results. Lastly, we will outline and provide a simple example of how this new breed of fast mobility models we are advocating for can hook into generative design methodologies such as reinforcement learning and genetic algorithms to leverage the power of these approaches to let compute power find solutions to what are currently computationally intractable problems due to the overemphasis on micro traffic simulation.
4:10 pm	Ecodistricts: Catalysts for Sustainable Urban Energy Systems	ICLEI Europe - Cities worldwide, particularly in Europe, are actively pursuing sustainable development goals and net-zero carbon emissions. Ecodistricts have emerged as a powerful tool for urban planners to demonstrate this commitment and take concrete action. This paper analyzes three renowned ecodistrict case studies, examining their innovative energy solutions in the context of climate change mitigation and greenhouse gas reduction. Drawing on data from these successful examples, the research highlights a paradigm shift in ecodistrict energy strategies. All three cases demonstrate a transition from fossil fuels to zero-carbon energy generation. While mandatory energy requirements have proven effective, the paper proposes a minimum standard of passive house design for future ecodistricts. The study emphasizes the importance of diversified power generation and district heating systems. This includes utilizing biomass-based combined heat and power plants alongside wind turbines, both sized according to the projected energy needs of the ecodistrict. Finally, the research underlines the crucial role of ecodistricts in transforming cities into drivers of change. These districts serve as pioneers of energy efficiency and renewable energy practices, encouraging innovation and inspiring other cities to implement similar approaches globally. Keywords: Ecodistricts, Positive Energy Districts, Green Cities, Renewable Energy, Sustainable Development GoalsREFERENCES1. IEA (2021), Empowering Cities for a Net Zero Future, IEA, Paris2. IEA (2022), Buildings, IEA, Paris 3. IPCC, (2014c). WGIII SPM Summary for Policymakers. 4. City of Heidelberg, (2007). Urban framework planning "Bahnstadt 2007"; 5. City of Heidelberg, (2019). Bahnstadt - The place to be in the science city of Heidelberg; Public Relations Office, City of Heidelberg.6. City of Heidelberg. (2022). Heidelberg Bahnstadt. 7. Coates, G. (2013). Sustainable Urbanism: Creating Resilient Communities in the Age of Peak Oil and Climate Destabilization. In (pp. 81-101).8. EEA (2022). Trends and projections in Europe 2022. 9. EEA (2022a). Primary and final energy consumption in Europe. 10. EEA (2022b). Greenhouse gas emissions from energy use in buildings in 11. Federal Ministry of Economy and Energy. (2016). Combined Heat and Power Act. 12. GEA, (2012). Global Energy Assessment - Toward a Sustainable Future 13. City of Freiburg, (2008). District of Vauban29 references in total

4:10 pm	Youth Impact Framework: An Action Framework for Cities to Learn From and With Youth	Student Energy - The Youth Impact Framework is a tool for youth to communicate their work to government officials and industry leaders and for decision-makers to understand the work youth are doing in the climate and energy sphere. This Framework, developed by Student Energy, the Global Covenant of Mayors on Climate and Energy, and the Melbourne Centre for Cities, was produced in 2022. Over the past few months, the team has launched the City Challenge Teams Pilot Project, intended to put the Youth Impact Framework into practice through two project teams working with local-level governments to address a climate issue. Through two successful projects with a team of youth and city officials in both Freetown, Sierra Leone and Ormoc, Philippines, the Youth Impact Framework was applied through recommendations that youth provided to address a challenge city governments were facing. This session will build off of the final presentations from the two youth City Challenge Teams at the Innovate4Cities Conference, showcasing how this Framework can be applied to local governments globally. This presentation will explore the application of the Youth Impact Framework and how learnings from the City Challenge Team Pilot Project could be applied to cities worldwide. Youth are at the forefront of climate and energy solutions, directly implementing solutions and advocating for the changes they need to see in their communities. Yet they often have access to far too few resources and are not included in decision-making processes. This Framework acts as the communication bridge between youth and decision-makers to understand a shared language around youth impacts in the climate and energy sphere. As a set of 15 impacts, the Framework includes some of the outcomes and indicators of youth-led work that is central to climate and energy challenges. This presentation will outline the value of cities and decision-makers adopting this framework as a tool to enhance their own actions, policies, initiatives, and procedures with the power of youth. Student Energy brings the perspective of global youth to the Innovate4Cities Conference and showcases how city officials and policymakers can best engage with youth in their communities.
4:30 pm	Cooling the urban form in an arid city of Argentina by easy-to-use urban design tools	INAHE - CONICET - Cities play a key role in integrate climate actions. Since multiple factors contribute to the increase the urban warming, as a result of interrelated effects. Reduce heat at the urban scale for achieve resilient planning through interventions of their infrastructure has a high-up impact. A whole-system approach to sustainable urban cooling is needed to allow keeping our cities cool in an efficient way. Therefore, urban design and planning tools to address city cooling need to be created and shared. This work presents three easy-to-use urban design tools to assess the impact that the urban form has over the outdoor thermal performance during summertime. The developed tools emphasis on heat-minimizing urban planning by quantifies the impact of diverse feasible interventions to implement in order to achieve efficient designs at neighborhood scale.The study was carried out in an arid city -Mendoza Metropolitan Area (MMA) - Argentina-. The methodology used consist in a microclimate monitoring campaign of three study cases that are representatives of the MMA urban form. Therefor 120 urban scenaries were design and simulated by Envi-MET software, with the goal of mitigate urban heat. From this inputs and using statiscall methods, three parametric models were generated.By consider that arid cities are more vulnerable to extreme heat events and their consequences. Employ and implement urban cooling oriented design tools -in the pre-design and rehabilitation stages- is considered a remarkable contribution for the sustainability of this urban context.The tools and more explanation are available to download in this open access link: https://drive.google.com/drive/folders/1aLGdv3uUg0KslrhLnAi90pr078nUK7s6?usp=sharing
4:30 pm	Introducing the True Value Framework (TVF): A Novel Approach to Sustainable Assessment in Renewable Energy Projects	Dublin City University - The increasing complexity of urban sustainability challenges necessitates innovative approaches that transcend traditional economic metrics. The True Value Framework (TVF) offers a comprehensive tool for assessing renewable energy projects, integrating environmental integrity, social equity, and economic viability. This presentation introduces the TVF, designed to redefine sustainability assessments and enhance decision-making in urban development. The TVF utilizes a robust set of sustainability indicators to provide holistic evaluations of projects, ensuring that renewable energy initiatives contribute effectively to urban climate goals. By incorporating a multidimensional approach, the framework helps stakeholders understand the broader impacts of projects, fostering a more sustainable and resilient urban environment. The presentation will outline the methodological underpinnings of the TVF, highlighting its capacity to merge rigorous scientific analysis with actionable policy insights. This methodology is crucial for city planners and policymakers who require comprehensive tools to navigate the intricacies of sustainable development and implement scalable climate actions. A general application of the TVF will be demonstrated through a case study involving a renewable energy project. This example will illustrate the framework's practical application and its effectiveness in identifying and enhancing sustainability outcomes. The presentation will focus on the TVF's utility in guiding urban projects towards achieving deeper ecological and social benefits, alongside economic growth. In conclusion, the TVF serves as a vital instrument for urban sustainability, offering a nuanced evaluation tool that addresses the multifaceted nature of climate action in cities. By adopting the TVF, urban stakeholders can ensure that their initiatives are not only economically viable but also align with the broader objectives of sustainable and equitable development.

4:30 pm	Covenant of Mayors: Prospective GHG emission factors for electricity use in EU27 countries	Joint Research Centre (European Commission) - The EU Covenant of Mayors for Climate and Energy (CoM) initiative brings together more than 10 000 local and regional administrative authorities fostering the design and implementation of effective climate change policies and strategies at city level. EU CoM signatories develop a Sustainable Energy and Climate Action Plan (SECAP), including baseline greenhouse gas (GHG) emission inventories and expected GHG reduction estimates for their planned climate mitigation actions. In this context, the Joint Research Centre (JRC) provides GHG emission factors (EFs) for local authorities to estimate emissions associated with the use of national grid electricity. Electricity plays a key role in the sustainable energy transition and in climate mitigation, and electrification across all sectors and the widespread uptake of electronic consumer devices (including ICT) have contributed to a significant increase in electricity demand in recent years.This paper presents current and prospective GHG emissions factors for national electricity use in the EU27, specifically developed for application in the CoM. We calculate generation- and consumption-based EFs for EU-27 member states, with a 5-year interval from 2020 to 2050, based on the POTEnCIA Central scenario. The 2020 EFs are compared with the current EU CoM EFs for national electricity in 2020, to understand how the methodology used in this article - adapted to the POTEnCIA data availability and format - compares to the current (retrospective) CoM EFs. Moreover, we evaluate the influence of international trade on the EFs, in particular, the potential significance of GHG emissions associated with electricity imports in the consumption-based EFs, as data on trade is often limited, particularly for prospective energy and emission models.
4:30 pm	THE ROLE OF LOCAL GOVERNANCE IN ACHIEVING SUSTAINABLE SOLID WASTE MANAGEMENT IN A HILLY REGION: CASE OF SHILLONG, MEGHALAYA, INDIA	M.S. Ramaiah School of Architecture, Bangalore, Karnataka - Solid waste management has emerged as one of the most challenging sector which contributes to GHG emissions. The harsh reality is that, the proper management of waste is still a neglected aspect by policy makers and planners in many cities of India. Shillong is one of the most beautiful, yet populated hill station in North-East India and is also capital of the state Meghalaya. Because of the increasing tourism, Urban Growth and steep terrains, there has been an increase in waste generation which is imposing a pressure on existing waste management practices. Shillong follows traditional governance system which plays significant role in proper implementation of Solid Waste Management. Governance of Meghalaya is governed by the rules of the 6th schedule of the constitution, which has its close ties with the local community. To tackle the issue of Waste Management being a major challenge, local municipal council with the help of Dorbars (local authorities) have implemented diverse sustainable methods aiming towards 'Zero Waste' from each ward of the city with community engagement. In order to reduce environmental degradation because of improper waste management, Shillong Municipal Corporation has taken many unique approaches such as, Zero waste campaign, use of local bamboo bins which are supported by existing traditional governance system. All these approaches establish Shillong as a good example of integration of traditional as well as sustainable waste management practices with the help of successful public involvement. This example also exhibits the successful amalgamation of Local Governance and diverse community groups- such as various Schools, Localities, Women, and NGOs in achieving Sustainable Waste Management. This study also focuses on the traditional & sustainable approaches in Shillong and also emphasizes on the role of urban planners in the development and implementation of solid waste disposal policies. The study will help to analyze the role of local governance system in community engagement and implementing strategies in hilly city Shillong to reduce improper waste management followed by environmental degradation & to attain sustainability in the hilly region of the developing country. Key Words: Local Governance, Community Engagement, Sustainability, Waste Management
4:30 pm	Make Gulu City Green Again.	Vision Ahead - Anek Lucy Abstract - Innovative collaboration - Introduction Make Gulu City Green Again is a city-wide climate action Project that features collaborative positive learnings and concrete results, bringing together stakeholders from business, government, academia, civil society and the community. The project showed how effective cross-sector cooperation can be bringing about significant change and tackling the intricate problems associated with city climate change action. The project focused on the following: Innovative collaborations City Climate Action Plans: Stakeholders' engagement by different sectors, Emission inventory and baseline assessment, and Action development plans NEMA and MWE: reduction on sludge grappling to ensure recycling of refuse in slum areas. Proper dumping of garbage in the city (garbage bins), garbage collection, and recycling into manure and plastic bottles for the manufacturing of plastics. Green Infrastructure Innovation: Big Green Innovation (BGI) solutions involve the planting of environment-friendly tree species along city streets, Blue Green Infrastructures through Social innovation, which cities can implement and adopt, and constructing artificial wetlands in urban cities and preventing flooding. Climate-Resilient Urban Planning: Zoning to allocate different land uses and planning activities in urban development. Clean Energy Transition: Investment in renewable energy through solar & solar-powered technologies, solar-automated Kiira motors in the transportation sector, climate-smart agriculture (CSA), and innovations for trapping CO2 in the atmosphere. Community-Led Climate Initiatives: Grassroots efforts are driven by residents, organizations, and stakeholders to address climate change at the local level using a bottom-up approach through community gardens and urban farming. Energy cooperatives, where the community comes together to develop renewable energy projects, Transition towns, where rural-urban migrations are being reduced and communities depend on their gardens. Transport by walking, using public transport, or bicycles, Climate action involves various stakeholders from various backgrounds. Resilient infrastructure projects to strengthen the community against climate-related hazards, zero-waste initiatives by recycling waste; Local policy advocacy, especially sustainable land use. Implementation, Public awareness, Financing, Monitoring, Reporting and review. Conclusion The effectiveness of innovative collaboration drives climate action projects that can be scalable in cities. Keywords: City Climate Action, Collaboration, Innovation, Cross-Sectoral Partnerships, Sustainability, Resilience.

4:30 pm	Accelerating place-based socially engaged renewable energy transitions by understanding the socio-technical aspects of emergence of renewable energy clusters	University of Victoria - The speed and scale of a renewable energy transition has important societal implications and opportunities to address citizen and community participation, equity, and justice. Renewable energy transitions depend on activities at both ends of the value-chain, from the development and manufacturing of new innovations and technologies to their widespread diffusion. In engineering modeling that incorporates the biophysical properties of energy systems and technologies, clusters of renewable and low-carbon innovations are found to be the building blocks of renewable energy transitions, as combining variable renewable energies with flexibility (including storage and demand management) and bidirectionality (such as storage and prosumership) can improve the reliability, share and costs of grids with more renewables. That is, one emerging type of energy phenomena that has gained attention as a potential driver of a reliable renewable energy transition, known as “renewable energy clusters”, describes a range of place-based energy activities along the energy value chain, from production of technologies and innovations to their use. The potential, demand, and production of renewable energies as place-based phenomena that are not accounted for in dominant energy-economy models. For regions, cities and communities to understand how renewable energy will diffuse spatially, reliably, and how it's governance affects issues of justice and labour, requires new methods of analysis. Despite their promise, there lacks a clear definition and typology of renewable energy clusters, and analysis of a wide range of existing renewable energy clusters could synthesise the potential place-based factors that influence or inhibit their emergence, that could be used to inform place-based strategies that address local assets, actors, space, labour, knowledge issues, or localised justice issues. This paper will present the development of a global empirical dataset of existing renewable energy clusters; and the developed framework of factors upon which this dataset can be tested and typified to better understand the underlying factors that predict their emergence, to remove barriers, and formulate better socio-technical interventions. This will help to identify how RECs emerge in different forms depending on the characteristics of location, social, geographic, economic, institutional, governance, and to understand their implications for renewable energy transitions in local regions.
4:30 pm	Edmonton budgets its emissions alongside its dollars	Sustainability Solutions Group (SSG) - What does it mean when you set a cap to the amount of greenhouse gas emissions you can generate… ever? Is it possible to operationalize this emissions cap to mobilize the whole organization? Yes, with a carbon budget framework that builds a link between emissions reduction targets and financial decision-making. Just as we manage the allocation of fiscal resources through fiscal budgets, the carbon budget framework uses familiar concepts like revenues (annual emission limit), expenses (emissions), and deficits/surpluses (annual emission limit minus emissions). With effective emissions quantification, the carbon budget framework makes it possible to consistently report on progress, while ensuring transparency and flexibility for budget adjustments. The City of Edmonton was the first city in North America to develop and implement a carbon budget framework, despite its status as having the highest per capita emissions in Canada. Equity is factored into the City’s carbon budget calculations, by applying the C40 fair-share methodology that puts increased responsibility on wealthier cities due to historical responsibility and greater capacity to act. Edmonton's first municipal carbon budget report, released in November 2022, revealed an alarming trend: the city was on track to exceed its 176 million tonne carbon budget by 2037. Despite falling short of their ambitions, the report inspired greater commitment from Edmonton by signaling the need for drastic emissions reductions. Other municipalities are now following suit after seeing how a carbon budget framework can serve as an accountability tool, linking future targets with present-day decisions. By having both a carbon and financial budgets, policymakers can weigh tradeoffs between financial and carbon considerations in tangible terms rather than abstract concepts. Globally, as cities grapple galvanizing the will and resources to achieve net-zero by 2050, the carbon budget framework provides a familiar and powerful mechanism to address emissions management, thereby influencing financial decisions and outcomes. Note: we are open to co-presenting with other presenters that may have a similar topic, and to other session formats.
4:30 pm	Fostering Sustainable Waste Management through Multisectoral Collaboration: A "Gunungan" Perspective of Rainbow Fruits from Bandung City, Indonesia	Telkom University - The 2024 Innovate4Cities Conference serves as a platform to exchange insights and innovative approaches at the intersection of cities and climate science. This abstract presents a unique initiative from Bandung City, Indonesia, which embodies the principles of sustainable waste management, innovatove collaboration, and cultural heritage through the creation of rainbow fruits from waste paper.This initiative aligns closely with the conferences's aim of accelerating city climate action by showcasing a novel approach to waste management that integrates sustainability, innovation, and cultural relevance. By highlighting the constructive learnings and tangible outcomes of multisectoral collaboration in Bandung City, it contributes valuable insights to inform broader processes such as the upcoming IPCC Special Report on Climate Change and Cities.The creation of rainbow fruits from waste paper demonstrates scientific and technical excellence in material engineering, artistic design, and sustainable innovation. Academic research informs the development of innovative techniques for upcycling paper waste into vibrant and durable materials, while technological advanvements facilitate the production process. The "Gunungan" perspective enriches the initiative by integrating cultural wisdom and holistic primciples into waste management practices. The "Gunungan" philosophy is deeply rooted in Javanese culture and represents a symbolic mountain that holds significant cultural and spiritual meaning. This philosophy embodies a set of values and principles that guide individuals and communities towards harmoby, balance, and sustainability in their interactions with nature and society (https://www.youtube.com/watch?v=2O0-CLoQKFc).The initiative of the creation of rainbow fruits from waste paper is highly relevant and suitable for the conference context, as it addresses pressing challenges related to waste management, climate resilience, and cultural preservation in urban environments, The initiative promotes diversity across global and regional contexts by showcasing a case study from Bandung, Indonesia, a city in a developing country context. It celebrates cultural diversity and social inclusion by integrating the "Gunungan" philosophy into waste management practices. Furthermore, the collaborative nature of the initiative fosters partnerships across diverse stakeholder groups, enhancing inclusivity and equity in urban sustainability efforts.

4:30 pm	Universalization of the Smart City PPP in Brazil: a case study in search for the optimum scope and the implementation of smart arrangements of cities	Institute of Planning and Management of Cities - The study addresses the viability of Public-Private Partnerships (PPP) for Smart Cities, focusing on LED Public Lighting, Telecommunications, and photovoltaic mini power plants. The central question is: what makes a Smart City PPP viable in a municipality? The answer could drive the universalization of these PPPs across Brazil and promote the adoption of other innovative public policies. The research concludes that the scale of the public lighting infrastructure is crucial for the economic viability of the service. Over 20% of Brazilian municipalities face challenges due to diseconomies of scale, hindering the implementation of public policies. Therefore, the survival of innovative and universalized public policies depends on the associated provision of services among municipalities to achieve the necessary scale and efficiency. To enable this association, public sector commitment to creating facilitating tools and encouraging movements is essential. The research presents technical-economic studies that define the optimal scope of the Smart City PPP and two facilitating tools: the Public Lighting Contribution (CIP) Calculator and the Atlas of Smart Arrangements. The CIP Calculator is a dashboard that generates new CIP tariffs for municipalities based on their electricity consumption histograms, assisting those with outdated tariffs. The Atlas of Smart Arrangements proposes the grouping of municipalities with fewer than 5,500 public lighting points. Individually unviable, these municipalities can, collectively, make the PPP economically viable. The methodology used in the research included descriptive, predictive, and prescriptive analyses of all Smart City PPP projects developed by the Institute of Planning and Management of Cities (IPGC) up to December 2022. The goal was to correlate demographic characteristics of the municipalities with project efficiency indicators. In summary, the viability of Smart City PPPs in Brazilian municipalities depends on the associated provision of services among smaller municipalities, which requires public sector tools and incentives to achieve the necessary economic scale. The research offers practical solutions, such as the CIP Calculator and Smart Arrangements, to overcome diseconomies of scale and promote the efficient implementation of these partnerships.
4:30 pm	Low Carbon Resilience Approach: Climate action that coordinates and mainstreams adaptation, mitigation, and co-benefits in municipal planning and decision-making processes	Simon Fraser University - Despite heightened global awareness, climate action remains insufficient to meet the urgent demands of our changing planet. ACT's Low Carbon Resilience (LCR) Approach is a pivotal methodology to bridge this gap, synergizing mitigation and adaptation strategies within municipal planning. This session, led by Lauren Vincent, alongside representatives from Port Moody and with contributions by ICLEI experts will dissect the shortcomings of current climate actions and elucidate the development of the LCR Approach. We will showcase its practical application through the lens of the Integrated Climate Action for BC Communities Initiative - a Phase I pilot - involving 10 Canadian municipalities and First Nations communities, with a focused examination of Port Moody's implementation journey. The session will culminate in the introduction of the Phase II pilot program, poised to further validate and refine the LCR Approach. Attendees will gain a comprehensive understanding of how multi-level governance and partnerships can leverage the LCR Approach to foster resilient, low-carbon communities.
4:50 pm	Move to next session	
5:00 pm	Protect, restore, and thrive: nurturing and mainstreaming biodiversity and climate-resilient development	The knowledge needed to enhance Biodiversity and Climate resilient development for increased urban resilience and protection of vulnerable communities from climate-related events and hazards.
6:00 pm	Day 1 wrap-up	
6:30 pm	Welcome Reception	

Day 2 Wednesday, 11 September 2024

7:00 am	Walk through the heart of Montréal: A guided tour	Join us for a fast-paced walking tour as our guide leads you through Montréal's vibrant streets, showcasing the city's history, culture, and beautiful architecture. Spots are limited—click "I'm Going" to secure your place and meet us in the lobby of Le Westin Montréal.
7:50 am	Climate Consultation for Guidelines on Smart Cities	A multi-stakeholder thematic consultation for UN-Habitat's International Guidelines on People-Centered Smart Cities with the objective of understanding how digital transformation in cities impacts climate change and simultaneously facilitates climate action. Hosted by UN-Habitat in collaboration with, Open North & the Next Generation Cities Institute, Concordia University as a Side-Event to Innovate4Cities
9:00 am	Day 2 welcome and launch of the Climate Innovation Navigator	
9:30 am	Raising, accessing, and finding finance to implement city climate action	Closing the climate finance gap for climate adaptation and resilience in cities: the knowledge needed to tackle barriers and develop opportunities to meet investment needs for increased climate finance flows and cultivating an enabling environment towards climate resilient development.
10:30 am	Morning Tea & Coffee	
10:30 am	Conflict Café & Participatory Mural with Percolab Coop	A space dedicated to supporting awareness, conflict resolution and collaboration skills. The Conflict Café offers collaboration practices that build emotional resilience and encourage climate action for the socio-ecological transition.
11:00 am	Inspiring smart, data-driven, and user-friendly cities	The knowledge needed to strengthen the role of digital tools and services in support of city-level climate action at scale: exploring the knowledge and innovation gaps for increased access to climate finance, enhanced digital infrastructure for integrated city development, digital assets and their resilience to climate risks and hazards.
12:00 pm	Move to next session	

12:10 pm	Data – Governance: measuring emissions to act on climate	This session is brought to you by Origins.earth, GHGSat & World Bank These are the original abstracts from each of the organizations: Origins.earth: Origins.earth finds its origin in the visionary pursuit of the City of Paris, which aspired to become the first capital worldwide to monitor its territorial emissions in real time, understand their origins, and model their behavior. The ambition was clear: optimize emissions reduction in a city at the forefront of the fight against climate change.To realize this mission, Suez created a collaborative research partnership with LSCE, Laboratoire des sciences du climat et de l'environnement, a globally renowned laboratory dedicated to addressing pressing climate challenges. Over a dedicated span of three years, relentless efforts were invested. The fruits of this labor culminated in a revolutionary solution. This cutting-edge technology, called MeteoCarbone, is now poised for widespread deployment, backed by extensive coverage in esteemed academic journals and supported by globally recognized authorities such as WMO and ICOS.Today, Origins.earth works to deploy this technology that empower cities to look at theor emissions and take decisive action on them being then able to follow and to look at the impacts of the mentioned actions and policies. The journey is fueled by the same vision that ignited the genesis - a vision of a sustainable future, underpinned by rigorous science and a relentless commitment to combat climate change done thanks to the collaborative framework between the research, the private and the public sector as for MeteoCarbone in Paris. https://ig3is.wmo.int/https://www.origins.earth/ World Bank: This session will present ‘Carbon Monitor Cities 2.0’, a new approach to near-real-time monitoring of city-level greenhouse gas emissions from various sectors without the need for local data collection. The World Bank collaborated with academic researchers at Laboratoire des Sciences du Climat et de l’Environnement (LSCE) in France, Tsinghua University in China, and a private firm, Kayrros, to pilot this approach for 11 cities in three middle-income countries: Egypt, South Africa, and Türkiye. The pilot was funded by the City Climate Finance Gap Fund. Carbon Monitor Cities 2.0 quantifies CO2 emissions of cities, including point source locations, at a temporal resolution of ten days with a spatial resolution down to block level. The platform provides a time series of historical emissions from three key emission sectors: energy, transportation (road transportation and aviation), and industry. The scope of Carbon Monitor Cities 2.0 follows the BASIC+ approach of the Global Protocol for Community-Scale Greenhouse Gas Inventories (GPC Protocol). All the CO2 emissions estimated using this approach could potentially be used by city representatives for reporting purposes within the GPC Protocol. The aim of the pilot was to demonstrate the ability to generate near-real-time data on local greenhouse gas emissions, which could allow a better understanding of the spatial and temporal patterns of urban carbon emissions in specific cities. This understanding could inform local climate change mitigation policies and investments, and also potentially be used as part of a monitoring, reporting and verification (MRV) system for carbon finance in the future. As this approach does not rely on local data collection, it can be scaled up to a large number of cities relatively easily, particularly in low-and-middle-income countries that lack data. An online interface was developed to visualize the data produced by the model and allow users to interact with it in order to gain insights. The presentation will discuss the institutional collaboration, modeling methodology, and opportunities to scale up the approach. GHGSat: The generation of waste is a byproduct of living things. Waste, in a natural system, is part of the cycle of life as it gets incorporated at different levels. Municipal Solid Waste (MSW) is primarily generated by human activity. Hence, the United States’ Resource Conservation and Recovery Act (RCRA) defines waste as “any garbage, refuse, sludge from a wastewater treatment plant, or an air pollution control facility, and other discarded material, including soil, liquid, semisolid, or contained gaseous material, resulting from industrial, commercial, mining, and agricultural operations and from community activities.” Methane is a short-lived (8-12 years) climate pollutant with a global warming potential that is 84-87 times greater than carbon dioxide over a 20-year timeframe and is generated from the anaerobic degradation of organic wastes within landfills. For this, GHGSat has the capability of performing remote measurements of methane from either space or from the air using spectroscopy. A similar sensor deployed on different platforms at different altitudes (~500km and ~2km) is an innovative approach with great promise to monitor the associated landfill infrastructure globally. GHGSat envisioned the use of high-resolution satellites to detect and quantify methane from individual facilities worldwide. In June 2016, GHGSat-D was successfully placed on orbit. In September 2020 and January 2021 GHGSat launched GHGSat-C1 and GHGSat-C2 commercial service satellites. Today GHGSat has a constellation of 11 methane detecting satellites and similarly based airborne sensors began flying in December 2019. This presentation will describe the unique advantages of using the same sensor in space and airborne for remotely detecting methane emissions generated by landfills. Examples and discussion of recent detections from landfills will be provided. This paper will also discuss how this technology can assist in the detection of large methane leaks and emissions coming from landfill infrastructure and propose an affordable monitoring program able to provide frequent and accurate surveys.

