

# **MAKING CITIES RESILIENT TO DISASTERS: “NEW” TEN ESSENTIALS**

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## **INTRODUCTION**

The growth of cities has resulted in a concentration of risk for people and assets alike. Catastrophes such as the 2004 Indian Ocean tsunami and Cyclone Nargis (which struck Myanmar just four years later) have led to the loss of hundreds of thousands of lives. These disasters also brought economic catastrophe: millions lost their homes and livelihoods; cities were reduced to rubble; economic growth and development were set back by years, or even decades in some cases. Left unchecked, the cost of climate change could account for some 20% of global GDP by the end of this century. Much of that bill will have to be paid for by cities and businesses (Axa, 2016).

Resilience planning is a complex issue that falls under the responsibility of multiple departments within governments. While some cities have set up plans that centralize the multiple aspects of resilience planning, others have integrated adaptation and resilience across departments and sectors. Cities are implementing both long-term adaptation measures as well as more immediate response activities. Given the nature of the challenges that cities will face, long term planning and adaptation to the changing environment will be crucial for surviving the worst impacts of climate change. It is, therefore, necessary to move beyond plans that simply identify the potential for disaster and to outline emergency responses.

There are also many cities and smaller urban centres where even the best-oriented disaster risk reduction policies have a limited impact due to large deficits in critical social infrastructure and in local investment capacity. Consequently, two of the key issues for building urban resilience is how to support, and learn from, the innovators, and how to leverage significant changes in city-level resilience, even where there are limited resources.

Another important trend is the extent to which cities are integrating

disaster risk reduction into other local government activities, including education, livelihoods, health, environment and planning, either by incorporating risk consideration into existing activities or by initiating projects that address multiple issues simultaneously.

The United Nations Office of Disaster Risk Reduction (UNISDR) launched the Making Cities Resilient Campaign: My City is Getting Ready! (UNISDR, 2016) in 2010 in recognition of the increasing risks linked to global urbanization and to strengthen local governments' role in reducing these risks. Since its launch, the Campaign has amassed pledges from more than 3,000 cities. By signing up to the Campaign, local governments commit to implementing the "Ten Essentials" for Making Cities Resilient, a 10-point checklist that serves as a guide to good disaster risk management and reduction practice.

Within this context, this paper aims to share the Ten Essentials that have been developed by UNISDR with the aim of promoting the increased understanding of, and commitment by, local governments to disaster risk reduction and to make cities resilient to disasters caused by natural hazards.

## **NEED TO MAKE CITIES RESILIENT TO DISASTERS**

Cities are complex in nature. They consist of a number of inter-dependent physical systems (Santos-Reyes, 2010) and human communities which are vulnerable to disasters in varying degrees. Kreimer et al. (2003) identified a city or an urban area as a "set of infrastructures, other structures, and buildings that create an environment to serve a population living within a relatively small and confined geographic area". Cities are seen as engines of economic growth where the majority of economic activity takes place (Pelling, 2003). In many cases, city centres are considered to be the preferred location for economic activities (as movement is cheap in terms of distance, time and convenience of travel as a result of good transport facilities), providing a thriving labour market and good service facilities to support business organizations (Macionis and Parrillo, 2004).

Increased global exposure to natural hazards has largely been driven by population growth and the trend for an increased proportion of that population to live in cities rather than in rural areas (Global Assessment

Report, 2015). In 1990, 43 per cent (2.3 billion) of the world's population lived in urban areas and by 2014 this was 54 percent. The urban population exceeded the rural population for the first time in 2008 and by 2050 it is predicted that urbanisation will rise to 70% (Albrito, 2012). This increase in urban population has not been evenly spread throughout the world. Different regions have seen their urban populations grow more quickly, or less quickly, although virtually no region of the world can report a decrease in urbanization. As the urban population increases, the land area occupied by cities has increased at an even higher rate. A global sample of 120 cities observed between 1990 and the year 2000, shows that while the population grew at a rate of 17 per cent on average, the built-up area grew by 28 per cent. It has been projected that, by 2030, the urban population of developing countries will double, while the area covered by cities will triple (World Urbanization Prospect, 2014).

