ICLEI – Local Governments for Sustainability, European Secretariat

Background paper for the Council of Europe's report on resilient cities

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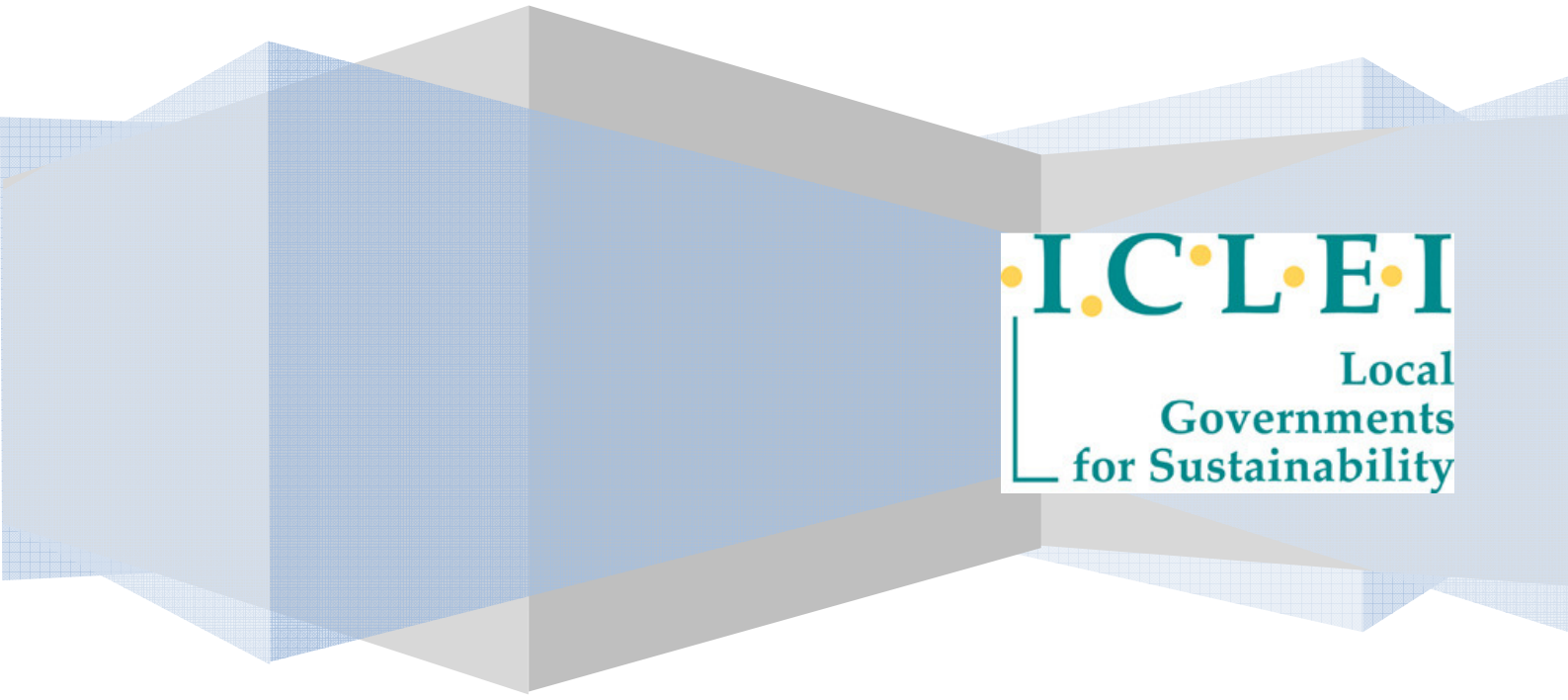

Table of Contents

Abstract

This background paper has been commissioned to the ICLEI European Secretariat by the Council of Europe and will serve as a building block for the Council's preparation of its forthcoming report on resilient cities. Its objectives are the following:

i. To give a brief and general overview of the state of cities with respect to global trends in climate and other factors such as demographics and urbanisation.
ii. To analyse the factors that make a city resilient and the arguments for moving cities in this direction, providing brief best practice cases.
iii. To take stock of the work on disaster management conducted by the Congress of Local and Regional Authorities, an institution of the Council of Europe.
iv. To present the UNISDR Making Cities Resilient Campaign as a vehicle for cities to enhance their resilience and to critically analyse its approach.

The paper concludes by suggesting to the Congress that they encourage cities to join the UNISDR 'Making Cities Resilient' campaign, and recommends actions on a series of areas including knowledge development and sharing, funding mechanisms, addressing different types of cities, and an integrated and multi-level governance approach to resilience building.

Introduction

As the areas of climate change adaptation and resilience become increasingly more important and more clearly cross-cutting at all levels of the policy agenda, adequately framing and integrating research and implementation efforts becomes ever more crucial. However, sectors and fields that directly affect adaptation, resilience, and each other – including climate change mitigation, disaster risk reduction and management, urban and spatial planning, social policies, economic growth principles, industrial policies, water directives, etc. – presently operate mostly independent from one another, and thus in an inefficient way.

But all levels of governance are increasingly gaining awareness of the importance of integrating initiatives of different sectors into one common vision. One relevant such example is the White Paper "Adapting to climate change: Towards a European framework for action," published by the European Commission in 2009, which suggests that collaboration efforts should be centred around four areas[1]:

- building a solid knowledge base on the impact and consequences of climate change,
- integrating adaptation into key policy areas,
- employing a combination of policy instruments (market-based instruments, guidelines, public-private partnerships) to ensure effective delivery of adaptation, and
- stepping up international cooperation on adaptation.

In addition to the EC's White Paper and its subsequent actions such as the EU Adaptation Strategy due in 2013 and the Clearinghouse Mechanism[2], other integrative examples are increased research funding dedicated to adaptation (e.g. through the FP7 in Europe, as well as national initiatives such as the German Government's International Climate Initiative), the UNISDR 'Making Cities Resilient' campaign and other related initiatives, the UN-Sasakawa Award for Disaster Reduction**,** and ICLEI's World Congresses on Cities and Adaptation to Climate Change (aka Bonn Resilient Cities) held annually since 2010.

The challenge at hand is to integrate these efforts and build a coherent picture. Ideally, all of these initiatives would join forces and develop a strategic approach towards sustainability, which encompasses all focal areas concerned (as mentioned above: resilience, disaster risk reduction, etc.). Such a holistic approach would support, coordinate, encourage and synergise efforts and thus enable enhanced replication of best practices at regional and local levels. It is with this backdrop that the activities of the Congress of Local and Regional Authorities have a high potential to spur action, particularly if its scope of work effectively takes an overarching view that builds on disaster risk reduction and management, works with climate change mitigation and adaptation, and builds resilience within a sustainability vision.

[1] European Commission (2009) – "White Paper - Adapting to climate change: Towards a European framework for action".

[2] See, for reference: http://ec.europa.eu/clima/tenders/2011/208209/clearinghouse_concept_note_en.pdf

At the local level, indeed, resilience and adaptation efforts have traditionally been implemented widely, but to a large extent this has been done in an isolated way, often lacking efficiency, cross-sectoral cohesiveness, and without any guidance of overarching sustainability criteria[3]. In other words, the challenge identified at the national and supra-national levels (above) is reflected locally, too.

The task of integrating these thematic areas, finding ways to align their actions and goals, and working with different levels of governance is clearly a difficult endeavour. Further difficulty is added when the main objective of cities – providing good services and quality of life to its citizens, while building resilience to climate and non-climate impacts in a sustainable way – often lacks a comprehensive roadmap. Trying to shed some light on this issue, the questions what is a resilient city, what are the costs of being resilient, and how does the stated pursuit of economic growth[4] interplay with these integrationist undertakings are addressed in this background paper (to the limited extent of the paper's scope). Decision making regarding adaptation can often be further complicated because of the considerable levels of uncertainty of climate change trends and socio-economic developments, even in the face of increasingly frequent and intense climate change manifestations and natural disasters, and newly-available scientific data.

The first section of this paper takes a look at the state of the planet from the perspective of a changing climate, a rising global population and rapid urbanisation trends. Next, the concept of resilience is explored in its relation to disaster risk, climate change adaptation and mitigation as well as sustainability, proposing a framework for resilience work at the local level. The following section looks into the UNISDR 'Making Cities Resilient' campaign and puts forward some ideas on how European cities may contribute to its objectives. Finally, some concluding remarks and recommendations are presented.

[3] Ecologic Institute; ICLEI European Secretariat; REC & AEA for the Committee of the Regions (2011) "Adaptation to climate change – Policy instruments for adaptation to climate change in big European cities and metropolitan areas".

[4] As stated in the EU 2020 strategy.

The state of the planet, the state of cities

It is now widely accepted that the impacts of humans on the planet are affecting the functioning of the climate system and placing stress on ecosystem services. In aggregate, the human population is using natural resources at a faster speed than they can be replenished, with peak oil[5] threatening the ability to maintain the 'business as usual' scenario and the increasingly fossil-dependent global lifestyles in the long term. Desertification, biodiversity loss, increased temperatures, glacial melt, water scarcity and drought, floods and coastal erosion are among the impacts that countries worldwide are facing today. There are many factors that contribute to these new conditions of gradual environmental degradation; some are climate related and others not. Non-climate factors include population growth, urbanisation trends, chronic poverty, socio-economic developments and resulting anthropogenic GHG emissions – an economic growth model coupled with resource consumption and depletion.

Cities are particularly vulnerable to climate change and natural disasters because of the large number of people living in relatively concentrated areas and the complexity of the systems that interact within them: infrastructure networks to transport people and goods, communications systems, water and energy distribution, sewers and waste removal systems, food production, housing and urban green spaces, etc.

Particularly in low-income countries, but also in high-income ones, cities face an additional burden as poor communities are often not covered by the systems' networks, but are rather served (at best) by informal structures lacking proper foundations. Whereas infrastructure systems are increasingly at risk of damage or failure from climate change impacts and other non-climate stresses, informal ones lacking appropriate structures and planning are, clearly, even more vulnerable. Furthermore, there are about one billion people living in informal settlements – or slums – which represent one in three of urban residents worldwide[6].

The Centre for Research on the Epidemiology of Disasters (CRED), moreover, indicates that the frequency of natural disasters appears to be increasing, while Munich RE states that "weather-related natural catastrophes and record temperatures (…) provide further indications of advancing climate change"[7]. Indeed, 2011 has been the year with higher costs related to natural catastrophes, ever[8]. A recent report indicates that more than half of the world's population resides in areas where

[5] Peak oil is the point in time when the maximum rate of global petroleum extraction is reached, after which the rate of production enters terminal decline. Optimistic estimations of peak production forecast the global decline will begin by 2020 or later. Source: Wikipedia.

