



Implementing urban resilience : Enablers, impediments and trade-offs

A scoping review of the literature 2005-2017

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We are witnessing a generalized trend toward increasing numbers of natural and man-made disasters.^{9;10} Urban resilience appears as a relevant and potentially effective response to this challenge, and is supported by international organizations,^{11, 12} governments,^{13;14} and philanthropic organizations.¹⁵ Urban resilience is defined as "the ability of an urban system - and all its constituent socio-ecological and socio-technical networks across temporal and spatial scales - to maintain or rapidly return to desired functions in the face of a disturbance, to adapt to change, and to quickly transform systems that limit current or future adaptive capacity".¹⁶ Better urban resilience could save lives, protect the environment and reduce economic losses. Moreover, it will likely support innovation and learning to help societies adapt and reduce their vulnerability to emerging challenges. Despite the growing popularity of the term, there is an important gap between the discourse on urban resilience and the capacity to develop resilience in practice.^{17, 18} City officials are guided in their efforts by resilience frameworks¹⁵ and indicators,^{19, 20, 21} but lack a clear picture of factors and strategies that facilitate the implementation of urban resilience and of barriers that need to be overcome.

This document is a summary of the scoping review Therrien et al., 2018²², which synthesizes evidence on the barriers and facilitators to implementation of urban resilience. We identified over

2,500 articles published after 2005 - the year the United Nations produced the Hyogo Framework for Action entitled "Building the Resilience of Nations and Communities to Disasters" was published. Most were eliminated following review by title and abstract as they were not based on empirical data, dealt with non-urban contexts, or dealt with plans rather than their implementation. The findings presented below are based on 188 articles that met these inclusion criteria.

Our aim is to provide useful insights and guidance, based on available evidence, for policy makers and practitioners involved in the development and implementation of urban resilience strategies. Many city actors are using the City Resilience Framework (CRF) developed by ARUP for the 100 Resilient Cities program of the Rockefeller Foundation (see www.100resilientcities.org/resources) in their work to implement urban resilience. We therefore organized our findings along the dimensions of the CRF : Health and Wellbeing, Economy and Society, Infrastructure and Environment and Leadership and Strategy (we consider this last dimension as being part of the three previous dimensions). Within each dimension, we ask : What strategies have been identified that enable resilience? and What factors have been found to create barriers to the implementation of resilience? We then explore trade-offs that emerge as resilience initiatives are implemented.

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The health and wellbeing dimension

This dimension, defined in the CRF as "[t]he health and wellbeing of everyone living and working in the city"¹⁵ involves increasing and assuring the ability to meet basic needs, support livelihoods and employment, and ensure public health services.

Enabling strategies

1. **Inclusive and transparent governance** in resilience-building at the local level has been found to reduce the risk that resilience projects will negatively impact livelihoods. Strategies such as iterative planning processes can help marginalized urban residents engage with resilience planning and ensure their livelihood interests are taken into account.²³ Bottom-up strategies help ensure that the community's priority issues are considered.²⁴

2. **Innovative financial protection and insurance tools** have been identified as helpful strategies for supporting livelihoods and employment. By spreading risk, these tools can provide affordable security against loss of assets and livelihoods and may provide poorer residents an alternative to migration or other coping strategies detrimental to their health, well-being or livelihoods.²⁵

3. **Public health and emergency preparedness research networks** can ensure that institutional actors have the resources to learn from multiple actors and continually improve their health and emergency preparedness system designs.²⁶ A systems orientation in public health involves many disciplines, works towards multiple interventions and leverages community resources to deliver results.²⁷

4. **Anticipating health threats that spread with the impacts of climate change** is an increasing focus of resilience projects (notably in the context of international aid) to build capacity to deal with water-borne diseases with flooding, shifting incidence of vector (mosquito)-borne diseases over geographic areas and seasons, and the impact of heat stress.²⁴

5. **Community resilience frameworks** have been found to facilitate the alignment of emergency preparedness, public health and health care. Health department staff benefit by receiving training to improve community engagement skills and conduct preparedness activities that both engage and learn from vulnerable populations.²⁸

6. **Community engagement strategies that couple communications with opportunities for participation** develop trust and distributed capacities to meet basic needs and ensure health services in crises.

7. **Investing in education** develops livelihood and employment, but also diminishes the poor and vulnerable proportion of the population⁷.

