1. Adaptation to climate change: Framing the issue

Over the last 5 years, the world has witnessed an ever-increasing amount of disasters such as in Pakistan, Australia, United States, Canada, Brazil, and Japan, Indonesia, Philippines, and recently, in India and Nepal, highlighting that resilience to disasters and to climate change is of critical importance.

At the same time, in May 2013, the historical threshold of 400 parts per million of carbon dioxide (ppm CO_2) was crossed. This on-going, increasing global warming and accelerated climate change is very likely to exacerbate the intensity and frequency of such disasters, with a disproportionate amount of the associated impacts affecting urban areas, the poor and vulnerable in both developed and developing countries. As such, appropriate measures need to be urgently implemented at the local, subnational, national, regional and international level – addressing climate change adaptation and improved resilience to a changing climate.

Combing these facts with yet another trend, namely our rapid urbanization that requires us to urgently build over the next 40 years, particularly in the cities of the Global South, the same level of urban capacity and infrastructure that we have built over the last 4000 years, means that all our efforts on urban resilience and adaptation must include a more integrated focus on overall risks, development conditions, and local area performance, in cooperation with all actors involved.

Within this perspective, a climate-resilient city or territory is a city or territory prepared to absorb and recover from any shock or stress while maintaining its essential functions, structures, and identity, adapting and thriving in the face of continual change. Climate-resilience building involves awareness and assessment of hazard risks, reducing vulnerability and exposure, and increasing resistance, adaptive capacity, and emergency preparedness.

For the purposes of this position paper, the term « adaptation » is understood as two interlinked dimensions:

- A set of processes and preventive measures, implemented to prevent the harmful effects of climate change on human life, infrastructures, natural and socio-economic systems.
- Sets of actions implemented to maximize the opportunities that climate change may present in terms of positive lifestyle changes, new economic opportunities in production and consumption in the service of a lasting and sustainable economy.

The discussion of this position paper should deal with questions related to the role of local and regional governments and its diverse economic and social actors in addressing adaptation to climate change, their capacities and limits to prepare, to act and re-act, their abilities to reduce vulnerability and exposure, their possibilities to resist, organize adaptive capacity and emergency responses. Furthermore, the debate should address the actions that territorial actors can take to adapt to climate change and to facilitate the development of « climate-smart » territories. This includes the water / food / energy nexus in the territories, with a focus on agriculture and forest (resources and land management, as well as management practices); urban/rural link (the interconnections between urban and rural areas is a crucial point for adaptation. It is worth to be treated as a separate issue. Life in rural areas relies on the resource supply from natural capital, while lives in urban area rely on the resources supply from rural area. Urban and rural areas should then be considered as a whole to create a global system and synergies); development of 4D territorial energies; circular economy ; blue economy (and the proposals of economic and territorial actors on oceans: food and health, management of coastal activities, future ships...); the upholding of vital functions (water and sanitation, energy, food…) and the continuity of activities despite climate change.

In this context, initiatives such as the Covenant of Mayors, Mayors Adapt and the Compact Mayors should be highlighted as such relevant integrated approach, calling for concrete commitments translated into actions and offering standardised reporting frameworks

It is important to acknowledge that mitigation and adaptation go hand-in-hand with each other, that complementary actions are required, and that there must be no division between territories engaging in mitigation and those engaging on adaptation based on their level of development or their geographic location. Adaptation is not a solution reserved to the territories, which cannot afford investments in mitigation. Quite the opposite, it is a proactive and predictive process.

In addition, the concepts of adaptation and mitigation is often associated with the concept of disaster risk, which indicates the probability, in a specified time period, of serious alterations in the normal functioning of a community or society due to hazardous physical events leading to adverse effects of widespread human type, material, economic or environmental impacts. Both Adaptation and the Disaster risk Reduction (DRR) need political objectives and instrumental and strategic measures used to prevent the risk of future catastrophes, reduction of exposure, and improving resilience (IPCC, 2012).

Both the DRR and the adaptation have to be considered and integrated into national development plans, strategies to fight poverty, social deprivation and sectoral policies. Indeed, the DRR based on past and present vulnerability may fail in its goal of building resilience to future risks if it does not take into account and does not address the consequences of climate change.

Finally, the development of adaptation actions also requires a cooperative approach and need for sharing actions and results with citizens, stakeholders, and companies. A multilevel governance, with the involvement of national, regional, and local authorities (« vertical » coordination), and the inclusion of the different policy sectors (« horizontal » coordination) are the keys factors to build successfully Adaptation Plans. In this context, it is also essential the role of the scientific research in order to cover gaps in knowledge, to strengthen the analysis of the opportunities, options and limits of adaptation in different sectors and to ensure the strengthening the dissemination of information, tools and methods of adaptation to decision makers and stakeholders. The scientific research and the technological innovations allow predicting and monitoring environmental risks and finding solutions to cope with it.