12:10 pm	Exploring urban climate futures: Decarbonising energy systems and building nature-positive cities	This session is brought to you by University of Leeds & OECD These are the original abstracts from each of the organizations: University of Leeds: Cities are key to decarbonising thermal energy infrastructure - whether used for heating or cooling - while providing access to health and well-being, ensuring a just transition for all communities. Urban scholars have also established that cities need to be considered as complex systems as they are known to exhibit characteristics such as (1) heterogeneity, (2) emergence,; (3) nonlinearity, (4) feedback loops (mechanisms that amplify or stabilise changes); (5) self-organisation (decentralised interactions between components resulting in coherent system-level behaviour). Therefore, any policy or initiative for urban heating or cooling systems must respond to this complexity through a deep, contextual engagement with a wide range of local knowledge holders as a way of systematic intelligence gathering about these complex characteristics. The engagement also needs to be continual, cyclical, and institutionalised to feed into the city's futures literacy, envisioning, and anticipatory governance. From a policymaking perspective, this would mean an understanding of the spatial diversity of needs, usage, and aspiration for heating and cooling technologies, visibility of a wide array of interlinkages and interdependencies not just within city boundaries but also beyond it; establishing consensus on a range of possible futures for the heating and cooling infrastructure and service delivery based on the evolution of these different demands interdependencies, and finally, a establish a responsive pathways and adaptive governance strategy. Here, we will present the innovative and varied forms of collaboration struck as part of a project that demonstrates a deep, continual engagement with city knowledge partners across domains, praxis, and social structures with the objective of co-producing complexity-compatible strategies for climate policymaking in the city of Pune, India. Critical reflections, learnings, and key outcomes will also be shared, such as a city-specific expert cooling network, academic/ government partnership, participatory systems map and other community visual tools, citizen visions, and possible futures. The different forms of collaboration and methodologies presented are part of a long-term complexity-based methodological framework for urban energy systems (Bale and Basu, 2023). Basu, S., & Bale, C. S., (2023). A framework for exploring futures of Complex Urban Energy Systems. Frontiers in Climate, 5. https://urbanheatsystems.leeds.ac.uk/ OECD: The proposed paper aims to establish a robust conceptual foundation for the Nature-Positive City (NPC) to facilitate its implementation and monitor its progress. As cities face the dual crises of biodiversity loss and climate change, they stand at a crossroads - a moment to reset their relationship with nature. At present, urban areas are consuming land and materials at an unsustainable pace, leading to negative environmental externalities and a reduction of resource availability. An NPC is a policy approach to create more liveable, resilient, and sustainable cities through enhancing nature, contributing to the net-zero agenda, and preserving biodiversity in the urban built environment. Its goals reflect the Kunming-Montreal Global Biodiversity Framework, which sets out ambitious commitments to living in harmony with nature by 2050. Although the breadth and diversity of approaches encompassed within the NPC framework are considered as its strengths, they may also lead to challenges in establishing a concrete definition and measuring its implementation progress. Indeed, there is currently no universally accepted understanding of what constitutes an NPC. Through an extensive literature review, this paper aims to articulate the principles and scope of the NPC, providing cities and countries with clear guidelines for adopting and implementing nature-positive strategies. Emphasis will be placed on the multifaceted benefits of NPCs, including how they can manage trade-offs and create synergies between climate action and biodiversity, as well as between climate mitigation and adaptation strategies. The paper will also review methodologies for measuring and monitoring the progress of NPCs, including key indicators and baselines, drawing on both qualitative and quantitative metrics. Overall, the proposed paper aims to develop a broader understanding and a clearer consensus on the concept of the NPC, providing a foundation for further work on this topic.
12:10 pm	Beyond Barriers: Lessons & Tools for Accelerating Climate Mitigation	Concordia University - The need is urgent, and the barriers are many; how can we move faster? The Accelerator for Zero Carbon Building Projects (ABC) was launched in 2022 by a multidisciplinary team of Montreal-based change agents from Concordia University, GI Quo Vadis, National Bank of Canada, McCarthy-Tétrault, and Énergère in collaboration with Hydro-Québec and the Ville de Montréal. The vision is to unite all stakeholders interested in advancing the decarbonisation of the building sector and collaboratively break down the barriers hindering its progress in both the private and public sectors. Against this background, the accelerator fosters collaboration and knowledge sharing by bringing together city officials, politicians, university researchers, engineers, architects, lawyers, utilities, private developers, and bankers. Through this collaborative effort, it is possible to develop and provide tools and resources to support private developers in measuring and quantifying key targets in energy use, building volume, and public space, ultimately incentivising and supporting sustainable development projects. This one-hour facilitated workshop offers participants tools and lessons for accelerating climate mitigation uptake using the case example of Concordia University's ABC Accelerator (ABC). In the first part of the workshop, we will have some ignite pitches with input from different perspectives on our accelerator, followed by a facilitated discussion with all participants on improving and developing further the concept with additional perspectives, indicators and metrics. We will also discuss potential opportunities for collaboration with other initiatives, as well as lessons from the accelerator that could be shared with stakeholders. Finally, the workshop will conclude with ideas and recommendations for next steps.
12:10 pm	Acknowledging the challenges of extreme heat in Informal settlements	Climate change is pushing heat close to the upper limits of what people can survive. This session will explore the evidence of rising temperatures, with increase of 6-10 degrees, across various cities and locations, emphasizing the severe impact on densely populated areas that turn into heat islands. The discussion will highlight the widespread inability among residents to understand and adapt to these changes, especially focusing on the unique challenges faced by women and children who are often home during the daytime. The session will emphasize the need for community-driven solutions and the crucial role of city fathers and government programs in developing and implementing strategies to mitigate these problems and support affected populations

12:10 pm	Making High Season Resilient: strengthening livelihoods, sustainability, and tourism in cities	This session is brought to you by Alahlie Community Service Organization & GIZ These are the original abstracts from each of the organizations: Alahlie Community Service Organization: Urban areas are increasingly recognized as critical arenas for addressing biodiversity conservation and resilience in the face of global environmental challenges. This abstract presents findings from a study examining the interplay between urban biodiversity and resilience in four major cities across Cameroon. Drawing upon case studies from diverse urban settings within Cameroon, this research explores the multifaceted dynamics shaping biodiversity conservation efforts and resilience-building strategies. Through a combination of qualitative and quantitative methods, I investigated the factors influencing urban biodiversity, including land-use patterns, green infrastructure, and community engagement initiatives. Additionally, I assess the resilience of these cities to environmental stressors such as climate change, population growth, and land degradation, highlighting the importance of biodiversity in bolstering urban resilience. My analysis reveals the complex interactions between urbanization, biodiversity loss, and resilience in Cameroon's cities, offering valuable insights for policymakers, urban planners, and conservation practitioners. By identifying key challenges and opportunities, this research contributes to the development of context-specific strategies for enhancing urban biodiversity conservation and resilience in Cameroon and beyond. GIZ: Sustainable tourism can be employed for enhancing climate resilience and driving sustainable growth in municipalities. Jordan has established a sound ground for a growing niche of nature-based tourism in the last few decades, resulting in an increase of the number of visitors to the country and the improvement of their touristic experience. In an effort to brand itself “the city of Oxygen” in Jordan, Kufranja municipality has envisioned a plan to boost sustainable tourism in its jurisdiction. An integral part of this plan is the design and rehabilitation of touristic trails. The project directly addresses the threat of biodiversity loss by establishing the Bee Trail as a sanctuary for pollinators. The project contributes to livelihood creation for local beekeepers and local residents who will engage in hospitality and accommodation services as well as tourism guidance activities. In essence, the project directly address the identified challenges and needs, providing a holistic solution that integrates environmental preservation, economic development, healthcare, education, and tourism to enhance the well-being of the community. However, paving the way for this transformation is impeded by various challenges. This includes the lack of sufficient public services, deficiency in reliable, affordable transport and tourism infrastructure including visitor centers, ecolodges, and well-maintained trails. Such conditions deter tourists from visiting and may result in negative impacts on the environment due to unregulated access. The social aspect of tourism is equally important, entailing that challenges related to the inadequate community involvement should be prioritized given that engaging local communities is vital for the success of sustainable tourism initiatives. Above all, a transformative vision was lacking until it was championed by the municipality’s director of development studies department. Her continuous efforts were pivotal in strengthening collaboration and partnerships among government agencies, local communities, a local university, and RSCN (a pioneer NGO in the field of nature conservation) to kickstart the process. This submission shall focus on an innovative collaboration that was championed by the municipality of Kufranja in effort to pave the road for sustainable development in one of the few green municipalities in Jordan.

12:10 pm	Improving urban infrastructure and enhancing coastal resilience through data and models	This session is brought to you by Environment and Climate Change Canada & Fugro These are the original abstracts from each of the organizations: Environment and Climate Change Canada: With recent advances in very-high resolution numerical weather prediction (NWP) for urban areas, it has become possible to develop numerical platforms to assess landscape modifications and in particular heat mitigation scenarios in urban areas. One of the major barriers that exist for urban planners and health institutes to rely on such data is that they might be reluctant to consider the large amount of data produced by such numerical simulations. This study aims at analyzing results in a more holistic approach, with the objectives of developing training data for statistical assessment of the impact of heat mitigation strategies in a particular city. A bench of scenarios with modifications of the urban landscape was performed in Canada for Montreal and Toronto metropolitan areas with the Global Environmental Multiscale (GEM) atmospheric model with grid spacing of 250 m (with the Town Energy Balance TEB and the Interactions between the Soil, the Biosphere and the Atmosphere ISBA surface schemes) and applied during several overheating periods, in particular in 2010 when large impacts on the mortality rate were observed. More than 20 scenarios were assessed with realistic but ambitious scenarios, including increase of vegetation fraction with or without irrigation, and of thermal reflectivities. Various responses on the temperature reduction were found with an overall improvement, and down to -3 oC during the daytime, but negative effects were also found on the thermal stress during daytime when increasing albedo values. More insights into the results are provided in this study, using various normalized efficiency metrics, not only for air temperature but also for thermal stress indices (UTCI and WBGT) and the 'skin' surface temperature that is relatively similar to remotely-sensed temperature. Fugro: Digitalization and AI are transforming the landscape of coastal management, providing cities with powerful tools for data-driven monitoring and rapid decision-making. This abstract examines the role of advanced geo-data technologies and their applications in coastal hazard modeling and risk assessment, drawing on case studies and innovations from Fugro. The increasing threats posed by sea level rise and extreme weather events demand robust and precise data to inform coastal adaptation and hazard mitigation strategies. Fugro's use of lidar technology and associated AI analytics exemplify how detailed 3D maps of the land-sea interface allow for a comprehensive understanding of the landscape and its vulnerabilities. This data is crucial for modeling storm surges, erosion, and other coastal hazards, enabling authorities to develop targeted and effective adaptation measures. Examples of cities in the US and Europe will be presented. Fugro's leadership in shared hydrospatial data, such as Seabed 2030 and the UN Ocean Decade, further highlight the benefits of open-access data and digitalization. Centralized, accessible data enable stakeholders to collaborate efficiently and make informed decisions to protect vulnerable coastlines. This approach ensures that all parties, from government to local communities, have access to the same high-quality data, fostering a comprehensive, effective and fit-for-purpose response to coastal challenges. Small island nations, particularly susceptible to rising sea levels, benefit significantly from these advancements. Detailed geo-data enables them to plan and implement projects that enhance resilience, such as sea walls, elevated buildings, flood management systems and nature-based solutions. By leveraging digital twins—virtual models that simulate physical environments with layers of data and actionable insights—they can predict the impacts of various scenarios and optimize their strategies accordingly. This will be showcased by examples in the Pacific and Caribbean. Digital twins enable monitoring and predictive analysis, providing cities with insights for proactively addressing vulnerabilities. As technology continues to evolve, it will become an indispensable tool for coastal cities, enabling them to anticipate and mitigate the impacts of climate change effectively. By harnessing the power of digital twins, coastal cities can build a more secure and resilient future, safeguarding their communities and ecosystems from the escalating effects of climate change.
12:10 pm	A new global Institute to drive urban resilience research and innovation	Session Description The new UN-Habitat Urban Resilience Research and Innovation Institute aims to support informed decisions and policymaking, with a special focus on the Global South, integrating climate change, disaster risk reduction, and urban development. This event, structured around the Institute's core objectives, will unfold in several segments: 1. Introduction to urban challenges and the need for resilience: Highlighting the urgency due to over 70% of GHG emissions stemming from cities and the increased exposure to climate risks, the session will set the stage for why urban resilience is a paramount global concern. 2. Overview of the Institute's vision and mission: This section details the institute's commitment to integrating climate change adaptation, disaster risk reduction, and sustainable urban development through research, innovation, and community practice. 3. Panel discussions featuring experts from academia and practitioners/policy makers. The panel will focus on: • Research and knowledge development: Discussing needs for cutting-edge research and the establishment of an Observatory on Urban Resilience. • Knowledge and technology transfer: Discussing strategies for developing normative and operative recommendations for urban resilience. • Key recommendations for a urban resilience research and action agenda The session is organized by UN-Habitat and the UNESCO Chair on Urban Resilience at the University of Southern Denmark, in collaboration with GCoM.

12:10 pm	The role of digital solutions in sustainable, smart cities.	GeSI - Cities are home to more than half of the global population and account for more than 70% of final global energy consumption and these figures are expected to rise. The climate and energy challenge is an urban one, and cities are essential to achieve a sustainable transition to a climate neutral, resilient world. Through the Global Covenant of Mayors alliance, more than 13,000 cities and local governments have made strong commitments to climate and energy action. At the same time, business and industry at then forefront of digital technologies and solutions wield the knowledge, capacity, and innovation necessary to usher in the next generation of city climate action implementation powered by connected, compact, and modern infrastructure and methods. The Global Enabling Sustainability Initiative - a key GCoM partner and the only global membership organization dedicated to enabling the ICT industry to meet opportunities generated by applying digital solutions to the world's most pressing environmental and social challenges - is poised to share and pursue opportunities with leading ICT companies that can demonstrate, replicate, and scale digital solutions with cities and local governments globally. As a concrete submission to the 'Digitalization' track of I4C24, this session proposes evidence-driven, forward-looking interventions from up to 5 GeSI members who lead the sustainable digital transition. PwC, Bell Canada, Dell, Verizon and Google, building on the first-ever 'Smart and Sustainable Cities' Track at the 2024 Digital with Purpose Summit, will highlight the knowledge and opportunities present for synergistic partnerships with local governments and other urban actors that can target multiple identified priorities in the Global Research and Action Agenda. Recognizing that there is no one-size-fits-all solution for an alliance of diverse cities and local governments - as well as the need for digital solutions that can be agile in their approach - this session will dive into how leading ICT companies are actively developing solutions that can benefit the core themes of I4C24: biodiversity and resilience, multi-level governance and partnerships, finance, and digitalization.
12:10 pm	Digital Tech and Organizational Transformation for Climate Action: Sustainability in Business & Beyond	Join leaders from Bell's Corporate Responsibility and Enterprise Solutions groups to explore how connected digital technologies and company initiatives are driving climate action and sustainability within Bell and for its customers. Dive into guiding methodologies and best practices along with real-world use cases driving environmental impact. Learn more about our corporate sustainability, and explore stories of our impact and our contribution to society.
1:10 pm	Lunch	
1:10 pm	Conflict Café & Participatory Mural with Percolab Coop	A space dedicated to supporting awareness, conflict resolution and collaboration skills. The Conflict Café offers collaboration practices that build emotional resilience and encourage climate action for the socio-ecological transition.
2:30 pm	Financing climate mitigation actions in cities: insights from European Covenant of Mayors initiative	JRC - Financial capacities are fundamental for the implementation of the climate actions envisaged by local climate action plans. These plans often involve a variety of measures such as transitioning to renewable energy sources, improving energy efficiency, decarbonise the transport, and mitigating greenhouse gas emissions. In this study, we analyse the data collected in the framework of the European Covenant of Mayors through the MyCovenant reporting platform to investigate how 203 European cities finance climate mitigation actions in their plans, by investigating three aspects: (i) the total budget per plan, (ii) the financing sources, and (iii) the financial mechanisms and instruments. By analysing these three aspects, this work aims to provide a comprehensive understanding of the financial landscape surrounding climate mitigation efforts in European cities. The analysis of 203 action plans with emission reduction targets to 2030 or beyond submitted by signatories of the CoM in the European Union reveals significant engagement in climate action efforts. These action plans, in to 21 of 27 EU countries, collectively cover over 46 million inhabitants and include 8,500 mitigation actions for a total budget of over €100 billion. This analysis can offer valuable insights into the size, effectiveness and challenges of current financing strategies, identify innovative practices, and inform policymakers and city officials on ways to enhance financial capacities for achieving climate goals.
2:30 pm	Planning for nature-based solutions in cities from the Global South	SELVAR - Planning for Nature-Based Solutions in Cities from the Global South" is a new guide from SELVAR, an organization that promotes nature-based solutions and nature-based thinking among local governments, organizations, and the private sector. The guide, set to be released in the second semester of 2024, aims to assist urban planners, decision-makers, and community leaders in integrating nature-based solutions into urban planning and their communities. This publication in English is inspired by the first version of the Guide to integrate Nature-based solutions in Colombian cities (Figueroa-Arango 2020). Building on SELVAR's efforts to implement the initial guide across various cities, with support from partners including Colombian cities, the German government, and local NGOs, we recognized the need to extend this tool for global use. This new guide aspires to inspire and direct, embracing our complex and often chaotic contexts, where we continuously adapt and learn how to proceed effectively. "Planning for Nature-Based Solutions in Cities from the Global South" is a collective effort resulting from the collaboration of 20 guest authors from 11 countries, sharing their professional experiences in 17 cities across the Global South. This guide has been led and supported by a Colombian organization, representing a tool created in the South, for the South. Our collaborators are: Latin America- Colombia: Carolina Figueroa as the lead author of the publication, Andrea Svensson, Diana Ruiz, Isabel Melo, Juan Carlos Caicedo, Maria Stella Sachica, Sandra Viviana Murillo.- Ecuador: Pablo Lloret and Paola Zavala- Brazil: Raquel Cruz- Mexico: David González, Diana Carrillo- Costa Rica: Huberth MéndezAfrica- Kenya: Leah Ahoko and Washington Kanyang- Ghana: Christopher Gordon- South Africa: Nadia SitasMiddle East and Asia- Lebanon: Leticia Rahal- Jordan: Zeena Ja'Ja- India: Seema Mundoli and Harini Nagendra By pre-launching this guide at I4C24, we aim to foster a global exchange of experiences and methodologies, contributing to a more inclusive and comprehensive understanding of urban climate resilience. This submission will highlight successful strategies and encourage dialogue on overcoming challenges unique to cities in the Global South, thereby enriching the collective knowledge and practice of climate science in urban contexts.

2:30 pm	BRIDGE Project: Empowering Knowledge Brokers for Climate Finance and Gender Equality in Cameroon	ICLEI Africa - Adaptation funding from donor countries and agencies often fails to reach the areas most affected by climate change: local communities. The Brokering Innovation for Decentralised climate finance & Gender Equality (BRIDGE) project aims to address this disparity by enhancing access by subnational actors to appropriate finance for locally-led, gender responsive climate change adaptation actions in Cameroon, with learnings scaled to the central Africa region and beyond. Partnering with key stakeholders such as FEICOM (Fonds Special d'Equipement et d'Intervention Intercommunale), the University of Yaoundé 1, the municipalities of Kribi 1 and Yaounde 4, along with over 30 community-based knowledge broker organisations, the BRIDGE project targets knowledge-to-action gaps hindering the financing of locally-led adaptation projects. The BRIDGE project team employs collaborative approaches to bolster the capacity of knowledge brokers and identify the most effective mechanisms to unlock finance for locally-led and gender-responsive adaptation in Cameroon. This session will delve into preliminary findings from the BRIDGE project, showcasing the diverse array of knowledge required for successful cross-sectoral and multilevel governmental collaborations. This project falls under the Step Change program and is co-funded by the Ministry of Foreign Affairs of the Netherlands and the International Development Research Centre (IDRC).
2:30 pm	Assessing the effectiveness of SNBs in adapting urban centres to climate change with UPSURGE	BeeOdiversity - Climate change poses significant challenges to urban centers, necessitating innovative approaches to enhance resilience and sustainability. To help European cities enter the regenerative transition pathway, the Upsurge Project aims to create an EU urban regenerative lighthouse to serve as a reference framework and network to accelerate, transfer and upscale the use of nature-based solutions and mainstream them into the agenda of urban policies through co-creation and co-design processes with citizens and other stakeholders. This collaborative initiative involving five European municipalities (Belfast, Breda, Budapest, Katowice and Maribor) and suppliers of nature-based solutions began last year. Among them, BeeOdiversity and its BeeOmonitoring solution and expertise are playing a pivotal role in assessing the effectiveness of these solutions by collecting on-site data. Our methodology focuses on assessing biodiversity and pollution levels before and after the implementation of nature-based solutions. Using advanced biomonitoring techniques based on the analysis of pollen samples collected by honey bees, we gather comprehensive data on environmental health and ecosystem services. This approach makes it possible not only to measure the direct impact of the solutions being tested, but also to provide data that can be used by their designers to improve them, and by urban planners and policy-makers to make informed decisions. Preliminary results from the participating cities indicate a positive correlation between nature-based interventions and improved biodiversity indices and pollution reduction, contributing to better urban air quality and overall public health. These findings underscore the potential of integrating ecological considerations into urban planning to create more resilient and sustainable cities. BeeOdiveristy is honoured to be a part of this project, which illustrates effective collaboration across sectors, leveraging scientific research and practical applications to address urban climate challenges. This presentation will detail our assessment methods, share key findings and discuss implications for future urban development. Our aim is to encourage other municipalities to adopt similar approaches, in order to have a wider impact on urban sustainability on a global scale. By participating in the Innovate4Cities conference, we aim to contribute to the collective knowledge on nature-based solutions and advocate for their wider adoption in urban environments worldwide.
2:30 pm	Coliving: social, environmental and economic impact of an emerging real estate hero	Woke Coliving Inc. - When we started Woke Coliving we wanted to deliver tangible benefit to the community and the environment. Metro Manila is one of the most problematic mega city in the world. Within its broader boundary live almost 30 million people and almost one third of it commute on a daily basis. According to Waze, the navigation app, the mega city has the worst traffic in the world and some of its municipalities recorded the highest population density in the world. Public transportation is minimal. With Woke Coliving we decided to have an impact on the young workforce, those with low income ($200-400 per month) and forced to commute up to 8 hours a day back and forward, home to work. Eight hours per day, one third of your day! This long commuting had a direct impact on the work/life balance of the individuals, their productivity and performance, but also their health, as most of the journey happens in very polluted street. Woke provide affordable bedspace rental to allow people change their long hours of commuting in to a 10-20 min walk to office. Woke locates its properties in the proximity of business district at a price that in most cases is lower than the commuting cost. We directly impact the environment too as less people commuting, less traffic, less CO2 emissions. Our property are designed to maximise passive design solution, like natural light and natural ventilation to minimise dependency from mechanical / electrical equipment.

2:30 pm	Generating Resilient Cities : Examining Climate Mobility Co-Creation Urban Planning Framework for Africa	Stockholm Environment Institute - Across the globe, climate mobility manifests between and across cities and national borders, encompassing a spectrum of constraints, agency, and vulnerability, ranging from labour migration to forced displacement and planned relocation. Over the past few decades, climate impacts have become more pronounced, affecting all key sectors of the African economy, as well as ecosystems and populations. Droughts, floods, rising temperatures, rainfall irregularities and sandstorms are all characteristic of these climatic impacts (Goita, 2023). Climate change and related impacts are already directly and indirectly affecting the growth and development of cities. Africa cities which are ill-equipped are bearing the full brunt of climate mobility. Africa is urbanizing fast and Africa's cities expected to be the most rapidly growing in the world. This requires adaptive planning and management of cities to enable strategic provision of urban settlements and supportive services such as education, health, commercial and infrastructure to manage the growth. This is complicated with this era of climate change which is causing destruction to city assets and a threat to human lives leading to migration. The normative planning in most Africa cities does not take into account the climate data and mapping of cities climate hotspots which seems to be growing with time due unplanned nature of Africa cities development, where informal development is outpacing planned development leading to habitation in sensitive environmental and biodiversity areas which are prone to harsh climatic conditions which lead to temporary and permanent migration of urban populations towards to more "safe areas". The marginalized community tend to be more exposed to risky living conditions (climate hotspots) which affect their health and wellbeing. This paper will examine the research projects carried out by the Stockholm Environment Institute (SEI) in African cities of Nakuru, Lusaka and Kampala in determining how the urban planning capacities of cities to manage climate induced migration can be enhanced using adaptive co-created planning framework. The paper concludes that existing city planning in these cities are yet to embrace co-creation approaches and the final plans are not fully informed by projected climatic data hence need for adaptive planning approach
2:30 pm	Stratégies intégrées pour la résilience des territoires face aux inondations : approches et outil innovants.	Université de Montréal - Les dérèglements climatiques vont intensifier l'importance et la fréquence des inondations. Cette réalité influence fortement les stratégies d'aménagement mises en place par les décideurs publics. Face à ces constats, l'urgence d'agir et de s'adapter de manière résiliente aux inondations s'impose désormais comme une priorité. Pour répondre à cette exigence, nous proposons une méthodologie structurée en plusieurs étapes qui permet d'identifier les enjeux d'un territoire, créer des scénarios d'aménagement et tester la résilience de ces scénarios.Afin de comprendre les enjeux locaux d'un territoire, l'approche des Retours d'Expérience (REX) est utilisée. Les REX permettent de colliger, à travers un processus structuré, des données sur l'aléa, les éléments exposés, les conséquences, les ressentis, les défaillances et les mesures de gestion des risques appliquées. Des REX ont été initiés dès 2015 par le ministère de la Sécurité publique et notre équipe afin de tirer des apprentissages sur les inondations passées au Québec, notamment à Sainte-Marthe-sur-le-Lac, à Gatineau et à Deux-Montagnes, ou sont en cours comme à Sainte-Marie ou encore à Charlevoix.Les REX permettent de comprendre les aléas d'inondation, la vulnérabilité et les risques des territoires. Ces données sont ensuite utilisées pour créer des scénarios d'aménagement résilients qui s'adaptent aux spécificités du territoire. Cette démarche améliore et permet le partage des connaissances sur les inondations et les aménagements résilients, tout en faisant progresser les pratiques des municipalités, des MRC (municipalités régionales de comté) et des ministères. Une fois les scénarios d'aménagement crées, leur niveau de résilience est évalué grâce à RésiliAction, un outil numérique labélisé à l'Université de Montréal, qui permet d'estimer le score de résilience des projets d'aménagement en fonction d'un modèle holistique de résilience basé sur huit orientations, qui inclut entre autres les enjeux environnementaux, de biodiversité, de gouvernance participative et d'équité sociale.RésiliAction a été créée pour que les décideurs publics, en particulier les petites municipalités, puissent posséder et bénéficier de toutes les compétences et connaissances nécessaires pour adopter et mettre en place des projets d'aménagement résilients face aux inondations. Cet outil permet de démocratiser l'accès au savoir-faire concernant la gestion des inondations et les aménagements résilients.
2:30 pm	Urban Community Engagement in Climate Change Adaptation through Participatory Approach	Center for Climate and Urban Resilience - Climate change is pushing heat close to the upper limits of what people can survive. This session will explore the evidence of rising temperatures, with increase of 6-10 degrees, across various cities and locations, emphasizing the severe impact on densely populated areas that turn into heat islands. The discussion will highlight the widespread inability among residents to understand and adapt to these changes, especially focusing on the unique challenges faced by women and children who are often home during the daytime. The session will emphasize the need for community-driven solutions and the crucial role of city fathers and government programs in developing and implementing strategies to mitigate these problems and support affected populations.
2:30 pm	Ancient Cities and Urban Adaptation to Climate Change	CU Boulder - Throughout history, human agglomerations have served as engines of development, fostering innovation, economic growth, and cultural exchange. Remarkably, positive agglomeration effects have manifested even in societies devoid of fossil fuel dependency. In addition, societies have typically coalesced into fewer, larger, and more aggregated settlements in response to declining population. This phenomenon underscores the intrinsic link between urbanization and human welfare, suggesting that if population growth continues to slow, future populations will likely be even more concentrated than they are today. In the context of climate change, cities emerge as central for ongoing human adaptation. With dwindling resources and escalating environmental challenges, urban centers represent not just concentrations of adaptation challenges but also loci of innovation and resilience. Indeed, history reveals that human development requires expanding knowledge generated and maintained by the social networks of human agglomerations. In light of these realities, the importance of understanding ancient cities and urban systems for the future trajectory of human civilization cannot be overstated. This paper explores the multifaceted dimensions of urban and climate change adaptation from a historical perspective, illustrating the points above using data from the archaeological record.