[6] The World Bank Group (2011). "Guide to Climate Change Adaptation in Cities".

[7] Munich RE. "Overall picture of natural catastrophes in 2010 – Very severe earthquakes and many severe weather events". Press release: 3 January 2011.

[8] Munich RE. "Review of natural catastrophes in 2011 – Earthquakes result in record low year". Press release: 4 January 2012. Munich RE also indicates that "at about US$ 380bn, global economic losses were nearly two-thirds higher than in 2005, the previous record year with losses of US$ 220bn."

natural hazards may significantly impact them[9], with a death toll of 710,000 persons between 1991 and 2010 due to weather extremes[10]. With an increasingly complex network of systems interacting with and providing goods and services to cities, the potential damage of natural disasters to humans and infrastructure becomes ever higher – due to the systems' complexity and linkages. A recent and vivid example is the Tohoku earthquake and tsunami which hit Japan on 11 March 2011.

In addition to physical systems that facilitate the interrelations between the city and its residents, climate change impacts also put pressure on 'soft' systems and – vice versa – unprepared soft systems can worsen the consequences /damages to the physical systems, such as was the case in New Orleans after Hurricane Katrina, in French local governments after Xynthia, in Russia during the recent wild fires, and in Pakistan and in Thailand during the floods of 2010 and 2011. These include governance structures and management procedures - in particular decision making processes – which are put to the test when extreme events strike cities, and also the complex grid of social and cultural interactions. To cope with climate threats and non-climate stressors, soft systems also need to be adjusted in order to deliver innovative solutions to the new challenges faced by city managers and residents.

> *"With natural hazard cycles repeating themselves every few years, developing countries find themselves in a vicious cycle of loss and recovery without the ability to move forward and achieve sustainable development."*
>
> *Maxx Dilley, International Research Institute for Climate Prediction (IRI) at Columbia University's Earth Institute*

Urban areas and cities in Europe face different threats. Further to socio-economic stresses as discussed above, cities face climate threats. Some of the most relevant are:

- temperature increase leading to heat waves and – more particular to medium and large cities – urban heat island effects;
- sea level rise leading to storm surges and salt water intrusion;
- heavy precipitation leading to fluvial and urban drainage floods;
- storms (wind, rain, thunder and snow storms) leading to floods and physical damage to infrastructure;
- decreased precipitation leading to water scarcity and droughts;
- climate impacts leading to natural disturbances, e.g. wildfires, pests;

[9] International Research Institute for Climate Prediction at Columbia University, *et al* (2005). "Natural Disaster Hotspots: A Global Risk Analysis".

[10] Germanwatch. "Pakistan and Guatemala mostly hit by weather extremes in 2010". Press release: 29 November 2011. Source: http://www.germanwatch.org/presse/2011-11-29e.htm

- climate impacts leading to earth movements (landslides, erosion); and
- climate impacts leading to increased human diseases.[11]

These threats are represented in Figure 1 below:

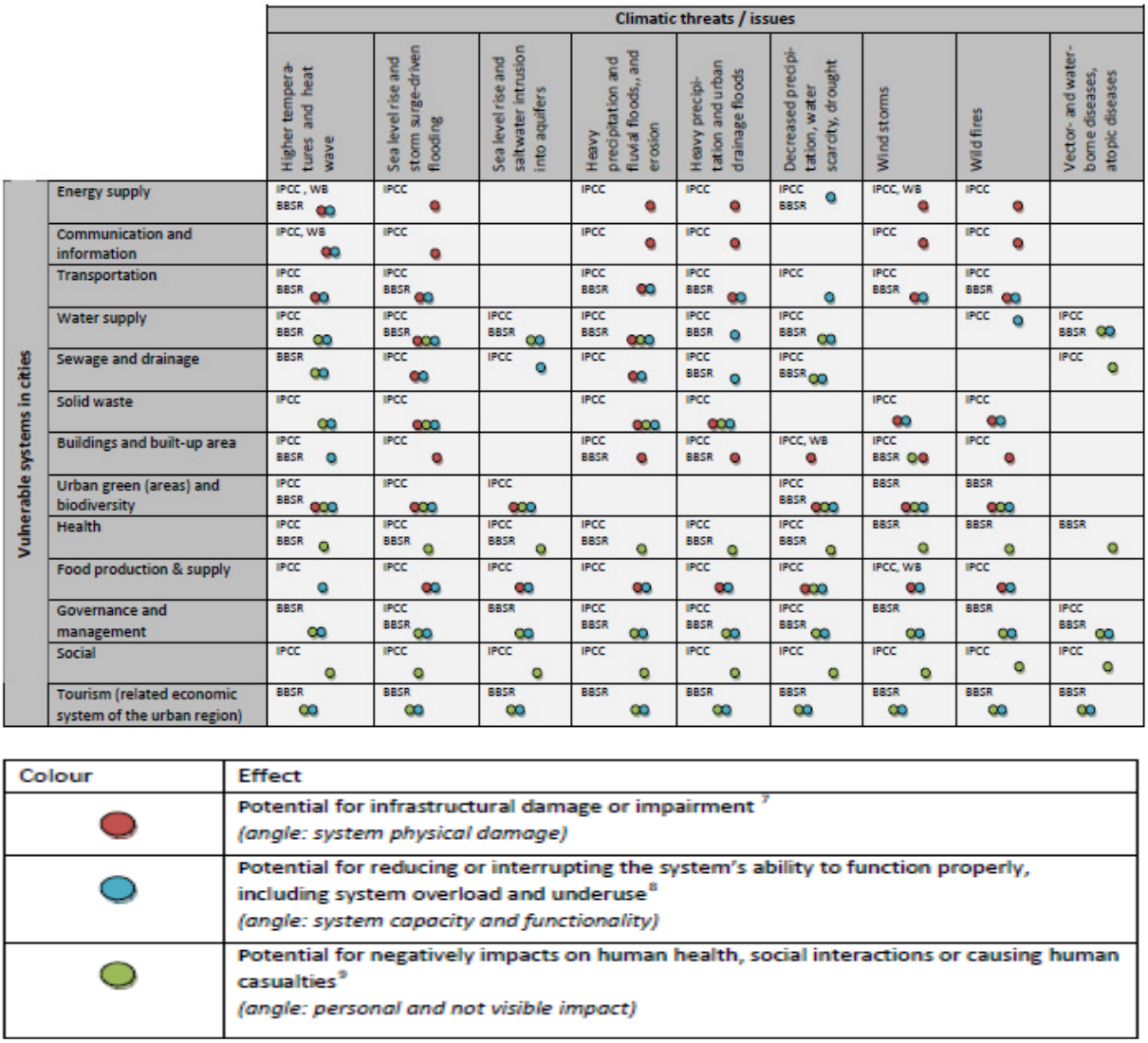

Figure 1. Relations between climatic threats and city systems[12]

[11] Robrecht, H. et Morchain, D (2010) Adaptation in cities and quality of life. Background document for workshop at "Adaptation to a Changing Climate: Time to Intensify Efforts" Conference. Brussels. November, 2010

[12] ETC/ACC – European Topic Centre for Air and Climate Change (2010) "Urban Regions: Vulnerabilities, Vulnerability Assessments by Indicators and Adaptation Options for Climate Change Impacts". ETC/ACC Technical Paper 2010/12. Available online at: http://acm.eionet.europa.eu/reports/docs/ETCACC_TP_2010_12_Urban_CC_Vuln_Adapt.pdf

These climatic manifestations – which sometimes reach the magnitude of disasters – and their impacts and interactions with infrastructure system have a direct consequences on humans, including health problems and mortaility (e.g. as a result of heat waves or floods), increased incidence of contagious and waterborne and pest-borne diseases (e.g. as a result of poverty and lack of access to proper sanitation), decreased production of food and higher commodity prices (e.g. due to drought), etc.

Cities do, in some cases, also face structural challenges, such as insufficient funding, poor coordination of efforts and with stakeholders, and limited knowledge. Frameworks to support prevention/adaptation actions are sometimes lacking, too.

While cities are focal points of vulnerability, they are also centres of prosperity, innovation, employment, economic growth and provision of services. People decide to live in cities because of the advantages they offer and the quality of life that they deliver. In the 21st century cities are faced with the major challenge of overcoming vulnerabilities, reducing disaster risks and enhancing their resilience through mitigation and adaptation measures articulated within a sustainable development path – where sustainability, and indeed resilience, is understood to encompass environmental, social and green economic growth.

Taking action against climate change and other impacts will almost invariably entail some risk due to a number of uncertainties as to how intense impacts will be in the future, or even whether such impacts will indeed affect a particular location. This uncertainty should not block action or shy local governments away from investment, considering that there is robust and abundant literature suggesting higher costs of inaction (most notably the 2006 Stern Report).

The outcomes of the UNFCCC's COP in Durban in 2011 – such as a second period of commitment for the Kyoto Protocol, the development of a new process to agree on legally binding targets for all parties, and the Green Climate Fund[13] – can be seen with optimism and as a sign of internationally coordinated efforts to take action to adapt to the new conditions to which we, as citizens of the planet, are all subject.

[13] IISD Reporting Services. "Summary of the Durban Climate Change Conference" Volume 12 Number 534 - Tuesday, 13 December 2011.

A resilient city

What is a resilient city?

When resilience is the aim, it is crucial to understand what the term means and what a resilient city should comprise. As may be expected, there are many definitions of a resilient city, ranging from very narrow to very broad and reflecting different cultural values. One feature, however, that seems to always be present is 'strength' – making communities and cities stronger against destabilizing forces that put their citizens and structures at risk. Generally, resilience is also linked to sustainable principles. To the World Bank, for example, "a resilient city is one that is prepared for existing and future impacts, thereby limiting their magnitude and severity"[6]. The World Urban Forum's Vancouver Working Group takes a more confined approach and links resilience to the ability of a city to expand its production base (e.g. from depending on one industry to attracting and embracing a broader base and economy)[14]. Yet another definition links resilience directly to peak oil and names resilient cities those "that can last, make it through crises, [possess] inner strength and resolve, as well as appropriate built form and physical infrastructure"[15]. The European Environment Agency (EEA) sees a resilient city as an "urban ecosystem" that is dynamic: consuming, transforming and releasing materials and energy in an adaptive way and interacting with other ecosystems, tackling mitigation and adaptation efforts and addressing quality of life through better and greener urban planning[16]. As a final and quite comprehensive approach, ICLEI's Bonn Resilient Cities conference defines a resilient city as:

> A city that supports the development of greater resilience in its institutions, infrastructure, and social and economic life. Resilient cities reduce vulnerability to extreme events and respond creatively to economic, social and environmental change in order to increase their long-term sustainability. Resilient city activities are sensitive to distinctive unique local conditions and origins. Efforts undertaken to prevent crisis or disaster in one area should be designed in such a way as to advance the community's resilience and sustainable development in a number of areas. As such, resilient cities define a comprehensive 'urban resilience' concept and policy agenda with implications in the fields of urban governance, infrastructure, finance, design, social and economic development, and environmental / resource management[17].