As cities grow larger and become economically more productive, they serve as magnets for rural-urban migration. As urbanization continues, more and more people settle in cities, leading to urban sprawl and also to increasing densification. Urbanization has the potential to make cities more prosperous and countries more developed, but many cities all over the world are grossly unprepared for the multi-dimensional challenges associated with urbanization. As a result, the world's population is increasingly concentrated in large cities with poor housing and a lack of basic protective infrastructure. Cities are, therefore, characterized by high population density and a concentration of resources and infrastructure. There is thus a high risk of economic loss, damage to assets, and human casualties and injuries in disasters and extreme weather events, making cities particularly vulnerable. Many of the world's mega-cities are already situated in locations that are already prone to major earthquakes and severe droughts, or along flood-prone coastlines where the impacts of more extreme climatic events and sea level rise pose a greater risk of disaster. Urbanization taking place in relatively smaller cities is also a concern - particularly in regions where the existing infrastructure and institutions are ill equipped to cope with disasters. The vulnerability of this new generation of urbanites will become a defining theme within disaster risk in the coming decades. In contrast, cities also have a concentration of resources, skills and political power and, hence, more capacity for enabling resilience to hazards.

Cities are also characterized by much more built up areas as compared to rural regions. Because of its concentration and extent in cities, the built environment (infrastructure, facilities/installations, buildings, etc.)

represents high assets' value and is vulnerable to damage and loss due to disasters and climate change impacts. The built environment contributes significantly to resource consumption and to greenhouse gas emissions (Rosenzweig et al., 2011) and, consequently, to climate change which is a key risk element within cities. A significant proportion of urban development in cities occurs in an ad-hoc, unplanned and unregulated pattern, characterized by large-scale informal developments that are particularly vulnerable to hazards. Urban planning and development agencies often lack the capacity and resources required to deal with the huge scale of the problem and, despite various localized coping strategies, urban communities cannot mitigate or manage disasters that stem from an urban development process beyond their control.

As a result of rapid urbanisation, cities are becoming extremely vulnerable to threats posed by natural hazards (Malalgoda et al., 2013). Increase in severe weather events and disasters have highlighted the need for cities to augment their ability to withstand the disaster risks that they may face, and to mitigate and respond to such risks in ways that minimize the impact of severe weather events and natural disasters on the social, environmental and economic infrastructure of the city. In the light of all the above, city leaders need to make significant transformative changes and investments in the resilience of their cities.

The 'resilient city' is a comparatively new term which is now widely used in disaster related literature (Malalgoda, 2014) and policy documents (UNISDR, 2012). UNISDR (2007) defines it as the ability of a system, community or society exposed to hazards to resist, absorb, accommodate, and recover from the effects of a hazard in a timely and efficient manner, including the preservation and restoration of its essential basic structures and functions. Friend et al. (2015) provide a context for considering the rapidly changing characteristics of risk at a local level and, in doing so, consider how the notion of the local level might be reframed, and the opportunities for multi-scale interventions for disaster risk reduction and how and the opportunities for multi-scale interventions for disaster risk reduction might be seized. Tyler and Moench (2012) draw on complex systems and resilience thinking to consider the implications of urbanization for an understanding of local disaster and climate risk. Furthermore, Friend et al. (2015) present urbanisation as a process of social and ecological transformation, and cities as dependent on complex systems and flows of resources beyond their physical location. These approaches emphasise the increasing influence of complex infrastructure and technology systems in shaping

cities and urbanization, and the increasingly complex mobility of people across different social arenas and locations (Graham and Marvin, 2001).

Godschalk (2003) states a disaster resilient city goes beyond changing land use and physical facilities. It must also build up the capacity of the multiple involved communities to anticipate and respond to disasters. With the effects of evolving coastal hazards, this swift increase in exposure makes cities key areas in which to address evolving disaster risk.

Accordingly, what makes a city resilient to disasters can be seen as a combination of resilience accumulated through the process of urbanization and planning on the one hand, and the result of specific actions to reduce disaster risk by various actors on the other. When viewed in this light, urbanization is obliged to consider actions to reduce vulnerability beyond the physical location of cities and, in so doing, to consider what is meant by the term 'local'. In considering the local dimensions of disaster risk reduction, the focus is thus on the process of urbanization rather than on the physical location of cities, or on the administrative units of the city or municipality. This is not to reject the importance of place as a key determinant in disaster risk and vulnerability but to also argue for the growing importance of more multi-scale, systems-oriented approaches (Friend et al., 2015).

## **POLICY CONTEXT**

The Sendai Framework for Disaster Risk Reduction: 2015-2030 (UNISDR, 2015) adopted at the Third UN World Conference for Disaster Risk Reduction, lays out the priorities of action that are necessary to be undertaken at both national and local level in order to reduce mortality and direct disaster economic losses (including damage to critical infrastructure) by increasing the number of national and local disaster risk reduction strategies by 2020.