2:30 pm	Innovative models to accelerate city-business collaboration	The session will delve into the vast potential of city-business collaborations to achieve greater emission reductions than either party could accomplish independently. By leveraging the unique assets and expertise of each actor, these partnerships can facilitate ambitious and coordinated local climate action, paving the way for an inclusive and climate-safe future. Participants will gain insights into effective models of collaboration to implement successful climate initiatives at the local level.
2:50 pm	AIAI Urban Ethos AI to Enable Inclusive, Citizen-Engaged Urban Design	Mila - Quebec AI Institute - AIAI is a machine learning research project designed to make urban architecture more inclusive, accessible and safe for marginalized groups. The research involves building a dataset, in collaboration with vulnerable communities living in Montreal, of AI-generated images that have been labeled for their inclusiveness, accessibility and safety (among other metrics). Once the dataset is completed, it will be used to fine tune a Stable Diffusion XL model to support the generation of more inclusive renderings of public spaces. Should this research be successful, the fine-tuned, prompt-based AI image generator can be used by community members to help them in visualizing the needs and desires they have for public spaces in their neighborhoods. By providing access to this tool during the community engagement process of an urban development project, the ease of brainstorming and visualizing with generated images can help make the sessions more efficient and engaging, improving the likelihood that landscape architects incorporate community needs into their designs.
2:50 pm	Advancing Urban Climate Resilience Through Cross-Sector Collaboration: Lessons from Innovative Strategies (Subtitle: Promoting Sustainable Urban Growth through Multidisciplinary Cooperation)	Pan African Alliance on Climate Change - Abstract: Achieving sustainable urban development and effective climate action necessitates robust cross-sector collaboration and the adoption of innovative strategies. This abstract examines the essential role of multidisciplinary cooperation and presents findings from the application of innovative strategies in diverse urban environments. Leveraging insights from the Global Research Agenda on Adaptation (GRAA) and the Climate Risk and Impact Assessment (CRIA), this study compiles collective research to evaluate progress on critical priorities. It highlights the importance of scientific rigor and evidence-based solutions in strengthening urban climate resilience. The study emphasizes the transformative impact of collaborative initiatives where academia, government, industry, civil society, and other stakeholders unite to drive climate action at the municipal level. By analyzing case studies such as the Cape Town Water Resilience Initiative and the Nairobi Integrated Urban Development Plan, it demonstrates how collaborative efforts have produced significant outcomes, advancing sustainable urban development. Additionally, the abstract discusses the effectiveness of innovative strategies in promoting local climate and energy action. Through approaches like challenge-driven innovation, foresight and scenario planning, and experimentation/living labs, cities have developed solutions collaboratively with various stakeholders. Case studies such as the Kigali Green City Pilot Project and the Lagos Resilient City Program exemplify the successful implementation of these strategies in practical settings. Moreover, the abstract highlights the role of creative works in enhancing the cultural vibrancy and sustainable livelihoods of urban communities. By incorporating cultural arts and heritage into climate initiatives, cities can cultivate a sense of identity and community involvement, thereby driving collective resilience. In conclusion, this abstract stresses the urgency of adopting interdisciplinary collaboration and innovative strategies in urban climate action. By integrating diverse perspectives and harnessing collective expertise, cities can effectively address the complex challenges posed by climate change and forge a path towards a more sustainable and resilient future. References:Cape Town Water Resilience Initiative - [https://resiliencerisingglobal.org/publication/cape-town-water-resilience-profile-cwra/#:~:text=The%20aim%20of%20the%20City,Greater%20Miami%20and%20the%20Beaches.)Nairobi Integrated Urban Development Plan - [https://www.kpda.or.ke/documents/Nairobi%20Integarted%20Urban%20Development%20Master%20Plan.pdf)Kigali Green City Pilot Project - [https://gggi.org/project/rwanda-green-city-pilot-project/)Lagos Resilient City Program - [https://lagosmepb.org/lagos-resilience/#:~:text=The%20Lagos%20Resilience%20Strategy%20is,the%2021st%20century%20and%20beyond.)
2:50 pm	Enhancing Climate Resilience in African Cities: Leveraging the Water-Energy-Food Nexus for Green Economy Transition.	WASCAL (West African Science Service on Climate Change and Adapted Land Use) - This document explores strategies to strengthen the climate resilience of African cities by building on the water, energy and food (WEF) nexus and transitioning to a green economy. African cities face many challenges related to the impacts of climate change, including water scarcity, energy insecurity and food insecurity. Adopting an integrated approach that takes into account the linkages between water, energy and food systems is essential to building resilience and promoting sustainable development. This article explores the potential of the WEF nexus framework to address these challenges and facilitate the transition to a green economy in African cities. The study used several models, including one specifically designed to analyze the Environmental Kuznets Curve (EKC) equation. Initial results indicate that principal component analysis (PCA) facilitated the construction of a food security index for the eight WAEMU countries from 1980 to 2021. In addition, dynamic panel modeling within a generalized method of moments (GMM) framework was used to obtain reliable parameter estimates. These methods revealed essential information about the interrelated challenges faced by these cities. By optimizing resource use, promoting renewable energy sources, and encouraging sustainable agricultural practices, cities can improve their resilience to climate change while contributing to economic growth and environmental sustainability. For example, improving water use efficiency in agriculture, integrating renewable energy into urban infrastructure, and improving food production systems are essential strategies. This integrated approach not only addresses immediate climate challenges, but also lays the foundation for long-term sustainability and economic development. In conclusion, this paper underscores the importance of an integrated WEF nexus approach for enhancing climate resilience and promoting a green economy transition in African cities. By focusing on sustainable development, renewable energy, and agricultural sustainability, and by fostering policy support and multi-stakeholder collaboration, African cities can better navigate the complexities of climate change and build a resilient future. Keywords: Climate resilience, African cities, WEF nexus, green economy transition, Water-energy-food interconnections, Sustainable development, Renewable energy, Agricultural sustainability, Policy support, multi-stakeholder collaboration.

2:50 pm	Leveraging Sustainable Mobility and Food Access through Innovative Partnerships and Human-centered approaches in Montreal	Ville de Montréal - Montréal en commun (MeC) is a smart city program developed in 2020 by the City of Montréal, with the financial support of Infrastructure Canada. It was built as an ecosystem of innovative solutions and partnerships that leverages community strengths and knowledge to react to the climate change crisis. This program acts as an incubator for solutions designed and supported by neighborhood stakeholders, building upon existing networks to empower communities. It is also unique in its' production of "commons": shared, adapted, and institutionalized solutions (Critic, 2023). Montréal en commun partners focus primarily on two core urban issues : sustainable mobility and food access. The partner projects aim to achieve the program objectives outlined in the theory of change, including reducing car dependency and transport-related greenhouse gas emissions, making urban mobility more inclusive and accessible, and improving access to fresh and local products. The Montréal en commun team, along with two non-profit organization partners, Solon and Collectif Récolte, would like to propose a panel for the Innovate4Cities Conference. The panel would showcase how the use of agile methodologies, experimentation loops, human-centred design and an efficient evaluation process can increase the impact of innovative projects on communities and climate change (Sandsto et al, 2021). The program team and two of its partners would present how they integrate evaluation in their projects at different levels. The presentation would demonstrate the potential of iterative processes to drive substantial and sustainable changes (Mirijamdotter, 2006). By emphasizing the importance of evaluation in refining strategies and maximizing outcomes, the panel aims to motivate and educate participants about the transformative capabilities of data-driven decision making in tackling urgent urban challenges (Bibri, 2018). Through concrete examples and practical insights, the panel would provide a comprehensive understanding of how these methodologies can lead to impactful and lasting solutions for innovative cities facing climate change, with a particular focus on addressing challenges related to food access and sustainable mobility.
2:50 pm	Local Solutions: Financing Equitable Climate Action through Land Value Capture	Lincoln Institute of Land Policy - The urgent need to address climate change has prompted cities worldwide to explore innovative financing mechanisms to fund climate investments. This session examines land value capture (LVC) as a source of financing for local climate action, reviewing relevant instruments and their implementation. Drawing on recent Lincoln Institute research projects, it will demonstrate how public climate interventions, including low-carbon transportation and green infrastructure, can positively impact land values and how cities can recover some of that increase through LVC to compensate for their investment and for additional public benefit. The session will examine common LVC instruments and their rationale, using global case studies to explore how jurisdictions have used these mechanisms to fund climate mitigation and adaptation. By highlighting emerging research and resources, the session will demonstrate LVC's potential as a viable financing mechanism for local climate action and offer insights into its practical implementation. This session will present new findings from a suite of recent interdisciplinary research from the Lincoln Institute of Land Policy, including new quantitative studies of the impact of green infrastructure on property values, evaluations of policies to equitable fund climate action, and in-depth case studies of cities implementing LVC for climate action, including assessments of the enabling environment and legal contexts. The session will draw on this suite of innovative research and growing evidence-base to demonstrate the uses of LVC for climate action and argue that local governments can and should leverage the largely untapped resource of land to sustainably finance climate investments. The magnitude of the climate crisis and the response needed present an opportunity to look beyond the economic and financial systems that have been complicit in fueling current challenges. LVC can be much more than another revenue stream for municipalities—it can foster the type of inclusive, resilient development necessary in an era of climate change.
2:50 pm	Accelerating City Climate Action through Project Pipelines and Matchmaking	C40 x GCoM - The session will focus on the work of the GCoM x C40 Global Project Pipeline and CCFLA PPF Connector under the 'Innovative collaboration' category of sessions at the I4C Conference. The presentation will explain the challenge of cities' limited capacity to develop bankable projects, and the limited available data (of the necessary quality) from which financiers can select projects, contributing to the significant gap between the very high demand for climate finance and the lagging finance supply. The Global Pipeline work aims to close this gap by better understanding the global landscape of city climate projects. Many organisations/initiatives have their own individual pipelines but there has been little attempt to aggregate this information at the global level. By understanding the trends, such as projects by region or by sector, we can determine city needs and then work with cities to assess the best options for their priority projects to get them to implementation. CCFLA's PPF Connector program offers project matchmaking services and partnership development support to project preparation facilities (PPFs) to link projects with the project preparation support / technical assistance they need to become investment ready. The Global Pipeline is working to unearth interesting, priority projects through discussion with relevant GCoM and C40 regional teams and then handover to the PPF Connector for an analysis of potential PPFs for which they could apply. The presentation will highlight: The importance of the role of city networks and how the pipeline work is uniquely placed to leverage the relationships with cities and technical understanding of both GCoM and C40;Examples of how the Global Pipeline and PPF Connector work in collaboration with other organisations) and cities; Examples of projects supported through the Global Pipeline and PPF Connector and how the engagement occurred; CDP research / data cuts specific to a certain topic which highlights the need for city self-reporting.

2:50 pm	Ecosystems of City Platform	Federal University of Santa Catarina - The "Ecosystems of City Platform" (https://leur.ufsc.br/en/project_cities.html) adopts a comprehensive, transdisciplinary approach to understanding and addressing the challenges cities face, recognizing them as complex systems intertwined with their environments. By bridging city decision-makers and academia, the initiative integrates scientific studies, monitoring data, governmental databases, and other documents into a digital repository. Aiming to enhance equity, social-environmental resilience, and biodiversity preservation, the platform seeks to ensure interconnected and regenerative urban development. The research project began in 2021 as a collaboration between the Council of Architecture and Urbanism of Santa Catarina State and the Federal University of Santa Catarina and led by the Urban Ecology Lab and focuses on selecting, classifying, and connecting studies and data when they address synergies across various of thematic fields. The fifteen preliminary thematic areas are atmosphere, biodiversity, community and culture, consumption and disposal, economy, education, energy, equity, governance, housing, health and wellness, mobility, natural soil, socio-environmental resilience, and water. Entries are geo-referenced according to specific localities, water basins, states, or broader regions, providing insights into spatial scales from local to planetary, and can be filtered by region. The platform aims to connect the equally fragmented structures of governance and academia. Establishing a network of researchers focused on urban life and its impacts, highlights the interdependency of the city administration sectors and the diverse scientific disciplines associated with how we maintain life in cities. Cities, therefore, should not be limited to their urbanized area, but to an open system that provides goods and receives waste and extends from the periurban and rural areas to other cities up to the planetary scale. Furthermore, this proposal aims to facilitate discussions and establish unified definitions of key terms and concepts used in academic, policy, and technical contexts. Such clarity in terminology is essential for effective policy framing and response strategies. The research group is currently applying a systemic perspective to risks and responses to natural disasters, particularly those related to rain, floods, and landslides, to frame the protocols for structuring the platform. The platform will also support papers' publication and the technical reports' systematization by research teams aimed at decision-makers.
2:50 pm	A theoretical and analytical framework for decoding urban DNA for policy and planning applications	Virginia Tech - Cities worldwide are responsible for 80% of total GDP and the world's urbanization rate hit a new benchmark of 57% in 2023. New cities are planned every year and existing cities continue to adapt to the pace of technology and economic growth. In this competitive era, cities need to be proactive in balancing economic development, environmental sustainability, and cultural diversity to attract and retain global investments and their workforce. In this context, urban planners and decision makers would benefit from a more complete understanding of the DNA of their cities. The multidisciplinary concept of urban DNA has implications for a wide range of urban policies. While not a new concept, applications of urban DNA are gaining popularity in the post-Covid pandemic era. This paper begins with an overview of the historical evolution and theorization of the urban DNA concept. It then presents an approach to consider urban DNA through urban managerialism and urban ecology theories, along with a justification for this theorization. Finally, it concludes by proposing a four-step analytical framework that could assist urban planners and decision makers who are interested in learning about the urban DNA of their cities and identifying core variables that can influence urban growth.
2:50 pm	Empathetic neighborhoods as an inclusive, resilient, and sustainable approach to the digital transformation of cities	Numana - In increasingly digital cities, it is essential that the deployment of technologies in urban areas primarily serves the well-being of citizens. It is with this perspective that Numana, a non-profit organization, introduces the concept of the "empathetic neighborhood." Due to the failure of current digital transformation approaches in cities, this initiative aims to focus the use of technologies around well-being. Technology in cities is used to optimize traffic with real-time data, increase energy efficiency through smart lighting, and monitor air quality with sensors, among other applications. Digital governance platforms simplify administrative processes, and apps like Uber and Airbnb are transforming mobility and housing. These innovations, increasingly present in cities, integrate Big Data, the Internet of Things (IoT), and artificial intelligence. However, these advancements raise social and ethical issues, such as the reinforcement of top-down governance, exacerbation of inequalities driven by tech-solutionism benefiting the private sector, and concerns about citizen data management related to privacy and human rights. These challenges necessitate a revision of technology deployment strategies in cities to better serve citizens and ensure sustainable development. By establishing new ecosystems of highly innovative technologies that consider human needs, Numana initiates a new approach centered on "empathetic neighborhoods." These are living ecosystems oriented towards the well-being of residents and supported by human-centered innovative technologies. The development of a guide to define the main directions for implementing an empathetic neighborhood, including structural principles, governance approaches, inspiring technologies, and ethical guidelines, is the first step towards the implementation of this approach in Quebec. The result of collaboration among researchers, innovators, citizens, and members of civil society, this guide lays the foundation for transforming cities into resilient, inclusive, and sustainable ecosystems. The session aims to present the collaborative work on developing a guide for implementing "empathetic neighborhoods,". It will introduce this concept and engage stakeholders in discussing its components, including structural principles, governance approaches, inspiring technologies, and ethical guidelines. The goal is to enrich the approach through stakeholder feedback and outline practical steps for transforming cities into resilient, inclusive, and sustainable ecosystems.

2:50 pm	Roots of Resilience: Using Trees to Mitigate Rising Heat in Arid, Frontline Communities	Science shows climate change will dramatically increase the frequency, duration, and intensity of heat waves, posing serious health and wellbeing impacts worldwide. According to the IPCC, life-threatening heat and humidity are expected to impact between half to three-fourths of the global population by 2100. Cities, which are currently home to more than half the world's population and will add another 2.5 billion people by 2050, will be exposed to double the intensity of heat stress compared to rural surroundings. Most at risk are frontline communities—that is those that will be impacted first and most intensely by climate change. Cities and towns in arid, water-scarce areas face exceptionally daunting challenges. In many cases, these cities are already impacted by heat, and climate change will make the threat more acute. There is potential for increased tree cover to serve as one potential adaptation to a warming world, as trees cool ambient outdoor air temperatures and provide shade. However, arid cities also face another, often related challenge—water insecurity. Climate change is expected to increase the variability in precipitation and rates of evapotranspiration, reducing water availability for many cities during at least parts of the year. As these twin challenges—extreme heat and water insecurity—interact, the lack of water to support additional trees may limit their use as a nature-based solution for heat in urban areas. Much has been writing about the potential for nature-based solutions (NBS) to help cities adapt to climate change, including increased heat risk. This session presents a new report by The Nature Conservancy and collaborators, launched during the Innovate4Cities conference, which quantifies the potential of NBS to help protect these frontline communities in arid cities from extreme heat. The session will present key findings from the report about the global potential for NBS to help arid cities adapt to heat and discuss two case studies: Phoenix (US) and Athens (Greece).
3:10 pm	How sharing can accelerate the social & enrivonnemental transition	Partage Club - 5 clear objectives have been set for this research project: (1) To experiment with and understand the accelerators and obstacles to the practice of object sharing in cities (2) To measure the change in the relationship to ownership (3) To quantify the social, environmental and economic impact of scaling up this innovation (4) To define a plan for replicating the implementation of an object-sharing culture in other populations (5) To identify the avenues of innovation that will result from the change in citizens' relationship to object ownership.
3:10 pm	Systematic evaluation of smart cities as catalysts for public value creation: do technological innovation and sustainability support urban development and well-being?	Universita' Telematica Pegaso - In contemporary times, urbanization is transforming territories. Policymakers have increasingly focused on the smart cities paradigm to drive the necessary changes. By leveraging technology and sustainability principles, this paradigm orients policies towards improving citizen well-being and fostering the creation of public value. The scientific literature concerning the role of smart cities in promoting public value is developing rapidly. Nonetheless, there is still a lack of systematic evaluation regarding how the implementation of the relative policies influences the dynamics of urban value creation. Through a three-phase methodological approach, which combines bibliometric, network and content analyses, this study provides a systematic review of the scientific literature in this uncovered field, identifying homogeneous research areas, investigating the role of technological innovation and sustainability in urban development and well-being. The bibliometric findings suggest that public value in smart cities is evolving. Network analysis of key co-occurrences reveals distinct clusters of related topics linked to each other: policies and strategies, organizational and managerial capacity, stakeholder engagement and participation, outsourcing and partnerships, results measurement and evaluation. Evidently, stakeholder involvement in the co-creation process, digital tools supporting democracy, sustainability practices in urban planning policies are the most debated. Content analysis reveals efforts to encourage stakeholders' participation in collectively creating public value and prioritizes social equity over technological advancements and environmental preservation. Social equity, a fundamental aspect of the public value concept, emerges as significant across all clusters. Technological innovation is more prominently considered in studies focused on stakeholder engagement, being considered as a tool to facilitate participation, as well as in those assessing the outcomes of technology utilization. Interestingly, environmental concerns, initially prioritized during the policy planning phase, diminish in significance as operational phases progress. Based on these findings, several gaps are apparent in the studied smart policies. These include (i) the limited integration of sustainability practices in public services, (ii) the absence of comprehensive tools capable of measuring all aspects of public value generated by smart city initiatives in a interdisciplinary manner, (iii) the challenge of adopting a holistic approach to urban development, which considers technological innovation, social equity, environmental protection in relation to public value.
3:10 pm	Enhancing Private Investment in Sustainable Urban Infrastructure	GIZ - The Guiding Question for the Paper is "When is it sensible to bring in private investors for urban sustainable infrastructure?" Existing research extensively explores the necessity, and broad enabling frameworks, for attracting private sector investment in sustainable urban infrastructure, sometimes including discussions on sector-specific issues. However, these general principles provide limited guidance for either national policy makers or to decision makers in cities who have to determine the specific actions to be taken. They need to determine the locations, sectors, project types, and circumstances under which mobilizing private capital for urban climate infrastructure is feasible. Additionally, they must identify the key capacities that will facilitate such investments. Through an analysis of various urban contexts and local private finance markets, the paper proposes decision-making rules for the use of private finance in targeted sectors and outlines essential competencies required to navigate and overcome the barriers that reduce access to suitable financing.

3:10 pm	Cool Cities! Leverage Data Intelligence to Build Heat Resilience	Esri - Cities around the globe are universally experiencing more frequent and severe extreme heat events with detrimental impacts to human lives and livelihoods, critical systems and resources, economies and ecosystems. This important session will feature lessons learned from experiences of government, NGO, academia and private sector executives addressing challenges of extreme heat, as well as innovative initiatives trying to address cities' needs. What kind of data and knowledge is available, valuable, missing. What kind of heat resilient solutions are based today on innovative data/knowledge development and what more do we need to make sure that more people (water, food, biodiversity) around the world are safe from extreme heat. The session will announce and discuss a new partnership initiative designed to scale successes of data driven extreme heat interventions in more cities. To help cities better plan for and implement heat resilience actions GCOM, UN HABITAT, and Esri are collaborating to assemble and create resources assisting cities create data-driven policies and actions. The partnership is launching a global mini-MOOC-style workshop “Working with Data to Build Heat Resilience” and an online platform the "‘Keep Cool’ Heat Resilience Hub," bringing together open data, tools, inspirational examples, methodologies, best practices and capacity development resources. These open-to-all resources will be complimented by a series of workshops in select cities, convening diverse stakeholders and focusing on specific climate, socio-economic and other issues; they'll serve as a deeper dive into heat related content and methodological approaches. In collaboration with GCOM’s regional networks we'll aim towards equitable global coverage to build capacity, introduce repeatable, scalable approaches to GIS technology for heat resilience plans. Our aim is to build a heat adaptation smart global community through a network of locally focused learning, which can leverage resources in the Heat Resilience Hub and also contribute new learnings back to the Hub creating a dynamic and evolving sharing platform. This initiative complements the Innovate4Cites initiative to promote generation of knowledge and solutions through local leadership and engagement, it also compliments and constitutes part of GEO’s vision for a global heat resilience service.
3:10 pm	Build Back Better - Increasing Infrastructure Resilience through a Municipal Climate Action Tax	Halifax Regional Municipality - In 2020 Halifax Regional Municipality (HRMM) adopted HalifACT: Acting on Climate Together - one of the most ambitious climate action movements in Canada, aiming to achieve net-zero emissions by 2050 and adapt to a changing climate. Implementing HalifACT created an opportunity to grow the green economy and create more jobs in sectors such as energy efficiency, solar and wind energy, and building retrofits. A Climate Action Tax (CAT)was established to implement HalifACT's strategic initiatives and leverage climate funding from federal and provincial governments, providing the necessary investment for the success of HalifACT. The CAT funds projects and programs supporting both climate mitigation and adaptation with major projects ranging from electrification of buses to retrofitting municipal buildings. A portion of the CAT funds the Small Projects Fund, which funds general climate action projects across HRM business units including small-scale mitigation and adaptation projects, green infrastructure projects, and demonstration projects. This allows HRM to capitalize on relevant funding opportunities and to pilot innovative technologies. Examples of successful projects include a free tree giveaway, anti-fouling paint to reduce ferry emissions, and e-bikes for parking enforcement. This contributed to mainstreaming climate change action across municipal operations and fostered a culture of prototyping. However, after experiencing Hurricane Fiona, devastating wildfires, and extreme flooding, there was a need to fund large capital projects focusing on increasing infrastructure resilience. As assets reach end of life, undergo damage from extreme weather, or require rehabilitation, there is an opportunity to build back better, increasing resilience and adaptive capacity. Often, insurance and municipal budget cycles only allow for a like-for-like replacement of an asset. Through the CAT, the Build Back Better Fund is available for upgrades and redesigns to prepare for climate impacts. Funds are available to staff for full projects, design work, or the cost differential above like-for-like replacement/renewal. Potential work includes upsizing culverts, redesigning roads and bridges, using more resilient materials, upgrading stormwater management capacities, green infrastructure, and more. This presentation provides an overview of the CAT and the Build Back Better Fund, including lessons learned, successful projects and case studies, and the strong public support for HalifACT.
3:10 pm	Developing a Strategy for Sustainable Urbanism: Analyzing the Financial Dynamics of the Smart Cities Initiative in India	Dr.Babasaheb AMbedkar Marathwada university - In 2015, the Indian government launched the Smart Cities Mission to identify and develop100 cities that offer quality infrastructure, sustainable solutions, and a high standard of living. The mission aims to create models that inspire other cities to follow suit. As sustainable urbanization increases, the concept of Smart or Sustainable Urbanism is gaining momentum worldwide. While initiatives like India’s Smart Cities Initiative play avital role in sustainable urban development, some lack a focus on sustainability, resulting in rapid changes in urban sustainability landscapes. This study examines India’s Smart Cities Initiative’s financial dynamics, analysing budget allocations, funding sources, and expenditure patterns to assess their alignment with sustainable urban development goals. By combining financial analysis and urban planning literature, this paper proposes recommendations to improve the effectiveness of these strategies for Sustainable Urbanism. Keywords: Smart City Initiative, Sustainable Urban Development, Urbanism, financial analysis

3:10 pm	Critical Land use planning and management questions in Ghanaian cities and the case of urban sustainability	Youth Employment Agency, Ghana - Land use planning in the Global South, notably in Sub-Saharan African cities, has failed to adequately manage urban development and environmental sustainability issues for decades now. As such, questions about the sustainability and functioning of these cities are beckoning in the arena of planning and management policy amid the global climate impacts. Consequently, we employed geospatial techniques and statistical hypothetical analysis to understand the impacts of rapid population and uncontrolled urbanization on vegetation extermination in Kwadaso municipality in 1984, 2000, 2010, and 2021. The study found that in 1984 the municipality had significantly healthier vegetation, which allowed for the existence of the municipality's ecosystem. Between 1984 and 2021, its built-up space increased from 25.29% to almost four-fifths (79.47%) depleting much of the vegetation and exposing the city to more climate vulnerability. The hypothesis revealed that, between spatial growth and expansion and population growth, there is a positive correlation. This means that when the population increases, the spatial growth of the municipality will also increase. Also, between population growth and the loss of vegetation cover, there is a perfect negative correlation, indicating that when the population increases, the vegetation cover of the area will decrease. In this regard, the study recommends that the city's land use planning and management strategies shift to conserving and transforming civic and cultural areas such as cemeteries, which have now been one of the major sources of greenery in the municipality, into valuable spaces. They can be converted into recreational centres in the municipality where more regionally-friendly trees are planted in these areas for recreational purposes while keeping their primary cultural purpose. Also, land uses (including civic and administrative), which do not need large land sizes for construction areas, should be weighed through sustainable planning, architectural, and design strategies to conserve land for the growing urban population. Ultimately, the study further recommends that land use planning strategies have to shift to height density (vertical) zoning rather than the dominant horizontal development patterns in any Ghanaian city.
3:10 pm	Research Needs for City Climate Action: City Practitioner Perspectives	C40 Centre for City Climate Policy and Economy - The Journal for City Climate Policy and Economy - the only city-network led academic journal - held a call for a special issue with criteria that the papers needed to be led by city practitioners, and needed to feature and highlight priorities, opportunities and solutions city policymakers see and seek from research and innovation for climate action. This session will share the outcomes and learnings from the issue - from the authors involved and the guest editorial team - and seek additional input from the audience.
3:30 pm	Afternoon Tea & Coffee	
3:30 pm	Conflict Café & Participatory Mural with Percolab Coop	A space dedicated to supporting awareness, conflict resolution and collaboration skills. The Conflict Café offers collaboration practices that build emotional resilience and encourage climate action for the socio-ecological transition.
4:00 pm	Empowering youth and measuring impact: the next generation of urban climate champions	This session is brought to you by SERAC-Bangladesh Youth represent a significant portion of the population in Bangladesh, yet their meaningful engagement in decision-making processes remains limited. The Urban Youth Councils (UYCs) project aims to address this gap by establishing platforms for youth aged 18-35 to actively participate in local governance. With a dynamic task force of 200 youth leaders strategically distributed across these cities, we're collaborating closely with city corporations to craft comprehensive Youth Council guidelines, form councils, compile voter lists, and elect city councilors for four-year terms. Through the creation of UYCs in four major cities - Mymensingh, Rajshahi, Narayanganj, and Rangpur - the project endeavors to empower youth to voice their concerns, access essential services, and contribute to city development. Key stakeholders, including mayors of the targeted cities, civil society leaders, and government officials, have been actively engaged in the project. Mayors have been brought on board to chair the UYCs, and the project has received approval for UYC council guidelines from the Local Government Ministry. Moreover, collaboration with the UN Democracy Fund, UN Habitat, and central government officials has ensured comprehensive project implementation and monitoring. The UYCs serve as formalized platforms for youth representation and participation in decision-making processes. By ensuring that 50% of UYC councilors are women, the project underscores its commitment to gender equality and inclusivity. The project also aims to inspire other cities and municipal bodies to establish UYCs following the guidelines set forth, thus fostering nationwide youth inclusion in governance. Looking ahead, the project anticipates organizing UYC elections in the targeted cities by May 2024. Post-election, the project will focus on providing continuous technical support and knowledge exposure to the established UYCs. Through participation in capacity-building workshops and ongoing mentorship, youth councilors will be equipped with the skills and knowledge necessary to effectively advocate for their communities' needs. In conclusion, the UYCs project represents a significant step towards empowering youth in local governance in Bangladesh. By providing formalized platforms for youth representation and participation, the project aims to foster a more inclusive and responsive society where the voices of youth are heard and valued in decision-making processes.