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[14] Walisser, Brian; Brent Mueller and Celia McLean (2006). "The Resilient City". The World Urban Forum, Vancouver Working Group Discussion Paper.

[15] Newman, Peter; Timothy Beatley and Heather Boyer (2009). "Resilient Cities - Responding to Peak Oil and Climate Change". Island Press. Washington DC. As quoted in: http://sustainablecitiescollective.com/brynajones/28388/what-makes-resilient-city

[16] European Environment Agency (2010). "The European Environment – State and Outlook 2010 – Urban Environment". Copenhagen.

[17] http://resilient-cities.iclei.org/bonn2011/resilience-resource-point/glossary-of-key-terms/ Resilient Communities Program Concept (2002).

There are two more points that a resilient city needs to take into consideration. One is that becoming resilient is a process that demands continual improvement and that, by definition, is an ever-evolving effort. This process is adaptive because it aims at a continual improvement of the decisions taken (e.g. in rethinking urban planning, in increasing local renewable energy supply, or in putting alert systems into operation) and the actions implemented. These require regular and effective monitoring and evaluation. The uncertainty of future developments in climate change and its implications are managed by becoming more flexible through robust, no- and low-regret actions and through periodical monitoring.

Still, uncertainty can often block action by local governments or other stakeholders, even more so in times of economic downturns. A recent, illustrative example comes from the Essex & Suffolk Water company in the UK. A company staff member indicated that "we're not ignoring [the scientific data and forecasts], but we're not spending money on [acting upon] them. We are aware of the changes there could be - lower river flows, hotter summers, wetter winters. But we have to be careful until the science is more definite or we'd risk wasting money[18]".

A recent report suggests that the present economic crisis felt globally has re-focused political agendas on issues of vulnerability, exposure to risk and threat of structural ruptures, moving priorities away from former top concerns of competitiveness, technological innovation and job creation[19].

The process to enhance resilience also needs to be integrative because it works in a cross-cutting way with existing policies and processes across different sectors in order to take advantage of the efforts already invested by cities and other levels of government. Another relevant feature of the process is its inclusiveness, as it relies on the input from a broad range of stakeholders and different city (Local Government) departments, ensuring a fair representation of all social groups in the city and promoting their active participation in the climate adaptation process, independent of their level of influence.

The second point that a resilient city needs to consider is that resilience should be embedded in the context of sustainability. Resilient solutions, which are largely addressed through climate change adaptation, climate change mitigation and disaster risk reduction need to contribute to the amelioration of environmental degradation and of the realities of poverty and inequality, as shown in Figure 2 below. Otherwise, solutions will not be effective in the long term.

[18] BBC News, 2 December 2011. 'Climate talks end with late deal' by David Shukman. Link: http://www.bbc.co.uk/news/science-environment-15996986

[19] Robert Lukesch, Harald Payer, Waltraud Winkler-Rieder: „Wie gehen Regionen mit Krisen um? Eine explorative Studie über die Resilienz von Regionen". ÖAR Regionalberatung, Vienna.

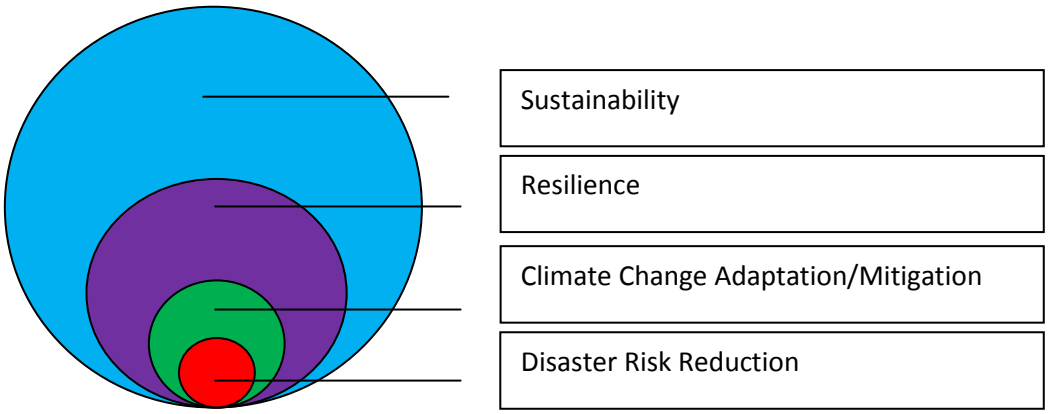

Figure 2: The context of resilience

As Figure 2 shows, addressing disaster risk reduces vulnerability, as do sustainable measures to deliver climate change adaptation (and mitigation, at least in the long term). These two fields – disaster risk management and climate change adaptation – are becoming closer in their approaches and objectives, as disaster risk management moves from reaction to also including prevention as a major objective[20]. These efforts enhance a community's or a city's resilience (purple ball), and they contribute to sustainability and to the long-term prevalence of communities, cities, humans and biodiversity only if they are shaped with sustainability criteria (blue ball).

The costs and benefits of being resilient

There is abundant literature on the economic costs and benefits of adaptation and mitigation; whereas estimating the cost of resilience remains more 'obscure' and more difficult to define. Mitigation and adaptation efforts, as well as economic development initiatives, are linked, and advances in one are affected by the evolution of the others. Indeed, "any estimation of the costs of adaptation is necessarily contingent on a scenario of future mitigation"[21]. In this background paper we understand the cost of resilience to be very linked to the cost of adaptation[22] – which includes the costs of disaster risk reduction. After all, adaptation aims to reduce vulnerability and enhance resilience. There are numerous estimations of the costs of adaptation measures at a global level, and some others focused on developing countries. They include the following:

"The World Bank projected $9 billion to $41 billion in annual costs to developing countries; the Stern Report $4 billion to $37 billion, an Oxfam paper at least $50 billion, and a United Nations Development Programme study $86 billion to $109 billion (by 2015). [The] United Nations

[20] This is a desirable approach as every Euro invested on risk reduction saves between 5 to 10 Euros in economic losses from disasters. Source: A Needless Toll of Natural Disasters, Op-Ed, Boston Globe, 23 March 2006 - by Eric Schwartz (UN Secretary General's Deputy Special Envoy for Tsunami Recovery

21 Ackerman, F. and E.A. Stanton (2011). "Climate Economics: The state of the art". Stockholm Environment Institute.

[22] As mentioned in sections above, the costs of inaction are calculated to be even higher than the costs incurred when actively addressing climate change impacts, natural disasters and non-climate related impacts.

Framework Convention on Climate Change (UNFCCC) estimates (…) put annual global adaptation costs at $44 billion to $166 billion per year, including $28 billion to $67 billion for developing countries. Of the global total, $8 billion to $130 billion would be required for infrastructure investments, $14 billion for agriculture, $11 billion each for water systems and coastal zones, and $5 billion for human health. (…)By 2030, [the UNFCCC] estimates that annual costs to developing countries will be $134 billion to $230 billion. A recent World Bank study (2010) estimated $80 billion to $90 billion in 2030 adaptation costs for developing countries, including $29 billion each in coastal zones and infrastructure."[21]

Furthermore, to cite a European example, Swiss Re recently estimated that the costs of a 100-year storm event could double by the 2080s with climate change in this continent[23].

It should not come as a surprise that the estimates listed above vary considerably, given the enormity of the scale and the uncertain nature and magnitude of future events. Likewise, estimates rely on major assumptions which are further complicated by lack of thorough data: the aggregate number of assets and financial flows that are vulnerable to climate change perturbations, and the increasing costs of making these resilient. These factors weaken possible consensus on adaptation costs and hinder their decision making potential[24]. In addition, funding for adaptation remains rather insufficient and the issues has not managed to attract the interest of funding institutions in the way that, for instance, climate change mitigation has.

On the other hand, cities, as has been discussed in this paper, are particularly vulnerable to climate change impacts partly due to their population density, the fact that a large percentage of cities are located in vulnerable locations (e.g. next to rivers or in the coast), their dependence on a network of systems and their complex interaction. This suggests that massive investments are required to upgrade city systems and enhance the location's resilience. Indeed, for cities it can be particularly difficult and costly to adapt to climate change, from physical, economic and technological perspectives[12].

One smart way to reduce the need for dedicated adaptation funding and to efficiently use resources to reduce vulnerability in cities is to incorporate climate change, adaptation and resilience criteria into present investments on urban fixed assets (many of which stem from the private sector). This concept of 'resilience upgrading'[25] looks at enhancing the city's resilience by increasing its performance – its ability to deliver a high quality of life and quality services to its residents. Instead of approaching the topic of adaptation and disaster risk from a perspective of 'escaping risks', it rather looks at the benefits that smart, climate-proof investments can deliver to the city and to the service or product providers. This implies that service or product providers, be them public or private, will

[23] Hunt & Watkiss 2007: ABI (2005).

24 Agrawala, S., Crick, F., Jetté-Nantel, S., and Tepes, A. (2008). "Empirical Estimates of Adaptation Costs and Benefits: A Critical Assessment." In S. Agrawala and S. Fankhauser, eds. *Economic Aspects of Adaptation to Climate Change: Costs, Benefits and Policy Instruments.* Paris: OECD Publishing.

[25] The term was coined by ICLEI in: ICLEI (2011). Financing the Resilient City: A demand driven approach to development, disaster risk reduction and climate adaptation - An ICLEI White Paper, *ICLEI Global Report.*

gain by conducting resilience-upgrading investments, in their *self-interest* to protect their own endeavours. Considering that $10 trillion are spent annually on urban assets (which represents 300 times the available funding for adaptation), promoting resilience-upgrading investments should be promoted widely[25].

The European Union's 2020 strategy is centred on growth. It aims to achieve smart growth, sustainable growth and inclusive growth. Growth in a world that is dominated by unsustainable practices, where the global population depletes natural resources and ecosystem services faster than the planet can replenish them, is a major challenge. The symbolism used by the Global Footprint Network to describe the problem of growth and unsustainable use of resources is an effective way to transmit the message: Today we consume the resources equivalent to 1.5 planet Earths – that is, it takes "the Earth one year and six months to regenerate what we use in a year" and to absorb the waste we generate – and by 2030 we are likely to need two planet Earths[26].