These strategies and plans needs to be available across different timescales, with targets, indicators and time frames all aimed at preventing the creation of risk, a reducing existing risk and strengthening economic, social, health and environmental resilience.

With the adoption of the Sendai Framework and Goal 11 of the Sustainable Development Goals (make cities inclusive, safe, resilient and

sustainable) local governments have become even more places at the centre of efforts to build resilience to disasters.

### **WHAT IS THE UNISDR “MAKING CITIES RESILIENT CAMPAIGN”?**

A consideration of resilience with regard to cities has been led by the United Nations Office for Disaster Risk Reduction (UNISDR) and was adopted in their Making Cities Resilient Campaign which began in 2010 (Cassidy et al., 2014). This Campaign launched in May 2010 addresses issues of local governance and urban risk. The Campaign is led by the UNISDR but is self-motivating and partnership and city-driven with an aim to raise the profile of resilience and disaster risk reduction among local governments and urban communities worldwide. It focuses on disaster resilience – that is, the ability of a city to plan for, mitigate, respond, recover, adapt and grow after major disasters in the light of its unique physical, economic, environmental and social circumstances. The objectives of the Making Cities Resilient Campaign are (UNISDR, 2012):

*Know More:* Raise awareness of citizens and governments at all levels of the benefits of reducing urban risks.

*Invest Wisely:* Identify budget allocations within local government funding plans to invest in disaster risk reduction activities.

*Build more safely:* Include disaster risk reduction within participatory urban development planning processes and protect critical infrastructure.

Though all levels of government are generally expected to become involved in disaster risk reduction, the role and actions of local governments in making cities resilient are critical. Local governments can play a key role in contributing to making cities resilient in numerous ways as they are rooted at the local level where disasters strike. The Campaign developed ‘ten essentials’ to enable local governments to make their cities more disaster resilient (UNISDR, 2012). The rationale for this important development was to devise and implement innovative tools and techniques for disaster risk reduction which can be replicated elsewhere and/or scaled up nationwide. This rationale is also based on the hypothesis that local governments are in a better position to organise, develop and experiment with new tools and technologies for disaster risk reduction such as early warning systems etc. and to make such tools and technologies policy priorities.

It is clear that local governments can contribute to disaster risk reduction and the resilience of cities in numerous ways. Disaster risk reduction has to be achieved, mainly, through the proactive means of implementing

mitigating measures with the participation of community groups and other stakeholders.

Even though the role played by local governments in making their cities resilient to disasters has been widely recognised in literature, several authors (Malalgoda, 2014; Friend et al., 2015) and researchers have identified that gaps exist in the actual contributions made by local governments towards disaster risk reduction endeavours. This is especially true within the context of the implementation of risk reduction factors (UNISDR, 2015). Local governments need guidance on addressing the underlying risk factors through resources, incentives and decision making responsibilities.

## **THE METHODOLOGY FOLLOWED IN DEVELOPING THE NEW ESSENTIALS**

Looking towards the implementation of 2030 global agendas, to increasing risks and to the future estimates of uncontrolled urbanization, there is a need to design the “Ten Essentials” to be more actionable and to encourage cities to move towards their implementation.

Member states and stakeholders have called for revisions to the local indicators, which are informed by the essentials, and to the reporting process; these revisions are required within the new framework including the goals of the Sustainable Development Goals (UN, 2016).

The Steering Committee of the Making Cities Resilient Campaign met in September 2014 and laid out guidance for the UNISDR for the revision of the ten essentials. The recommendations included:

- Establishing a group consisting of technical agencies, experts and partners working at local level to lead the modification and harmonization of the Ten Essentials;
- Engaging National and Local Governments in the process to ensure that relevant linkages are built into the measurement and monitoring;
- Ensuring pilot studies are undertaken to factor in the realities on the ground;
- Focusing on action oriented actions; and
- Engaging in the intergovernmental processes to get the new essentials and indicators endorsed.

Accordingly, an expert group of 50 global agencies’, experts’, cities’ and government representatives was established and the group first met in December 2014. As an input to this process, UNISDR, in advance,

conducted an evaluation of the ten essentials' associated local government indicators that engaged cities from all regions, partners and stakeholders.