4:00 pm	The Centrality of Informality: recognizing the innovation and transformative potential of informal areas for sustainable climate action in cities	Co-organized by Cities Alliance and SPARC Session Overview: Over 1 billion people, especially lower income residents, live in poorly serviced “informal” settlements across Africa, Asia, and Latin America and many work in the informal economy and rely on informal networks of services, including transport. Informality is a system and process that has shaped urbanization for decades, out of which lessons, limitations and innovations have emerged that are vital information for equitable, just and transformative climate action in cities. However three issues clearly emerge: (1) Those closest to the problems – the residents, workers, consumers of informal services and transport - are rarely part of processes where they can contribute their knowledge and ideas so representation of these communities at global, regional and national events to discuss climate action is limited. (2) The climate finance needed and dedicated to the people living in informal settlements, working in the informal economy and utilizing informal services, including transport, is not fully realized, limiting action. (3) The understanding of how integral informality is to the development and functioning of cities is poorly understood across climate communities and there is a need for deeper understanding as well as linking this understanding to the innovation and transformative systems change which is needed for just and equitable climate action. Part I of this session will begin with a focus on the informal transport sector to illustrate the linkages between mobility, informality, and livelihoods. It will show how the workers and consumers of these systems are those most adversely impacted by air pollution and climate change impacts including flooding and extreme heat, adding to significant existing public health burdens. The examples from eight cities which have implemented highly inclusive and collaborative “living labs” will showcase how engaging key policy actors can result in improvements in working conditions and services as well as emissions reductions in the informal transport sector thus have the potential to contribute significantly to equity, well-being, and health for these urban residents. Part II will feature a panel discussion on the centrality of informality to cities in the Global South, and therefore the transformative climate action needed in these rapidly growing, economically vibrant, yet vulnerable hotspots. This in-depth and frank discussion between Professor Debra Roberts, University of KwaZulu-Natal/University of Twente; Greg Munro, Director, Cities Alliance; Hein Tun, WRI, will discuss: How informality is a system and process that has shaped urbanization for decades, and what are the lessons, limitations and innovations have emerged that are vital information for equitable, just and transformative climate action in cities. What informality means for transformative climate action in cities including how we can reframe the narrative, inspire more action and research on climate change and informality? What are some of the needs in terms of financing, capacity, partnership and engagement to bring about this change and necessary action in Global South cities.

4:00 pm	Loss and damage: local knowledge for local responses	This session is brought to you by UCLG, United Nations University - Institute for Environment and Human Security (UNU-EHS) & C40 These are the original abstracts from each of the organizations: UCLG: The session aims to explore and advocate for the development of localized knowledge frameworks that prioritise research and actionable responses to climate-related losses and damages, particularly in vulnerable communities in intermediary cities. The session will bring together local governments and experts in climate science, social sciences, and policy to discuss innovative approaches and the importance of community-driven solutions. The session will begin by highlighting the critical need to prioritise research efforts aimed at understanding both economic and non-economic losses in local communities affected by climate change, as well as damaged territories. Emphasising the active involvement of indigenous peoples in this research will be paramount, as their traditional knowledge and perspectives are invaluable in developing effective response strategies. This session will serve in framing a foundational path for identifying and documenting the impacts of climate-induced displacement, especially within intermediary and among vulnerable groups such as children, and disaggregating these impacts into tangible categories of loss and damage. Furthermore, the session will explore the pathways for a comprehensive governance framework that is locally efficient for responding to loss and damage with a restorative-led impact on the territory and the communities. A key advocacy point of the panel will be the inclusion of loss and damage considerations in the upcoming IPCC AR7 Special Report on Cities. Panellists will stress the importance of ensuring that this issue is prominently featured in the report's outline, encouraging scientists to engage in localised science and knowledge that responds directly to the challenges faced by urban and rural communities. Lastly, the panel will address the complex issue of compensation versus response, particularly in the Global South. While exploring science-based attribution of impacts, the session will advocate for innovative approaches that go beyond litigation, focusing instead on community-centred responses that benefit territories and communities. This may involve structured dialogues between stakeholders to identify practical, equitable, and sustainable solutions. This session will be organised in the framework of the LGMA Working Group on Loss and Damage. United Nations University - Institute for Environment and Human Security (UNU-EHS): While the adverse impacts of the climate crisis intensify, global urbanisation is taking place at an unprecedented scale and pace. Meanwhile, one in three urban inhabitants in the Global South already lives in informal settlements; their number could reach well over three billion in less than 30 years. Marginalised urban communities have contributed the least to the climate crisis, yet they are extremely vulnerable due to their poor economic situation, spatial location and exclusion from public services and adaptation measures. As a consequence, they are most critically affected by its impacts, including on health, livelihoods and access to functioning basic services. The Loss & Damage Fund established during COP28 offers immense opportunities to develop more equitable development pathways for them. This is much-needed given the intensifying climate hazards. Yet, there is a high risk that those who need it most will only have limited access to its technical and financial resources, if at all. This is especially true for residents of informal settlements, who are often not taken sufficiently into account in formal governance schemes. The session therefore specifically addresses the question of how a justice perspective can be applied to the creation of appropriate mechanisms for access to the Fund. Taking this integrated approach, the proposed event focuses on these assets and current needs from general to specific, global to local. It creates needed synergy by opening a new dialog between L&D and urban practitioners to jointly identify adequate approaches in support of the most-vulnerable urban dwellers in light of the latest environmental, political, financial and institutional development. The interactive session with diverse speakers is informed by a study on loss and damage in informal urban settlements with insights into cities in Brazil, Indonesia and Kenya. The long report will be launched during the session. The discussions will explore how informal settlement communities can actively engage in the design of, and access to the L&D Fund. The session will conclude on which role urban and climate actors could play to build adequate livelihoods of dwellers of informal urban settlements in line with New Urban Agenda commitments. C40: Recognizing the critical gap in existing internal climate migration projections which to date have focused solely on the national level, C40 Cities partnered with Baruch College to develop a new modelling approach to quantify the expected volume of internal climate migration towards ten Global South cities by 2050. This research builds on C40's existing work on urban Loss and Damage, including its flagship report on the topic, Loss And Damage: Challenges and Opportunities for City Leadership. Building on the principles of gravity, and blending quantitative and qualitative inputs, this innovative research will: Evaluate the impact of climate change on urbanisation and rural-to-urban migration in six Global South countries and shed light on the impact that such in-country movements will have across key social, political, economic, spatial, and environmental variables in urban areas. Formulate anticipatory policy and programmatic recommendations and advice, specific to the urban context, with a focus on urban climate migration and urban losses and damages. Raise awareness of the unique urban dimension of climate migration and Loss and Damage and the vulnerabilities these issues exacerbate in cities, especially in the Global South. This research comes at a pivotal moment, as the UNFCCC has recognized climate migration as a crucial component of L&D and the critical importance of meeting climate targets in order to mitigate extreme displacement scenarios that will exponentially increase the financial and non-financial scale of L&D. With climate impacts fuelling fast-paced urbanization and internal displacement, these compounded effects are exacerbated in cities. Projections of anticipated migratory movements at an urban level will be essential for advocacy efforts and to support urban leaders to plan accordingly to mitigate and address uniquely urban losses and damages. This report aims to equip cities with innovative data on projected demographic pressures that their urban systems will face due to the climate crisis and to equip experts and policymakers with key information ahead of the key IPCC AR7 cycle. This panel discussion will present the report's preliminary findings and solicit feedback and input from the expert audience in attendance; final findings will be publicly released later in the month.

4:00 pm	7GenCities: How can Indigenous-municipal-civil society partnerships help transform cities worthy of future generations?	Dark Matter Labs / 7GenCities - What are the physical, digital, and social infrastructures needed so that city dwellers - human and more-than-human - over the next seven generations will thrive in just, radically inclusive, caring, and regenerative communities? This session will share a set of ongoing explorations in response to this challenge, including the following - all from visionary leaders who are partners in the 7GenCities collaborative initiative (see 7GenCities.org): - Selina Young, Head of City of Toronto's Indigenous Affairs Office will share policies, strategies and demonstrations of what Toronto is working on to advance Truth & Reconciliation and Indigenous health.- Pam Glode-Desrochers, Executive Director of the Mi'kmaw Native Friendship Centre will share the vision and plans underway to build Wijewinen, a new Friendship Centre at the foot of Citadel Hill in Kjipuktuk/Halifax. Plans include a regenerative site development and a novel approach to land relationship, called FreeLand, in which the land will be self-owning / self-sovereign. - Delanie Passer, lead of Wapi Kihew Attention to Creative Solutions, will share various work they've been part of in Saskatoon, including an urban ceremonial site and a new project for an Indigenous-led tiny green home village. Jayne Engle and Tanya Chung-Tiam-Fook, co-leads of 7GenCities will moderate the discussion and present the broader vision and ambition of the 7GenCities initiative. Session participants will hear about the Learning and Practice Community, Social Finance work, and Field Building activities, including collective imagination work and system demonstrations underway of social and civic infrastructure.
4:00 pm	Making emissions reduction equitable: practices and initiatives at the forefront	This session is brought to you by Fossil Fuel Non-Proliferation Treaty Initiative, Boston Planning and Development Agency & University of Waterloo These are the original abstracts from each of the organizations: Fossil Fuel Non-Proliferation Treaty Initiative: Municipal governments have gained increasing visibility and influence in the advancement of global climate action, and their role will continue to be elevated in the face of continued urbanization, accumulating consequences of climate change, and a need for coordinated responses across global and local levels. Numerous cities are already taking substantive climate action and successfully lowering their GHG emissions but their efforts are being undermined by the expansion of fossil fuel infrastructure and production. Municipal leaders know well that their budgets, businesses and residents will be hard hit by the climate crises, as cities wrestle with heat waves, flooding and wildfire smoke, and seek to accommodate thousands of climate migrants. Their populations - particularly the most at-risk and vulnerable - will face disruptions to food systems and rising food prices, and are most likely to suffer the consequences of fossil fuel-derived air pollution. As global calls for a transition away from oil, goal, and gas based energy production grow, so will the importance of a unified call from cities worldwide for collaboration to move away from fossil fuels, pressuring their national governments. More than 100 have already joined the call for a Fossil Fuel-Non Proliferation Treaty, alongside 13 nation states, the WHO, 2,500 civil society organizations, over 3,000 scientists and academics, and more than 600 Parliamentarians across the world. Treaties have shown tremendous normative power and local adoption of demands for bold actions and changes is not a new phenomenon. In the 1970s and 80s, hundreds of cities around the world declared themselves to be nuclear weapons free zones (NWFZ) as a means of putting pressure on national governments to take bold action on nuclear disarmament. Daring city leaders will be invited to discuss common solutions, challenges, and opportunities to reduce fossil fuel dependency, from transportation decarbonisation to renewable energy transitions. They will also highlight how global cooperation through a Fossil Fuel Non-Proliferation Treaty could enable a just, sustainable, and energy diverse, and healthy future for all urban populations. Equity and climate justice will be at the core of this conversation, with Mayors from different continents invited to share their experiences. Boston Planning and Development Agency: Reducing emissions is a pressing global issue for large cities, and Boston is no exception. Boston's Imagine 2030 plan is a city-wide initiative to address the problem. One of the primary challenges in reducing emissions is the question of scale. Existing policies, pilots, and regulations assess energy and carbon emissions by aggregating data from individual buildings for cities, creating the same mandates across all neighborhoods. However, the planning objectives of the town are set at a neighborhood scale. This discrepancy creates a gap in neighborhood-level governance from a bottom-up approach, which this project aims to fill. This project focuses on creating an emission-based public-facing tool for building owners to increase awareness among citizens and make informed decision-makers. The project seeks to move away from top-down agencies of territorial enforcement and policing through regulations encouraging community participation in shaping reduction goals in governance, planning, and action. To achieve this, the project aims to create a two-sided virtual tool for continuous governance, planning, and accounting engagement. The tool will allow planners to easily differentiate between optimal and excessive consumers and correlate emissions data with demographic data. It will also provide visualizations of neighborhoods' performance over the years, monitoring and tracking retention strategies' effectiveness and creating neighborhood-specific strategies for retention. On the citizen user side, the tool will provide future compliance checks based on BERDO emission standards and visualize energy retrofit scenarios. It will also have a gamified experience and reward strategies and allow networks of building owners inside neighborhood collectives. The tool development will involve layering data such as demographic data, income and property taxes, land use, energy consumption, wealth, lived versus floating population, open-to-built ratio, and climate awareness. Process improvement will involve interactions on the application, data flow from both sides, networks of users inside neighborhoods, and a nested local governance system. Financial assistance such as loans, carbon trading, subsidies, and federal or state aid will also be incorporated. Social acceptance will be promoted through awareness campaigns and engagement in new project suggestions, and public perception will be measured through acceptance rates of pilot projects. University of Waterloo: Cross-sector partnership (CSP) approaches have gained recognition internationally and have been integrated into development agendas such as the UN Sustainable Development Goals (SDGs) and UN Habitat's New Urban Agenda. In recent years, empirical studies have identified CSPs as a strategy in achieving deep decarbonization (Kuttan, 2023; Wang et al., 2022), including at the local level (Linton et al., 2022). Furthermore, there is a positive correlation between partnership structural features and sustainability progress, particularly regarding climate action (Sun et al., 2020). However, the potential relationship between the size and design of local CSPs working on achieving net-zero climate plans remains understudied (Clarke et al., 2023). Also, better clarity on the assessment of CSP outcomes is needed (Stadtler et al., 2024). Finally, the documentation of best practices of partnerships allows for replication within similar contexts (Suhendra et al., 2023). Thus, this research focuses on identifying the similarities and differences in the structural features of three types of CSPs that contribute to mitigating greenhouse gas

		(GHG) emissions, and the influence of structure on outcomes. Specifically, we are studying larger community-wide partnerships addressing all decarbonization pathways (e.g., buildings, transportation, waste, etc.), sector-specific partnerships addressing one pathway, and project-based partnerships (e.g., residential building retrofits). The research uses a qualitative cross-case comparison approach, involving 12 cases. All are focused on climate mitigation, have equity goals in addition to climate goals, and involve public, private and/or civil society partners. Data were collected through ~50 semi-structured interviews with partners and from archival documents. Analysis is underway, using a deductive analytical framework on partnership structures (e.g., decision-making, monitoring & evaluation, etc.) and on outcomes, and an inductive analysis on partner perspectives about the implications of their structure on outcomes. This study is led by Working Group 4 of the Municipal Net-Zero Action Research Partnership (N-ZAP). The Working Group involves seven professors (and their graduate students), two municipal representatives, two Indigenous engagement advisors and three non-profit organizational representatives. Data analysis is underway now. By September 2024, we will have a draft guide on designing cross-sector partnerships for equitable local climate mitigation, that will ultimately be piloted with Canadian municipalities. https://uwaterloo.ca/implementing-sustainable-community-plans/working-group-4
4:00 pm	Urbanisation tipping points: climate challenges and net-zero transitions in new and rapidly urbanising cities	Global Covenant of Mayors - According to global urbanisation forecasts, 1.6 billion people will reside in the 101 largest cities by 2100, almost doubling today's figure. While humanity will become almost entirely an urbanised species, rapid urbanisation and poor planning, compounded with the exacerbating effects of the climate crisis, will put a strain on the prosperity of our communities. In those contexts, urban planning that has resilience and adaptation in the focus will be key to reduce risks and ensure liveable environments for all. The Urban Transitions Mission, together with KAPSARC, will host a session to delve into the climate scenarios and challenges posed by rapid urbanisation and new cities, as well as identify potential solutions that can be used and scaled across global south cities. The session will be structured around a moderated panel discussion and an audience workshop. In the panel, case studies from the city of Ryadh, Saudi Arabia, as well as UTM cities from Africa and South Asia (Accra in Ghana, Mumbai and Patna in India, Nusantara in Indonesia, Tamansnourt in Morocco) will be showcased during the session. The discussion will touch upon key examples and challenges of rapid urbanisation, case studies on resilience planning and multilevel collaboration, with a focus on the use of action learning and scientific findings. Knowledge, cross-sectoral and multilevel governmental collaborations will be explored during the panel. In the workshop, participants will be asked to provide inputs on the main challenges, solutions and lessons learned for climate resilience in rapidly urbanising contexts. The findings of the session will be used as a starting point to develop a capacity building and training offer to UTM cities in the field of development of new and rapidly urbanising cities. A dedicated publication by KAPSARC will be showcased at the event.
4:00 pm	Empowering women, the poor, and displaced persons to tackle climate head-on	This session is brought to you by Université de Montréal & International Organization for Migration (UN Migration Agency) These are the original abstracts from each of the organizations: Université de Montréal: In early 2023, two devastating earthquakes hit the entire Southeast Anatolian Region of Türkiye and Nothern Syria. Over 60.000 lives lost, and 14.5 million people were affected. 35.000 buildings collapsed, and 180.000 structures severely damaged. In September 2023, Morocco's poorest areas experienced another earthquake, affecting 2.8 million people, causing damage to around 60.000 houses, and claiming over 3.000 lives. The disasters unveiled spatial injustice among marginalized groups and their exposure to disaster risks in both regions. Women are particularly vulnerable. Earthquakes intensified the challenges they face, including poverty, exclusion, and inequality. Despite vulnerabilities, women demonstrate remarkable resilience to navigate encountered challenges after the disasters. This research is a transformative effort to address complex challenges faced by marginalized women in post-disaster recovery in Türkiye and Morocco. It aims to identify pre-disaster and current spatial vulnerabilities, exploring women's adaptive capabilities and potential to influence the reconstruction of their primary living environments in a more inclusive and sustainable manner. The study focuses on Alevi women in Hatay province of Türkiye and Indigenous Amazigh women in rural Marrakesh, Morocco due to their ethnic and religious marginalization and substantial impact of the earthquakes in these regions. This research is not merely an academic pursuit; it's a call to action. Current investments in the regions for recovery efforts enhance the research's ability to drive impactful change. Considering this timely opportunity, the project is designed in a way to engage with local communities, NGOs, and government agencies to co-produce the knowledge and solutions. Through workshops and expert panels, the research aims to provide a platform that expand marginalized women's voices and actively involve them in the discussions and eventually influence the ongoing recovery efforts. Outcomes include academic studies, and a documentary to share the recovery narratives of women. This novel approach is expected to contribute to global discourse on disaster management. International Organization for Migration (UN Migration Agency): The project "Climate Migration in Urban Areas: Challenges, Representations and Inclusion", funded by the City of Paris, France, was conducted in partnership with the Hugo Observatory of the University of Liege and the City of Paris. The objective of the project was to contribute to identify ways to assist cities in their efforts to better understand how climate and environmental change will affect migration and urbanization trends in Paris in the coming decades, and to include these considerations in urban planning and key sectoral policies. In line with growing initiatives at the international level. The project contributed to accelerate local, national, regional and global responses to climate change and migration in cities and support local governments in their efforts to design inclusive climate and integration policies. The project was built on three pillars: I) Data collection and improvement of knowledge on climate migration and cities, II) Strengthening dialogue and partnerships with leading cities on migration and climate change issues, III) Implementation of a pilot project with the City of Paris to develop an action program on climate change and migration. An action agenda was drafted, resulting from an online public consultation, interviews with 30 stakeholders from a wide range of field activities. It identifies challenges and opportunities to increase the resilience of Paris residents in the face of climate hazards, to prepare the city to welcome people, engage with migrants, displaced and diaspora communities and promote their positive contribution to climate action. A summary of the key findings can be found here. In short, it identifies entry points and draws 13 recommendations to assist the city of Paris in anticipating for and addressing the impacts of climate change on migration and displacement at local level.A phase two of this project is currently being led. It seeks to go beyond the current results of the project by implementing a communication phase to raise awareness about the topic among the population in creative ways; an exchange program with other cities to exchange best practices and join forces during international fora, such as COP29 and COP30.

4:00 pm	Governance4Climate: a living lab to enable city climate action	This session is brought to you by Climate-KIC & Flourishing Enterprise Institute, Wilfrid Laurier University These are the original abstracts from each of the organizations: Climate-KIC: This session offers a live policy-lab - conducted in person, with possibly a parallel virtual session - focusing on needs, benefits, learnings and future challenges of multi-level governance and collaboration between local, national, and regional governments to expedite local climate action toward achieving climate neutrality. Building on real-time learnings from the EU Mission to achieve 112 climate-neutral and smart European cities by 2030 and to ensure that these cities act as experimentation and innovation hubs to enable all European cities to follow suit by 2050, this session would directly tackle challenges of multi-level governance, advocating for inclusive governance that involves all levels to address complex challenges like climate change. Despite the ambitious climate goals set by many cities worldwide, the roles played by national governments are vital. Disconnects between national and local governments often hinder cities in their efforts, due to lack of capacity support and access to resources, policy incoherence, or structural governance barriers. This is true in Europe and the US and proving to be an issue elsewhere as sustainable urban development becomes a global imperative. We will explore the importance of experimentation and agility, highlighting the need for flexible regulatory interventions and rapid response measures to adapt to changing circumstances. Political dialogue and collaboration are critical factors. We will delve into financial and institutional challenges cities face including the role of national and multilateral support. We will model the benefits of working with national and regional governments through 'National Platforms', which align climate objectives across government levels and address cities' needs through innovative policies, funding mechanisms, and technical support and bring together diverse stakeholders, both public and private, relevant for the implementation of transformative urban commitments in different national contexts. We will touch upon citizen participation, emphasizing the importance of balancing citizen engagement with swift decision-making in urban development processes. We will seek contributions from all participants on innovative governance structures that facilitate collaboration and enable cities to achieve climate neutrality at an accelerated pace. Above all, the session will examine how to achieve a comprehensive approach to addressing climate challenges, that includes integrated planning and engaging industry expertise. Flourishing Enterprise Institute, Wilfrid Laurier University: In the face of mounting urban challenges, the Municipalities Adapting in Response to Complexity (MARC) Partnership emerges as a beacon of collaborative innovation. Co-founded by VERiS, FEI, ICLEI World Secretariat, and REFOCUS, MARC is an ambitious, international learning and innovation partnership that facilitates collaboration between dozens of municipalities, sector NGOs, systemic innovators, academics, and funders focused on collaboratively innovating to enable transformative change within municipalities and studying the experiences to maximize learning. Those who join MARC have recognized that the response of municipalities to the complex, systemic issues challenging our communities (typically led by a sustainability-, climate- or equity-focused office or rep) has led to slow, incremental progress. Further, they recognize that to accelerate progress, we must overcome underlying organizational barriers and constraints, which necessitates shifting the mindsets of senior leaders and transforming strategic management practices. MARC facilitates collaboration across its diverse network to catalyze innovation development and mobilization. Additionally, MARC serves as an innovation incubator providing access to a collective of leading experts, municipalities motivated to test new solutions, scholars interested in studying the application of innovations in practice, and a platform capable of mobilizing knowledge and attracting partners interested in scaling adoption globally. In particular and over the past four years, MARC partners have collectively endeavoured to test, enhance, and scale the Enterprise Evolution Program (EEP). The EEP is designed to enable municipalities to evolve practices by leveraging emerging systemic frameworks, methods, and tools that enable organizations to harness their collective intelligence and collaboratively design their desired futures. This session will be co-delivered by representatives of the Co-Founding organizations, including the ICLEI World Secretariat, VERiS, REFOCUS and the Flourishing Enterprise Institute, who will, together, introduce MARC's ethos, the EEP, and the diverse composition of our network, which spans municipalities, NGOs, academia, and systemic innovators. We will present illustrative case studies on the impact of the partnership in building collaboration and catalyzing the development and mobilization of leading innovation. Attendees will gain insights into the partnership's objectives and future direction and are warmly invited to join our quest to catalyze systemic change for sustainable urban futures.
4:00 pm	Accelerating city climate action through data and digital technologies: lessons from the Field	This session is brought to you by WGIC & UN-Habitat WGIC is a Global Trade Association of Geospatial and Earth Observation companies. WGIC is joined by member companies who played a pivotal role in contributing to the GCOM-WGIC White Paper, they will outline case studies showcasing how their innovative geospatial tools and services are driving cities forward on their climate action journey. UN-Habitat promotes transformative change in cities and human settlements through knowledge, policy advice, technical assistance and collaborative action to leave no one and no place behind. Building on its Flagship Program on People-Centred Smart Cities and the Climate Smart Cities Challenge, UN-Habitat's Innovation Unit is now focusing efforts on positioning climate action within people-centered smart cities.
4:00 pm	Deep Dive into draft Global Research and Action Agenda (GRAA) 2024	University of Melbourne Knowledge Team & Global Covenant of Mayors Conference Advisory Committee. This is the interactive 60-minute session to attend if you'd like to deep dive into the key I4C conference outcome - the Global Research and Action Agenda for Cities and Climate Change Science (GRAA). We will workshop and discuss the currently identified knowledge gaps and needs that cities need addressed to meet their climate action ambition… to review, edit, update ready for the second draft to be presented in the morning plenary on Day three (Thursday).