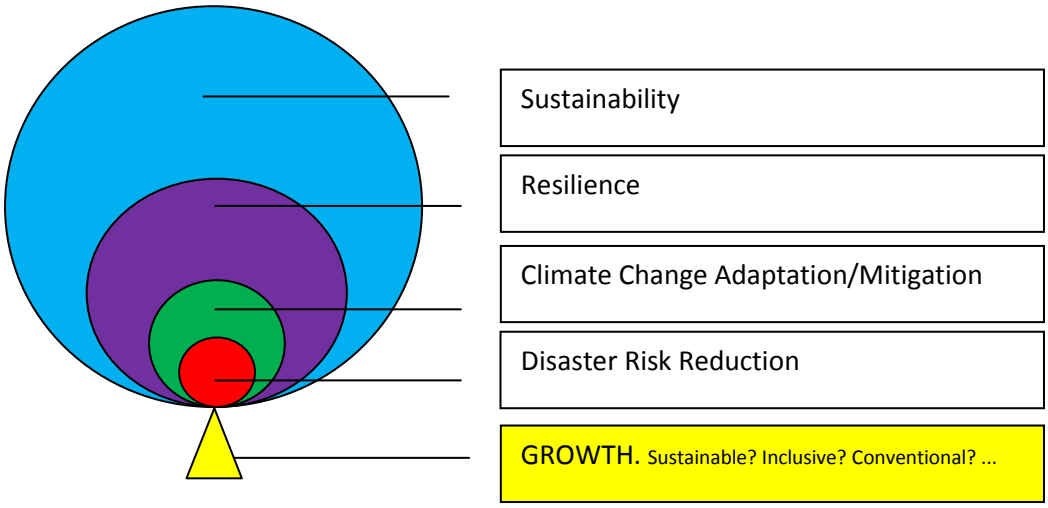

Figure 3a: Striking a balance between growth, sustainability, resilience, climate change adaptation/mitigation and disaster risk reduction

[26] The Global Footprint Network: http://www.footprintnetwork.org/en/index.php/GFN/page/world_footprint/

The issue of growth and sustainability generates intense debates globally. Some believe that growth and sustainability, departing from the present state of the world, can simply not be pursued in parallel, and that sustainability has suffered a setback when growth is explicitly brought back to the EU agenda (even if under a *green* terminology) and remains a clear worldwide objective. Indeed, what climate resilient growth actually entails in practice is far from resolved, and is likely to need more than just 'climate proofing' of investments. Socio-economic trends will be a key determinant of the feasibility of a climate resilient (or sustainable) growth. The prospects are less than optimistic, as a strong increase of GHG emissions is expected in the next two decades, driven in particular by a substantial increase in energy demand in developing countries[27].

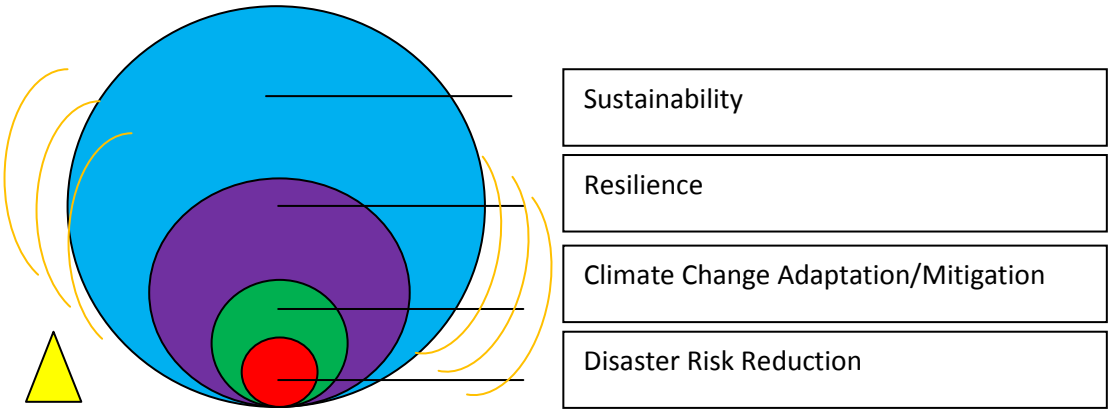

Figure 3b: Not striking a balance between growth, sustainability, resilience, climate change adaptation/mitigation and disaster risk reduction

However, the recent outcomes of Durban (UNFCCC COP 17) show that international cooperation and the intention to commit to GHG reductions may be a likely, and positive, mid-term scenario. This is in line with what others believe, as regards the debate of growth and sustainability, that there exists sufficient behavioural and technological potential (in some cases only lacking more widespread deployment of e.g. renewable energy technologies) to achieve economic growth while greatly reducing GHG emissions and thus underpinning vulnerability in the long-term. This point is in line with the IPCC's 4th Assessment Report, which argues that limiting global warming to 2°C can be achieved through considerable mitigation efforts, and this can be attained globally at a 'reasonable price' of only a 1-2% reduction in GDP. These positions are visualized in Figures 3a and 3b above. While the feasible paths are likely to be somewhere in between these two lines of arguments, there are clear indications that "development substantially increases the potential damages from climate change"[21]. Even so, a higher standard of living for the billions of people living in poverty is an ethical pursuit that will require economic growth and development, and which necessitates a fairer share of emissions per capita between developing and developed countries in order to improve the chances of Figure 3a from prevailing over Figure 3b.

[27] Pye, S., Watkiss, P., Savage, M. and Blyth, W. (2010) "The economics of low carbon, climate resilient patterns of growth in developing countries: A review of the evidence". Stockholm Environment Institute for the UK Department for International Development.

This brings us back to the argument that reducing vulnerability and enhancing resilience must be pursued through efficient (resilience-upgrading) and sustainable means, where measures are effective under different climate scenarios, or even in the absence of climate change impacts.

The work of the Congress of Local and Regional Authorities on disaster management

The Congress of Local and Regional Authorities ('the Congress'), an institution of the Council of Europe, has been working for several years on the issues of climate change and natural disasters, how these affect local and regional authorities, and what actions should be taken to reduce the vulnerability and increase the resilience of cities, regions and, naturally, their residents. The Congress has made recommendations at different European policy levels on the way forward, for example, through a number of Recommendations, Resolutions and the handbook "Natural and industrial disasters- local authorities facing emergencies: 40 measures in dealing with natural hazards."[28] The Congress fully supports the UNISDR's campaign 'Making Cities Resilient'.

The main features of the Congress's approach are essentially presented below:

- An integrated, holistic and multi-disciplinary approach to disaster risk management and climate change adaptation that includes soft and hard measures, with careful consideration of all relevant stages, including (for the case of natural and industrial disasters): prevention, information on risks, information on disasters, organisational preparedness and emergency relief.

- Work under a management framework that allows to plan and to react as efficiently and as quickly as possible.

- Multi-level governance is a crucial element to successfully align efforts and attain the desired objectives. Local authorities have a very important role in identifying, implementing, monitoring and evaluating policies and measures.

- The climate policy agreed after multi-level governance discussions should be based on two mutually supportive pillars comprising mitigation and adaptation efforts. The Congress is committed to sustainable development principles, and this should be reflected, particularly, in its approach to adaptation and disaster risk reduction.

- Public awareness and dissemination to all stakeholders and citizens in general, in order to provide support to better understanding and coping with the changing conditions. Stakeholders and citizens should be fairly and comprehensively included in the resilience building process, valuing local knowledge inputs.

- The Congress strives to harmonise existing legislation (e.g. national legislation of its member countries) in order to reduce territorial vulnerability.

[28] https://wcd.coe.int/ViewDoc.jsp?id=889763&Site=DC

- The socio-economic dimension is carefully considered, including the effects that global warming is having and will continue to have on migration. More action at the international level is necessary to fast-track attention to these pressing issues.

- Even under the best mitigation scenarios, global warming consequences will continue to worsen in the coming decades. Action, therefore, should be prompt and anticipatory, and should be implemented even where climate change impacts are not yet evident. This will reduce the total cost of action (or the mounting cost of inaction).

- Funding earmarked for climate vulnerability assessments and climate adaptation projects is insufficient and should be increased.

- The handbook mentioned above describes 40 practical ways for local authorities to respond to natural hazards. The theoretical principles are in line with the bullet points listed above.

Framework for resilience work at the local level

This chapter has described the need to conduct resilience work under a framework which ensures a holistic, integrated, inclusive and continually improving process. In the following pages we briefly describe such a framework, as developed under the European project 'CHAMP – Local Responses to Climate Change'[29].

The complicated system of cities and regions needs management on various levels. To name but a few, the economy, the social sector and personnel are all managed in one way or another. Managing tasks individually and sectorally, however, is most often inefficient and leads to increased workload and weak results. Re-organising and integrating existing practices, plans and strategies under one steering wheel – the Integrated Management System (IMS) - will systemize the work, boost efficiency and provide a multitude of positive outcomes. It will direct all available resources towards the goals defined and secure the transparency and democratic principles of decision making. In the IMS, the effort lost in running several parallel management systems can be turned into sustainability.

The IMS consists of five major steps repeated in annual cycles. Although the system follows an annual cycle, full revision will be required once per election period – and preferably at the outset - unless evaluation of achievements and results at the end of an annual cycle suggests reconsideration.

At any one step of the cycle, its immediate offer and impact on the following as well as the prerequisites for stepping forward are to be considered. The cycle begins with a baseline review, in which the current state of sustainability factors in the city is mapped. As the next step, targets are set for the priorities identified as a result of the baseline review. Political commitment is needed throughout the cycle but becomes most crucial when the outcome of the target setting, i.e., the strategic programme, is being approved by the city council.

[29] Robrecht, H. and Hammerl, M. (2011) "INTEGRATED MANAGEMENT - Towards local and regional sustainability". Link: http://www.localmanagement.eu/index.php/champ:home?language=en. Also see: Managing Urban Europe-25; link: http://www.localmanagement.eu/, and European Communities (2007) "Integrated Environmental Management", link: http://ec.europa.eu/environment/urban/pdf/iem.pdf.

