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Scientific Brief on the implications of local and regional jurisdictions for mitigation and adaptation to climate change: How can they enhance engagement of their constituents? State of science and focus on economic and financial tools

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Lima-Paris Action Agenda

STATE OF PLAY

Regional jurisdictions – geographical areas and political units such as cities, provinces, and territories – are extraordinarily diverse, with distinct economic conditions, populations, infrastructure, geographies, institutions, and governance systems. In these districts, urban areas have an important role and status, as cities generate more than 80% of global GDP and house the majority of the world's population (54% today and projected to grow to 66% by 2050). There currently are 1,000 urban agglomerations of 500,000 or more inhabitants[1]. Home to 70% of the developing world's poor, rural areas[2], and the provinces and territories encompassing these regions, will also play a crucial role in reducing humanity's vulnerability to climate change impacts.

The Sustainable Development Goals (SDGs), adopted in September 2015 by the UN General Assembly, confirm and legitimise the will of regional jurisdictions, human settlements, and cities to become more inclusive, safe, resilient and sustainable. SDG 11 highlights the need for participatory, integrated, and sustainable urban planning to build inclusive human settlements that are innovative, resource efficient, low carbon, and resilient to climate change impacts. Recognizing multiple levels of governance, the goal explicitly aims to foster positive economic, social, and environmental outcomes through vertically integrated jurisdictions.

Regional Jurisdictions as Key Actors in Low-Carbon and Resilient Development

Levers of regional jurisdictions

Depending on national setting and legal environment, regional jurisdictions – for instance, territories, provinces, and municipalities – have significant levers of power. Subnational governments often control greenhouse gas (GHG) emissions from real property (e.g., public buildings), operations (e.g., vehicle fleets), and public services (e.g., transportation systems) under their jurisdiction. These sectors, however, usually represent only a small portion of a region's broader GHG emissions. Because they set and implement local public policies (e.g., land-use regulations and zoning), subnational governing bodies influence the day-to-day lives of their jurisdiction's inhabitants as well as private-sector infrastructure and energy use and thus a region's GHG emissions and adaptation potential. Mainstreaming (i.e., incorporating) climate policies into regional and municipal policies and initiatives, such as promoting the construction of energy-efficient, climate-adapted housing, is critical to addressing the many challenges of climate change[2].

Subnational jurisdictions also play a key role as a base for vertical integration with higher levels of government. The development of interregional, low-emission transport systems and coordinated transformation of energy systems are chief examples of these important intra-governmental collaborations.

Integrated climate change mitigation and adaptation is both a co-benefit and a driver of sustainable development as aligned policies can be potent tools to solve climate challenges at national as well as regional levels[3]. Emphasizing co-benefits – e.g. encouraging biking and thus reducing both GHG emissions and obesity while improving air quality – is an effective strategy to mobilize citizens and decision-makers at the local level and can be linked to national climate and health programs[2]. The UCCRN[3,4], documents the advantages of adopting a holistic approach that facilitates interactions among stakeholders, considers regional jurisdictions important platforms for climate actors (i.e., public entities, households, companies, civil society, etc.) and highlights the need to continually re-evaluate and adjust policies with the aim to make municipalities, provinces, and territories sustainably equitable as climate change impacts affect societies.

Regional jurisdictions in low-income countries face special challenges and extra hurdles to build low-emissions and resilient initiatives. These areas are especially vulnerable to climate change impacts and their ability to engage in mitigation activities is shaped by a host of factors including cultural and socio-economic factors, local governments' institutional capacity and technical knowledge, characteristics of natural and built environments, roles that ecosystem services play in the quality of life, and existing stresses, such as resource over-exploitation and environmental degradation[3].

Ideas for compact, connected and coordinated development, elaborated notably by the New Climate Economy [5] and UCCRN [3] provide foundational elements for building a low-carbon future, although these components must be tailored to local settings. Elements that contribute to urban resilience include high-density compact growth, functionally and socially mixed neighbourhoods, and adequate public green spaces. Regional jurisdictions can be connected by innovative, low-carbon infrastructure (e.g., multi-modal transport systems with electric vehicles, bus rapid transit, etc.) deployed in conjunction with both vertically and horizontally (e.g., metropolitan region scale) integrated governance. Coordinated governance can help build effective and accountable institutions for developing climate policies and implementing them.

Forward-thinking urban planning, transport policies, building efficiency retrofits and low-energy use construction, waste management, and mixed, decentralised energy production are the primary factors determining achievement of mitigation goals in regional jurisdictions. A New Climate Economy Report [6] estimates, based on the recent Bloomberg assessment [7] that covered 11 activity clusters, that these measures in the building, transport, and waste sectors could generate annual GHG emissions reductions of 3.7 $GtCO_2$ in 2030 and 8 $GtCO_2$ in 2050, and that the investments needed to finance them could have an average payback within 16 years.