2. Good practices

Rotterdam, The Netherlands – A sponge city approach

Rotterdam has a well functioning Climate Change Adaptation Strategy[1], and is very adept at managing water, including with "Water squares". This strategy combines technology, ecosystem-based approaches, and integrated data analysis to identify vulnerable areas, considering social, economic, and ecological factors. Rotterdam was one of the first Mayors Adapt signatories - the city is therefore committed to monitoring and reporting its progress every two years.

The challenges of Rotterdam include flooding, housing, transport, and lack of public space. To tackle these, the city incorporated four clusters of ecosystem services of the Economics of Ecosystems and Biodiversity[2] (2012), then completed an action and policy review, a scenario assessment, and workshops with local practitioners. The outcomes included a decision to ensure 34.9 m2 of green space per person and higher life expectancies. Major innovations in Rotterdam include water-squares, water living and canal transport, sponge roofs, underground storage for sewage overflow, and resilience profiles combined with GIS data to set new targets for ecosystem services[3][4]. Finally, Rotterdam developed and uses the Resilient City Planner[5]. This tool links traditional data inventories to GIS mapping technology. It creates a baseline study of about 100 variables and scores an area's performance on an easy-to-read diagram linked to detailed digital maps. In a short time a resilience scan can be produced to guide and rationalize planning for a lot of stakeholders. GIS technology is enabling cities to build an urban agenda.

Bologna, Italy

Bologna is home to about 380,000 inhabitants and a flourishing industrial sector. Climate change projections indicate that Bologna will face increased temperatures and extreme rainfall events. As such, heat waves and urban heat island, water scarcity, droughts, flooding and landslides are expected to become major challenges in near future for which adaption measures are needed.

Inspired by other climate adaptation initiatives, Bologna began by developing a comprehensive information system (Local Climate Profile) with ARPA, the Emilia Romagna environmental agency, to observe climate variability in the city, assess climate risks and vulnerabilities, and investigate existing resilience capacities by integrating environmental and social data. The Profile helped to identify effective strategies and inform the participatory decision-making process, which was established to involve relevant stakeholders in the selection and implementation of adaptation measures. In addition, the Municipality in partnership with the Kyoto Club developed a smartphone app called Blue AP(P) to inform citizens and stakeholders about adaptation and resilience, and to actively involve them in data collection and communication. Bologna joined Mayors Adapt on 26 May 2014. The approval of the Local Adaptation Strategy in autumn 2014 is an important step in the planning process, defining the core strategies, which

will then be translated into concrete actions in the Adaptation Plan. In the meantime, several pilot projects are being implemented, including monitoring the drainage system, examining measures for water use and saving, and promoting urban greening and agriculture activities.

In lieu of an immediate and acute climate change impact, it is difficult to mobilize communities and decision-makers to invest in and mainstream climate adaptation planning. To overcome this and change attitudes in the long run, cities need to raise awareness about climate resilience and adaptation, framing the issue in a way that is appealing and accessible to a broader audience and particularly to public officials and the private sector.

Solutions and tips from Bologna and peer-cities:

- Popularize precautionary adaptation planning with awareness raising;
- Provide transparent, accessible information to identify policies that satisfy various stakeholders at the lowest costs;
- Strengthen and facilitate local initiatives by providing the civil society with tools to become more resilient (e.g. smartphone app);
- Implement integrated solutions with multiple and cross-sectorial benefits, such as vegetable gardens, which contribute to food security, climate change mitigation and flood control.

Santiago de Chile, Chile

Santiago, Chile's capital and largest city, has nearly 7 million inhabitants and generates over 40% of the country's GDP. It is located in the upper basin of the Maipo River, which provides water for domestic use and plays a crucial role in Chile's economy.

Pressure on water resources in the basin is rising as Santiago grows in both size and population. Meanwhile, the city has had to cope with four consecutive years of drought and is projected to continue experiencing rising annual average temperatures and reduced precipitation. Santiago has also faced occasional floods from intense rainfall events that cause high turbidity levels and disrupt the water supply. The development of effective climate adaptation measures is crucial for Santiago to sustain water resources and thus economic activities.

To tackle these issues Santiago prioritized the following actions: promoting responsible water and energy consumption; efficient agricultural irrigation technologies; reducing pipe leakage; diversifying energy and water supply sources; designing a new water management structure for the basin and retrofitting canals to reduce storm water runoff.

Challenges include a lack of convective storm prediction and turbidity early warning stations, emergency plans based on winter rather than summer events, and the difficulty in identifying crucial clients and effectively communicating problems. Lasting improvements in the water sector require better coordination among suppliers and increased awareness amongst consumers and policy makers of the importance of effective water consumption. With much of the relevant information and scientific data being generated, future priorities lie in developing processes that ensure evidence-based adaptation planning and implementation.