4:00 pm	Communicating climate: Driving change through effective communication	Effective and innovative communication is at the heart of driving climate action. This session will explore how local leaders are navigating the challenges of climate change communication in their respective communities. Together, we'll discuss key strategies, challenges, and solutions for engaging different audiences, from socioeconomic groups to local businesses, and how to tailor messages that resonate.
5:00 pm	Move to next session	
5:10 pm	Making city climate action inclusive, fair, and just	The knowledge needed to support inclusive climate action and explore equitable solutions to our planet's most pressing challenges.
6:10 pm	Day 2 wrap-up	
6:30 pm	Open Info Session on the UCCRN Case Study Atlas	Learn about the case study Atlas (CSA) being developed by UCCRN in parallel to the IPCC Special Report on Climate Change and Cities
Day 3 Thursday, 12 September 2024		
7:00 am	Run through the heart of Montréal: A guided tour	Join us for a running tour as a guide takes us through the vibrant streets of Montréal, highlighting the city's blend of history, culture, and beautiful architecture. Spots are limited—click "I'm Going" to secure yours and meet us in the lobby of Le Westin Montréal.
9:00 am	Day 3 welcome	
9:30 am	Prioritizing knowledge and action: the next-generation Global Research and Action Agenda	Moderated deep-dive session on the cornerstone output of I4C24, inclusive of reflections from Days 1&2 Global online live stream and worldwide submission-based Q&A
10:45 am	Morning Tea & Coffee	
10:45 am	Conflict Café & Participatory Mural with Percolab Coop	A space dedicated to supporting awareness, conflict resolution and collaboration skills. The Conflict Café offers collaboration practices that build emotional resilience and encourage climate action for the socio-ecological transition.
11:15 am	The state of climate action in Canada, India, and Indonesia: a comparative snapshot	This session is brought to you by Global Centre for Environment and Energy, Ahmedabad University & Concordia University These are the original abstracts from each of the organizations: Global Centre for Environment and Energy, Ahmedabad University: Urban actions to address climate change have been emphasized in India's National plans including the National Action Plan on Climate Change, its Nationally Determined Contribution (NDC), and the Long-Term Low Carbon Development Strategy (LT-LEDS). Key urban strategies towards meeting India's net zero targets include urban planning to achieve efficient and compact urban form leading to reduced travel distances, shift to cleaner transport modes, efficient buildings and appliances, low emissions infrastructure, and renewable energy. While both mitigation and adaptation solutions exist and in many cases are successfully adopted, the scale of urban transformation needed entails a major departure from the business-as-usual incremental actions to major shifts. We assess the climate plans and actions in 100 Indian cities. The assessment draws from the following: an in-depth review of existing peer-reviewed literature, a detailed content analysis of individual city climate plans, a review of sectoral plans for key sectors and 12 semi-structured interviews with urban experts. The analysis focuses on the following areas: i. the degree to which climate change is addressed within the plan ii. the institutional factors influencing the planning process and iii. the extent to which the plan is implemented including whether the intended mitigation or adaptation outcomes were delivered. Concordia University: The Municipal Net-Zero Action Research Partnership (N-ZAP) presents findings from a nationwide survey evaluating Canadian municipalities' progress in reducing local greenhouse gas (GHG) emissions. The active involvement of municipalities in planning, implementing, and monitoring climate action is crucial in supporting Canada's GHG reduction targets to limit global temperature increases to 1.5°C, as per the 2015 Paris Agreement. This research aimed to determine the current landscape of Canadian municipal GHG emission reduction initiatives, measurement practices, monitoring mechanisms, and planning strategies to outline the current state of climate action in Canada. The findings derived from surveying 256 municipalities across 10 provinces collectively represent approximately 69.5% of the Canadian population. Of the local governments surveyed, 63.3% had formulated a climate action plan, 51.2% had established an official climate target for their corporate GHG emissions, and 46.5% had set an official community emissions reduction target. Thirty percent of these targets were aligned with Canada's national goal of achieving net-zero emissions by 2050. However, a notable discrepancy was evident in their progress: only 21.8% had advanced towards fulfilling their corporate targets, and a mere 15.6% had made strides towards meeting their community targets. Moreover, our research revealed that while larger cities are leading the charge in municipal efforts to attain national net-zero objectives, both large and mid-sized communities are making headway in target setting, emissions measurement, and action implementation. Encouragingly, smaller communities are also stepping up to the challenge, as indicated by 55.5% of surveyed municipalities with populations under 30,000 having developed a climate action plan, and 36% having either fully developed or begun formulating a climate action target. Overall, the survey findings show that local governments nationwide are taking meaningful and impactful action to mitigate climate change. However, they also highlight the need for accelerated interventions, more robust targets, and improved efficiency in local efforts to support national climate action. Over the next four years, N-ZAP will develop research-informed materials, provide support, and offer guidance to enhance local climate mitigation efforts, ultimately promoting increased adoption, and action to achieve local climate action targets.

11:15 am	Harnessing digital technology to accelerate climate action and inclusivity in urban infrastructure	Presented by The International Coalition for Sustainable Infrastructure and Bentley Systems - Infrastructure is the interconnected “system of systems” that provides the physical foundation for our society. When done right, it can help to make cities more inclusive, sustainable, safe, and resilient. The increasingly interconnected nature of infrastructure and urban society means that risks of failure can cascade faster and broader than ever before. Challenges like reducing carbon emissions and making cities resilient to the physical effects of climate change are systemic and require systems-based solutions. Digital technology - such as digital twins and AI - can advance this systems-based thinking and accelerate action. This interactive panel discussion will explore the impact of digitalization and AI on the resilience and sustainability of urban infrastructure. By exploring how emerging technologies can be used throughout the infrastructure lifecycle, we aim to facilitate a deeper understanding of their potential in accelerating climate action in the built environment and shaping the future of a more inclusive, climate-ready urban landscape. The session will showcase available roadmaps, tools, digital technologies, as well as innovative local projects and initiatives that have incorporated them. We will explore how digitization can enhance decision-making for climate action, for example, by modelling physical climate risks, assessing the condition of existing infrastructure, or supporting efficient and reliable decision-making, before, during and after hazard events. We will showcase real-world examples and local efforts, highlighting best-practice knowledge and solutions that demonstrate the practical application of technologies driving digitalization for climate action. These include initiatives such as the multimodal transportation and land-use modelling software used in Beijing to optimise rail travel and promote green transportation, and the use of digital twin technology in Ayodhya, India to increase access to clean water, reduce emissions and improve health outcomes. The session will bring infrastructure and tech experts and engineers together with city leaders to explore the challenges and opportunities for incorporating technology in urban infrastructure and to discuss the role of policy and governance in facilitating this. Through this cross-sector action, the session will aim to address critical gaps in the use of data and digital technology for climate action.
11:15 am	From Science to Action: Co-creating actionable strategies to implement the IPCC SR CC	This session is brought to you by GIZ and ICLEI
11:15 am	Government and business: financing urban research and innovation	The Session: This one-hour session, literally bubbling with real-world examples from around the globe, will explore how governments and businesses are engaging to finance urban research and innovation. You will discover how partnerships engaging national and local government, researchers, and local stakeholders can deliver urgent solutions and funding. The session, featuring mayoral, business and thought leaders, will dive into examples of cities, especially in Central and North America and Asia, working with the private sector to bring climate action plans to fruition. You’ll see real world-projects in action, including a floating boardwalk, personally presented by Belize City’s Deputy Mayor Allan Pollard and business Blue 21. This technologically and financially remarkable approach was made possible through government grants and GCoM Bankable Cities technical assistance. Additionally, The Great Bubble Barrier company will present its pioneering technology to filter plastics from Bangkok’s waterways, in an exciting collaboration with the Bangkok Municipal Authority. You’ll also hear from the Mayor of Guelph, Canada, himself on transitioning to a smart and inclusive city, and have insights provided by the Fonds de recherche du Québec (FRQ), DUT and UTM on how national governments and research agencies are mobilizing international funding to support local climate solutions. FFG will go further, unveiling strategies in funding research innovation for radical urban change. The Hosts: This opportunity is brought to you by some of the world’s leading partnerships for rapid urban transition. It is co-hosted by Global Covenant of Mayors for Climate and Energy (GCoM) and the Austrian Research Promotion Agency (FFG) representing the Driving Urban Transitions (DUT) partnership, as well as the Urban Transitions Mission (UTM). GCoM, the world’s largest global alliance for city climate leadership, is built upon the commitment of over 13,000 cities and local governments, hailing from 6 continents and 144 countries, encompassing more than 1.2 billion people. These cities aim to reduce global emissions by the equivalent of 5.6 GtCO2 annually by 2050, while also addressing adaptation and energy poverty with firm commitments. The Driving Urban Transitions (DUT) Partnership is an intergovernmental research and innovation program with currently 67 partners from 28 countries, within and outside the European Union (EU). Aligned with key EU initiatives like the European Green Deal and the Urban Agenda, it significantly contributes to the EU Mission on Climate-Neutral and Smart Cities. The Urban Transitions Mission (UTM) mobilizes decision-makers across all levels of government to prioritize net-zero pathways enabled by clean energy and systemic innovation. Working with 98 cities worldwide, UTM helps to identify needs-based solutions and offers the opportunity to test, pilot and scale up innovative solutions for urban transitions. Since 2022, DUT has hosted Mission Innovation (MI) calls focused on urban transformation to coordinate multilateral funding. The calls are aligned to respond to key challenges and needs highlighted by the DUT and UTM cities. Click on the link below to access the detailed AGENDA: https://docs.google.com/document/d/16D3m--qHqawNZEZkIzwZqGyT292pw64VCB_d62_fECc/edit?usp=sharing

11:15 am	Demand and supply: what next for urban climate finance	This session is brought to you by UNESCO Chair on Urban Resilience at the University of Southern Denmark (SDU), University of Pennsylvania & GCoM These are the original abstracts from each of the organizations: UNESCO Chair on Urban Resilience at the University of Southern Denmark (SDU): The event will consist of a panel discussion based on the following research conducted in 2023 by UNESCO Chair on Urban Resilience at SDU group in partnership with GCOM and UN-Habitat.(preliminary results) 194 most recent NDCs submitted by June 26th 2023, were analyzed against a system of indicators that explored national and urban, climate mitigation and adaptation, challenges and responses, climate vulnerabilities and crosscutting issues. This research will be repeated, and preliminary results will be updated during the months of June to August 2024. Preliminary results suggest that 129 NDCs have urban content (66%) in the form of mitigation and/or adaptation challenges and/or responses. 53 NDCs (27%) have the urban sector well covered, 76 NDCs (39%) have moderate coverage of the urban sector and 65 NDCs (34%) have no urban content at all. 28 NDCs (14%) include a request for international support at the urban level. 19 only in the shape of climate finance, 2 only in the shape of capacity building. No NDC requests only technology. 7 NDCs request support for finance, capacity building and technology (all 3). Among the 26 countries that request finance support at the urban level, 10 NDCs are conditional to international support, 2 are unconditional and 14 contain both conditional and unconditional provisions.Preliminary results suggest that urban finance is poorly portrayed in the NDCs:• 16 NDCs, 62% of the NDCs that include a request for urban finance and only 8% of the total analyzed NDCs, quantify the request.• It is pivotal to take a systematic approach to including urban areas in the NDCs and estimating the required investments in urban climate action.• for the 16 NDCs that quantify their request the cumulative estimate is 30 billion USD circa.• Additional research is needed to estimate the overall size of the urban investments necessary for mitigation and adaptation compared to the mobilized funds.In the months prior to Innovate4cities, the research will be repeated to include updated NDCs, and to better quantify and qualify the type the financial request (by sector, by region, by city, etc). University of Pennsylvania: This paper offers an overview of the challenges related to subnational urban climate finance, discusses guarantees as one solution, inventories today's guarantee funds, and details the creation of a green cities guarantee fund as being developed in conjunction with the SDSN Global Commission on Urban SDG Finance (https://urbansdgfinance.org/) co- chaired by Mayors Anne Hidalgo (Paris), Eduardo Paes (Rio de Janeiro) and economist Jeffrey Sachs.We show how cities are critical, but, as yet, rarely the subject of climate finance as nations develop programs to meet the Paris Agreement. When accessing international finance for loans to address necessary mitigation and adaptation concerns, cities in many countries either fail to secure the lenders' required sovereign guarantee due to political issues and/or face challenges associated with lending criteria: their own creditworthiness, high interest rates, short tenor, lengthy and complex approval processes We summarize the data that shows the well-known dilemma: cities need rapid-turn-around, low interest, long term, loans to secure a range of instruments while lenders need assurance of contractual compliance for their extended credit. As one solution to the problem, we argue for the development of a guarantee fund whose de-risking protects lending entities from losses and attracts capital that would ordinarily not be available to cities. We analyze nine guarantee funds that work in climate. They are: Green Guarantee Company (launched 2024), UNFDC Sustainable Cities Guarantee Facility (2022, unfunded), Development Finance Corporation (DFC, 2019), ARIZ (2008), GuarantCo (2005), African Energy Guarantee Facility (AEGF, 2017, 2020), Assured Guaranty (AGO, 1988-2017), Multilateral Investment Guarantee Agency (MIGA, 1988), African Development Fund (AFD,1974). We show that: municipal borrowers are often eligible in guarantee funds, but account for a very small percentage of total guarantees. Based on these findings, we detail a proposal for a Green Cities Guarantee Fund. We estimate its potential impact and benefits. We conclude with an exploration of the fund's business model, sponsoring entity/host, fund manager and target countries and details of a pilot developed in conjunction with the Latin American Development Bank (CAF). GCoM: Trillions of dollars will be required to help cities build the low-emissions, resilient infrastructure necessary to combat and react to the climate climate crisis and reach net zero in the shortest time possible.The Urban Transitions Mission (UTM), with the support of its Center (UTMC), has launched a Finance & Funding Helpdesk to respond to the urban climate finance deficit experienced by GCoM signatories. The Helpdesk offers support to UTM cities in connecting with the right financing sources for their projects, improving the quality of plans and getting the right information along stages of financing. The Helpdesk actively scans for financing and funding opportunities tailored to the needs of UTM cities and it is open for collaboration with all GCoM signatories.In the session, the UTM F&F Helpdesk will bring four projects from the UTM cities of Puerto Montt, Belo Horizonte, Rosario and Buenos Aires, to present on their financing journey and open the floor for potential tailored collaboration for each of the projects. The collaboration opportunity will be designed based on the results achieved during the UTMC marketplace that will take place on 18th June 2024 during the ICLEI World Congress.The intervention will revolve around the themes of infrastructure financing needs for cities; matching finance at the right project stage; key data, analyses and studies needed to structure project portfolios and access climate finance for cities.

11:15 am	Accelerating Local Climate Action through Partnerships: Navigating the Urban Project Lifecycle with the Global Covenant of Mayors and the City Climate Finance Gap Fund	Global Covenant of Mayors for Climate and Energy - Transforming urban climate action ambition into successful projects is often hampered by limited resources, capacities, and a lack of clear guidance to navigate the project development lifecycle. This session bridges that gap, offering a roadmap for cities embarking on this journey.The conversation will explore the five stages of project preparation: planning and strategy development, project definition, project feasibility, transaction and investment, and implementation. Expert-led parallel guided discussions will delve into each stage, sharing insights, tools, and resources to help cities implement climate projects. These discussions will highlight the resources available at each stage, and cities will learn about the requirements for a successful transition into the next phase. A closing plenary session will allow participants to reflect on a cohesive roadmap from idea to implementation. The critical role of early-stage project preparation is often overlooked yet instrumental in laying the groundwork for successful project implementation. The City Climate Finance Gap Fund, a vital initiative supporting cities during this phase, provides technical assistance, capacity-building, and guidance on project prioritization and pre-feasibility studies. The session will highlight the relevance of partnerships and the role of city networks in accelerating climate action, leveraging learnings from the alliance between the Global Covenant of Mayors (GCoM) and the Gap Fund. Speakers will include representatives from MDBs, City networks, academia, PPFs, and other initiatives. who will share their expertise on innovative solutions and provide a comprehensive wrap-up. A key output of the session will be a draft knowledge product, showcasing the tools and resources available for each project stage, to be included and further refined through the discussions. Objectives:1. Enhance understanding of the urban climate project cycle, from planning to implementation, and the handover mechanisms between such stages.2. Highlight the critical role of early-stage project preparation and the support available through initiatives like the City Climate Finance Gap Fund.3. Foster knowledge-sharing and learning by bringing together subject matter experts, city representatives and practitioners to share insights, best practices, and lessons learned.4. Inspire and empower cities to develop and implement impactful climate projects that contribute to global sustainability goals.
11:15 am	Place Based Transition Funds: A playbook for systemic portfolio construction	This session is brought to you by Open Earth Foundation This session is designed to provide city leaders, policymakers, investors, and community advocates with practical insights into establishing and managing Place Based Transition Funds (PBTFs), by following our published playbook methodology. These funds are not just financial tools, but catalysts for inclusive and sustainable urban transformation. By aligning investments with local climate action plans, PBTFs offer a strategic approach to blended finance for resilient infrastructure and green initiatives that are crucial for meeting city climate action targets. Our expert panel will include leaders from Peace Department, Metabolic, Dark Matter Capital Systems, and the Open Earth Foundation—organizations at the forefront of systems thinking and collaboration, and core members of the Systemic Climate Action Collaborative (SCAC). We will discuss the successes and lessons learned from reviewing multiple climate action finance frameworks for cities to compile the PBTF playbook and its ensuing pilot deployments. The focus will be on the playbook's application in selecting geographies and crafting portfolios that reflect community needs and data-driven climate action plans. Key discussion points will include:- Strategies for engaging with local communities and steward ownership to ensure that projects are not only viable but also equitable.- How to use digital and data-driven platforms like City Catalyst to enhance transparency, planning, and implementation effectiveness.- Innovative financial structures such as loan guarantee funds that reduce investment risks and attract a broader spectrum of investors.- Case studies from SCAC members on where existing work is creating the conditions for place based transition funds and spotlighting its needs. Attendees will gain knowledge on how to navigate the complexities of fund creation, and how PBTFs can foster impactful partnerships across governmental, private, and nonprofit sectors to mobilize large scale capital for city transitions. This session is a must-attend for anyone interested in the intersection of climate finance, urban planning, and community development, offering a blueprint for how cities can become engines of sustainability through catalyzing targeted, impactful investments. We invite all stakeholders committed to urban sustainability and climate action to join this conversation, and explore how PBTFs can be a key instrument in achieving resilient, low-carbon, and equitable urban futures.

11:15 am	Accelerating Risk-Informed Investments in Climate-Resilient Urban Infrastructure: a dialogue between engineers, business and urban policymakers	This session is brought to you by GIZ - Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH, KPMG & International Coalition for Sustainable Infrastructure These are the original abstracts from each of the organizations: GIZ - Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH: The municipal enterprise of the production department of water supply and sewerage (ME PDWSS) provides drinking water to almost the entire territory of Konotop and some adjacent areas, maintains a centralized wastewater disposal system and accompanies the transportation of wastewater to the city's sewage treatment facilities, where it is treated and discharged. Drinking water is extracted from artesian wells, which total 26 in number (including 14 reserve wells and 2 plugged wells). The depth of some of the wells reaches 620-750 m of underground aquifers. The depth of the wells makes it possible to supply really high-quality artesian water with good taste without additional mechanical or chemical treatment. Konotop started laying water supply networks in 1929 and today their length reaches 192 km. The construction of the centralized sewerage system began in 1961 and now the length of the city's sewerage system is 99 km. The project "Installation of a solar power plant for the municipal enterprises of the production department of water supply and sewerage in Konotop Urban Territorial Community" envisages the installation of a 1.6 MWh ground-mounted solar power plant at the Konotop Urban Community Wastewater Treatment Plant to compensate for the electricity consumed by its own devices and equipment through the generated electricity from solar radiation. The measure to install a solar power plant to compensate for its own electricity consumption is in line with the objectives of the Sustainable Energy and Climate Action Plan of the Konotop Urban Territorial Community for the period up to 2030. KPMG: The 2030 UN Agenda for Sustainable Development is an ambitious global plan aiming to transform the world by addressing critical issues such as poverty, employment, health, education, gender equity, and climate change. Despite its noble goals, significant systemic barriers are hindering progress. KPMG, in collaboration with the United Cities initiative, developed a Dynamic Risk Assessment (DRA) to identify and understand these obstacles. The United Cities program facilitates international cooperation and information sharing among cities to help achieve the UN's goals. The DRA methodology involved interviews and workshops with professionals from diverse industries and sectors worldwide, revealing severe risks that need addressing. This assessment employs Expert Elicitation, Network Theory, and Behavioral Finance to create a multi-dimensional risk network, considering not just the severity and likelihood of risks, but also their velocity (the speed at which risks impact) and connectivity (interdependencies between risks).The findings stress the urgency for global unity and prompt action by local leaders, businesses, and communities to mitigate these risks and secure a a more resilient future. The journey towards sustainable development requires new collaborations and innovative partnerships. Accelerating action among cities, businesses, and citizens is challenging, and there is a critical need for funding viable sustainability initiatives. Risks that will be discussed are linked to city-specific risk, ecosystem risks, project risks, and SDG-related risks (incl future financial cost of inaction, social implications of non-action, lack of standardized integration approach). Other topics that will be part of the debate: key risk emitters—risks that can trigger other risks—include political instability, competing city priorities, and a lack of embedded innovation within cities. Lastly, the lack of awareness about the Sustainable Development Goals (SDGs) and a need for greater collaboration across the SDG ecosystem. Data and tools such as GIS-applications and digital twins can help model these risks at a neighbourhood, district, and city scale to not only offer insights but also to design plausible scenarios across sectors, across actors, across levels of governance, and across cities and build critical mass for change. These scenarios can then help unlock new value and business models, public private partnership constellations, and integrated approaches. International Coalition for Sustainable Infrastructure: There is an urgent need to unlock funding for equitable, sustainable and resilient infrastructure across the globe and to prioritise infrastructure that delivers positive outcomes for people and the planet. The International Coalition for Sustainable Infrastructure (ICSI) is partnering with the Global Covenant of Mayors (GCoM), and the Institution of Civil Engineers (ICE) to convene a high-level dialogue between international climate leaders from the engineering community and urban policymakers on de-risking investment in adaptation and resilience in cities across the world, with a focus on Global South cities. The discussion will be guided by key recommendations from the policy brief 'Accelerating Risk-Informed Investments in Climate-Resilient Urban Infrastructure: A Framework-based Approach' recently included in the T20 Brazil, which include:- the need for standardised framework and indicators to identify, prioritise and unlock risk-driven investments in climate action for cities, underpinned by data-driven quantitative climate risk assessments to generate science-based evidence for local-level interventions.- the need for bolstering the technical skills of decision-makers, enabling them to grasp risks, opportunities, and effectiveness of solutions.- the need for clearer communication of context-specific risk to boost investor confidence, allowing municipalities in developing economies to utilise global tools to scale up finance for resilient infrastructure. This interactive session will highlight current challenges for financing local climate action initiatives, showcase examples of successful approaches to climate finance in municipalities around the world, and emphasise the need for collaboration between engineers and policymakers to scale up solutions. While the focus of the panel will primarily be on adaptation finance, the discussions will also explore strategies for ensuring a more systemic approach to addressing the global climate transition.

11:15 am	Sustainable urban food, three ways: learnings from Nepal, Argentina, and Iceland	This session is brought to you by StoryCycle, Rio Grande Municipality & Jörp These are the original abstracts from each of the organizations: StoryCycle: Urbanization in Nepal poses unique challenges for food security and sustainable development. To address these issues, a collaborative initiative has been launched, uniting UN Habitat in Nepal, the Women Entrepreneurship Facilitation Center of Lalitpur Metropolitan City (LMC), HASERA Agricultural Research & Training Center, and StoryCycle. This abstract highlights the innovative collaborative approaches employed to promote urban farming and enhance local food systems in Nepal. Firstly, it emphasizes a multi-sectoral partnership, leveraging the expertise and resources of governmental, non-governmental, and private entities. By fostering collaboration among diverse stakeholders, the project ensures comprehensive and holistic approaches to promoting urban farming.Secondly, the project prioritizes gender-inclusive strategies, recognizing the vital role of women in sustainable development. Through targeted interventions by the Women Entrepreneurship Facilitation Center of LMC, women are empowered to actively participate in urban farming initiatives, promoting gender equality and women's empowerment.Thirdly, active engagement with local government involvement in driving sustainable urban development. By collaborating with municipal authorities and community and public schools, the project integrates urban farming into local governance structures and enhances food security at the school level, ensuring the long-term sustainability of urban agriculture initiatives.Fourthly, collaboration with HASERA Agricultural Research & Training Center brings technical expertise and research insights to inform urban farming practices. The project advances evidence-based approaches to sustainable agriculture in urban contexts, enhancing the effectiveness and scalability of urban farming initiatives at the community level.Lastly, StoryCycle's innovative storytelling platform amplifies the voices of urban farmers, fostering public awareness and advocacy for urban farming. StoryCycle also develops the Mobile Application KARESA to guide urban farming techniques and link farm produce to local markets.In conclusion, this collaborative project exemplifies how innovative collaboration across multiple sectors can drive impactful solutions for promoting urban farming and advancing sustainable urban development in Nepal. By embracing diverse partnerships and approaches, the project offers valuable insights for addressing complex urban challenges and creating resilient and inclusive cities.https://storycycle.com/karesa-1/ https://www.youtube.com/watch?v=VbzDGQgctH0 Rio Grande Municipality: The municipal government of Río Grande in Argentina´s Tierra del Fuego Island promoted local horticultural production to reduce the costly and low-quality importation of vegetables from the mainland. Projects were implemented to strengthen this production and overcome the seasonality caused by the local climate. The project was divided into two lines of action to improve the production chain and strengthen local commercial flow. The first line involved providing heaters to strategically warm horticultural and livestock greenhouses. The second consisted of a main water supply network to increase and ensure access to water in areas without services, thereby guaranteeing the planned production of annual crops. These projects regularized production throughout the year, allowing for an orderly flow to the market and avoiding oversupply problems. Additionally, they enhanced competitiveness against imported products. Thus, the historical issue of water access was resolved, promoting self-sufficiency and the quality of local production for the benefit of the Río Grande community. The seasonality in supply was due to adverse weather conditions in autumn and winter. To address this, heaters were acquired using biomass from forest waste, contributing to environmental sustainability and solving forest fires caused by open burning. To address water access, wells were constructed in strategic locations, along with the installation of cisterns and a water tanker for distribution, improving logistics and reducing production costs. These measures aimed to ensure consistent production, enhance competitiveness, and address historical issues in the region, promoting sustainable development and community well-being. Jörp: The Smart Food Campus proposes a transformative vision for an abandoned cement factory and its silos in central Reykjavík, reimagining it as a cornerstone of urban sustainability and innovation. Located in an industrial area undergoing redevelopment into a new residential neighborhood, the project addresses the community's aversion to the factory's symbol of pollution and carbon emissions. By repurposing the dilapidated structures into a vibrant food growth, processing, and distribution hub, the Smart Food Campus aims to become a beacon of sustainability and resilience for Iceland. This project encompasses vertical farming, a food startup incubator, a dark store (supermarket for online orders), a food court, a 0km restaurant, and an events hall. The central goal is to bolster Iceland's food self-sufficiency by promoting locally grown and processed food, addressing the nation's reliance on imported food due to its challenging agricultural climate. Partnering with Infarm, a leading vertical farm operator, and Iceland's largest supermarket chain, the Smart Food Campus will transform the silos into high-tech vertical farming facilities and operate an efficient dark store, respectively. Powered by Iceland's abundant sustainable energy from waterfalls and hot springs, the Smart Food Campus will leverage these resources to reduce the carbon footprint associated with food production and distribution. This initiative will offer Icelanders access to fresher, more nutritious food while providing a platform for food entrepreneurs to innovate and thrive. The campus will serve as a community hub, fostering engagement with high-tech, hyper-local food production, and offering spaces such as a food hall, restaurant, gardens, and a sky deck on top of the silos. Currently in the entitlement phase and negotiating with the City, the Smart Food Campus aims to turn a symbol of industrial pollution into a model of ecological redemption. By doing so, it will contribute to the new neighborhood's identity, making it a vibrant center for sustainable urban living and food culture celebration. This project not only addresses local food security but also sets a precedent for sustainable urban redevelopment, demonstrating how obsolete industrial sites can be revitalized to support ecological and community health.