Mobilization of multiple actors

In addition to creating direct structural effects through public policies, regional jurisdictions engage and mobilise a wide range of actors in collaborative mitigation and adaptation efforts. Subnational governments can induce strong multiplier or 'knock-on' effects by awareness-building and mobilization, information sharing, and capacity development. This work encourages a broad array of entities to undertake climate actions, confront climate risks, and simultaneously seize opportunities to engage in sustainable development. Local authorities also have the power to send out strong signals through regulations and targeted economic incentives – e.g., via local taxation, the introduction of carbon criteria into public procurement (e.g., the Paris Declaration of European Cities in 2015), and the establishment of carbon emission trading systems (e.g., China and Quebec pilot carbon markets) [3].

Mitigating greenhouse gas emissions in the housing sector can create local jobs in production, operations, and maintenance, especially in low-income countries and informal settlements, illustrating another example of the multiplier effect of capacity building [3]. To promote climate resilience, regional and municipal governments, especially those representing low-income populations, need to bring attention to their communities' vulnerabilities and mobilize action to support disadvantaged citizens. These include the poor, the elderly, women, and minority populations who face the greatest exposure to climate change impacts. Actions that promote equity foster human wellbeing, social capital, and sustainable social and economic development, all of which increase regional jurisdictions' capacity to respond to climate change.

Role of Cities and Human Settlements

Urban areas are major emitters of greenhouse gases (GHGs), accounting for about 35 to 50% of global emissions [2], and they are also especially vulnerable to climate change impacts. Cities' GHG output primarily results from energy consumption, as urban areas are responsible for two-thirds of the world's energy use and about 70% of global GHG emissions from energy [8]. Cities are often located on rivers or coasts, with high population and infrastructure densities, making them particularly exposed to climate change hazards, including rising sea levels and storm surges, heat stress, extreme precipitation, inland and coastal flooding, landslides, drought, increased aridity, water scarcity, and air pollution. In rural areas, climate change's most pernicious effects result from shocks to water supply, food security and agricultural incomes, and ecosystems [2].

Climate change impacts in urban areas, particularly in developing countries, compound existing challenges as many cities struggle to deliver basic services to their residents, especially people living in informal settlements. The poorest populations will be disproportionately affected because they have fewer resources to respond [2,9].

Urban form and governance affect climate resiliency and GHG emissions by influencing population dynamics, density, income, land use, economic structure and energy mix. City institutions may determine and also build in GHG emissions and adaptation capacity for decades by deciding urban form, a quality shaped by urban infrastructure and, in particular, the transportation system [2,3].

Infrastructure's longevity and capital intensity create strong lock-in effects: today's construction choices determine emissions trajectories and climate vulnerability that will be difficult or unfeasible to alter as climate change unfolds [2]. In the existing built environment, much infrastructure is already in place and as these systems age, they will need to be renewed, while in developing cities there is great need for infrastructure expansion [3]. This need for additional construction represents critical opportunities to establish low-carbon, resilient pathways through long-term territorial planning. Employing climate resilience strategies now is crucial to build a sustainable future because technical decisions made today will inextricably bind us to the world of tomorrow.

Strengthening the Role of Regional Jurisdictions in Preparation for COP21

Throughout 2014 and 2015, regional jurisdictions have mobilized in unprecedented ways, working to transition to a low-carbon and climate-resilient economy. Many subnational initiatives, including the Compact of States and Regions, Compact of Mayors, Covenant of Mayors[1], and sectoral commitments belonging to other frameworks[2], have identified, pledged, and implemented low-carbon solutions. These efforts enhance value, visibility, and knowledge-sharing. The NAZCA platform[3] collects and reports data from such major initiatives.

1 *Through the Covenant of Mayors, more than 6,000 European municipalities, provinces and regions have pledged to meet and exceed the 20% GHG reduction objective by 2020 and are now moving onto 2030 targets; through the Compact of Mayors, more than 140 cities are engaged in measuring and reporting GHG emissions using the GPC protocol; the Compact of States and Regions, announced in the UN Climate Summit in September 2014 was signed by The Climate Group States & Regions Alliance, nrg4SD, and R20.*

2 *See, for example, the C40 Clean Bus Declaration, New York Declaration on Forests, CCAC Municipal Solid Waste Initiative, Paris Declaration of European Cities 2015, International Carbon Action Partnership (ICAP), etc.*