The expert group proposed a set of new Ten Essentials that was shared with cities and partners at the Third UN World Conference on Disaster Risk Reduction, held from 14<sup>th</sup> to 18<sup>th</sup> March 2015 in Sendai, Japan. These essentials were then finalised after further consultations and a pilot implementation. These new essentials were aligned to the guidance provided by the Sendai Framework for disaster risk reduction monitoring at the local level, the work of the inter-governmental working group on indicators for the global targets of the Sendai Framework, and the overall Sendai Monitoring framework. Identified technical agency leads (who were recognised experts in their specific fields relating to any of the proposed new ten essentials) assisted in the process of the development of the indicators and the guidance notes for users. These guidance notes provide city officials with examples on how to implement the essentials.

Pilot tests of the new essentials, their indicators and the generation of the guidance notes were carried out in 20 cities commencing in January 2016. Feedback generated in the pilot studies were used to revise the new ten essentials and in establishing the final indicators and the guidance notes. These revisions were then fed into, and assisted in forming, the new indicators for the combined monitoring and action planning tool for disaster risk reduction at the local level.

## **NEW ESSENTIALS**

As already identified above, the main objective of the new essentials is to be actionable. These new Ten Essentials are built upon the previous essentials, just as the Post 2015 framework for Disaster Risk Reduction builds upon the Hyogo Framework for Action (2005-2015), with interlinks with priorities for action, representing a transition to the implementation stage.

The new "Ten Essentials" listed below should be viewed as the key and interdependent steps that need to be undertaken in order to build and maintain resilience. The first three Essentials are the foundation blocks from which all other Essentials can be acted upon, in parallel. Essentials 4-10 are, therefore, not presented in a specific sequential or prioritized order:

Organise for disaster resilience - Put in place an organizational structure



and identify the necessary processes to understand, and act on, the reduction of exposure, its impact and vulnerability to disasters;

Identify, understand and use current and future risk scenarios - City governments should identify and understand their likely risks, including hazards, exposure and vulnerabilities, and use this knowledge to inform decision making;

Strengthen financial capacity for resilience - Understand the economic impact of disasters and the need for investment in resilience. Identify and develop financial mechanisms that can support resilience activities;

Pursue resilient urban development and design - The built environment needs to be assessed and made resilient as applicable, informed by the risks identified in essential 2;

Safeguard natural buffers to enhance the protective functions offered by natural ecosystems - Identify, protect and monitor critical ecosystems' services that confer a disaster resilience benefit;

Strengthen institutional capacity for resilience - It is important to ensure that all institutions that are relevant to a city's resilience have the capabilities they need to discharge their roles;

Understand and strengthen societal capacity for resilience - Ensure the understanding of and strengthening of societal capacity for resilience. Cultivate an environment for social connectedness which promotes a culture of mutual help through a recognition of the role of cultural heritage and education in disaster risk reduction;

Increase infrastructure resilience - Assess the capacity and adequacy of, as well as the linkages between, critical infrastructure systems and upgrade these as necessary according to the risks identified in essential 2;

Ensure preparedness and an effective disaster response - Ensure that the creation and updating of disaster response plans are informed by the risks identified in essential 2 and are communicated to all the stakeholders through the use of an organizational structure as per essential 1;

Expedite recovery and build back better - Ensure the existence of sufficient pre-disaster plans according to the risks identified and that, after any disaster, the needs of the affected are at the centre of recovery and reconstruction, alongside the support needed to design and implement rebuilding.

Foundations for these new essentials have been the need to organise for resilience, to identify, understand and use current and future risk scenarios, and to strengthen financial capacity for resilience.

The annex contains further details including a detailed description of each Essential.

## **IMPLEMENTATION OF THE 'TEN ESSENTIALS'**

The outcome of any city development strategy should be sustainable and resilient systems, services and communities. Unfortunately, the relationship between sustainability and resilience is not clearly understood or applied and quite often “being sustainable” has also been incorrectly assumed as “being resilient”. The confusion is brought about by a lack of standards in both disciplines and a lack of clarity in language and concepts resulting in fragmented and disjointed efforts to achieve sustainable and resilient communities (UNOPS, 2016). Cities progress with the new Ten Essentials can be reviewed through various tools. Through the monitoring of progress, the needs of cities can be identified and, thereafter, partnerships can be sought with those in appropriate positions, and with the expertise to assist with improvements.

In order to build resilience a common and shared understanding of what makes cities resilient must be established. If a city has certain characteristics or elements present it is likely to perform better than a city without them. The Ten Essentials define the elements or characteristics that need to be present in order for a city to be able to absorb, or recover quickly from, shocks and stresses. The indicators that support the essentials “measure” if these characteristics are present or not and to what degree they are present so that decision makers can get an indication of “how the city would perform if faced with shocks and stresses”. In some instances this may require a qualitative approach in assessing the degree to which the characteristic is present or not. Each Essential covers one characteristic. However, in order to understand to what degree it is present, a number of sub-indicators are used to reflect the makeup of the main characteristic. The sub-indicators should be assessed and a qualitative score set with reasons given. This will provide more granularity and substance for each of the main indicators.