Completing the steps carefully that prepare the ground for implementing actions, will notably diminish the risk of hardships during the implementation. After these three steps of the cycle, the implementation of the priority actions decided earlier takes place. The actions taken are to be monitored during their implementation in order to gather information on the functionality of the system. During the last step of the system, evaluation and reporting, the collected information is evaluated and used for reporting the successes and possible draw-backs of the process. It provides the basis for a city council decision on how to continue in the next annual cycle.

Framework for resilience work at the local level

Two cross-cutting elements need to be kept in mind throughout the steps of the cycle: involvement and communication as well as organisational setup. From the very beginning of the cycle, it is important to carefully plan who is involved in the process and what they can contribute. Getting as many relevant actors activated as possible will make the effort a common interest and is thereby more likely to succeed. A well-functioning organisational setup of the management system will exert decisive impact on the success of the undertaking. Strong organisational management is needed to keep the extensive entity of a city and the great number of stakeholders together and in a common course towards a more sustainable urban area.

An important assumption is that it may not be possible to achieve everything in the beginning. The model is better described as a journey with one step following the other, where cities and regions have different starting points. An important road map for this journey is outlined with the Aalborg Commitments in 2004, which can be regarded as a thematic framework of the system. Other such frameworks, however, should be noted and considered, e.g. the Reference Framework for Sustainable Cities or even thematic processes, e.g. the EU Covenant of Mayors addressing climate and energy issues. In terms of disaster risk management, the 40 measures proposed by the Congress[28] offer valuable guidance.

Baseline review

The first important step of the IMS is to analyse the present sustainability condition of the city. The purpose is to create a framework of information that will later serve as a basis for setting priorities, targets and the monitoring of progress. Improvements are visible only if they can be compared to a starting point. It is also an analysis of the pressures that have led to the current situation as well as the impacts those pressures have on various parts of the society, economy and environment, as well as the policies and measures already in place.

The baseline review is a regularly repeated part of the IMS which should be conducted by a cross-sectoral working group. It determines the geographical and thematic scope of the IMS. Available data on all relevant sustainability aspects should be collected and structured. Even if all the data cannot be delivered during the first cycle, it serves to identify the gaps. The baseline review should map legal requirements, data regarding all significant aspects, emerging issues and trends, political priorities,

departments and external organisations involved, existing instruments and systems, risks and opportunities. The Aalborg Commitments or other commitments or monitoring processes compose the recommended framework for the data collection.

Based on the information and data available in the baseline review, political priorities can be set and the first strategic programme can be drawn up.

The baseline review is renewed at least once in an election period or more often if the evaluation either suggests significant deviation from targets or surrounding conditions have changed substantially as new trends and information emerged.

Target setting

The next step is to prepare the strategic programme and action plan. They are based on the baseline review and its analysis of priorities to be focused on during the following management cycle period and beyond. These documents define the city's or regions ambitions and help planning the way towards implementing them. Note, that this planning exercise is on providing an idea of how to reach targets. It is distinct from any formal project or land-use planning. Formal planning forms part of the step Implementation & Monitoring.

A common vision for the future development of the city should be established in a participatory process. It has a long-term orientation offering goals for a period of 15-20 years balancing the environmental, social and economic dimensions. The vision should be reachable and inspiring, and should find its point of departure in the priorities to find a suitable scope.

The strategic programme is the document that sets mid-term targets and measures for the agreed priorities. The priorities should be described using indicators as the main tool of communication within the IMS. Based on indicators, measurable and time-related targets are formulated and balance and integrate the environmental, social and financial resources. If there are missing data in the baseline review, the strategic programme should include measures to create these reference data and the corresponding indicators. On the basis of practically used indicators in Europe, a "Set of Key Indicators for IMS" has been selected to provide orientation to cities and regions . These indicators may be used as a basis but adding specific regional or national key data and indicators need to be considered. The "Set of Key Indicators for IMS" can be found at www.localmanagement.eu.

The action plan is broken down from the strategic programme with a perspective of 1-3 years. It should display short-term targets derived from long-term targets and set out measures to fulfil both. The action plan should also clearly define the allocation of human and financial resources as well as the responsibilities for implementation.

Participation and cooperation are keys to success. Hence, the involvement of all relevant stakeholders is essential for target setting and action planning.

Political commitment

Political commitment is pivotal and needs to be secured throughout the entire process. Political commitment should be seen as a driving force that stimulates the management cycle. Therefore, it

should be sought from the very beginning of the process, when the idea of the implementation of the Integrated Management System is in its infancy. Once this fundamental decision is made and capacities and procedures for the local Climate Change response management have been established, formal decision is requested at least twice during each agreed management period, which usually appears to be an annual or bi-annual cycle: firstly, when setting up politically binding climate targets, and secondly for evaluating the achievements concluding the cycle and setting the basis for the following one.

During the third step, the strategic programme should be put forward to the council for the purpose of its approval and legitimization. Many cities choose to also approve the action plan and the entire organisational setup for running the Integrated Management System. It is a good idea to align this formal and regularly renewed Council resolution with the annual financial budget decision to ensure uptake of actions and projects therein.

If the Integrated Management System is not accepted and backed by the politicians and the top management in the city, its implementation process may actually never take place due to a high degree of disregard and resulting inaction at the implementation level.

Major political groups, including the mayor, other high-level politicians, different stakeholders and the general public should not only be informed, but also involved in preparing the strategic programme and action plan. Debate is required and it leads, finally, to the political approval of the strategic programme by the city council to gain legitimacy.

Implementation & monitoring

With the implementation of the strategic programme and the action plan, the management cycle reaches its very core: all the preceding assessment, target setting and planning has the overall objective of improving the way the city functions in terms of sustainable development. The implementation is where it shows. The implementation is a demanding task in terms of organisation and coordination of all the parallel actions that will usually take place in decentralised responsibility. Turning measures outlined in the action plan into projects requests a proper project planning including work-plan, roles and responsibilities for an individual action. These projects might be of different character depending on the issue and the target to reach, e.g. infrastructure projects, construction and design measures, land-use or mobility plans, procurement measures, information and awareness raising campaigns etc.

A crucial condition for implementing the action plan is a solid communication and involvement approach and the organisational setup. Cooperation with and between various stakeholders assures that the different actors buy in to the implementation process. Therefore, implementation is based on the “foundation” which is a combination of the action plan, the organisational setup and above all – communication and involvement. The approval of the action plan by the city council might be a determining success factor, as it legitimises actions and gives them a required priority

In parallel, and for the purpose of being able to measure and report the results, the implementation of the strategic programme and its action plan should be monitored in an appropriate way and fed back to the politicians. It allows for being able to see if actions are implemented with good results. This suggests, that monitoring has two aspects, the implementation of actions and their impacts. The

latter – environmental impacts - will in some cases only display in longer periods. In all other cases, monitoring will allow for taking corrective measures in case of deviation from the action plan or targets. Again, in order to be able to engage in monitoring, actions need to rely on targets based on indicators defined in the strategic programme.

Evaluation & reporting

After an intensive phase of implementing activities and with the monitoring data output at hand, it is time to step back and – together with others - evaluate what has been achieved. The data collected through monitoring are used for evaluating both the results obtained through implementation and the way the management cycle is working.

Evaluation and reporting is the last step of the cycle, but provides the basis for starting a new year with a new cycle. It analyses what has happened during the year in order to understand why things happened or failed to succeed. It provides the politicians with a basis for taking further decisions on the targets and actions for the next year. It provides the stakeholders, including the public, with a report on what the city has done during the year and how they have succeeded in fulfilling their targets. The importance of this step is the actual city council decision on how to act on the results of the evaluation process. How will the knowledge gained be used to adapt or set the short-term targets for the next year? What actions should be implemented next year? Is there a need to revise the baseline review because of major changes in the city or its surroundings? In any case, a decision should be taken and a new annual cycle should begin.

The UNISDR Making Cities Resilient Campaign

This section describes the UNISDR 'Making Cities Resilient' campaign and explains its achievements, activities, describing what it offers and what it demands from its signatories.

What is the campaign about?

The 'Making Cities Resilient' campaign is an initiative of the UN International Strategy for Disaster Reduction (UNISDR) and a number of partners[30] to support cities, towns and their local governments in becoming resilient to the changing climate and to the increasing frequency and intensity of climate manifestations that result in disasters. This is particularly important at a time when urbanization trends are increasing, and with them the prevalence of informal settlements. The campaign seeks "to empower local governments with stronger national policies to invest in risk reduction at local level, as part of urban and regional development plans"[32]. The campaign – which welcomes cities and towns from around the world – was originally planned to run from January 2010 until December 2011, but it has been extended until 2015.

The objectives of the campaign are (i) to inform and raise the awareness of citizens and governments on the benefits of reducing risks at the urban level, (ii) to use local government budgets in a smart way, which enhances the resilience of infrastructures and reduces disaster risk – in other words mainstreaming disaster risk reduction into urban planning and development at the decision-making level – and (iii) to include disaster risk reduction in participatory development and planning processes at the city level to protect critical infrastructure[31]. An overarching objective of the campaign is to build long-lasting partnerships that will support the local, regional, national and supra-national actions and processes in the long term.

Mayors of local governments are the main target group of the campaign. Nevertheless, as a resilience building process requires a participatory approach, the actors involved will also include all major stakeholders in the city/region.

The campaign has developed a list of ten point essentials for making cities resilient, which derives from the priority areas of the UNISDR's 'Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities' and the principles of sustainable urbanization of UN-HABITAT, with a localized approach. Signatories are expected to implement as many of the ten points as possible. These ten points are[32]:

[30] They include UN-HABITAT, with its broader World Urban Campaign, along with other UN organizations, city associations and organizations such as UCLG, ICLEI and CityNet, among others.

[31] UNISDR "Making Cities Resilient – 'My city is getting ready' – World Disaster Reduction Campaign 2010-11: Frequently Asked Questions". Available at: www.unisdr.org

[32] UNISDR „Strategy Outline for the 2010-2011 World Disaster Reduction Campaign on Making Cities Resilient, addressing urban risk". Available at: www.unisdr.org

1. Put in place **organization and coordination** to understand and reduce disaster risk, based on participation of citizen groups and civil society. Build local alliances. Ensure that all departments understand their role in disaster risk reduction and preparedness.
2. **Assign a budget** for disaster risk reduction and provide incentives for homeowners, low-income families, communities, businesses and public sector to invest in reducing the risks they face.
3. Maintain up-to-date data on hazards and vulnerabilities, **prepare risk assessments** and use these as the basis for urban development plans and decisions. Ensure that this information and the plans for your city's resilience are readily available to the public and fully discussed with them.
4. Invest in and maintain **infrastructure** that reduces risk, such as flood drainage, adjusted where needed to cope with climate change.