11:15 am	Artificial Intelligence for Everyone	Emerging technologies are reshaping entire industries, redefining how they operate and what we know about them. Just think about how GPS, smartphones, and big data transformed the taxi industry. But have you considered how Artificial Intelligence (AI) could revolutionize climate practices? Join Beth Blauer in exploring the transformative potential of artificial intelligence in addressing urgent climate challenges. Discover how the integration of fundamental data skills, AI technology, and innovative problem-solving can empower individuals and communities to make a rapid impact on climate issues. Through interactive demonstrations and practical exercises, participants will learn to harness AI tools for climate data analysis, gaining valuable insights and developing actionable strategies accessible to everyone, regardless of their technical background. Stay for the following session where we will spotlight the finalists of the AI x City Climate Action Hackathon, who have developed cutting-edge AI tools for risk and vulnerability assessments in Brazilian cities, and showcase the next generation of AI-driven adaptation solutions.
11:15 am	Fireside Chat	Global Covenant of Mayors for Climate & Energy (GCoM) x UN Habitat
11:15 am	Leveraging place and territory for multi-level climate action implementation	This session is brought to you by Open Earth Foundation & OCED
12:15 pm	Move to next session	
12:25 pm	Digital Defenses: using spatial analysis to build urban resilience	This session is brought to you by Fugro & World Resources Institute, India These are the original abstracts from each of the organizations: Fugro: This abstract explores a case study on coastal hazard modeling and risk assessment for South Padre Island (SPI) and Port Isabel, TX, illustrating how digital tools can support adaptation solutions in vulnerable coastal regions, enabling swift and informed decision-making. The southwest Texas coastline is highly susceptible to storm impacts and sea level rise, exacerbated by climate change. These areas are critical to the state economy, relying on beach recreation, ecosystem tourism, recreational fishing, and port facilities. Despite previous beach and dune resilience assessments, a comprehensive vulnerability and risk assessment had not been conducted to support adaptation planning until now. The initial step involved characterizing the coastline to understand its varied typology - sandy areas, marshes, wetlands, and hardened sections - essential for determining suitable adaptation strategies. The typology was identified by downscaling the existing Environmental Sensitivity Index and editing it using high-resolution aerial imagery. Physical assets of both cities - commercial/residential buildings, roads, critical infrastructure, and cultural resources - were compiled in GIS from various sources. Coastal hazard modeling utilized publicly available data on sea level rise and storm frequency from NOAA and FEMA. Asset risk was assessed by combining inundation levels from storms with sea level rise projections over a digital elevation model created from lidar data. Building elevation data were extracted to compare flood levels to the lowest building elevation points. The study evaluated impacts for 10-, 100-, and 500-year storm scenarios with no sea level rise (SLR), 2040 (1.15 ft.), and 2080 (3.81 ft.) projections, using intermediate high values from NOAA. Findings revealed that low-lying residential communities on canals in Port Isabel are extremely vulnerable, with infrastructure adjacent to dredged canals at highest risk. On SPI, flood vulnerabilities primarily originate from the Laguna Madre side, except in ocean facing areas where the dunes have been leveled for recreational activities. The study highlights that areas of very low elevation, especially those modified by human activities, face the highest flood risks in future storms with sea level rise. High-resolution geo-data, advanced modeling techniques and digital tools are essential for coastal cities worldwide, enhancing their resilience to climate change impacts and ensuring sustainable development. World Resources Institute, India: The concept of differential vulnerability and its importance in driving resilience is critical for robust and inclusive climate action. India is the seventh most climate-vulnerable country in the world, with nine of its states among the top 50 most vulnerable regions globally. The country's cities are particularly affected by the climate crisis, with over 80% of the urban population living in hazard-prone districts. Extreme heat, unprecedented rains leading to flooding and storms, and water stress, are climate events - individual, concurrent and related; are straining the urban communities in India. However, the impact of these hazards on communities are not the same. The underprivileged communities bear most of the brunt - due to their limited adaptive capacities. Unequal access, varied living, social and economic conditions, with nearly half of urban residents living in informal settlements in the Indian cities, dictate the differential vulnerability. WRI India based on the experience of working with different size and geography of cities across India, has put together a 'Climate Hazards and Vulnerability Assessment (CHVA) Framework'. It is designed to assess vulnerability at the intra-city level and identify risks at the watershed level for additional analysis and engagement. It evaluates the social drivers of vulnerability, such as social capital, secure housing, education and employment, good governance, reliable emergency services, basic civic infrastructure, and transportation etc. CHVA puts together multilayer analysis with multi-perspective approach emphasizing the need to further the Sustainable Development Goals and create more equitable and livable cities. Based on the publicly available datasets using satellite and monitoring station information, and the secondary endorsed by the national government which is easily available across geographies in the country in a continuous and homogeneous in format, CHVA lays opportunities for the cities to create baselines that they can continue to monitor for years to come. It lays ground for various partnerships across academia, community representatives, subject experts, citizens and policy makers to highlight the nuances of socio-economic and intersectional marginalism through cases and hotspot analysis. It highlights the importance of putting people at the center of climate resilience and integrating equity into climate action planning.

12:25 pm	'Good enough' data for climate action at the city level: what's available, where are we going next and what will be needed?	This session is brought to you by Ricardo, Open Earth Foundation, & International Coalition for Sustainable Infrastructure. The 2018 Cities IPCC conference highlighted Observation, Data, Modelling and Scenarios at the City Level as one of the critical knowledge gaps, including a need for more climate and socio-economic metrics at the city scale, improved modelling capabilities for higher resolution data at local scales, incorporation of transdisciplinary approaches that integrate sociological, economic, climatic and ecological features applicable at the city scale, and the need to better consider complex and dynamic feedback systems and their impact on adaptation strategies. The call to action on data has been embraced, with a rapidly growing range of innovative, user-friendly tools and datasets now available to cities, enabling them to estimate and report emissions, climate risks, develop future projections, model the impacts of actions, and develop climate action plans. However, many cities, particularly in the global south, continue to struggle with data and planning processes and it often remains less of a priority than more urgent, local socio-economic development needs. Additionally, the need to adapt to climate impacts is fast becoming a more pressing reality for many. Adaptation efforts, and the data and tools we use to inform these, continue to lag behind and will increasingly need to consider the implications of living in an overshoot-scenario, where changes in critical natural systems may become irreversible. Despite the growing recognition of the likelihood of a climate overshoot, current commitments from global, state and local actors to mitigate these impacts are not ambitious enough. This session will encourage reflections on the current, emerging, and future landscape of data and tools available at city level, reflecting on the journey to date and the future gaps and needs. It will consider what might be 'good enough' to support effective planning, ambitious action, and tackle the most urgent issues as well as unknown future impacts and feedback loops. It will reflect on the available resources for cities with different priorities, experiences, capacities, geographies and climates, taking a look back at some of the data and tool developments in recent years and examples of new emerging tools now available. It will consider the limitations of current climate data and tools, and where might they need to go next, the gaps and challenges that remain that must not be overlooked, and that data and tools can't solve. It will reflect on what's needed now and the priorities moving forwards, and challenge what role data might or might not continue to play in addressing future climate change. Hear from three speakers who bring different perspectives on 'good enough' data for climate action: Dr Rose Bailey, Ricardo – hear about the results of a landscape analysis of data and tools and reflections on which might be most useful for different cities in different contexts and stages of climate planning, and some reflections on the remaining gaps and future direction. Evan Prodromou, OEF – see an example of a new tool designed to help cities efficiently and effectively address their evidence and data needs for ambitious climate action planning. Debra Roberts – learn about the importance of ensuring that processes supporting adaptation to climate impacts consider overshoot scenarios, and the future needs for climate action considering current predictions.

12:25 pm	Communities at the forefront of climate-resilient development	This session is brought to you by Single Mothers Association of Kenya & Society for the Promotion of Area Resource Centers (SPARC) These are the original abstracts from each of the organizations: Single Mothers Association of Kenya: This paper probes land injustice, the notion that, not all natives are indigenous persons and the thought that forest-dwellers cannot coexist with the wildlife in the 'jungle'. Though Kenya ranks amongst mega bio-diverse countries, with Nairobi city having diverse green spaces and animal places exemplified by; Karura and Ngong' forests, the botanical gardens that are Nairobi Arboretum and City Park, as well as Nairobi National Park and Jamhuri Agricultural Show Ground-cum-park, Nairobi green is threatened by both climate-change and human activities. Global warming local warning comes with man-made maladies and through act-of-God. Deforestation and poaching, natural disasters and human negligence due to population growth and greed, sees beings and beasts fight for the ever shrinking habitat. Slum-dwellers are building on riparian lands, as UN bodies, Habitat and Environment Programme, encroach on indigenous forest. Combing through planning documents and interviewing urban planners, a community mapper used both Participatory Video (PV), a Participatory Action Research (PAR) methodology and Geographic Information Systems (GIS), to present a comprehensive analysis of the ecological injustice meted against urban-poor. From a human rights and humanitarian laws lens, this gives an overview of the nature of Nairobians deprivations, violations that include inaccessibility of peoples' parks. The result of this research indicates the fundamentalism of urban open green spaces as socio-ecological, and economic justice. Nairobi, to reclaim its green and grin, botanical and zoological diversity maintenance ought to correspond with city-dwellers' eco-friendly and biodiversity needs. Nature-based solution, Kenya's Vision 2030 should mind wealth after health. That lifestyle diseases can be factored from environmental degradation of cities. That cemeteries are an identification and historic places connectors. This research thus concludes that dispossessing locals of their mother-land, creation of separate reserves for natives and wild-animals and segregation on racial lines or socio-economic status, negates Just City tenets. Urban renewal shouldn't gentrify nor densification be unsustainable development. Urban farming and peri-urban farming are proving to be part of greening cities hence townies are to be beneficiaries of Community Forest Association (CFA) and Water Resource Users Association (WRUA) models. KEY WORDS:Gentrification, Geographic Information Systems, Just city, Open green spaces, Reserves Society for the Promotion of Area Resource Centers (SPARC): The "Roof over our heads" campaign, a flagship initiative of the Race to Resilience (RtR), aims to help local and global stakeholders recognize the existing deficits in city development, investment, planning, land allocation, and provision of immunity to these households. It seeks to explore how development and climate investments can support the production of climate-resilient homes. The strategy aims to empower women's collectives and their neighborhoods to assess the resilience of their home structures. It will serve as a learning laboratory involving material providers, contractors, and finance providers to explore the added value that can result from investing in these homes themselves. Most importantly, it aims to call on local, national and global duty bearers to recognize that resilient homes are the first line of defence against widespread disasters caused by heat, wind, and rain, safeguarding against human, asset replacement, and economic costs. Join us for "Roof Over Our Heads," an engaging session that delves into an ongoing campaign focused on briefing mayors who represents the duty bearers and is the face of the state closest to people in cities about the imperative need to address the challenges faced by individuals living informally within urban areas. Our discussion commences with an exploration of the complexities surrounding habitat and extreme weather conditions, serving as the foundational elements of this vital initiative. Discover how we're shaping strategies to ensure every member of our community has access to safe and secure housing.
12:25 pm	Scaling Up and Speeding Up: New Recommendations for Climate Action in Cities, Emerging from The Third Assessment Report on Climate Change and Cities (ACR3.3)	Urban Climate Change Research Network (UCCRN) - This proposed high-level panel discussion will present emerging knowledge from the Urban Climate Change Research Network's (UCCRN) Third Assessment Report on Climate Change and Cities (ARC3.3), which provides benchmarked knowledge with actionable strategies for cities to address climate change in the context of other urban stressors such as inequity, limited financial resources, governance challenges, insecurity, conflict, and crises. Consideration of these major forces is critical to how cities confront climate challenges and for the assessment of urban climate change, as revealed in the ARC3.3 process. ARC3.3 is being published as an Element series on twelve topics including: Justice for Climate-Resilient Development; Architecture, Urban Design, and Planning for Climate Action; Governance, Enabling Policy Environments, and Just Transitions; and Financing Climate Action. ARC3.3 represents a collaboration of over 300 authors from cities in low, middle, and high-income countries around the world and provides knowledge and applications for urban climate change researchers, city practitioners, and policymakers to accelerate transformative climate action. The new knowledge emerging in ARC3.3 that will be presented at this session addresses many of the I4C24 Conference themes and cross-cutting topics, including resilience, finance, multi-level governance, justice and equity. In this session, UCCRN Co-Directors and ARC3.3 editors and authors and city practitioners will present and lead discussions on key ARC3.3 findings and on critical components for an inclusive urban climate assessment leading to actionable knowledge. The session will explore how ARC3.3 findings can be leveraged to achieve effective climate solutions across multiple scales and sectors. Discussion themes will include building resilience, governance for just and equitable climate solutions and decision making, and financing climate action. The session will also discuss key components of the process for an inclusive assessment and effective knowledge generation including: engaging stakeholders throughout the process; ensuring that equity and inclusion underpin urban climate strategies, emphasizing the need for equal access to financial and technological resources; and accessing digitized tools, such as the UCCRN Case Docking Station. All these components can support cities, especially in the Global South, to address climate change more effectively.

12:25 pm	Nature-Positive Cities: Guidelines, Benefits, and examining the potential case of Mendoza, Argentina	This session is brought to you by CONICET, INAHE - Instituto de ambiente hábitat y energía - CONICET & Instituto de Ambiente, Hábitat y Energía (INAHE) - Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET) These are the original abstracts from each of the organizations: CONICET: Reducing the albedo of urban surfaces stand as a proven strategy for mitigating overheating in cities. City surfaces with high solar reflectance reduce the solar energy absorbed by the building envelope and streets, thereby reducing energy need for air conditioning and the associated CO2 emissions from fossil-fuel power plants. Urban surfaces with high albedo reflect a higher fraction of shortwave solar radiation to the atmosphere, creating a negative radiative forcing (RF) that counteracts the RF induced by greenhouse gases in the atmosphere (mainly CO2). The Intergovernmental Panel on Climate Change (IPCC) has developed a metric, the CO2 equivalency effect, to gauge the efficiency of high albedo in urban areas. It´s established that a 1 % increase in albedo per square meter of urban Surface equates to approximately 1.8 kg of CO2 offset globally. In this context, the paper aims to map the CO2 equivalent ranges resulting from albedo modification in urban surfaces in South American cities according to their climatic regions. Building upon Akbari´s methodology, the analysis utilizes regional data on regional global horizontal insolation (GHI) at both the top of the atmosphere (TOA) and the ground surface, accounting for atmospheric solar transmittance in each location. The findings highlight significant CO2-equivalent levels across various cities in Argentina, Colombia and Peru. Notably, the calculated maximum CO2 offset in the Sudamericana region is approximately 3.5 kg per 1 % albedo change per m2 of a surface. Such insights are pivotal for shaping policies aimed at mitigating urban warming and addressing climate change vulnerabilities in environmentally sensitive countries. INAHE - Instituto de ambiente hábitat y energía - CONICET: Consolidated cities no longer have free spaces to allocate to new squares. For this reason, it is necessary to work on the remodeling of these green spaces using design strategies that maximize the potential of open spaces to improve the microclimatic conditions of the square and the surroundings. This work aims to evaluate the benefits and environmental consequences produced by the urban remodeling process in the city of Mendoza. Particularly, the variables of decreased air temperatures and thermal comfort are analysed in the “Plaza San Martin” case study. This work analyses measurements developed in the summer of 2013, where the design dating back to 1970 was monitored, and in the summer of 2023, where the remodeling of the year 2018 was monitored. Methodologically, three representative design schemes of the square were characterized: forest, meadow and centre. For this purpose, measurements were made with fixed and mobile stations that recorded microclimatic data - air temperature, solar radiation, wind speed, wind direction, relative humidity, and atmospheric pressure. The SVF value was determined with the RayMan program and thermal comfort was calculated with the COMFA method. The results show that the green structures evaluated maintained or improved thermal and comfort conditions. While the centre structure substantially increased its discomfort condition due to the increase in sealed surfaces and solar exposure. It is highlighted that the design decisions have impacted slightly in terms of benefits and significantly in terms of damages on the thermal habitability of the square. Instituto de Ambiente, Hábitat y Energía (INAHE) - Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET): It is estimated that over half of the world's population currently resides in urban areas. The phenomenon of urbanisation is occurring at an unprecedented rate in the global south. Green infrastructure and other nature-based approaches have the potential to facilitate the creation of sustainable urban development, while simultaneously meeting climate adaptation and mitigation goals. Green infrastructure has the capacity to enhance the liveability of cities, particularly for those who are economically vulnerable, by reducing temperatures and cleaning the air. The city of Mendoza is characterised as an "oasis city", i.e. it is located in a semi-arid climate zone and its streets have been forested for more than 100 years. However, in recent times a decline of the urban forest has been observed. The objective of this paper is to conduct a comprehensive analysis of the tree line and its surrounding areas within the Mendoza Metropolitan Area. This analysis is based on the data provided by the Public Tree Census of the Metropolitan Area, which was conducted in 2020 by the Secretariat of Environment and Territorial Planning of the Province of Mendoza. To achieve this, the geographic database is analysed using advanced GIS tools, which enables the development of a range of indicators at the street section level. These include indicators of tree quantity and distribution, as well as other relevant indicators. Some variables of low quality were identified, preventing the consolidation of indicators such as sustainability and the danger of trees. The results demonstrate considerable variability between different departments and according to age, with older urbanisations exhibiting the highest canopy cover. The average forest cover was found to be 20%. The oldest part of the Metropolitan Area exhibited the highest canopy cover, attributed to the magnitude of the species and their age. Further research is required on the species present, street widths, and aspects of forest management. These preliminary results permit the conclusion that the maintenance of the forestry system must be assumed by the corresponding organisations, as well as the involvement of the different actors in order to achieve the improvement and sustainability of the tree management system.

12:25 pm	Designing Resilient Futures: Climate-Induced Displacement, Spatial Data, and Urban Planning Solutions for Sustainable Development	UN-Habitat - Climate change, conflicts, and crises have led to a significant increase in displacement, with many forced into long-lasting exile, often in the world's poorest and most resource-scarce nations. Humanitarian aid alone is insufficient to meet the long-term needs of displaced populations, necessitating a shift towards strategic urban planning and environmental management that considers the interconnected challenges of displacement and climate change. With its expertise in working with urban experts and promoting local resilience, United Nations Human Settlements Programme (UN-Habitat) plays a crucial role in facilitating transformative initiatives that respond to local contexts. Through resilience principles and collaboration with various stakeholders, including local authorities, municipalities and hosting communities, UN-Habitat develops strategies to harness the socio-economic benefits that migrants bring to urban areas. The publication “Designing for Displacement: A Spatial Guide for Planning Along Seasonal Rivers in Drylands”, builds on field experience and research to establish a repository of spatial strategies and socio-economic approaches for humanitarian-development contexts, focusing on settlements along intermittent rivers in East Africa. It aims to provide a resource for practitioners, governments, and stakeholders to expedite planning processes and implement nature-based design solutions that enhance self-reliance and resilience in the climate adaptation context. While the strategies outlined are not prescriptive, they inspire the development of context-specific Nature-based Solutions (NbS) that promote self-reliance and overall resilience. High level speakers from the International Organization for Migration (IOM) and the Global Centre for Climate Mobility (GCCM) will also showcase examples of their work and processes which represent a step towards a collective effort to address the impacts of climate change through innovative approaches that consider the needs of displaced populations and their host communities. The intention is for similar research and innovation to be developed in other regions, and for the topic to be presented from the perspective of partners internationally.
12:25 pm	Tackling the energy crisis from all angles: lessons from Energy Geography, Manchester, and the UN Environment Programme	This session is brought to you by University of Victoria, University of Manchester & United Nations Environment Programme These are the original abstracts from each of the organizations: University of Victoria: Cities are a pivotal context in addressing climate change, and many cities are looking to transition to renewable energy. Responsible for two-thirds of global greenhouse gas emissions, addressing cities' emissions is essential to meet the Paris Agreement goals. Due to the land requirements of renewable energy sources, cities likely cannot produce renewable energy self-sufficiently. To overcome this issue, some ambitious cities are looking to the regions that surround them to source renewable energy. For example, Melbourne purchases over 100 MW of electricity generated by wind farms in the surrounding region. While energy generation often benefits societies, it also causes injustices, such as uneven dispossession, marginalization, and socioeconomic injustices, including for renewable energy development. When energy is developed with the meaningful involvement of non-traditional (“niche”) energy actors, such as citizens, small and medium enterprises, and local governments, a more equitable distribution of the outcomes of energy development is possible. However, in practice, many community energy initiatives have more often engaged wealthier, dominant, and less diverse segments of society. Through interviews and document analysis, this study will examine the justice implications of renewable energy projects being developed in regions for cities' decarbonization by applying the democratic innovations framework defined by Elstrub and Escobar. This framework addresses who is involved, how participants are selected, and how decisions are made. Projects will be identified through the analysis of city plans, energy strategy documents, planning documents from relevant organizations, government documents, and webpages of the global cities that have adopted ambitious climate change goals and measures. Given the contrast between high demand for energy in cities and the land requirements of renewable technologies, cities sourcing renewable energy from the regions that surround them could become an important model for decarbonization. Documenting the engagement of niche actors in regional renewable energy development will enhance decision-making among energy sector participants, working to prevent the potential reinforcement of disparities in the impact of energy development and offering a more equitable and justice oriented model of decarbonization. University of Manchester: Decision-making on climate and energy policy remains dominated by national scale actors. Whilst this keeps whole system impacts in view, it relegates place considerations to a variable which impacts policy success. Such an approach misreads the implementation challenge, risks reinforcing sectoral siloes and misses opportunities for integrated solutions across the economy, reinforcing regional inequalities. A place-based approach is therefore essential to designing and delivering the decarbonisation and energy transformation that is now urgently required. Research suggests that adopting place-based decarbonisation approaches could deliver Net Zero goals at around a quarter of the cost of top-down approaches with half of the energy demand and greater co-benefits (Innovate, 2022). This research paper will introduce research being conducted by the EDRC - the first UK-wide Energy Demand Research Centre which undertakes research for an affordable and secure low energy future. Our work, conducted by a consortia of 13 universities across the UK, focuses on bringing together sectoral transformations (in industry, transport and buildings) in place to understand the extent to which different policy pathways are deliverable or at risk, given the variable combinations of topologies, communities, regions, skills, infrastructures, services and institutional change capacity that exist across places. As part of work under the ‘Place’ theme, we intend to address the overarching research question: “How can place characteristics be used to accelerate the design and delivery of low energy demand futures?” Looking towards an example of one strand of research, this paper will introduce the “The Place-Based Retrofit & Regeneration Models project”. This unique project lasting over the next 3 years, will focus on the provision of comprehensive national-level energy support to households and businesses in the context of building retrofit, while considering the unique aspects of different locations. It recognises that retrofit decisions are influenced by social dynamics and relations within communities, emphasising the importance of local involvement and collaborative problem-solving embedded in different sites of governance and action. Through a co-design process, we will work with local communities, local government, skills and delivery bodies, engineers and network planners to explore how to design and realise place-based energy demand strategies and interventions. United Nations Environment Programme: The Digital Demand-Driven Electricity Networks Initiative (3DEN) is an interagency initiative, led by Italian Ministry for Ecological Transition in collaboration with the United Nations Environment Programme (UNEP) and the International Energy Agency (IEA). The initiative addresses the policy, regulatory, technology and investment context needed to accelerate progress on power system decarbonization, digitalization, and effective utilization of demand side resources, such as energy efficiency, demand response, electric

		vehicles, building-level energy storage and distributed solar photovoltaics. Many transformative digital technologies and solutions for energy remain in the early stages and require further investment. Pilot projects play a crucial role in de-risking new technologies by providing opportunities for learning and reducing implementation costs, and can be adapted for local urban contexts. As part of the 3DEN Initiative, the project is supporting the implementation and monitoring of pilot projects, including the following two, dealing with the digitalisation of distribution grids. Colombia: Mitigating Congestion and Supply Interruptions with Demand Response Colombia's pilot project focuses on addressing congestion and supply interruptions in the power system through the implementation of a Demand Response mechanism in Bogota. By incentivizing consumers to adjust their electricity usage during periods of high demand, this project aims to alleviate grid strain, enhance grid reliability, and promote more efficient energy consumption. Insights gained from this initiative will inform the development of effective demand response programs that can be scaled up contributing to a more resilient and responsive energy infrastructure. India: Digital Twin for Enhanced Electric Distribution Grid Operation and Management in New Delhi, the pilot is introducing the concept of a Digital Twin for Enhanced Electric Distribution Grid Operation and Management. A digital twin is a virtual replica of a physical system that can simulate, monitor, and optimize its performance in real-time. By implementing digital twin technologies in electric distribution grids, India aims to improve grid stability, reduce losses, enhance operational efficiency, and enable better integration of renewable energy sources. This pilot will serve as a testbed for advanced grid management techniques that can be replicated across the country, fostering a more reliable and flexible power system.
12:25 pm	From Policy Discourse to Science Foresight: Leveraging grey literature to inform the development of the IPCC Special Report on Climate Change and Cities (SR-Cities)	This session is brought to you by ICLEI and GIZ
12:25 pm	Municipal Net-Zero Action Research Partnership (N-ZAP) - Supporting municipalities to achieve net-zero GHG mitigation goals	University of Waterloo - The Municipal Net-Zero Action Research Partnership (N-ZAP) aims to support Canadian municipalities in monitoring, measuring and achieving their GHG mitigation goals. This research project is studying and creating improved measurement, analysis and monitoring systems for both corporate and community-wide GHG emissions. We are currently in year two of a five year project. N-ZAP is a partnership between the University of Waterloo, the Federation of Canadian Municipalities, ICLEI Canada, 11 other Canadian universities, nine other national organizations and 15 municipal governments. Our work is organized into five working groups: Working Group 1 Objective: Determine the current state of GHG emission reduction targets, measurement, monitoring and planning in Canadian municipalities. Also, create a user-friendly, open database to share the data . Deliverables: An open, publicly available database with searchable, visible display options; A report on current state of GHG mitigation planning, measurement and monitoring in Canada (after year 1); and a report on progress of GHG mitigation planning, monitoring and monitoring in Canada (after 5 years). Working Group 2 Objective: Advance standardized measurement systems and tools (indicators) that can also be used to identify mitigation opportunities and further social equity. Deliverables: New indicators related to transportation, carbon sinks, social equity, and green economy; and GHG emissions and social sustainability reporting software. Working Group 3 Objective: Enhance corporate monitoring & disclosure (carbon accounting, climate budgets, and climate-risk disclosure), and integrate net-zero accounting and carbon budgets into municipal level decision making, to enhance transparency on action and gaps, drive planning to close gaps and provide accountability. Deliverables: An advanced technical guide for climate-related financial disclosure; an instruction manual based on advice on carbon accounting; and an improved software tool to embed methods for carbon accounting. Working Group 4 Objective: Enhance community-wide emissions measuring & monitoring (collaborative governance), and ensure equitable, diverse and inclusive engagement in climate action, measurement and monitoring. Deliverables: An advanced guide for collaborative governance that ensures diverse and inclusive action, measurement, and monitoring. Working Group 5 Objective: Mobilize knowledge resources and tools to diverse audiences using accessible and inclusive formats. Deliverables: Knowledge mobilization to 250 Canadian pilot cities. Websites https://uwaterloo.ca/implementing-sustainable-community-plans/n-zap https://www.pcp-ppc.ca/n-zap
12:25 pm	Research and Innovation Priorities in Asia	