This process establishes a “baseline” at multiple levels. Strategically, it provides cities with a clear guidance for determining the priorities for action while, at the sub-indicator level, it enables gaps or weaknesses to be identified so that remedial actions can be taken in order to build resilience in a coherent and systematic fashion. Output indicators that will enable progress to be measured on specific actions within each element can be defined action by action.

Furthermore, the new Ten Essentials are in line with the focus of the second phase of the Making Cities Resilient campaign. Starting in 2016,

this phase will be dedicated to implementation, aiming to ensure that the commitments made by governments are integrated into the local context. Serving as a means for implementing the Sendai Framework and the Sustainable Development Goals (SDGs), the Campaign will shift its focus to implementation support, to partners' engagement, investment-cooperation opportunities, local action planning and the monitoring of progress.

The Campaign will continue to advocate widespread commitment by local governments in the building of resilience to disasters, aiming to reach 5,000 city-local government participants by 2020 with at least 500 of them developing and implementing DRR and resilience strategies. Standardized approaches to resilience such as the checklist for the new "Ten Essentials" and corresponding indicators, targets and a reporting process applicable to all cities will be introduced.

Private sector partners will also be targeted as well as looking for connections with local governments and other development partners to actively contribute to the development of products and services, and the tools and technical support required for innovative urban risk reduction solutions.

## **CONCLUSION**

Local governments and local authorities are key to building urban resilience. They are well placed to understand the local/national context, to leverage public interest in climate change once specific risks become salient, and to plan for, and implement, resilience measures. However, local governments face complex and interrelated challenges in attempting to take effective action such as a lack of coordination between different departments, a lack of clear authority (even with devolved responsibilities) and a lack of capacities to carry out policies effectively.

The Ten Essentials will assist local governments and local authorities in building urban resilience (by assisting them in identifying gaps and priorities), in building up the trust of their investors and, consequently, in reducing losses both to human lives and investments.

Since 2010, the Making Cities Resilient Campaign has served as the primary means of supporting the implementation of disaster risk reduction at a local level. Among global initiatives, the Campaign is unusual in its focus on both urban and local governments which are seen

as the “front line” in disaster risk reduction. The Campaign promotes: resilience-building in cities through many mechanisms, including raising awareness of DRR among local governments through high-profile events; providing tools, technical assistance and training for local authorities and facilitating city-to-city support networks and learning opportunities, including building on experiences gained from previous disasters and refining local sustainable disaster management systems; the use of cost effective local resources; participatory institutional systems for effective disaster management; mediation with national agencies to bring in locally relevant scientific advancements for effective disaster management, and interaction between local communities and national governments to implement policy changes in order to support locally relevant development measures.

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## Annex – The New “Ten Essentials”

E#	Essential	Description
	Organise for disaster resilience.	<p>Put in place an organizational structure and identify the necessary processes to understand and act on reducing exposure, its impact and vulnerability to disasters.</p> <p>Recognizing that the exact format/structure will vary within and between countries, this will include but is not limited to:</p> <p>Establishing a single point of coordination in the city, accepted by all stakeholders (see below).            Exercising strong leadership and commitment at the highest elected level within the city authority, such as the Mayor.            Ensuring that all departments understand the importance of disaster risk reduction for achieving the objectives of respective departments’ policies and programmes and identifying measures to reduce disaster risk within <b>the departments’</b> roles and responsibilities, and that they have a framework within which to collaborate as required.            Engaging and building alliances with all relevant stakeholder groups including government at all levels (e.g national, state, city, parish or other subdivisions, neighbouring cities or countries as applicable), civil society and community organizations, the private sector.            Engaging and learning from other city networks and initiatives (e.g. city to city learning programmes, climate change, resilience initiatives, etc.)            Establishing necessary strategies, acts, laws, codes or integrating resilience qualities into existing policies aimed at preventing the creation of risk and the reduction of existing risk.            Creating policies to gather and manage data for sharing amongst all stakeholders and citizens.            Ensuring that all city government discussions routinely capture resilience implications; that the resilience implications of policies and standards in use are also assessed, and that action is taken upon these as needed.            Putting in place reporting mechanisms that capture key information about resilience and promote transparency, accountability and improved data capture over time.</p>
	Identify, understand and use current and future risk	<p>City governments should identify and understand their risk scenarios, and ensure that all stakeholders both contribute to, and recognize, these.</p> <p>Risk scenarios should identify hazards, exposures and</p>