> *"We will continue to see significant moves away from rural areas and huge migration into cities which are already bursting at the seams. The resources are not there for climate adaptation so getting cities to work together on resilience with UNISDR is going to be critical."*
>
> *David Cadman, President, ICLEI – Local Governments for Sustainability*

5. Assess the **safety of all schools and health facilities** and upgrade these as necessary.
6. Apply and enforce **realistic, risk-compliant building regulations and land use planning principles**. Identify **safe land for low-income** citizens and develop upgrading of informal settlements, wherever feasible.
7. Ensure that **education programmes and training** on disaster risk reduction are in place in schools and local communities.
8. **Protect ecosystems and natural buffers** to mitigate floods, storm surges and other hazards to which your city may be vulnerable. Adapt to climate change by building on good risk reduction practices.
9. Install **early warning systems and emergency management** capacities in your city and hold regular public preparedness drills.
10. After any disaster, ensure that the **needs of the survivors are placed at the centre of reconstruction** with support for them and their community organizations to design and help implement responses, including rebuilding homes and livelihoods.

What has the campaign achieved?

The campaign has managed to attract interest worldwide, with signatory cities representing throughout the developing world as well as in Europe, totaling 962 cities (as of 27 December 2011) – about one third in Europe and Central Asia – compared to a target of 1000 by the end of December

2011. The engagement of high-level decision makers, business players, NGOs and other community organizations, as well as the rise of so-called champions – individuals who have a relevant impact and sometimes even drive the resilience building process – has been crucial in creating a dialogue to stir change in the usual implementation of processes (e.g. urban planning).

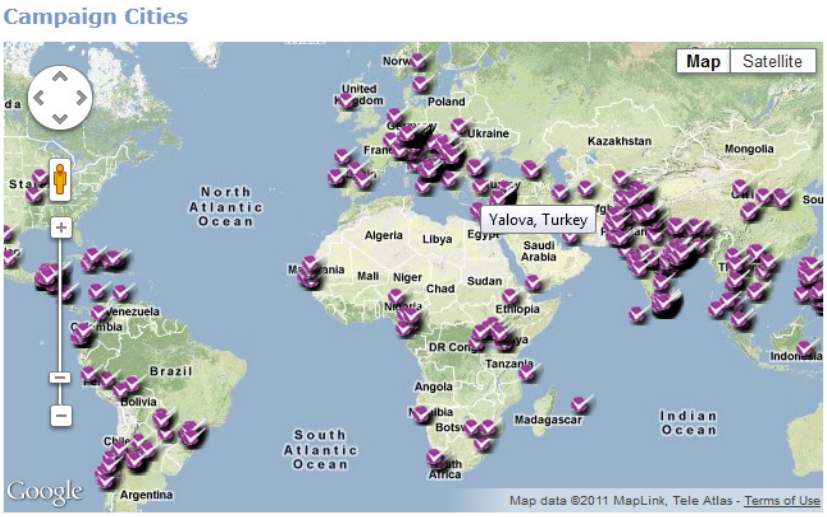

Figure 4: World map showing signatory cities to the UNISDR 'Making Cities Resilient' campaign (Source: UNISDR website)

Building on the 2006-2007 “Disaster Risk Reduction Begins at School” and the 2008-2009 “Safe Hospitals” campaigns, the “Making cities resilient” campaign has built and maintained momentum for resilience building at the local level. With the extension of the ongoing campaign for an additional four years, the process should continue to raise awareness and trigger relevant risk-reducing actions.

What are the activities of the campaign?

The campaign signatories have the opportunity to become engaged in several initiatives resulting from their commitment and supporting their objective of ‘ticking’ the ten points for making cities resilient. These opportunities are[31]:

- Organising policy dialogues, workshops and other events to raise the profile of urban risk issues, create political space among different stakeholders, and provide opportunities for information and knowledge sharing.

- Develop and apply tools aimed at reducing the vulnerability of cities. One such example is the Local Government Self-Assessment Tool (LG-SAT), which has been tested in 23 cities that “provide data on 43 key indicators designed to measure the progress of local governments in implementing ten essential actions outlined by the Cities Campaign”[33]. The tool will be made available globally in early 2012.

[33] The testing of the LG-SAT was conducted by UNISDR and ICLEI in cooperation with local governments, with funding from the World Bank and the European Commission's Humanitarian Aid branch, ECHO. Source: http://www.unisdr.org/archive/24170

- Organising city-to-city learning and study tours with role model cities, in collaboration with the campaign partners.

- Promoting and facilitating access to existing tools and resources for urban risk reduction, particularly through the campaign website and the mailing list.

- Developing and contributing to high-visibility initiatives such as the One Million Safe Schools and Hospitals pledging initiative and the International Day for Disaster Reduction.

It should be noted, for clarification, that there is no funding assigned to signatories.

What does the campaign offer to its signatories?

First and foremost, joining the campaign represents a direct support to signatory cities in reducing their risk to disasters through implementing the ten essential points for making cities resilient.

Partnerships and alliances are pillars of the campaign. Cities and towns need to build fair and comprehensive participatory processes to successfully develop the resilience building process. The knowledge required to move in this direction is provided by the campaign's participating expert organizations, its Advisory Board and the signatory cities themselves, including through the improvement of urban and local governance. Networking opportunities with other signatories and through the city networks that support the campaign can also help to develop knowledge and raise awareness among the local government staff as well as among citizens. It also offers good visibility to partners in the international arena, for example during the Global Platform for Disaster Risk Reduction in 2011, and access to influential initiatives, global experts and policy makers.

The 2011 UN-Sasakawa Award for Disaster Reduction was granted to the city of San Francisco in the Philippines as recognition of its efficient and equitable indigenous method of self-organization. (Photo: UNISDR)

The campaign partners also "provide support by publicizing success and practice, creating space for learning and meeting and seeking to influence policy makers at all levels"[31]. Furthermore, by signing up to the campaign, cities are automatically nominated to the 'UN-Sasakawa Award for Disaster Reduction'[34].

How can European cities contribute to the campaign?

While the campaign partners have a proven range of capacities and expertise to run the initiative, the campaign would benefit from direct support from engaged cities. In this section we look at some opportunities for European cities to champion the campaign – we take a European focus because this paper will inform the Council of Europe.

[34] The United Nations Sasakawa Award for Disaster Reduction is awarded to an individual or institutions that have taken active efforts in reducing disaster risk in their communities and advocates for disaster risk reduction. Source: http://www.unisdr.org/we/campaign/sasakawa

European cities can contribute to the aims of the 'Making Cities Resilient' campaign in several ways, including:

- Through sharing best practices with other cities in Europe and in the developing world. These best practices could focus, mainly, on governance, sustainable land use and urban planning, and social aspects (e.g. initiatives to reduce vulnerabilities in informal settlements and integrate its residents into the formal city life) – all in relation to disaster risk reduction. Technology transfer could represent a valuable part of this initiative.

- Through developing partnerships with cities in low-income countries, as well as in the same (European) country/region where the 'supporting' city is located. There are several successful examples of such collaborations which deliver benefits both ways. For instance, the Swedish city of Växjö has a long history of collaboration with the Province of Bohol in the Philippines in issues of sustainable energy and natural resource management, just as the city of Bologna (Italy) with the Municipal Corporation of Guntur (India)[35].

- Through designing and testing innovative schemes of operation and partnerships with different actors (including business), European cities may demonstrate leadership and pave the way for similar ideas to be replicated elsewhere, creating large potentials for knowledge transfer.

- Through serving as replicators of best practices identified in other regions or continents, and potentially by 'upscaling' those to bigger cities. Practices that have been recognized by the UN- Sasakawa Award for Disaster Reduction, for example, could be transferred and adapted to localities in Europe, expanding the scope of their further implementation.

- Through lobbying – by themselves and/or through city networks – for example, for enhanced awareness on disaster risk reduction, for mainstreaming of disaster risk management, and for increased support to low-income countries vis-à-vis national and supra-national levels.

The great diversity of cultures, landscapes and ecosystems existing within the European continent, and even more so within the larger territory covered by the Council of Europe, creates different conditions under which cities exist, thrive and are impacted by a wide range of phenomena and natural disasters. This setting also suggests that European cities have the potential to design, collaborate and apply solutions of different types and develop best practices that can be applied elsewhere with the support and through the channels of the 'Making Cities Resilient' campaign.

[35] Some of these collaborations take place in the context of the Europe Aid funded DReAMS project (http://dreams.ecobudget.org/home/).

Conclusions and recommendations

This background paper has attempted to briefly describe the risks that cities are facing, stemming from both climatic and non-climatic pressures. It has then considered what the pieces that construct a resilient city may be, wherein resilience may lie (suggesting that it should be embedded within sustainability criteria) and how efforts of climate change mitigation, climate change adaptation and disaster risk reduction may be aligned; not least with the backdrop of 'sustainable' growth and economic development pressures placed in the highest priority of Europe's agenda today.

The UNISDR 'Making Cites Resilient' campaign has attracted cities from regions all around the world – developed and developing – who have committed to making efforts to reduce the impacts of natural disasters, particularly their associated damages in monetary and human terms. The prolongation of the campaign until 2015 is a positive sign that should encourage cities to become further engaged in this initiative and to further build their resilience to climate change and natural disasters.

Finalising, the authors of this background paper would like to make the following recommendations to the Council of Europe and its Congress on their preparation of the explanatory memorandum and resolution on the Congress' report on resilient cities:

- Encourage cities within the Council of Europe's member states to sign up to the UNISDR 'Making Cities Resilient' campaign as a starting point to develop and implement a local adaptation and resilience building process.

- Promote capacity development in local governments as regards building resilience to climate change and natural disasters, disaster risk management and climate change adaptation.

- Be particularly attentive and supportive of small cities, which represent the overwhelming majority of cities in Europe[36], and which are frequently those most lacking the needed resources to take necessary action against climate change impacts and other natural disasters.

- Understand and promote an integrated approach to the issues of disaster risk reduction, climate change adaptation (and mitigation), and other non-climate related issues such as demographics impacts (e.g. growing and shrinking cities). The vision of a resilient city has to be a cross-cutting one, addressing quality of life and be embedded within sustainability criteria.