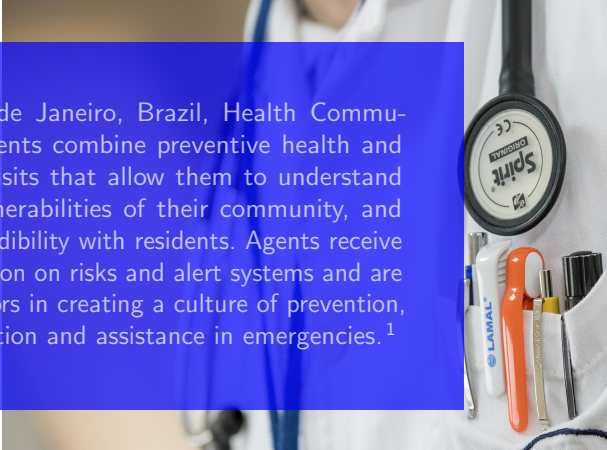
Impeding factors

1. **Disregard for socio-economic inequities and lack of attention to vulnerable populations** impedes resilience on the health and well-being dimension. Resilience-focused land-use policies, as well as relocation policies from high-risk sites can disrupt social networks and livelihoods and lead to isolation and greater vulnerability.²⁴ Policies that devolve responsibility to households to implement adaptive measures often fail to recognize inequalities in the ability to undertake these measures.

2. **Insufficiency of solely local measures** to address vulnerabilities related to human resources and economic development hinders livelihood, especially as households attempt to diversify their livelihoods away from climate-threatened sectors,²⁴ or recover following a disaster.²⁹

3. **Treating preparedness as an add-on in health skills training**, with expertise from the responder community brought into public health organizations as an afterthought, does not encourage lasting collaborative relationships across emergency responder and public health practitioners.²⁸ An integrated preparation would be more efficient.

4. **The disconnect between healthcare facilities and disaster management strategies** impedes resilience of health infrastructure. With little data on the impact of shocks and crises on volume and nature of case, the ability of



In Rio de Janeiro, Brazil, Health Community Agents combine preventive health and home visits that allow them to understand the vulnerabilities of their community, and gain credibility with residents. Agents receive instruction on risks and alert systems and are key actors in creating a culture of prevention, information and assistance in emergencies.¹

healthcare facilities to adapt is very poorly understood and under-resourced. In New Orleans, two years after Hurricane Katrina, only one of the city's seven general hospitals was operating at pre-hurricane levels³⁰.

5. **Lack of long-term investment** during recovery and in infrastructure and care services, where instant solutions are often favored (Lizzaralde 2014, Sciulli 2015), can undermine the benefits of risk reduction and mitigation programs.³¹

The economy and society dimension

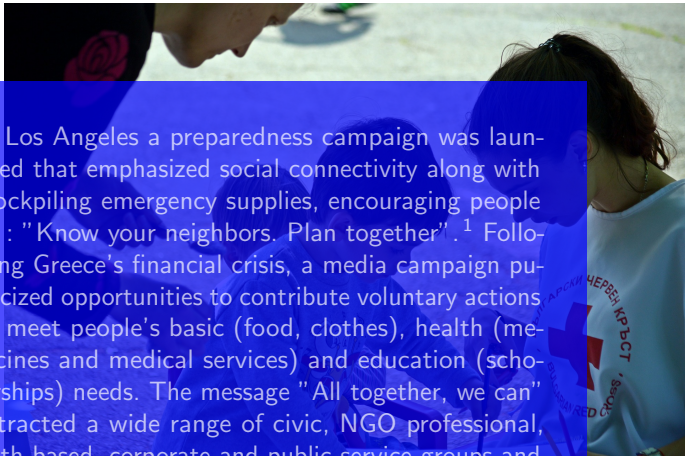
This dimension of the CRF is described as "the social and financial systems that enable urban populations to live peacefully, and act collectively,"¹⁵ and involves efforts to increase resilience by promoting cohesive and engaged communities, ensuring social stability, security and justice, and fostering economic prosperity.