	scenarios	<p>vulnerabilities in at least the most probable and most severe (worst-case) scenarios, paying particular attention to the following:</p> <p>How hazards might change over time given the impact of factors such as urbanization and climate change; how multiple hazards might combine; and how repeated small scale disaster events (if there is a relevant risk of these) might accumulate in their impact over time.</p> <p>Geographic areas exposed and territorial impact; Population segments, communities and housing exposed</p> <p>Economic assets and activities exposed including their impact on the <b>society</b>, health, education, environment, and cultural heritage.</p> <p>Critical infrastructure assets exposed and the consequent risk of cascading failures from one asset system to another (for example, where loss of power prevents water being pumped or weakens the hospitals' system).</p> <p>Timescales over which risks, vulnerabilities and impacts occur and responses are required.</p> <p>Creation and publication of risk and exposure maps detailing the above.</p> <p>Scenarios should be:</p> <p>A means for current and future investment decisions. Based on participatory processes that seek input from the full range of stakeholders (including ethnic and social groupings). Regularly updated. Widely communicated and used for decision-making purposes and the updating of response and recovery plans.</p>
	Strengthen financial capacity for resilience	<p>Understand the economic impact of disasters and the need for investment in resilience. Identify and develop financial mechanisms that can support resilience activities. Key actions might include:</p> <p>Understanding and assessing the significant direct and indirect costs of disasters (informed by past experience, taking into account future risk) and the relative impact of investment in prevention rather than incurring more significant costs during recovery. Assigning a ring-fenced capital budget for any major works found to be necessary to improve resilience. Including risk management allocations in operating budgets as required to maintain the required state of resilience over time (including supporting the actions set out in the Ten Essentials).</p> <p>Assessing disaster risk levels and the implications coming out of all the planning and capital spending decisions, and adjusting those decisions as needed. Creating incentives for homeowners, low-income families, communities, businesses and the public</p>

		<p>sector to invest in reducing the risks they face (e.g. business continuity planning, redundancy, building upgrades).</p> <p>Applying for (and if necessary, generating) insurance coverage for lives, livelihoods, city and private assets.</p> <p>Exploring as needed innovative financing mechanisms such as specialised bonds, specialised insurance, tax efficient finances, development impact bonds, etc.</p>
	Pursue resilient urban development and design	<p>The built environment needs to be assessed and made resilient as necessary. Building on the scenarios and risk maps from essential 2, this will include:</p> <p>Land zoning and the management of urban growth to avoid exacerbating resilience issues; the identification of suitable land for future development taking into consideration how low-income groups can access suitable land.</p> <p>Risk-aware planning, design and implementation of new buildings, neighbourhoods and infrastructure using innovative or existing/traditional techniques as applicable.</p> <p>Addressing the needs of informal settlements including basic infrastructure deficits such as water, drainage and sanitation.</p> <p>Assessing infrastructure for resiliency to potential hazards; incorporating appropriate retro-fitting of prevention measures.</p> <p>The development and implementation of appropriate building codes and guidelines for heritage structures.</p> <p>Education about hazard-resistant building practices for all construction sector actors.</p> <p>Integrating the protection of cities' natural and cultural heritage.</p> <p>Maximizing the use of urban design solutions (such as impermeable surfaces, green areas, shadowing, water retention areas, ventilation corridors, etc) that can cope with risks and also reduce the dependency on technical infrastructure like sewage systems, dikes, etc.</p> <p>Engaging affected stakeholders in appropriate and proportional participatory decision-making processes when making urban development decisions.</p> <p>Incorporating exemplary sustainable design principles into new developments. Link to other existing standards where appropriate (BREEAM, LEED, Greenstar, etc).</p> <p>Updating building regulations and standards regularly (or periodically) to take account of changing data and evidence on risks.</p>
	Safeguard natural buffers to enhance the protective	<p>Identify, protect and monitor critical ecosystems' services that confer a disaster resilience benefit.</p> <p>Relevant ecosystem services may include, but are not</p>