- Support the mainstreaming of DRM and technical assistance into policies (through the EU adaptation strategy, cohesion policy, the efforts of the Development and Cooperation –

[36] 94.6% of all European cities have fewer than 50,000 inhabitants, representing almost 60% of the total European population. Source: ESPON "The Role of Small and Medium-Sized Towns (SMESTO) - Final Report". Link: http://www.espon.eu/export/sites/default/Documents/Projects/ESPON2006Projects/StudiesScientificSupportProjects/SmallMediumCities/fr-1.4.1_revised-full.pdf

EuropeAid DG,etc) and funding programmes (including the Cohesion Fund, ERDF, funds for neighboring and developing countries, such as through EuropeAid financial instruments, in addition to national funding lines and international donors targeting the CoE region). The effect of this would be an enhanced implementation of processes and measures aimed at resilience building in cities. Availability and accessibility to funding is, at present, considerably limited. Multi-level governance should be enabled, giving fair access to funding to cities across the Council of Europe's sphere.

- Encourage clear and mutually supportive links between the campaign, the Council of Europe's efforts in this field and the EU Adaptation Strategy (to be published in 2013).
- Support the sharing of knowledge among the Council of Europe's member countries and their cities (creating links to existing knowledge development and sharing platforms[37]). In addressing disaster risk, climate change adaptation and resilience building, assign a high value to local and traditional knowledge, and exploit its potentials.
- Promote and/or participate with other European institutions in the process of further developing an overarching, equitable multilevel governance framework for DRM and resilience building across the continent and in cities in the Council of Europe's sphere.
- Get involved (if not already) with the city of Venice in the preparation and delivery of the conference "Cities engagement in reducing vulnerability: the importance of protecting cultural heritage and of adapting to climate change" and its launch of the European campaign, to be held in that Italian city on 19-20 March 2012.

[37] Such as the EU's Clearinghouse Mechanism (to be released in March 2012) and the existing weADAPT platform: http://weadapt.org/

Annexes

Six case studies are presented below which describe the efforts of four cities in four different continents on building resilience to climate change and to natural disasters.

Case study: Southern Leyte, Philippines

Aerial view of the 2006 mudslide. Image: Wikimedia, Raymond D. Petersen III

Following a devastating landslide caused by heavy rainfall in 2006, Southern Leyte greatly strengthened its climate adaptation and mitigation plans. Over 1,000 people lost their lives when the landslide, considered one of the world's worst, hit a village in the town of St. Bernard.

An assessment after the event revealed that 70 percent of the total land area is highly vulnerable to hazards, including typhoon, flooding, earthquake, tsunami, landslides and severe storms.

Faced with this information, the authorities had limited options. They could relocate inhabitants, effectively 'moving' villages; ensure that appropriate services are available to deal with disasters after the fact; or take preventive action to minimise the effects of disasters. The final option was chosen.

The local government bolstered the existing Municipal Disaster Coordinating Council, improving its power and efficacy, and incorporated disaster risk reduction, climate change adaptation programs, trainings and activities into its annual development planning and budgeting.

As part of its capacity building work, the local government developed standards, guidelines and protocols on emergency response, instigated emergency response preparedness training, and made evacuation drills mandatory for communities and schools.

Risk mitigation work has also been undertaken. To lessen the effects of flooding, young people have been mobilised to plant bamboo along river banks. Likewise, gabion walls (wire baskets filled with rocks) were constructed.

Residents living in highly dangerous areas were relocated to safer areas. A community-based early warning system was set up, as well as an Emergency Response Unit.

St. Bernard's disaster mitigation and climate adaptation strategies have been successful thanks, in part, to participation from all sectors of the community, including the most vulnerable. Strong political will aided the process greatly, as has accountability and transparency within the process.

City in profile

Size:	
Megacity	
Large	
Medium or small	√
Economy:	
Developed country	
Emerging economy	√
Developing country	
Climate classification:	
Tropical	√
Dry	
Temperate	
Continental	
Polar	
Alpine	
Climate change challenges faced:	
Sea level rise	√
Increased heavy precipitation	√
Decreased precipitation/Drought	
Increased temperature	
Wind storms	√
Natural disasters faced:	
Storms/Cyclones/Hurricanes	√
Earthquakes/Tsunamis	√
Landslides	√
Drought	
Flooding	√
Coastal erosion	√
Main socio-economic challenges faced:	
Poverty/Lack of sanitation	√
Lack of access to education	
Migration	
Income inequality	
Corruption/Lack of democracy	
Increased resource use	
Disease/malnutrition	
Insecurity	
Response (in this example):	
Economic incentives	
Infrastructure improvement	√
Use of natural systems	√

Tackling complex problems through a holistic solution, as this case shows, is an effective and efficient way to enhance a community's resilience.	Strengthening governance √ Other **The city has developed a disaster risk management**

Author: Sean Carroll, ICLEI European Secretariat.

Sources:
http://www.preventionweb.net/files/14023_JotoAfrika31.pdf
http://siteresources.worldbank.org/INTURBANDEVELOPMENT/Resources/336387-1306291319853/CS_Dar_Es_Salaam.pdf

Case study: New York City (NYC), USA

Image: http://new-york-pictures.com/d/1033-4/New+York+City+Skyline+viewed+from+East+River

The most populated city of the United States, New York, is located in a natural harbour and is mainly built on the islands of Manhattan, Staten Island and Long Island. The climate projections for the area have determined a likelihood of increased temperatures, sea level rise and increased precipitation.

In order to adapt to these challenges NYC engaged in a variety of measures. In 2007, PlaNYC, a comprehensive sustainability plan for NYC outlined the development of a greener city over the next 25 years. In detail, it reviews the potential climate change impacts in NYC and describes strategies to reduce the city's greenhouse gas emissions by 30% by 2030 relative to 2005 levels. PlaNYC concludes with adaptation measures that aim at reducing the city's vulnerabilities to climate change. Among the 127 proposed initiatives of the PlaNYC are:

- The creation of an Intergovernmental Task Force on Climate Change, made up of City and State agencies, authorities and private companies that operate, maintain, or control critical infrastructure in NYC (e.g. water supply, sewer, subterranean subway systems, power plants, etc.).
- Working with vulnerable neighborhoods in the city to develop localised strategies. To this end, community planning was used to engage community members in problem solving and effectively communicate preferred solutions.
- The Launch of a city-wide strategic planning process for climate change adaptation to assess the costs, risks, and potential solutions for adapting to climate change.

In addition, the New York City Climate Change Advisory Board was created to help the Office of Long-term Planning and Sustainability develop a planning framework based upon a risk-based, cost-benefit assessment to inform investment decisions and establish clear metrics and decision points and to assess possible strategies to protect against flooding and storm surge. The city also plans to update its 100-year floodplain maps, which has been due since 1983. This in turn will allow NYC to develop standards that qualify residents for reduced premiums for flood insurance. It Is also planned to amend the city's building codes to better address the impacts of climate change such as flooding, droughts, warmer temperatures, high winds and heat waves.

In order to develop and implement these plans and projects NYC has made conscious efforts to include multiple stakeholders in its adaptation

City in profile

Size:	
Megacity	√
Large	
Medium or small	
Economy:	
Developed country	√
Emerging economy	
Developing country	
Climate classification:	
Tropical	
Dry	
Temperate	
Continental	√
Polar	
Alpine	
Climate change challenges faced:	
Sea level rise	√
Increased heavy precipitation	√
Decreased precipitation/Drought	
Increased temperature	√
Wind storms	
Natural disasters faced:	
Storms/Cyclones/Hurricanes	√
Earthquakes/Tsunamis	
Landslides	
Drought	
Flooding	√
Coastal erosion	
Main socio-economic challenges faced:	
Poverty/Lack of sanitation	
Lack of access to education	
Migration	
Income inequality	
Corruption/Lack of democracy	
Increased resource use	√
Disease/malnutrition	
Insecurity	
Response (in this example):	
Economic incentives	
Infrastructure improvement	√
Use of natural systems	
Strengthening governance	√
Other	
The city has developed an adaptation plan	

planning. Another driving force leading to this broad variety of actions was the wide understanding of the importance of immediate action in the field of adaptation.	

Author: Claudia Kiso, ICLEI European Secretariat.

Sources:
http://www.cakex.org/case-studies/915
http://www.iwahq.org/contentsuite/upload/iwa/all/Case%20study_NYC_preview.pdf

Case study: Dar es Salaam, Tanzania

http://en.wikipedia.org/wiki/File:Dar_es_Salaam_aerial.jpg

Dar Es Salaam is located at the sea-side in a tropical climate and is one of the fastest growing cities in sub-Saharan Africa. Due to its exposed location at the coast, unplanned rapid urbanisation, frequently occurring heavy rainfall and the lack of a properly functioning drainage system, flood risk and coastal erosion have increased substantially over the past years.

Especially the poor living in unplanned settlements and representing about 70% of the city's population suffer from these events. Their vulnerability is especially high, as they often lack access to sanitation, knowledge of risks and adaptation options, means to protect themselves and services.

Despite the techno-institutional, financial and skill constraints, the city government is engaged in various key adaptation and mitigation efforts such as coastal management, slum upgrading and greenhouse gas mitigation.

Some of the initiatives that will be outlined include the Kinondoni Integrated Coastal Area Management Project (KICAMP), developed as a comprehensive plan on land and water resources management, also highlighting the importance of mangroves for protecting coastal populations against coastal floods and tsunamis, among other benefits.

Another project to address many of the infrastructural challenges is the Citywide Strategy for Upgrading Unplanned and Unserviced Settlements in Dar es Salaam. In addition, innovative solid waste management strategies developed at community level were implemented. A USAID funded project aims at building adaptive capacity and resilience among vulnerable coastal communities.

In order to help the population living in unplanned settlements, the city tries to strengthen their capacity and educate them about the risks. At the same time Dar es Salaam tries to identify all properties in informal settlements and issues land/ property licenses, ultimately leading to the regulation of the slums in terms of provision of infrastructure etc.

All in all it can be said that there are a variety of solid and successful initiatives and programmes taking place, showing the growing awareness of issues such as climate change and vulnerability to extreme weather events. However, an overall strategy mainstreaming all these initiatives is yet to be developed in order to strengthen the resilience building efforts.

Since Dar es Salaam is located in a developing country, effective financing mechanisms are most crucial to implementing further action.

City in profile

Size:	
Megacity	√
Large	
Medium or small	
Economy:	
Developed country	
Emerging economy	
Developing country	√
Climate classification:	
Tropical	√
Dry	
Temperate	
Continental	
Polar	
Alpine	
Climate change challenges faced:	
Sea level rise	√
Increased heavy precipitation	√
Decreased precipitation/Drought	
Increased temperature	√
Wind storms	
Natural disasters faced:	
Storms/Cyclones/Hurricanes	
Earthquakes/Tsunamis	
Landslides	
Drought	√
Flooding	√
Coastal erosion	√
Main socio-economic challenges faced:	
Poverty/Lack of sanitation	√
Lack of access to education	√
Migration	√
Income inequality	√
Corruption/Lack of democracy	
Increased resource use	
Disease/malnutrition	√
Insecurity	
Response (in this example):	
Economic incentives	
Infrastructure improvement	√
Use of natural systems	√
Strengthening governance	
Other	

The city has not yet developed an adaptation strategy

Author: Claudia Kiso, ICLEI European Secretariat.