3 *Launched at the previous climate conference (COP20) in Lima, Peru, the NAZCA web portal compiles, organises, promotes and showcases commitments and initiatives for a transition towards a low-carbon economy (through emissions reduction, development of renewable energies, energy efficiency, carbon storage, resilience, etc.) taken by non-state actors such as cities, regions, and private companies. The portal's main objective is to promote the initiatives of international actors, disseminate best practices, and provide encouragement for further commitments, in favour of an ambitious agreement at COP21 in Paris and beyond.*

Commitments made by regions and cities will be crucial to achieve the 2°C goal. The IPCC[2] notes, however, that subnational initiatives, like national efforts, require evaluation of emissions reductions in order to address uncertainties regarding rebound effects, carbon leakage, and interactions among sectors. There are also, as of now, no widespread policy levers, such as carbon pricing schemes, to aid in integrating climate mitigation into decision-making. It is important for groups like the UCCRN to provide independent evaluation of emissions reductions pledged by regional jurisdictions.

Encouraging Innovation and Scaling Up

Key issue n°1: Governance and the need for collaboration and coherence across scales

The UCCRN[3,9] emphasizes that climate change drivers, dynamic challenges, and impacts cross administrative boundaries, highlighting the need for collaborative governance across all sectors and jurisdictions. Participatory processes that align sectors toward a common aim hold the potential to create legitimate and effective response strategies. The UCCRN *Summary for City Leaders*[9] notes that effective climate planning and program design involves common attributes including extended time scales for planning, implementation, and adjustment; the coordination and participation of multiple actors, including the private sector; and flexible, adaptable arrangements that span multiple levels of governance, including regional jurisdictions.

At the local scale, the IPCC[2] highlights key success factors in terms of governance: **1)** institutional arrangements that promote incorporating mitigation into other high-priority local agendas; **2)** a multilevel governance context that empowers cities to promote transformations; and **3)** spatial planning skills and political will to support integrated land-use and transportation planning. The IPCC[2] notes that government planning and provision can facilitate shifts to less energy- and GHG-intensive infrastructure (such as in the energy, transport, and building sectors) as well as lifestyle and behaviour changes. The UCCRN[3,4] documents how integrated climate planning can help to achieve cost-efficient responses to climate change, showing how the sharing of resources is essential to increasing the efficiency of climate governance and implementation. Effective local government supported by cooperative multilevel governance is even more important for adaptation issues[2].

Key issue n°2: Measurement, transparency, integration, and decision-making support tools adapted at the regional level

Relevant information and knowledge, skills, tools, and methodologies are essential to undertake climate action in regional jurisdictions[2]. The use of tools to support decision-making is widely encouraged by international institutions (IPCC, UNEP, UCCRN, etc.) to **1)** Provide the right economic signal to integrate externalities and co-benefits, for example through carbon pricing[10]; **2)** Deal with uncertainties, especially for climate adaptation, by taking into account the range of possible futures and outcomes, state-of-the-art knowledge, and current financial conditions[11]; and **3)** Adopt a holistic, system-based analysis, highlighting synergies and co-benefits between mitigation and adaptation options and the need to reinforce technical knowledge and skills on climate issues and sectorial solutions[3].

The development of user-friendly decision-making support tools should take into account local priorities and be based on rigorous evidence and evaluation[3,4]. Such tools can be useful to identify, prioritize, select, and implement actions. Monitoring, reviewing, and verification (MRV) systems adapted to local contexts and shared across actors are also crucial to guarantee the credibility, effectiveness and accountability of initiatives and to ensure their economic and environmental viability and public acceptance. Monitoring tends to be more complex for adaptation because there is not an equivalent to the universal metric of CO_2-equivalent; however, some measurement and evaluation tools are helpful for monitoring the effectiveness of adaptation strategies[12]. In both adaptation and mitigation, there is still a need for the development of indicators that are targeted to regional jurisdictions[3,12].

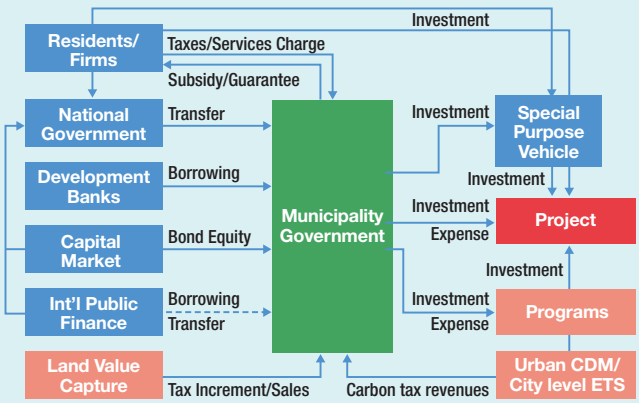
Key issue n°3: Adapting economic and financial resources to the local level