	<p>functions offered by natural ecosystems</p>	<p>limited to, water retention or water infiltration; afforestation; urban vegetation; floodplains; sand dunes; mangroves and other coastal vegetation, and pollination. Many ecosystem services that are relevant to a city's resilience may well be provided outside its geographical area.</p> <p>This Essential includes:</p> <p>Recognising value and benefits from ecosystem services for disaster risk prevention and protecting and/or enhancing them as part of risk reduction strategies for cities.</p> <p>Integrating ecosystem services to enhance more urban resilience into urban land use management, urban design and into relevant investment projects. Considering also natural buffers in the rural hinterland of cities and their wider region, and cooperation with municipalities there to establish a regional approach to land use planning in order to protect the buffers. Anticipating changes from climate trends and urbanization and planning to enable ecosystem services to withstand these.</p>
	<p>Strengthen institutional capacity for resilience</p>	<p>It is important to ensure that all the institutions relevant to a city's resilience have the capabilities they need to discharge their roles. "Institutions" include, as applicable, central, state and local government organizations; private sector organizations providing public services (depending on locale, this may include telephones, water, energy, healthcare, road operations, waste collection companies and others as well as those in a volunteering capacity or the equipment required in the event of a disaster); industrial facility owners and operators; building owners (individual or corporate); NGOs; professionals, employers' and labour organizations, and cultural institutions and civil society organizations (see Essential 8).</p> <p>Capacity should be developed across the five key DRR areas of understanding, prevention, mitigation, response and recovery planning. Factors affecting capacity will include:</p> <p>A shared understanding of roles and responsibilities. Skills, including, but not limited to, hazard/risk assessment, risk-sensitive planning (spatial and socio-economic), integrating disaster and climate risk considerations into project evaluation/design (including engineering design), co-ordination, communication, data and technology management, disaster management, response, recovery,</p>

		<p>assessment of structures post disaster, and business and services continuity planning.</p> <p>Training, based ideally on case studies how DRR can be implemented and what business continuity requires.</p> <p>Creating and implementing information and data frameworks for resilience and disaster risk reduction that build consistency in data capture and storage and can enable access to data, their use and re-use by multiple stakeholder groups for regular development processes.</p>
	<p>Understanding and strengthening societal capacity for resilience</p>	<p>Social “connectedness” and a culture of mutual help have a major outcome on the impact of disasters of any given magnitude. These can be encouraged by measures that include:</p> <p>Establishing and maintaining neighbourhood emergency response groups and training.</p> <p>Engaging and co-opting civil society organizations such as churches, youth groups, clubs, advocacy groups (for example, for the disabled).</p> <p>Providing community groups with “unvarnished” data on risk scenarios, on the current level of response capabilities and thus on the situation they may need to deal with.</p> <p>The formulation of neighbourhood plans by reference to such groups (see Essential 9).</p> <p>Offering education, training and support to such groups.</p> <p>Undertaking formal or informal censuses of those who may be vulnerable and less able to help themselves in each neighbourhood, and understanding from them what their needs are.</p> <p>Using government “touch-points” with the public (such as welfare or social services’ visits) and offices, police, libraries and museums to build awareness and understanding.</p> <p>Ensuring that the education curriculum within schools, higher education, universities and the workplace includes disaster awareness and training.</p> <p>Recognizing the role of cultural heritage in building resilience and in protecting the sites, structures and artefacts they represent.</p> <p>Engaging with employers and using them as a communications channel with their workforces for disaster awareness and training.</p> <p>Engaging with local media in capacity building (TV, print, social media, etc).</p> <p>Mobiles (phones/tablets) and web-based “systems of engagement” (for example, crowd sourcing or disseminating data on preparedness).</p> <p>The translation of all materials into all languages used in a city.</p>
	<p>Increase</p>	<p>Understanding how critical infrastructure systems will</p>