Sources:

http://www.unhabitat.org/downloads/docs/GRHS2011/GRHS2011CaseStudyChapter06DaresSalaam.pdf
http://siteresources.worldbank.org/INTURBANDEVELOPMENT/Resources/336387-1306291319853/CS_Dar_Es_Salaam.pdf
http://www.ferrybox.eu/imperia/md/content/loicz/hotspots/urbanization/Megacities_and_the_coast_report_4_6_2011.pdf

Case study: Venice, Italy

Image: Flickr, wanderlass

The impacts of climate change are severely threatening the continued existence of the City of Venice. Rising tides are increasing the possibility of wide-spread and permanent flooding, which would devastate the historic city. These threats are not new - in 1966 the city flooded, displacing 5,000 people from their homes and destroying €6 billion worth of artwork.

The increase in water levels also poses a threat to the brickwork covering the edges of the island, which is necessary to prevent erosion. Tides are rising above previously implemented safeguards and are permeating the stone, eroding mortar and leading to salination. This occurrence is also endangering the stability of water-front buildings.

In response to the increasingly threatening conditions, the city authorities are undertaking a wide-ranging adaptation plan, aimed at reducing future impacts and making the popular tourist destination and cultural site safe for years to come.

As well as the maintenance carried out by public utility Insula spa to ensure the city's longevity, such as raising the margins of islands and canals, raising urban surfaces and restoring brickwork to prevent water seepage, the city is currently instituting a new system to tackle the problem of flooding.

The city lies in the middle of a lagoon and is separated from the sea by thin strips of land. The lagoon drains and fills up with sea water twice a day, through three inlets. The MOSE project (Modulo Sperimentale Elettromeccanico, or in English, Experimental Electromechanical Module) aims to protect against unusually high tides through blocking all three inlets via remote controlled underwater doors.

Rows of mobile doors (78 barriers in total) will close off the Venetian lagoon from the Adriatic Sea when sea level exceeds 110cm. The barriers will lay on the sea floor until high tides are forecast, when they will inflate and rise to the surface to act as floodgates. The barriers can protect against sea levels up to three metres tall.

Work on the project has been underway since 2003 and has been designed to take into account the predicted sea rise as a result of global warming. MOSE has a budget of €4.7 billion and is scheduled to be completed by 2014.

Providing smart technical solutions to prevent expected impacts of climate is an important aspect of a city's resilience building.

City in profile

Size:	
Megacity	
Large	
Medium or small	√
Economy:	
Developed country	√
Emerging economy	
Developing country	
Climate classification:	
Tropical	
Dry	
Temperate	√
Continental	
Polar	
Alpine	
Climate change challenges faced:	
Sea level rise	√
Increased heavy precipitation	√
Decreased precipitation/Drought	
Increased temperature	√
Wind storms	
Natural disasters faced:	
Storms/Cyclones/Hurricanes	
Earthquakes/Tsunamis	
Landslides	
Drought	
Flooding	√
Coastal erosion	
Main socio-economic challenges faced:	
Poverty/Lack of sanitation	
Lack of access to education	
Migration	
Income inequality	
Corruption/Lack of democracy	
Increased resource use	√
Disease/malnutrition	
Insecurity	
Response (in this example):	
Economic incentives	
Infrastructure improvement	√
Use of natural systems	
Strengthening governance	
Other	
The city has developed an adaptation plan	

Author: Sean Carroll, ICLEI European Secretariat.

Sources:
http://www.preventionweb.net/files/14023_JotoAfrika31.pdf
http://siteresources.worldbank.org/INTURBANDEVELOPMENT/Resources/336387-1306291319853/CS_Dar_Es_Salaam.pdf

Case study: Rotterdam, the Netherlands

A water plaza. Image: http://www.waterpleinen.com/Watersquares.pdf

Rotterdam, the second largest city in the Netherlands and a globally relevant port, is highly exposed to climate phenomena and to climate change impacts. With large sections of its area located below sea level, the region is facing increased rainfall, more frequent floods, sea level rise and increasing temperatures.

Aware of its vulnerabilities, the city as a whole has come together to make the climate threat an opportunity to enhance the city's attractiveness, accessibility, knowledge, innovation and business potentials. Through an adaptation strategy titled 'Rotterdam Climate Proof', started in 2008, the city expects to achieve 100% resilience by 2025. The strategy is based on three pillars: Knowledge, Actions and Exposure. The knowledge foundation consists of enhancing the understanding of all stakeholders with respect to issues that are relevant to the city. These are, to a large extent, related to water management and to designing innovative solutions. The city dedicates efforts, too, to developing knowledge sharing networks, such as the one called 'Connecting Delta Cities'.

Rotterdam is also a city of Action, serving as a testing base for ground-breaking ideas on water management and delta technology. For instance, water plazas are especially designed to serve as recreation centers both in times of dry weather as well as of heavy rain – when the plaza provides the additional service of water storage. Another example: the district of Stadshavens will experience the development of floating constructions and adaptive buildings, which are likely to be, later on, best practice examples for coastal cities globally.

And precisely this point connects to the third pillar of the strategy: Exposure. Rotterdam seeks to show the world that difficulties can be overcome even when faced with significant obstacles; that delta cities can be resilient by cleverly embracing climate and non-climate challenges. In doing so, Rotterdam collaborates with higher levels of government in the Netherlands, as well as with cities and institutions abroad.

The three pillars of Rotterdam's climate adaptation strategy are further elaborated into five themes, which are: flood management, accessibility, adaptive buildings, the urban water system, and the urban climate. Rotterdam's case shows that resilience building and disaster risk preparedness require a thorough understanding of the local realities, relevant exchange of knowledge, and political and stakeholder leadership that supports the implementation of truly innovative solutions. Rotterdam is a living proof that challenging the traditional conceptualization of systems is increasingly becoming more of a need, and less of an option.

City in profile

Size:	
Megacity	
Large	√
Medium or small	
Economy:	
Developed country	√
Emerging economy	
Developing country	
Climate classification:	
Tropical	
Dry	
Temperate	√
Continental	
Polar	
Alpine	
Climate change challenges faced:	
Sea level rise	√
Increased heavy precipitation	√
Decreased precipitation/Drought	
Increased temperature	√
Wind storms	
Natural disasters faced:	
Storms/Cyclones/Hurricanes	
Earthquakes/Tsunamis	
Landslides	
Drought	
Flooding	√
Coastal erosion	√
Main socio-economic challenges faced:	
Poverty/Lack of sanitation	
Lack of access to education	
Migration	√
Income inequality	
Corruption/Lack of democracy	
Increased resource use	√
Disease/malnutrition	
Insecurity	
Response (in this example):	
Economic incentives	√
Infrastructure improvement	√
Use of natural systems	√
Strengthening governance	√
Other	
The city has developed an adaptation strategy	

Author: Daniel Morchain, ICLEI European Secretariat.

Source: Rotterdam Climate Initiative - http://www.rotterdamclimateinitiative.nl/en/100_climate_proof/rotterdam_climate_proof/introduction_rotterdam_climate_proof

Case study: Manchester, United Kingdom

Manchester, with more than 400,000 inhabitants, is located in the North West of the United Kingdom. Increasingly, the city has been experiencing the effects of a changing climate. Among these effects are floods, heat waves and a higher probability of storms.

In August 2008, the *Commission for the New Economy* published the so-called "Mini-Stern" report. It found that failure to adapt to the policy, legislative and physical demands of climate change could lead to considerable potential loss of £20bn to the economy of the Manchester City Region by 2020.

Partly sparked by the report and the eagerness to achieve level 1 of the national indicator 188, the University of Manchester, the Manchester City Council and Red Rose Forest worked in partnership collaboration on the development of the Greater Manchester Local Climate Impacts Profile (GM-LCLIP). It identifies the principal weather related impacts that have occurred over the past 50 years and can then be used to predict the likely weather and climate related impacts. In order to do so, climate modelling techniques will be used.

In addition, the vulnerability of priority services of Manchester were assessed, as well as to current and future weather events affecting the city.

The feasibility of objectively costing the risks and impacts of climate change was checked. This collaboration has helped to raise the awareness of the need of risk management and has developed new successful working partnerships.

In July 2011 the Greater Manchester Climate Change Strategy (GMCCS) was published. Its four priority areas are Economy, CO_2 reduction, Adaptation and Culture Change. In detail, the Climate Strategy aims at a rapid transition to a low carbon economy while creating future jobs and new industries in the 'green' sector. At the same time a reduction of emission by 48%/40% from 1990/2005 base years is planned by 2020. In the area of adaptation a special focus is put on the preparedness for a changing climate. In this regard flood risk management and the management of heat waves are of special importance. Besides these clear targets, Manchester aims at an increased "Carbon literacy" embedded into the daily life and culture.

By now, Manchester is already contributing to the delivery of GMCCS through *Manchester . A Certain Future* and a number of programmes being delivered in conjunction with the nine other Greater Manchester Local Authorities. One of them is the Green Roofs Programme Manchester.

City in profile

Size:	
Megacity	
Large	√
Medium or small	
Economy:	
Developed country	√
Emerging economy	
Developing country	
Climate classification:	
Tropical	
Dry	
Temperate	√
Continental	
Polar	
Alpine	
Climate change challenges faced:	
Sea level rise	
Increased heavy precipitation	√
Decreased precipitation/Drought	
Increased temperature	√
Wind storms	√
Natural disasters faced:	
Storms/Cyclones/Hurricanes	√
Earthquakes/Tsunamis	
Landslides	
Drought	
Flooding	√
Coastal erosion	
Main socio-economic challenges faced:	
Poverty/Lack of sanitation	
Lack of access to education	
Migration	
Income inequality	√
Corruption/Lack of democracy	
Increased resource use	√
Disease/malnutrition	
Insecurity	
Response (in this example):	
Economic incentives	
Infrastructure improvement	√
Use of natural systems	
Strengthening governance	√
Other	

The city has developed an adaptation strategy

Author: Claudia Kiso, ICLEI European Secretariat.

Source: http://www.manchesterfire.gov.uk/media/86283/sustainability_strategy_2010.pdf#page=43