Solutions and tips from Santiago

- Use of water reservoirs to secure water supply for 32 hours after a turbidity event;
- Develop collaborative processes that ensure science-based policy and practice;
- Encourage self-organized local water management and bottom-up participatory methods.

eThekwini, (Durban), South Africa

Adaptation must work with other political agendas and allow for a balanced approach between development and environmental decisions. Durban has coupled ecosystem restoration with job creation, improving over 3,000 hectares while creating nearly 300 jobs (in 2014).[6]

Region Sardinia, Italia

Role of Sardinia for the development of the National Plan for Adaptation: contact details on http://www.regione.sardegna.it/j/v/38?s=1&v=9&c=12053&na=1&va=2

More good practice examples on the European Commission's Mayors Adapt website as well as in the European Environment Agency's Climate-ADAPT platform.

3. Recommendations to local and regional governments for their adaptation actions with their local stakeholders

We encourage the following **overall visioning and strategic cornerstones of local adaptation** by local and regional governments:

- Future urban development should be assessed in terms of its contribution to improved urban resilience;
- Impacts of climate change will most severely affect vulnerable groups within our cities and territories, and thus require strategies for social, economic, cultural and environmental development that will reduce the vulnerability of "all" citizens;
- Ecosystem-based adaptation offers a cost-effective and sustainable approach to adaptation that can improve human wellbeing, particularly of vulnerable groups, in the cities of the Global South.

We invite **local and regional governments**, with a view to build adaptive capacities and achieve resilient communities that their local adaptation strategies are based on, in particular:

- Local planning processes for identifying and assessing vulnerabilities and risks,
- Local technical and institutional capacity for designing comprehensive adaptation and resilience upgrading projects and actions,
- Local procurement of investment through managed, competitive sourcing mechanisms and processes.

We recommend that **additional appropriate joint initiatives with business and civil society** partners are undertaken, in particular:

- Mainstreaming new adaptation and resilience standards into conventional urban development projects, similar to recent "green building" standards that have been mainstreamed into urban development and construction over the last decade.
- Developing specialized financial instruments for comprehensive local adaptation and resilience upgrading projects in urban areas and systems known to be highly vulnerable.
- Building additional local institutional capacity to prepare, structure and manage large scale redevelopment;

We invite **local and regional governments**, together with their networks and their partners to:

- Recognize the Durban Adaptation Charter (DAC), as a powerful mechanism to enhance urban adaptation action and sign the DAC;
- Report their climate adaptation and mitigation commitments, performances and actions to the carbon*n* Climate Registry [7] to increase feasibility, transparency and credibility of local and subnational level actions and urge national governments to follow suite;
- Increase the number of cities and towns committing to the Durban Adaptation Charter
- Increase the number of cities, towns, provinces, states and regions expressing respectively their intent and ensuring their compliance with the Compact of Mayors and the Compact of States and Regions; or with regional initiatives such as Covenant of Mayors, Resilient Communities for America.
- Increase the number of entries and diversify the information on mitigation and adaptation measures visible at the NAZACA Platform, through the carbon*n* Climate Registry.
- Actively engage in the consultations on Lima-Paris-Action-Agenda (LPAA).
- Engage in the Transformative Actions Program (TAP) at COP21/CMP11.

- develop a multilevel governance, with the involvement of national, regional, and local authorities (« vertical » coordination), and the inclusion of the different policy sectors (« horizontal » coordination) with the purpose of building successfully Adaptation Plans.
- involve the research sector in the process of formulating territorial policies related to climate change and disaster risk reduction in order to provide scientific support to policy decision makers.

We invite the **private sector** to recall that the scope of adaptive actions led by the private sector includes:

- Studies on the vulnerability of the whole production processes;
- Development of modelled early warnings;
- Collaborative actions with the territories in order to feed excellence and expertise centres on the know-how concerning adaptation (Integrated Management of Water Resources is a good example of how it is possible to combine these three types of action).

We recommend that **financial institutions shall fund locally relevant and appropriate development**, rather than conventional global financing mechanisms determining which local projects are eligible for funding.