	<p>infrastructure resilience</p>	<p>cope with disasters the city might experience (see Essential 2) and developing contingencies to manage risks caused by these outcomes. This should be addressed via measures which include, but are not limited to:</p> <p>An assessment of capacity and adequacy in the light of the scenarios in Essential 2. For example, considering possible damage to parallel infrastructure (for example, the impact on evacuation capacity if one of two roads out of a city is blocked) and considering linkages between different systems (for example, the impact created if a hospital loses its power or water supply).</p> <p>Systematic triaged processes for the prioritization of retrofit or the replacement of unsafe infrastructure.</p> <p>Liaising with, and building connections between, infrastructure agencies (including those that may be in the private sector) to ensure resilience is considered appropriately in project prioritization, planning, design, implementation and maintenance cycles.</p> <p>Tendering and procurement processes that will include the resilience criteria agreed upon by the city and stakeholders and is consistent throughout.</p> <p>For emergency management infrastructure, an assessment of "surge" capacity – the ability to deal with suddenly increased loadings from law and order issues, casualties, evacuees, and so on.</p> <p>Protecting or supporting cultural and other sites of historical, cultural heritage and religious interest.</p> <p>Critical infrastructure includes that required for the operation of the city particularly that required specifically for emergency responses where different. Infrastructure required for the operation of a city includes, but is not limited to:</p> <p>Transport – roads, rail, airports and other ports.  Vehicle and heating fuel supplies.  Telecommunication systems.  Utilities' systems (water, wastewater, electricity, gas, waste disposal).  Health care centres, hospitals and other healthcare facilities.  Schools and educational institutes. See pink highlight below  Community centres, institutions.  Food supply chain.  Police and fire services.  Jails.  "Back office" administration – welfare payments, housing  computer systems and the data which support the above  cultural heritage sites and structures.</p>
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		<p>The infrastructure required for any disaster response may include the above, plus (as examples):</p> <p>Emergency or incident command centres and associated communications and monitoring/situation awareness systems. These may include cameras, sensors and crowd sourcing mechanisms such as the reading of SMS and Twitter feeds.</p> <p>Additional fire, police and ambulance vehicles.</p> <p>The national guard or other military services.</p> <p>Earth and debris-removing equipment.</p> <p>Pumps.</p> <p>Generators.</p> <p>Sports facilities, school buildings and so on, that provide places of shelter.</p> <p>Mortuaries.</p> <p>Back-up computing facilities.</p>
	Ensure preparedness and effective disaster response	<p>Building on the scenarios in Essential 2, ensuring effective disaster response by, for example:</p> <p>Creating and regularly updating contingency and preparedness plans which should be communicated to all stakeholders through the structure in Essential 1 (especially including other levels of government and adjacent cities, infrastructure operators, community groups). Contingency plans should include law and order, providing vulnerable populations with food, water, medical supplies, shelter and staple goods (e.g., for housing repairs).</p> <p>Developing and installing detection and monitoring equipment, early warning systems and effective associated communication systems for all stakeholders and community groups.</p> <p>Ensuring the interoperability of emergency response systems with adjacent countries, between agencies and with neighbouring cities.</p> <p>Holding regular trainings, drills/tests and exercises on all aspects of the wider emergency response "system", including community elements and volunteers.</p> <p>The integration of risk reduction and emergency responses from engineers, contractors etc. in order to be able to effectively and efficiently engage in preparedness, response and recovery operations.</p> <p>Coordinating and managing response activities and relief agencies' inputs</p> <p>Ensuring in advance that a viable mechanism exists for the rapid, rational and transparent disbursement of funds after a disaster.</p> <p>Assigning and ring-fencing adequate contingency funds for post event response and recovery.</p>
	Expedite recovery and	<p>After any disaster:</p> <p>Ensuring that the needs of the survivors and the affected communities are placed at the centre of</p>

	<p>build back better</p>	<p>recovery and reconstruction, with support for them and their community organizations to design and implement rebuilding shelter, assets and livelihoods at higher standards of resilience. Planners should ensure that the recovery programmes are consistent and in line with the long-term priorities and development of the disaster affected areas.</p> <p>Recovery, rehabilitation and reconstruction can, to a considerable degree, be planned ahead of a disaster. This is critical to building back better and making nations, cities and communities more resilient to disasters. Pre-disaster plans for post-event recovery should cover the following <b>including</b> necessary capacity building, where relevant:</p> <p>Mechanisms for the integration of disaster risk reduction in all investment decisions on recovery and reconstruction. Providing shelter, food, water, communication and the addressing of psychological needs, etc. Limiting and planning the use of schools as temporary shelters. Identifying the dead and notifying next of kin. Debris clearing and management. Specific actions for the recovery of sectors including livelihoods, health, education, critical infrastructure, environment and ecosystems, psycho-social support, cultural heritage and governance issues (such as accountability, roles and responsibilities and corruption control). Taking over abandoned property. The management of local, national and international aid and funding, the coordination of efforts and the prioritizing and managing of resources for maximum efficiency, benefit and transparency. The integration of further disaster risk reduction in all investment decisions for recovery and reconstruction. Business continuity and economic rebooting. Systems to help communities integrate disaster risk reduction into the decisions they take to recover from a disaster in order to reduce future vulnerabilities. Learning loops: undertaking retrospective/post-disaster assessments to assess potential new vulnerabilities and to build learning into future planning and response activities.</p>
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