12:25 pm	Shaping the future of AI powered climate action: from incubation to next generation solutions	Have you considered how Artificial Intelligence (AI) could revolutionize climate practices? Discover cutting-edge AI solutions developed by our hackathon finalists to enhance risk and vulnerability assessments for Brazilian cities. Plus explore ClimateIQ, a next-generation tool harnessing AI to empower local adaptation to climate change. Join us earlier, at 11.15 for “Artificial Intelligence for Everyone” a beginner-friendly hands-on session where we’ll explore how you can integrate AI into your climate work, using current tools to stay ahead of the curve and shape the future of AI-powered climate action.
1:25 pm	Lunch	Conflict Cafe + Participatory Mural by Percolab Coop, today at lunch and breaks
1:25 pm	Conflict Café & Participatory Mural with Percolab Coop	A space dedicated to supporting awareness, conflict resolution and collaboration skills. The Conflict Café offers collaboration practices that build emotional resilience and encourage climate action for the socio-ecological transition.
2:45 pm	CityRetroFit: Identifying the Potential for Digital Twins for Urban Decarbonization	Toronto Metropolitan University - The CityRetroFit project is a partnership between academic (TMU and Concordia), government (NRCan, NRC, City of Toronto), and private sector (Enwave, Purpose Building, RDH Building Science) partners to develop a rapidly scalable tool to simulate existing and potential post-retrofit building energy performance at the building, district, and city scales. Funded as part of the $123M CFREF "Volt-Age" program, this two-year project is in its first year and approaching the proof-of-concept stage.Building upon previous work undertaken as part of the Tools4Cities (https://www.concordia.ca/research/cities-institute/initiatives/tools4cities.html) and Toronto2030 district platform (https://toronto2030platform.ca/), CityRetroFit will serve to provide a valuable planning tool to inform large-scale decarbonization initiatives and supporting utility planning. The proposed session is a highly collaborative and interactive workshop with a target audience of City officials and other relevant stakeholders involved in Sustainability, Climate Action, and Planning activities.The proposed format of the workshop would be as-follows: 1. A mock-up of the CityRetroFit tool, its data requirements, and planned functionality will be presented.2. A short interactive survey (mentimeter) will be used to get high-level feedback from audience members regarding: a) The most important KPIs that should be measured and reportable with the tool.b) Prioritization of the proposed functionality and potential use cases, with opportunities to suggest additional use cases of value.3. Each table will have a facilitated discussion (with the survey results visible on the screen) to discuss the two question above, providing more detailed input and identify the priority KPIs and use cases. The student participants would serve as facilitators and note-takers in these discussions. The intended outcome of this workshop will be the establishment of a set of core KPIs and the identification of core functionality and priority use cases, which will be used to guide the future development of the tool, which will be open-source and scalable to support replication/redeployment in other jurisdictions.
2:45 pm	ResScore™: Empowering People for Climate Resilience	Resilience AI Solutions pvt ltd - World Economic Forum estimated climate adaptation to be a USD 2 trillion opportunity per year by 2026. Climate change has tripled the occurrence of natural events in less than three decades, leading to an inevitable and significant surge in the occurrence of natural disasters globally[1]. Such disasters have caused a seven-fold increase in economic losses between the 1970s and 2010s[1], with the cost of inaction amidst such events exceeding US$ 30 trillion[2]. In light of this and based on insights from the WMO & UN Office for Disaster Risk Reduction (2021), climate events and disasters disproportionately impact countries and cities located in the Global South [1],[3]. Given this context, climate security within the Global South remains a matter of uncertainty.While there is increasing recognition of the need for tools for climate action, adaptation, and resilience, the use of these largely remains clustered at the city scale; Localised climate security for local communities & organisations, receives limited attention. Hence, essential to reimagine climate adaptation using a bottom-up approach that considers nuances across scale and the diversities within developing geographies. This research argues for the critical need for ‘ResScore™’, a climate resilience index that is co-owned and co-operated by different stakeholders across various scales. ResScore™ integrates scientific evidence to enhance climate resilience across diverse geographies and scales.ResScore™ is an index designed to evaluate climate resilience using a structured assessment framework that determines users’ climate preparedness based on 6 pillars - strategy, social, physical, environment, economic, & crisis management. Parallelly, it works with several sub-pillars with over 100 parameters. Here, each pillar and sub-pillar is assigned weights based on several expert consultations. Through this framework a score based on the users’ responses, offering insights into their climate-preparedness & resilience. The tool can aid users to identify vulnerabilities & empower communities to take informed decisions for climate resilience. Reference(1) https://news.un.org/en/story/2021/09/1098662(2) Global Landscape of Climate Finance 2023, Climate Policy Initiative(3) Poverty in the global south: does the geographical theory offer any new insight to understanding penury? https://doi.org/10.1080/23311886.2024.2321710.
2:45 pm	Addressing air quality co-benefits in the Covenant of Mayors. Tools and methodologies	EC, JRC - Tackling Climate Change is a priority for the European Union, who has set targets for reducing greenhouse gas emissions progressively up to 2050. In 2008, acknowledging the role of local authorities, the European Commission (EC) launched the Covenant of Mayors (CoM) initiative to endorse their efforts in the implementation of sustainable energy and climate policies. Since 2018, in the frame of its support to the EU Covenant of Mayors (CoM) initiative, the JRC (Joint Research Centre) is bringing to the attention of the city administrators the importance of tuning climate change mitigation and air quality. For this goal, we have made available to CoM signatories methodologies and tools to evaluate ex-post the consequences of their mitigation policies on the air pollutants emissions taking place in their territory, using data provided by signatories themselves in their baseline and monitoring GHG emission inventories. We will present the main results of this activity and will discuss suggestions for local authorities to practically improve the co-designing of climate and air pollution policies based on the experience collected throughout the CoM initiative. We will also present the new methodology developed to estimate the air quality impact of the overall SECAP (Sustainable Energy and Climate Action Plan) and of the most relevant key actions planned by signatories, together with the assumptions taken to overcome the intrinsic limitations of the information contained in the SECAPs. A special emphasis will be given to our effort in reaching a common and harmonized perspective in modelling greenhouse gases and pollutants emissions throughout the CoM initiative.

2:45 pm	Sharing Power in Climate Justice Work: Learnings from Vancouver's Climate Justice Field School	City of Vancouver - Cities are facing increasing pressures to address complex challenges of climate change, equity, and reconciliation as intersecting issues. Working on these challenges discreetly, or solely within dominant, western colonial paradigms and practices of governance, isn't effective or just, and risks further marginalizing and exploiting the people, lands, waters and beings most impacted by a changing climate. In 2022, community members advising the City of Vancouver wrote a powerful Climate Justice Charter for Vancouver, which outlines the vision, guidance, and accountability for a just climate future centered on the perspectives of those disproportionately impacted by climate change, including people who are disabled, racialized, Black, Indigenous, living below the poverty line, young/old, or unhoused. City staff identified the need to learn more about how to shift/share/relinquish power, practice different forms of accountability, and cultivate relationships in service of climate justice. In 2023 the idea for a Climate Justice Field School emerged as a collaboration between City of Vancouver sustainability staff, a design team at Emily Carr University and community members. Walks, site visits, immersive learning experiences, cultural gatherings and co-design workshops formed twenty field school sessions. For Innovate4Cities, we propose two formats for sharing our work: Innovation Methodologies - This unique collaboration used systemic design, social innovation, equity-centered and decolonizing methods as alternatives to standard policy-making and public engagement processes. We will share how orienting towards matriarchal strategies helped us to interrupt the dominant patterns of professionalism that often prop up status-quo power dynamics, creating surprising, joyful, informal and nourishing experiences for participants. Creative WorksField School member Zoë Laycock documented the project in a traditional star blanket that will be shared and displayed at the conference. In her words, the blanket is "a visual representation of the unique conversations, listening and perspectives shared: each individual coming into the discussion carries worlds of learning as we move through place and events. The star blanket lives as a representation of not only the whole of the Climate Justice Field School, but also of all the experiences, communities and those who make up each of us as individuals coming together.
2:45 pm	Managing the benefit- and risk-scape of the urban canopy for more resilient and equitable cities	Habitat - With more than 80% of Canada's population living in urban areas, cities are where most people access and experience nature. However, nature and the benefits it provides are not equitably distributed across cities, nor are the risks posed by climate change to urban nature. To support cities to design more resilient and equitable urban canopies and green spaces, we develop a pan-Canadian natural infrastructure platform with five pilot cities across Canada. This platform, with interactive maps for each city, aims to provide standardized and comparable data to urban foresters, city planners and citizen groups alike to improve awareness of the benefits produced by natural infrastructures and inform conservation, restoration or management actions. The platform i) maps the distribution of the urban canopy and green spaces, ii) quantifies the benefits these natural infrastructures provide (carbon storage, air quality, avoided run-off, heat islands, wildlife connectivity) - i.e. the "benefitscape", iii) estimates the vulnerability of these canopies to climate change impacts (pests, diseases, extreme weather, climate shifts) - i.e. the "riskscape", iv) and assesses the spatial distribution of these benefits and risks across socio-economic indicators. Together these data are then combined to classify areas of the cities where different interventions (conserving benefits, reducing risks, boosting benefits, or improving access) are required for a more equitable and resilient urban landscape. This new tool will provide cities across Canada with a means to track and compare the health, vulnerability and access to their urban natural infrastructure on their path to sustainability.
2:45 pm	How to compare or combine datasets from Google Environmental Insights Explorer and the Montreal Carbon Map?	École de technologie supérieure - The objective of the Montreal Carbon Map (MCM) project is to design and develop an information and decision support system to quantify, democratize access to data and reduce urban greenhouse gas (GHG) emissions. The innovation focuses on better quantification, monitoring and visualization of anthropogenic urban GHG emissions to support GHG emission reduction scenarios. This project brings together an interdisciplinary collaboration between researchers in engineering and social sciences, a partnership with the City of Montreal, and a collaboration with Hydro-Québec and Énergir, the major players in Quebec's electricity and natural gas sectors. Since 2018, Google has released Environmental Insights Explorer (EIE), a freely available dataset to measure buildings and transportation emissions for major cities in the world to help them measure, plan, and track efforts in their climate action plans. It means that those cities can now benefit from GHG dataset digitalization from a simple mouse click. But are EIE datasets accurate and can cities rely on them? In the transportation sector, we combine datasets between the EIE and MCM datasets. EIE uses a bottom-up approach (granular data collection) which estimates Vehicle-Kilometers Traveled (VKT) and uses national fuel efficiency and emission factors from the Climate Action for Urban Sustainability (CURB) tool. On the city scale with the MCM project, we use the EIE-derived VKT and local fuel efficiency and emission factors. We then discuss the use of local versus Canadian vehicle occupancy factors. In the building sector, the MCM uses local energy consumption data directly provided by the distributors, whereas EIE estimates the emissions based on statistic consumption and building superficies. Our results provide insights for cities to have better foundations for building their inventories

2:45 pm	What do urban policy, planning, and reporting documents reveal about current city sustainability initiatives? Patterns and new insights from AI-assisted textual analysis	University of Quebec in Montreal - This presentation outlines the findings and lessons learned from a research project from the Department of Urban Studies and Tourism at the University of Québec in Montréal, supported by the Social Sciences and Humanities Research Council of Canada, Mitacs, and AlphaFixe Capital, a Canadian-based fixed income portfolio management firm. We developed an artificial intelligence (AI) assisted textual analysis methodology and tested its potential and limitations in identifying patterns in urban sustainability initiatives. To illustrate this, our analysis focused on a comprehensive set of policy, planning, and reporting documents from a selection of 339 diverse municipalities ranging from 2,500 to 450,000 inhabitants in Québec, totaling over 33,000 documents. Combining web scraping, automatic text analysis, and sentiment analysis assisted with Natural Language Processing, our approach has proven effective in distinguishing between sustainability issues that cities address or overlook, the diversity and intensity of their commitments, and the operational nature of their goals and monitoring frameworks. However, we also encountered methodological challenges, which we will discuss in this presentation, highlighting the need for more consistency in cities' planning and reporting documents. The presentation concludes by highlighting policy implications. One key takeaway is the untapped potential of policy, planning, and reporting documents as valuable data sources. We argue that when these documents are extracted and properly analyzed, they can provide actionable guidance for city officials, national governments, and financial entities. Such guidance can help them tailor their programs to local interests, capabilities, and needs, thereby promoting better urban sustainability initiatives. The practicality and relevance of our findings make them a valuable resource for urban planners, policymakers, and financial entities.
2:45 pm	CHAMPioning Investment in cities and climate change science	
2:45 pm	Connecting data with finance for city climate action	Cities often struggle to access the financial resources necessary to make climate-related investments. They face challenges related to limited own-source revenues, insufficient or irregular fiscal transfers, and limited borrowing capacity. They also lack the data to assess where opportunities may lie to improve their access to finances for climate investments. While some climate-related data is widely understood to be necessary for climate action (e.g., data on climate hazards, GHG emissions, etc.), other forms of data and analytical tools may be needed to understand the broader financial landscape relevant to climate finance, e.g., data on residents' willingness to pay for certain services, land values and their projected increases due to climate-related investments, market demand for green municipal bonds, etc. Join us to learn how to harness evidence-based tools and resources to streamline your city's climate action efforts and secure the investment needed to make a real impact.
3:00 pm	Open innovation in cities: Addressing urban climate problems through challenge-driven innovation	Nesta Challenge Works - This session will focus on the challenge-driven innovation method. It will build the skills of city officials and other city stakeholders to foster open innovation to address their climate challenges, by collaborating with actors across government, the private sector, social enterprise, and city residents to create more resilient, sustainable, inclusive urban futures.This session will introduce how, when and why to use open innovation challenges to create and scale innovative solutions to reduce emissions, adapt to climate impacts and create resilient communities in cities. Participants will hear examples of how this approach has been used to drive innovation in cities, including examples from cities where this method has been applied in Latin America, Africa, Europe, and North America. They will learn how to apply this approach in their city, walking through problem identification, challenge definition, and ways to engage with innovators to co-create impactful, scalable solutions. Participants will leave with an understanding of how to approach creating open innovation challenges that will foster local climate solutions to complex problems, with the following expected learning outcomes:1) An understanding of what an open innovation challenge is2) When it is suitable to use this approach within the context of urban climate change3) How to foster co-creation with the innovation communityThe session will include: A presentation explaining open innovation and challenge-led innovation, and why and how to use these approaches to solve problems in cities, drawing on methods developed and tested by Nesta and UN-Habitat and informed by rigorous research and evaluation, including programs conducted by the OECD, SIDA, USAID and other bilateral and multilateral funders who have used this approach. Case studies of how open innovation has been used in cities, including real-world examples and lessons learned from the City of Montréal (winner of the Smart City Challenge), the Sustainable Cities Challenge, the Climate Smart Cities Challenge and other similar programs including from Impact Canada and Grand Challenges Canada.
3:00 pm	Australian Local Government Climate Review 2024: what are the research, data & knowledge priorities of Australian cities?	Ironbark Sustainability - 30 mins pre recorded interactive panel - presented by Ironbark Sustainability and Better Futures Australia Local Government Working Group Key tag: Multilevel governance and partnerships. Second tag: digitalisation
3:00 pm	Unlocking Local Climate Finance: Insights from Namibia's Learning Lab	ICLEI Africa - Explore the transformative potential of climate finance in this insightful session, featuring the Climate Finance Learning Lab initiative under the Covenant of Mayors in Sub-Saharan Africa (CoM SSA). This session will provide a deep dive into how local governments can unlock financial resources to support their climate initiatives. Uncover the success of the Climate Finance Learning Lab held in Namibia, where local governments and key stakeholders converged to discuss the process of unlocking local climate finance (More information). This workshop facilitated hands-on support for concept note development and featured presentations from financiers on funding opportunities and project development. Through this platform, local governments and financiers forged meaningful connections and engaged in fruitful discussions, leading to improved collaboration and shared learning. Discover the commonalities and trends that emerged, and see how this learning lab has empowered cities to secure the necessary financial resources for their climate initiatives. Gain practical strategies and insights into how your city can navigate the complexities of climate finance, forge essential partnerships, and secure funding to drive sustainable and resilient climate actions.

3:00 pm	Spatial Analysis Using AI and GIS for Climate Vulnerability Assessments	Georgia Institute of Technology - Spatial climate vulnerability assessment is an emerging methodology to determine the intersection among factors such as local socio-economic issues, exposure, and hazards, necessary to identify climate risks and pertinent solutions (de Sherbinin et al., 2019). Advances in digitalization, specifically in Artificial Intelligence (AI) and Geographic Information Systems (GIS), provide cities with an innovative and technically-oriented tool to determine decision-making processes while showcasing local efforts to drive digitalization for climate action. The objective of this presentation is to demonstrate how these digital tools, specifically GIS socio-economic variables in climate action decision making, intrinsically includes aspects such as informality, justice, and equity, as well as historical and cultural heritage to address effectively climate adaptation measures. Results of related research done at the Georgia Institute of Technology will be provided to the audience to demonstrate feasibility and practicality of these tools (UrbanClimateNexus, 2023).Referencesde Sherbinin, Alex & Bukvic, Anamaria & Rohat, Guillaume & Gall, Melanie & McCusker, Brent & Preston, Benjamin & Apotsos, Alex & Fish, Carolyn & Kienberger, Stefan & Muhonda, Park & Wilhelmi, Olga & Muthike, Denis & Shubert, William & Sliuzas, Richard & Tomaszewski, Brian & Zhang, Sainan. (2019). Climate vulnerability mapping: A systematic review and future prospects. Wiley Interdisciplinary Reviews: Climate Change. 10. 10.1002/wcc.600.UrbanClimateNexus (2023). Sustainable Cities Studio. Retrieved from: https://urbanclimatenexus.com/gt-sustainable-cities-studio
3:00 pm	Leaving no one behind in cities: accessibility indicators for the SDGs	UN SDSN - In the 2030 Agenda for Sustainable Development and the associated New Urban Agenda, the UN urged cities to provide more accessible, well-connected infrastructure for bringing people into public spaces and improving walkability. Monitoring spatial indicators of pedestrian accessibility helps planners and policymakers evaluate the impacts of urban design and transport interventions and guides targeted interventions towards creating healthy, sustainable cities, and achieving the United Nations (UN) Sustainable Development Goals (SDGs).Pedestrian accessibility is the extent to which the built environment supports walking access to destinations of interest, or the ability of urban residents to access services and opportunities. This measure is particularly useful for assessing spatial justice in cities, usually represented by underprivileged communities which are pushed to live in deteriorated urban areas receiving a minor share of public investments and thus low levels of accessibility. As part of its effort to develop new geospatial indicators for the SDGs, the SDG Transformation Center presents this ongoing study focusing on identifying accessibility indicators that can better inform the current state of a set of Sustainable Development Goals at local scales.
3:00 pm	Simplifying data-driven decision support for Danish municipalities: Monitoring progress for the Danish Climate Alliance	CONCITO - Almost all Danish municipalities have adopted climate action plans (CAPs) in recent years, through the DK2020 partnership. The municipalities have now started to establish an implementation structure and implement their action plans, as well as identified indicators and developed monitoring systems adopted alongside their plans. However, they seldom have the time and capacity to evaluate progress and incorporate learning from this monitoring process. As a result, monitoring of local climate action, is often aimed at reporting to policy makers and external partner, with limited feedback for project owners and limited direct value for the municipal planners. The Danish Climate Alliance, a partnership between Realdania, Local Government Denmark and the Danish regions, seek to remedy this, by developing a joint monitoring system, aimed at providing decision-support to municipal, regional and national actors. The monitoring system is being developed by the green think tank CONCITO in collaboration with C40 Cities, municipalities, regions and key experts in the field. The system is based on mapping the intervention logic in the CAPs, identifying the systems and activities they aim to influence towards a sustainable transition. Subsequently indicators have been identified by combining this systems approach with a mapping of publicly available data sources. By utilizing the ecosystem of publicly available data in Denmark, the system is aimed at providing locally relevant decision-support with limited local reporting, with the goal of enhancing the learning aspect of the MERL-cycle, while also aiding local governments in fulfilling their reporting obligations in other settings, such as the Cities Race to Zero, Covenant of Mayors, EU-funded projects, and reporting obligations to national governments and other entities. In time the system is aimed at improving the knowledge base for local decision-making as well documenting the contribution of local actors to the national transition and thereby creating a stronger basis for a multi-level collaboration on climate action in Denmark. The session will present the methodology, design and structure of the monitoring system and discuss the challenges and opportunities arising in developing a cross-cutting joint monitoring system.
3:00 pm	Adaptation measures for urban heat island leveraging interstitial open spaces in densely built low-income settlements in Kolkata city, India	Concentrix - Open spaces are essential natural assets in urban environment. Even interstitial spaces among buildings account for micro-climatic moderation. Especially in high density low-income settlements they cater as only breathing spaces without substantial green cover. The households in such context, characterised with negotiated openings and heat-entrapping roofing materials become hot chambers from inside. Those buildings coupled with hard-paved interstitial spaces create a contiguous inside-out urban heat island (UHI); an inescapable living environment for residents. Kolkata's one-third of 4.5 million+ population, currently, faces the brunt of such climate stress due to its challenging warm-humid tropical location in India. MDPI report 2023 mentioned that unregulated urbanization in last decade propelled 33% increase in built land uses costing the city a loss of 25.5% green cover. Collectively, these contested greens could barely offer 5.08 sqm per capita open space as compared to UN recommended 12-16 sqm, derived from the ward-wise open space distribution records of Kolkata municipality. This has triggered a peak temperature rise of 4.72oC in the city over just last three decades. According to UN IPCC Kolkata witnessed annual temperature rise by 0.157oC. An analysis by nonprofit group CarbonPlan warns that city's maximum temperature may reach almost 50°C around 2080. The local planning actions are yet to offer particular greening guideline of interstitial open spaces. This is creating gap between built development and climate adaptation initiatives driven to bring respite to the vulnerable population. To analyse the impact of interstitial open spaces on UHI moderation Landsat and Sentinel data are combined in GIS in this study to interpret land use land cover changes. The cooling effect is further studied over a prototype settlement case using advanced urban energy system modelling. The result showed greening of interstitial open space could facilitate urban cooling lowering land surface temperature outside as well as maintaining ambient indoor temperature. A few cost-efficient methods include pocket greens, vertical greening on walls, roof greening with portable units. This study can advocate for better planning and policy decision to preserve, reserve and sustain urban interstitial open spaces in combating urban heating. Keywords: Blue-green infrastructure; Urban cooling; Energy modelling; Climate mitigation.

3:00 pm	What's the Damage? Quantifying Adaptation Risks and Costs for the City	Sustainability Solutions Group (SSG) - The small city of Kelowna in British Columbia's Okanagan Valley (Canada) is one of the province's fastest-growing communities. Like many communities around the world, Kelowna faces a wide range of climate hazards, from increased flooding and wildfires to extreme heat events and water scarcity, most recently demonstrated by the record-breaking wildfires experienced during the 2023 season. To understand the variable impact of current and future climate hazards on different types of development within the city (residential areas vs. commercial and industrial areas, for example), and to develop a strategic approach to resilience and adaptation, the City of Kelowna developed a climate adaptation analysis. Working with SSG, the City used innovative climate change models to develop multiple future scenarios out to 2070, one representing planned growth, and another incorporating deliberate actions taken to reduce the risk of impacts from climate change. These scenarios were spatially modelled, taking into account the location of vulnerable populations, so that actions could be designed to reduce un-equitable impacts on populations with different risk profiles and vulnerabilities. Comparing these scenarios revealed a high cost of doing nothing, and a positive return on investment for adaptation actions. The city's rapid growth and development can exacerbate climate vulnerabilities and create additional challenges in the future. By integrating climate adaptation considerations into urban planning, land use policies, and infrastructure development, Kelowna can effectively manage its growth while minimizing climate risks. Moreover, the spatial models allow a refined analysis that enables the city to plan for adaptation measures, like nature-based solutions, at the building level. This brief presentation, punctuated by interactive polling and a Q&A with planners and modelers from SSG, will describe how cities around the world can take a similar approach to climate adaptation planning and use the results to inform future land use plans and community development initiatives.
3:00 pm	Sustaining Urban Resilience: A Study of Urban Green Spaces and Ecosystem Services in Delhi	Jawaharlal Nehru University - Urban Green Spaces (UGS) are vital nature-based solutions, crucial for tackling local climate challenges and bolstering urban resilience. Despite their significance, many cities struggle with preserving and expanding UGS due to shifts in land use, population growth, and inadequate planning and management. These factors threaten phytodiversity loss and ecosystem service degradation, hampering UGS's ability to sustain urban ecosystems. The diverse plant species within UGS provide various benefits, from pollination to carbon sequestration. This study delves into the role of UGS in providing ecosystem services to urban communities, with a focus on parks in Delhi, India. It highlights the importance of different attributes influencing UGS quality, quantity, and accessibility in determining their overall status within a ward. Evaluating UGS across 285 wards in five Delhi municipalities, the study employs Analytical Hierarchical Process (AHP) to assign attribute weights, generating a composite index termed Urban Green Spaces Assessment Index (UGSAI). Higher UGSAI values denote better UGS conditions within a ward. UGSAI values indicate that New Delhi municipality leads with the most wards in the High to Very High category, followed by the Cantonment area, South Delhi Municipal Corporation, North Delhi Municipal Corporation, and East Delhi Municipal Corporation. Sensitivity analysis highlights GC as the most influential attribute affecting UGSAI. Furthermore, the study assesses the ecosystem services (ES) provided by UGS, encompassing material, non-material, and regulating services essential for sustainable urban living. Using remote sensing and questionnaire surveys, the research evaluates various ES critical for urban sustainability. Residents' perceptions of these services and their willingness to invest in their preservation and enhancement are explored. Findings underscore parks' role in addressing issues such as air quality, heat stress, and runoff. Moreover, visitors' willingness to pay for services and maintenance demonstrates awareness and value placed on these services. This research contributes to the discourse on nature-based solutions for urban resilience, offering actionable insights for policymakers and urban planners striving to create sustainable and livable cities.
3:00 pm	Scenario planning for flood management in Colombia: Applications and recommendations	University of El Rosario, Bogota - Colombia is a country prone to various natural and man-made disasters, including earthquakes, landslides, floods, droughts, volcanic eruptions, and armed conflicts. These disasters often result in significant loss of life, severe economic damage, and disruption to essential services. To effectively mitigate the impact of such disasters and build resilience, it is crucial to have more robust disaster management strategies, instruments and tools in place. Explorative Scenario planning (XSP) is an innovative tool that can aid in preparing for and managing these disasters efficiently. However, the use of scenario planning in Colombia and Latin america is limited, mainly for urban planning and expansions land plan in Bogota (Studies for assessing Urban expansion trends carried out by FEDESARROLLO, 2018); and the formulation of prospective scenarios for the development or the urban growth areas of Bucaramanga. This research proposal investigated with a codesign and community participatory approach, the application of scenario planning as a tool for risk and disaster management and support of decision making processes to increase climatic resilience in Colombian cities and towns with special focus on vulnerable communities and informal settlements. In this sense, the research also recognizes and understands the particularities, obstacles and challenges involved in scenario and participatory planning with local communities, specially if they are vulnerable and directly affected by continuous hazards and risks linked to climate change. The results are a valuable resource for urban planning and risk reduction, providing municipalities and communities with a wider understading of the possible futures in their territories and increase preparedness and envieronmental awareness.