Mitigation gap, adaptation gap: A large funding gap exists between climate action needs and climate funding, though precise costs are hard to estimate due to differing timeframes and methodologies. On a global level, annual investment needs for climate actions are estimated to be in the trillions of dollars[5], while the level of climate finance was evaluated at USD331 billion in 2013, of which USD25 billion targeted adaptation[13]. Adaptation needs have been estimated at around USD150 billion/year by 2025-2030, according to a 2°C scenario[14]. This gap will especially impact urban areas because they are projected to carry ~80% of the adaptation costs for the period between 2010 and 2050[15].

Diverse access to funding: Access to financial resources is essential for regional jurisdictions and municipalities to implement climate change actions. Any single source of funding will be inadequate to deliver the large infrastructure financing needs of low carbon development and climate risk management for these entities[3]. Figure 1 shows the different sources that can provide funding at the municipal scale, from local financing (land-value capture, local taxes, etc.) to the traditional role of banks, and the more innovative use of capital markets and international finance that can be dedicated to climate change climate change[3].

It is essential for regional jurisdictions and municipalities to diversify their sources of finance and tap the full spectrum of resources available to raise funds for climate action. However,

FIGURE 1: POTENTIAL SOURCES OF CLIMATE FINANCE FOR MUNICIPALITIES*



Source: UCCRN,2015[3].

** This figure shows how municipal governments or regional jurisdictions could raise climate financing and how this could be invested in programs and projects. Both inflow and outflow of municipal financing may vary depending on the level of autonomy of fiscal management of respective municipalities and regional jurisdictions (UCCRN 2015).*

successful funding for climate action, notably in developing countries, needs to overcome barriers such as the lack of creditworthiness of subnational governments, access to capital markets and international mechanisms, and financial and technical skills and human resources[3,9,12].

A first step to get finance flowing for climate-related projects is to make local and regional governments more attractive for investors. Internal estimates from the World Bank indicate that every dollar invested in the creditworthiness of a developing country city is likely to mobilize more than USD100 in private-sector financing for low-carbon and climate-resilient infrastructure, suggesting a high leverage effect. Municipal taxes and allocations from national governments can also help to improve the scale and stability of revenues[3,9]. This can also raise awareness among citizens and even encourage them to finance projects through crowdfunding, for instance.

Local authorities in developing countries generally do not benefit from multilateral funding as most international donors and funds channel their resources through national governments of the recipient country[16], mainly because decentralization processes are not yet mature enough and there is a need for sovereign guarantee[3,9]. Strengthening fiscal decentralization through institutional and legal reforms could overcome this barrier (Lyon Climate and Territories Summit Outcomes). Identifying and highlighting co-benefits of climate-related measures would facilitate financing for projects in regional jurisdictions through international funds and initiatives[12].

Engaging the private sector and accessing capital markets. The private sector can be successfully involved in regional and urban projects under one of the various forms of public-private partnerships. To implement planning strategies with ambitious environmental goals, the design of creditworthy projects is essential. Based on a common vision of the region or city and an appropriate regulatory framework, partnerships with the private sector could be formed to exploit the multiple co-benefits and innovation opportunities for transformation[3,9].

Access to capital markets can be facilitated through municipal/regional and green bonds. However, bonds are mainly feasible in larger metropolitan or regional areas (or through a pool of cities), due to the required scale of the projects and their transaction costs[17].

Redirecting funding and aligning policies. Another complementary way to ensure funding for low-carbon and resilient cities is to mainstream climate change considerations (both mitigation and adaptation) into capital investments made by local governments. For instance, this would mean redirecting funding from high-emitting territorial infrastructure such as roads in favor of less-emitting solutions such as public transportation, eliminating fossil-fuel subsidies, and adopting climate-smart building codes for new buildings[5,18]. By integrating climate across multiple funding sources and maintaining a focus on economic growth, the additional cost of climate change mitigation and/or adaptation measures becomes much more manageable at a city scale[19].

Conclusion: Expectations for COP21 and the 5-Year Vision

Leading up to COP21 and forging the path ahead for regional jurisdictions in regard to climate action, the global process will lead to a 5-Year Vision to catalyse the main solutions for local engagement, thereby making rapid urbanisation and regional dynamics an opportunity for massive change with environmental, health and economic benefits:

- stimulating further mobilization of local leaders;
- strengthening attention paid to issues of resilience;
- reinforcing access to knowledge and finance; as well as;
- increasing coordination from a vertical integration perspective, as well as worldwide.

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