4. Recommendations and proposals on adaptation for the COP21

To enhance local adaptation, the following priorities have to be addressed:

a. Governing Adaptation:
   i. Improve governance at all levels including communities, and horizontal-vertical integration
   ii. Engage citizens-business, including SMEs
   iii. Gender and migration

b. Managing adaptation
   i. Demystify adaptation,
   ii. Make better use of technology, science and traditional, indigenous knowledge/practice,
   iii. Create and implement innovative tools
   iv. Train users and decision makers at all level;
   v. Provide legal frameworks on risks, liability
   vi. Integrate mitigation-adaptation, air quality-health, ecosystem-community based adaptation

c. Nexus approach
   i. Connect urban-rural,
   ii. Water-food-energy-nexus
   iii. Water – adaptation; shortage, excess of water, security, access to water, reuse of water

Therefore; we urge our national governments to:

1. Support and further recognize the role of the local and regional governments in improving the climate change resilience of our territories,

2. Set up coherent adaptation schemes and ensure consolidated policy frameworks which support the development and implementation of local adaptation solutions,

3. Include local and subnational governments' consultation in the technical guidelines for the preparation of National Adaptation Plans (3. NAPs) and engage local and subnational governments in the implementation of NAPs.

4. Engage with local and regional governments in the preparation and implementation of Intended Nationally Determined Contributions (4. INDCs), the Nationally Appropriate Mitigation Actions (4. NAMAs), the Low Emission Development Strategies (4. LEDS) and in particular the National Adaptation Plans (4. NAPs), amongst others.

5. Upon submission of INDCs, continue to explore innovative formulations to raise and complement pre-2020 ambitions at the national and global level, through voluntary commitments of local and regional governments, taking into account the strong commitments taken and the progress achieved for example by local and regional governments engaged in the Compact of Mayors and the Compact of States and Regions, the Covenant of Mayors and Mayors Adapt, as well as the information contained at the carbonn Climate Registry, CDP, NAZCA Platform.

6. Provide sufficient technical support to local and regional governments to help them build local adaptive capacity for all types of disasters,

7. Identify and mobilize sufficient financial resources for the development and implementation of adaptation solutions at local level.

We urge the Parties of COP21 to:

1. Implement para.7 of the Decision1/CP16 that designates local governments as "governmental stakeholders" both at the UNFCCC level and within the negotiations related to international environmental governance, with a view to reach an effective and efficient global environmental system.

2. Engage with local and regional governments and include in the Paris outcomes a paragraph as follows:

Recalling para.7 of Dec.1/CP16 adopted at COP16 in Cancun in 2010 that recognizes local and subnational governments as *"governmental stakeholders",*

Further recalling para.5b of Dec.1/CP19 adopted at COP19 in Warsaw in 2013 that recognizes role of cities and subnational authorities in raising pre2020 ambition,

Parties to the UNFCCC should, as appropriate, seek to engage their local and subnational governments, as appropriate, to achieve the objectives of the Convention and the implementation of the Paris2015 Outcomes, by developing policy tools, guidelines and programmes, providing technical, financial, institutional assistance and/or guidance, as appropriate, to support their national contributions, plans, commitments and actions, in line with other relevant governance arrangements established by their national Governments.

3. Ensure that sustainable and resilient urban development that prioritises climate change adaptation, poverty alleviation and improved human well-being are defined as a thematic window in the design of the Green Climate Fund and the Adaptation Fund under the UNFCCC.

4. Adopt a 10-Year Work Programme for local and subnational governments[8] that includes mitigation and adaptation efforts.

5. Ensure synergies with other Post2015 development agenda negotiations, in particular on Sustainable Development Goals, Financing for Development, Disaster Risk Reduction and HABITATIII Conference.

6. Include local government representation in their COP 21 delegations where appropriate.

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[1] http://www.rotterdamclimateinitiative.nl/documents/Documenten/20121210_RAS_EN_lr_versie_4.pdf

[2] http://www.teebweb.org/

[3] https://www.youtube.com/watch?v=m8HdOiz6jGg

[4] http://resilient-cities.iclei.org/fileadmin/sites/resilient-cities/files/Resilient_Cities_2013/Presentations/B5_Tillie_RC2013.pdf

[5] http://resilient-cities.iclei.org/fileadmin/sites/resilient-cities/files/Resilient_Cities_2014/PPTs/D/D4_Tillie.pdf

[6] http://resilient-cities.iclei.org/fileadmin/sites/resilient-cities/files/Full_papers/RC2014__Congress_Report__Final.pdf

[7] http://carbonn.org/climateregistry/

[8] As a result of the Technical Examination Process and Meetings (TEP/TEM) on Urban Environment, and building upon the information contained in Technical Paper Addendum as well as the policy options presented at the ADP 2014 Technical Paper para.156-164, including creation of a platform of practitioners, recognition of local commitments and creation of further incentives, including enhanced access to financing, technology and capacity building mechanisms under the UNFCCC. A 10-Year “Plan of Action on Subnational Governments, Cities and Local Authorities for Biodiversity “ was adopted by the national governments at the 10th Conference of Parties of the Convention on Biological Diversity as Dec.X/22 in Nagoya in 2010.