3:00 pm	Assessing, Mitigating And Building Resilience Of Aquatic Communities To Climate Change In Lagos State, South Western Nigeria.	The Federal University of Technology, Akure. - Water bodies are vital ecosystems that support diverse life forms and provide essential resources for human well-being. However, these invaluable natural assets face continuous threats from climate change and human activities. Not only does it threaten the integrity of aquatic ecosystems and the sustainability of water resources, but it also undermines efforts to promote public health, support economic development, and enhance the quality of life for residents. Therefore, there is a pressing need for comprehensive monitoring and assessment initiatives to understand the extent of the problem, and develop effective strategies for mitigation and management. Through rigorous scientific analysis and data collection, we anticipate quantifying the impacts of climate change on water quality, sediment quality and aquatic ecosystems. This includes assessing changes in key parameters such as nutrient concentrations, heavy metal levels, hydrocarbon contamination, and microbial contamination. It is expected to characterize the ecological responses of affected water bodies to the impacts on aquatic habitats, biodiversity, and ecosystem functioning. This project seeks to contribute to these efforts by undertaking a systematic investigation into the impact of climate change on selected water bodies in Lagos state. Through rigorous scientific analysis and field monitoring activities, we aim to generate actionable data and insights that can inform evidence-based decision-making, guide policy development, and promote sustainable environmental management practices. By working collaboratively with stakeholders, researchers, and policymakers, we aspire to make meaningful contributions towards safeguarding the health and integrity of Lagos state's water resources for present and future generations. The project is a long term project carried out by collaboration with the academia, government and non-governmental organization in Nigeria. So far, Lagos State is particularly vulnerable to the impacts of climate change and unless concerted and urgent action is taken, it could result in widespread ecosystem degradation, thus disrupting socio-economic development and the welfare of the people.
3:00 pm	Harmonizing Walkability: Embodying Charles Correa's Vision for Resilient Urban Design in Navi Mumbai	Bharati Vidyapeeth College Of Architecture, Navi Mumbai - As cities worldwide aspire to embrace the principles of smart urbanism and prioritize public health, understanding and enhancing walkability emerge as a pivotal strategy for achieving sustainable, liveable urban environments. This abstract presents a nuanced exploration of walkability in Navi Mumbai, India, inspired by the visionary urban design principles of Charles Correa. Navi Mumbai, a contemporary city planning experiment celebrates 50 years of its conception and offers an ideal setting to investigate the integration of walkability within the framework of smart and healthy cities. This satellite city was conceived to alleviate the pressures of Mumbai's urban sprawl, embodying Correa's vision of human-scale urbanism, prioritizing pedestrian-friendly environments, mixed land uses, and integration with nature. This research explores how walkable urban streetscapes, interconnected public spaces, and green corridors can foster biodiversity while promoting social interaction and well-being. Through a synthesis of Correa's design principles and interdisciplinary research methodologies comprehending global best practices, the study reimagines Navi Mumbai's urban landscape as a resilient, walkable city that nurtures both people and nature. By examining the design and infrastructure of Navi Mumbai's streets, neighborhoods, and public spaces, the study identifies opportunities to leverage urbanism to enhance walkability and promote active living. The role of community engagement and participatory planning in realizing Correa's vision of inclusive, people-centric urbanism is explored. By empowering residents to shape their neighborhoods and contribute to stewardship initiatives such as Happy Streets: reclaiming spaces for pedestrian activities for safe walkability in Navi Mumbai, we can foster a sense of ownership and collective responsibility towards slow city concepts. Incorporating insights from stakeholders, including residents, policymakers, and urban planners, this research advocates for a holistic approach to urban development that prioritizes walkability as a cornerstone of smart and healthy cities. By aligning planning policies, investment strategies, and technological innovations to create pedestrian-friendly environments, Navi Mumbai can emerge as a model for sustainable urbanism in the 21st century. The case examples are focused on the node of Kharghar and CBD Belapur, addressing the necessities of pedestrians and the existing provisions in city planning, which have over the years become more focused on the vehicle-centric approach.
3:00 pm	Advancing Sustainable Architecture: Sustainability through Green BIM Integration	Bahcesehir University - Green Building Information Modeling (Green BIM) is an advanced approach to architectural design and construction, integrating environmental considerations directly into the building process. This paper investigates the research question: How can Green BIM effectively contribute to reducing carbon emissions and enhancing the sustainability of building projects. The study employs a detailed case studies analysis of The Pixel Building in Melbourne, Masdar Headquarters in Masdar City, and Shanghai Tower in China, as an examples of Green BIM's application. Through the analysis of three case studies, the Shanghai Tower demonstrates optimized resource usage, the Pixel Building showcases carbon-neutral construction, and the Masdar Headquarters exemplifies energy-positive design, all facilitated by Green BIM. These cases collectively indicate that Green BIM is not just a tool for architectural design but a component in achieving sustainability in the built environment. The successful implementation of Green BIM in these projects highlights its potential in creating environmentally responsible and technologically advanced structures. This paper concludes that Green BIM is an essential tool in the quest to reduce carbon emissions and promote sustainability in architecture, offering insights and best practices for future green construction projects.

3:00 pm	Building Resilient Cities through Nature based-Solutions in Latin America and The Caribbean	UNEP - Join us for an innovative collaboration showcasing the Nature4Cities initiative, which focuses on enhancing resilience through Nature-based Solutions in Latin American cities. This groundbreaking project adopts a bottom-up approach to identify the necessary mechanisms for introducing innovative solutions, particularly Nature-based Solutions (NbS), into urban planning processes. Covering 13 cities across the region, the project has developed a comprehensive capacity-building framework aimed at empowering local decision-makers, key stakeholders, and national governments. Additionally, the project has successfully engaged youth through a dedicated Community of Practice. During the presentation, we will delve into the methodology used to integrate NbS into urban planning, which includes the following key steps: a) Assessment: Establishing a baseline through Climate Risks and Vulnerability Assessments Analysis, identifying suitable climate financial mechanisms for implementing NbS, developing Private Sector Engagement Plans to raise awareness about climate change, and assessing the legal and policy frameworks. b) Planning: Providing guidance on adapting cities and integrating NbS through an Ecosystem-based Adaptation Plan, with a focus on gender perspective. c) Finance: Redirecting traditional finance toward innovative approaches and involving the private and business sectors, crucial for the sustainability and expansion of urban NbS. d) Scaling-Up: Collaborating with partners to identify strategies for scaling up transformative initiatives for urban adaptation. Join us as we explore these innovative approaches and their potential impact on building resilience in Latin American cities, through the presentation of a member of the Regional Office from UNEP that is implementing the project and a National Coordinator of one of the countries part.
3:00 pm	Smartainity: An Integrated Framework for Sustainability and Smartness Assessment in African Cities.	UM6P - Mohammed VI Polytechnic University - Abstract: Urbanization in Africa presents unique challenges that smart cities are increasingly expected to address. Despite this, there is a notable absence of comprehensive and systematic frameworks for evaluating the performance of African cities in terms of both sustainability and smartness. This paper introduces Smartainity, an innovative methodology for urban performance assessment, using Key Performance Indicators (KPIs) across five critical dimensions: technology and innovation, economy, energy, society, and environment [1]. Designed to be flexible, scalable, and adaptable to diverse contexts and scenarios, Smartainity offers a robust tool for city planners and policymakers. The paper further illustrates the implementation of Smartainity through a case study of a pioneering initiative in Morocco aimed at transforming the city into a sustainable and intelligent urban center. The study examines the strengths and limitations of the framework and suggests avenues for future enhancement and broader application. This research contributes to the existing literature on smart cities by offering a novel perspective on urban performance assessment that seamlessly integrates criteria for sustainability and smartness. References[1] N. Moumen, H. Radoine, K. M. Nahiduzzaman, and H. J. Oulidi, “Smartainity: A Comprehensive Framework for Urban Performance Assessment in African Smart Cities with Key Performance Indicators,” in International Conference on Advanced Intelligent Systems for Sustainable Development (AI2SD’2023), 2024, pp. 126-138.
3:00 pm	Synergies and trade-offs between adaptation and mitigation planning: how can digital methods and tools support integrated climate action in cities?	Joint Research Centre - Climate change is a significant and undeniable reality, leading to increased temperatures and extreme weather events. This has widespread impacts on food security, ecosystems, and land degradation. Not only is coordinated global action necessary, but also local implementation that provides solutions to foster climate neutrality and achieve resilience is crucial. On the one hand, cities, where the majority of the population resides, are particularly vulnerable to these effects. On the other hand, cities are also particularly equipped to address the issue through the implementation of adaptation and mitigation strategies, requiring a holistic approach to decision-making. However, assessing the implementation of these strategies at the city scale and the potential synergies or unintended consequences that may arise can be challenging for cities. Given the complexity and interconnected nature of climate change impacts, it is essential to consider the types of actions that can be planned and implemented at the city scale. This requires urban planning and regeneration processes that take into account the specific vulnerabilities and opportunities of each urban area. Additionally, diagnostic and assessment mechanisms must be applied to understand the complexity of climate change in this environment, considering the diverse range of factors that contribute to the challenges cities face in addressing climate change. For these reasons, this research paper provides a review of the selected digital methods and tools that are available to support cities’ planning processes in the assessment of integrated adaptation and mitigation solutions, and explores their main advantages and disadvantages. By leveraging digital technologies, cities can enhance their capacity to analyse and address climate change impacts, ultimately leading to more effective and sustainable strategies for climate adaptation and mitigation at the city level.
3:00 pm	SylvCiT : An urban forest diversification software to improve resilience to global change	UQAM - The importance of urban tree diversity for improving resilience is increasingly understood by decision makers. Urban foresters want to prevent the overrepresentation of species on their streets and in their city, which could result in a significant loss of canopy cover in the event of a large-scale disturbance such as a drought or an exotic pest or disease. Although numerous software and tools exist to visualize tree inventories and plan tree maintenance work, only a few offer support for increasing tree diversity. We present SylvCiT, a novel decision-support and open-source software available on a web platform designed to consolidate information related to the urban forest in one place and facilitate decision-making at different scales. While the first interfaces provide the user with a spatially explicit portrait of the urban forest (species richness, functional diversity, structural diversity, i.e., diameter classes) and associated ecosystem benefits (e.g., stored carbon, ornamental value), the software is designed to produce a list of functional groups and appropriate species to plant considering tree species already present. Based on an artificial intelligence algorithm, SylvCiT identifies the types of trees (species and functional groups) that are absent or underrepresented at different scales to make recommendations that increase species and functional diversity to improve resilience to global change. SylvCiT will continue to be developed to evaluate other ecosystem benefits and integrate criteria such as site characteristics into the recommendation algorithm.https://sylvcit.ca/St-Denis, A., Maure, F., Belbahar, R., Delagrange, S., Handa, T., Kneeshaw, D., Paquette, A., Nicol, M., Meurs, M.J. & Messier, C. (2024). An Urban Forest Diversification Software to Improve Resilience to Global Change. Arboriculture & Urban Forestry (AUF), 50(1), 76-91.

3:25 pm	Enhancing urban biodiversity through BeeOmonitoring: A decade of success in Knokke-Heist	BeeOdiversity - Striking a balance between economic growth, resident well-being and environmental preservation is a major challenge for municipalities. Knokke-Heist, a coastal town in Belgium, renowned for its dynamic tourist activities, has embarked on a pioneering initiative to integrate sustainable development into its urban planning policy. The key to this initiative is the ten-year partnership between Knokke-Heist and BeeOdiversity, centred on the BeeOmonitoring project. BeeOmonitoring is an innovative biomonitoring technique where bees act as natural drones to collect pollen, serving as bioindicators to measure biodiversity and pollution over vast areas. This non-intrusive method has enabled Knokke-Heist to map biodiversity and monitor pollution levels in five strategic areas. The data collected includes agricultural pesticides, industrial pollutants (e.g. heavy metals, PAHs, PFASs), as well as a detailed assessment of biodiversity. This accessible data enables pollution and biodiversity problems to be identified proactively, making it easier to take targeted actions and make informed decisions at municipal and community levels. Over the past decade, the partnership has produced remarkable results. Pollution levels and pesticide use have been dramatically reduced, while biodiversity has flourished, with plant species increasing fourfold. These improvements have transformed Knokke-Heist into a haven for pollinators, birds and other wildlife. Based on the data collected and the recommendations of BeeOdiversity's experts, Knokke-Heist has planted over 20 flower meadows, improved the management of its green spaces and enhanced the attractiveness of its hinterland by creating nature and bee awareness routes for cyclists and pedestrians. Community involvement has been the cornerstone of this success. For 10 years, BeeOdiversity has worked with municipal teams to share results and involve stakeholders, including citizens, farmers and schools, in workshops designed to foster better environmental practices. Local food production has become more sustainable as farmers adopt practices based on BeeOmonitoring data, balancing ecological preservation with economic viability. Knokke-Heist's transformation highlights the power of collaboration and innovation in achieving environmental sustainability. By presenting this project at the Innovate4Cities conference, we hope to encourage other municipalities to adopt similar approaches to achieving urban sustainability on a global scale through targeted biodiversity management and pollution control.
3:25 pm	Self-help Initiatives in The Rural Communities of Ondo east Local Government Area, Ondo state, Nigeria	Federal University of Technology, Akure - This study focuses on Ondo East Local Government Area (LGA), a rural area in Nigeria. It examines how community self-help has contributed to rural development in the region. Ondo East LGA is characterized by a predominantly agricultural economy, with farming as the main livelihood activity of the residents. The objectives include identifying the types and number of self-help projects provided in the study area and examining their impact on the development of the area. One hundred and sixty-nine (169) copies of a questionnaire were administered to households using the simple random sampling technique. Findings from the study reveal the successful implementation of various self-help projects in the study area through the Community Development Associations (CDAs). Such projects include the provision of hand-dug wells and maintenance of boreholes, waste management, health care services and affordable housing. The main source of funding for these projects in the area is residents' contributions. Challenges such as members defaulting on the developmental levy and lack of cooperation from some community members were discovered. Recommendations include developing strategies to encourage timely and consistent community contributions and creating incentives for community members to participate in infrastructure maintenance and self-help efforts actively.ReferencesAfolayan, I. J. (2012). An assessment of rural development strategies and rural infrastructure on rural sustainability. Unpublished Undergraduate Thesis. Department of Urban and Regional Planning, The Federal Polytechnic, Offa.Akinbami, F. K., & Oladokun, A. E. (2019). Community-based self-help projects in rural development: Implications for rural livelihoods in Oyo State, Nigeria. Journal of Rural Studies, 68, 186-196.Akpomuvie, O. B. (2010). Self-help as a strategy for rural development in Nigeria: A bottom-up approach. Journal of Alternative Perspectives in the Social Sciences 2(1), 88-111.Charlery, L. C., Qaim, M., & Smith-Hall, C. (2016). Impact of infrastructure on rural household income and inequality in Nepal. Journal of Development Effectiveness, 8(2), 266-286.Ebong, F., Otu, J. & Ogwumike, F. (2013). Self-help initiatives and the development of rural communities in Nigeria. Research on Humanities and Social Sciences 3(12), 66-74IFAD (2021). The People Behind Your Plate. International Fund for Agricultural Development. https://www.ifad.org/en/web/knowledge/publication/asset/42182109 https://townsvillages.com/ng/ondo-east/
3:25 pm	Relevance and resilience of climate-smart agrobiodiversity for greening and sustaining savanna cities in Global South	Earth System Governance Project, Utrecht University, The Netherlands - The urban Earth systems of (peri-)urban savannas in the Global South are impacted every day by adverse climate change, triggering droughts, wildfires, migration, air pollution, food insecurity and biodiversity loss. Nowadays, climate-induced destruction of urban ecosystems have depopulated trees, eroded grasslands and reduced livelihoods for vulnerable residents in savannas. The human-environments, including open lands, rivers and deforested zones in savanna cities can substantially benefit from agrobiodiversity interventions. This is because the processes or methods of agrobiodiversity production, including organic manuring, IPMs, and greener technologies, immensely contribute to carbon sequestration either through soil carbon absorption or green carbon storage, thereby helping to limit global warming to 1.5°C. Yet it is not all aspects of agrobiodiversity, especially mainstream urban agriculture, are fully embraced by urban policy. Urban residents are occasionally resistant to producing fresh foods on city fringes. Also, cultivating vegetables on smallholder plots is negatively branded in the media. Competition for open land spaces often devalues and disposes land under agrobiodiversity, putting the survival of thousands of deprived urban dwellers who depend on green cropping and trading its services at high risks. In this paper, multifunctionality of agrobiodiversity, with an emphasis on Accra and Tamale, is reviewed to demonstrate increasing socio-ecological relevance of this activity for sustainability, resilience and human-environment security. Using topographically contrasting but behaviourally similar cases of Highland City Zones (HCZs) of Capital Hill and the Lowland City Zones (LCZs) of the Odaw River in Accra city, this article reiterates systemic change in urban lifestyles and greener investment in (agro-)biodiversity restoration as a nature-based solution for reviving and sustaining nature-based infrastructure to support the UN Sustainable Development Goals, Paris Agreement, and the Climate Action Plans. Landscape-level practices and products of agrobiodiversity are explored from the context of sustainability science to stimulate new debates and deepen understanding among policymakers and practitioners to accelerate agrobiodiversity towards system transformation and transition to safer, secure and sustainable futures of Global South cities. Capacity building for urban youth-led initiatives to intensify education on agrobiodiversity as a climate action is advocated. Keywords: Agrobiodiversity, sustainability, climate action, savanna cities, Global South

3:25 pm	Plastic pollution abstract	Focus for life development link - Title: Plastic Pollution: A Threat to Sustainable Development in Uganda Abstract: Focus for Life Development Link, a civil society organization in Uganda, presents a critical examination of plastic pollution's far-reaching consequences on the environment, human health, and sustainable development in Uganda. Our research reveals alarming rates of plastic waste generation, inadequate waste management infrastructure, and a lack of effective regulations, exacerbating the plastic pollution crisis. Uganda's rapid urbanization and population growth have led to an unprecedented increase in plastic consumption, resulting in approximately 1.5 million tons of plastic waste annually. The majority of this waste ends up in waterways, soil, and ecosystems, contaminating the environment and posing severe health risks to communities. We highlight the urgent need for a multi-stakeholder approach to address plastic pollution in Uganda, emphasizing the importance of:- Strengthening policy frameworks and enforcement- Promoting sustainable plastic production and consumption practices- Investing in waste management infrastructure and education- Supporting community-led initiatives and innovations. Our presentation showcases successful initiatives and solutions implemented by Focus for Life Development Link, demonstrating the potential for collective action to mitigate plastic pollution and promote sustainable development in Uganda. We call on governments, private sector entities, and civil society organizations to join forces in tackling this pressing global issue. By sharing our experiences and insights, we aim to contribute to the global conversation on plastic pollution and inspire collaborative efforts towards a more sustainable future.
3:45 pm	Move to next session	
4:00 pm	Formal closing session of the 2024 Innovate4Cities Conference	
6:50 pm	Family Photo of I4C24 Attendees	Join us for a memorable family photo at the 2024 Innovate4Cities Conference! This moment will capture all attendees together, celebrating our collective dedication to urban sustainability and climate action.

Annex C. Submissions to the AI x City Climate Action Hackathon

ID	TITLE	NAME	ORGANIZATION	COUNTRY
1	ResSolv	Haripriya Kesavan	Resilience AI	India
2	Enhancing Urban Climate Resilience through AI-Driven Water Management Solutions	Ebrima Jonga + team	Department of Parks and Wildlife Management, The Gambia	The Gambia
3	Climate Resilience Mapping: AI-Driven Risk and Vulnerability Assessment for Smarter Cities.	Ebrima Jonga	Department of Parks and Wildlife Management, The Gambia	The Gambia
4	HEAT BUSTER: The Vulnerability & Risk Mapper	Karina Angelica Garcia Pardo + team	Technische Universität Wien	Austria
5	RESILIENT CITIES: AI-DRIVEN ASSESSMENT OF CLIMATE VULNERABILITIES AND RISKS IN BRAZILIAN URBAN AREAS	Dr. Tumusiime Abel, PhD + team	Mbarara Development Agency	Uganda
6	Urban Resilience Geoportal & ClimaGPT	Sagnik Bhattacharjee + team	ECOTEN urban comfort s.r.o.	Czech Republic
7	Information Convergence	Raúl Taghon + team	Asociación Sustentar	Argentina
8	ComuniClima: Resilient Communities to Climate Disasters	Jaqueline Nichi, Malcolm Reis, Silvana Alves, Bruno Dias, Wallace Patrocínio	University of Campinas	Brazil
9	Racing Against Time: Putting Data into Action	Tre Rodriguez + team	Ecoheart	United States of America, Spain, others
10	DUCTExplorer	Adelia Ayu Sukma + team	Singapore -ETH Centre	Singapore
11	I2UD	Carlos Rufin	Institute for International Urban Development	United States of America
12	Smart Solutions for Combating Urban Heat Islands: A Technology-Driven Approach for Resilient Brazilian Cities.	korra chaitanya + team	Various	United States of America & Canada
13	Porto Alegre, for a city free of floods	Juana Inés Jiménez Perdomo + team	Institute of Transparency	Mexico
14	Climate Resilience Mapping platform	Ebrima Jonga	Department of Parks and Wildlife Management, The Gambia	The Gambia

The selection and evaluation process thoughtfully incorporated principles of equity and inclusion. Please follow this link to view the AI x City Climate Action Hackathon that took place at I4C24.

I4C24 Partners

2024 Innovate4Cities Conference Advisory Committee (CAC)

WGIC	World Geospatial Industry Council
Google	Google
UNDRR	United Nations Office for Disaster Risk Reduction
WRI Africa	World Resources Institute Africa
Ouranos	Ouranos
IIHS	Indian Institute for Human Settlements
P4CA	Partnership for Climate Action
C40	C40 Cities
IHS	Institute for Housing and Urban Development Studies
IPCC	Intergovernmental Panel on Climate Change
European Commission	European Commission
UNSDSN	United Nations Sustainable Development Solutions Network
UNEP	United Nations Environment Programme
Future Earth	Future Earth International Research Program
UTM	Urban Transition Mission
JRC	Joint Research Centre of the European Commission
Cities Alliance	Cities Alliance
Durham University	Durham University
Student Energy	Student Energy
Dark Matter Labs	Dark Matter Labs

McGill University	McGill University
World Bank	World Bank Group
KPMG	KPMG
Climate-KIC	Climate Knowledge and Innovation Community
GeSI	Global Enabling Sustainability Initiative
UNFCCC	United Nations Framework Convention on Climate Change
SDU/UNESCO Chair	University of Southern Denmark / UNESCO Chair Urban Resilience
Arup	Arup
Fugro	Fugro
ICLEI	ICLEI – Local Governments for Sustainability
ICSI	International Coalition for Sustainable Infrastructure
Resilience Rising	Resilience Rising Network
SPARC	Society for the Promotion of Area Resource Centers
umontreal	Université de Montréal
IPCC	Intergovernmental Panel on Climate Change
Columbia	Columbia University
UCCRN	Urban Climate Change Research Network
OECD	Organisation for Economic Co-operation and Development
Concordia University	Concordia University
Singapore Management University	Singapore Management University
Fenner School of Environment and Society	Fenner School of Environment and Society, Australian National University

GCoM Research and Innovation Technical Working Group (R+I-TWG) Members

ICLEI Local Governments for Sustainability
C40 CITIES
CDP DISCLOSURE INSIGHT ACTION
UN-HABITAT
UCLG United Cities and Local Governments
UCLG MEWA BİRLEŞMİŞ KENTLER VE YEREL YÖNETİMLER ORTA DOĞU VE BATI ASYA BÖLGE TEŞKİLATI UNITED CITIES AND LOCAL GOVERNMENTS MIDDLE EAST AND WEST ASIA SECTION
WWF
The Joint Research Centre – the European Commission's science and knowledge service

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Covenant of Mayors for Climate & Energy Eastern Partnership
Covenant of Mayors for Climate & Energy Europe
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Covenant of Mayors Mediterranean
Global Covenant of Mayors for Climate & Energy Oceania
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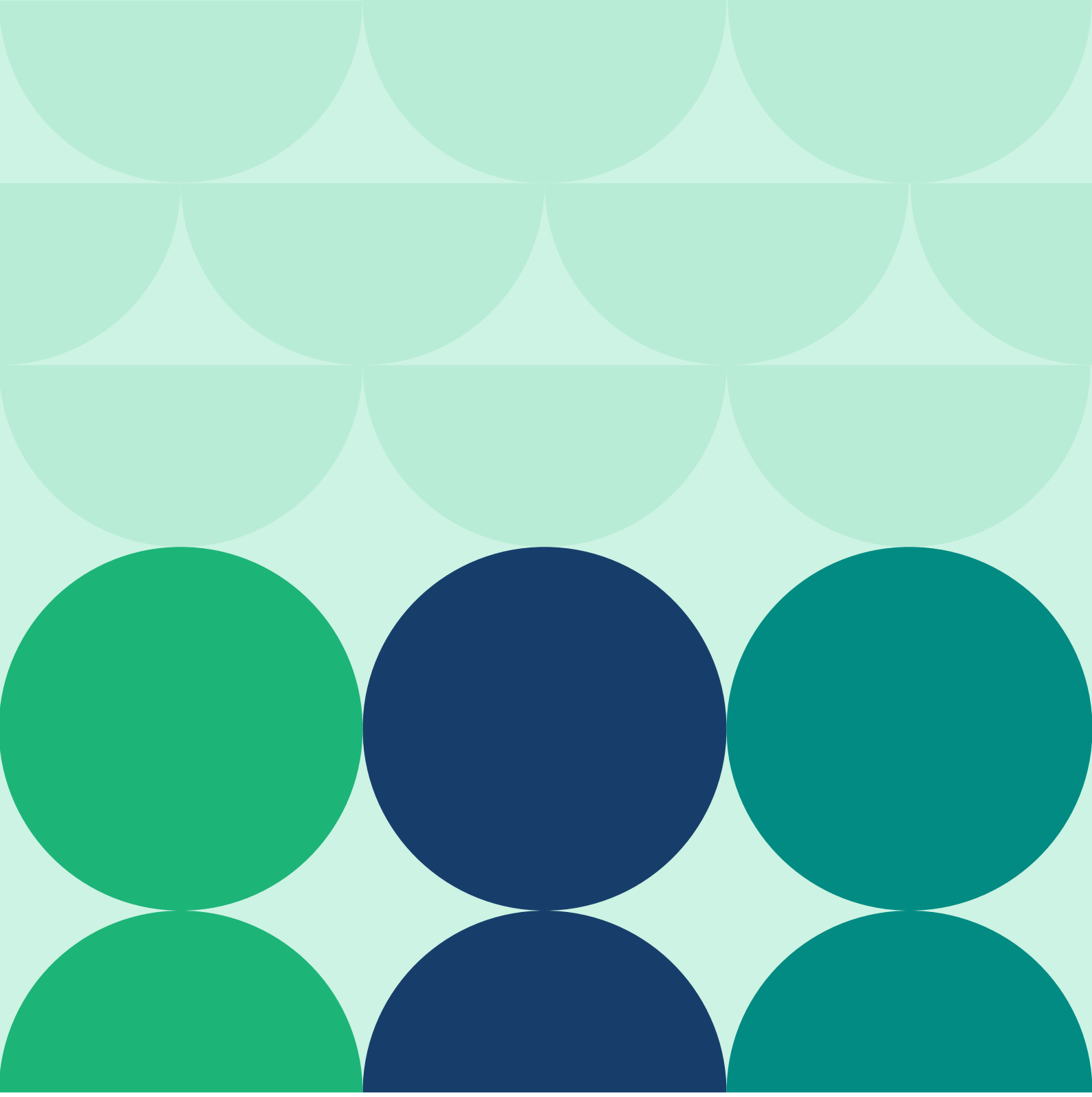
November, 2024



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