Enabling strategies


1. **Involving entire communities in assessing risk and generating strategies** helps vital information spread effectively³² and can assemble different perspectives to collectively construct risk narratives, conceive of resilient possibilities and develop common purpose. Tools such as crowd-sourcing are increasingly being used to collate dispersed information held in communities.^{33;34} In public consultations, using language that is clear and employing cooperative strategies are effective ways to prevent elite domination of meetings.³⁵

2. **Working through schools** increases community capabilities, as "children are at the centre of the neighbourhood network".³⁶ Simulated exercises including evacuations can be conducted in schools and involve parents,¹ thereby increasing the preparedness of individual community members and also building cohesiveness and trust that become crucial in the event of a disaster. People who know each other and are confident in receiving help from neighbours fare much better during an event.^{37;38;39}

3. **Government support for community groups** can build cohesiveness in normal times that then becomes a valuable resource in response and recovery during events.^{3;1} Local action groups can serve as an intermediary between official recovery organizations that have resources, and local people who can be engaged in efforts.⁶ Building relationships between state



In Los Angeles a preparedness campaign was launched that emphasized social connectivity along with stockpiling emergency supplies, encouraging people to: "Know your neighbors. Plan together".¹ Following Greece's financial crisis, a media campaign publicized opportunities to contribute voluntary actions to meet people's basic (food, clothes), health (medicines and medical services) and education (scholarships) needs. The message "All together, we can" attracted a wide range of civic, NGO professional, faith-based, corporate and public service groups and rallied enormous volunteer energy; it also increased legitimacy and oversight of the distribution of donated resources.²



In New Zealand, community groups established as hubs of volunteer activity in normal times provided vehicles for prompt community mobilization following disaster.³

security services and community security services can help assure social stability, security and justice.⁴⁰

4. **Information sharing** through coordinating bodies and formal multiagency partnerships is helpful in ensuring social stability and security.^{41;42}

5. **Spreading risk through financial instruments and regulation**, such as regional catastrophe insurance pools can help manage the financial risks associated with shocks, reduce the cost of insurance, provide timely funds in the event of disaster and manage expectations.^{25;43}

6. **Supporting efforts to manage risks by small and medium-sized enterprises (SME)**, with sensitivity to their particular needs and a range of options, enables SMEs to reopen operations more quickly following an event.⁴⁴

Impeding Factors

1. **Failing to recognize opposing or alternate priorities**, either when priorities are set by international groups³⁵ or when resilience plans are controlled by outside managers, reduces acceptability of change among residents.⁴⁵ Priorities competing with risk management inside businesses are common, as they often lack an understanding of the risks and adopt a 'wait-and-see' attitude.⁴⁴

2. **The content and form in which information is shared** may impede the development of engaged and cohesive communities, either through over-segmentation that leaves out some community members, or under-segmentation that renders information too general to be useful.^{46;33}

3. **Alienation of local actors** can result from lack of information about risks,⁴⁷ from other priorities that make resilience may seem like a luxury,³⁵ and from assumptions that government is responsible for dealing with crises and disasters.⁴⁶ Businesses may develop a wait-and-see attitude rather than invest in assessing and mitigating risk.⁴⁴

4. **Business elites with weak links to the city** lack a sense of civic responsibility and can impede the type of economic prosperity that supports urban resilience.⁴⁸

5. **Difficulty to insure slow-onset risks** such as climate change generates gaps in insurability.²⁵

The infrastructure and environment dimension

The CRF describes this dimension, from the point of view of urban planning and infrastructure management, as "effective leadership, empowered stakeholders and integrated planning",¹⁵ driven by strategies that enhance and provide protective natural and man-made assets, ensure continuity of critical services, and provide reliable communication and mobility.

Enabling strategies

1. **Integrating disaster risk reduction (DRR) into design** improves the resilience of infrastructure and the environment. Enforcing DRR building codes, integrating risk thinking into design and construction guidelines, and mainstreaming DRR in urban development plans are enabling strategies.⁴⁹ This planning is improved when it draws on past experience of how communities use urban spaces in responding to an event before emergency responders arrive : what do they have on hand to help them survive/help each other.⁵⁰ Open spaces can serve as shelter and for the distribution of aid following disaster, while multiple passageways to safe sites can prevent bottlenecks during escape.⁵⁰

2. **Engaging local perspectives in design processes** ensures that design is adapted to local conditions and integrates community views and priorities.⁵¹

In an example of water management, a change in the definition of "water" to include urban runoff brought together municipal infrastructure managers and other concerned agencies to find solutions⁴ and provided homeowners incentives to increase rainwater capture for use during droughts.⁵

3. **Redefining a problem in a way that points to solutions** enables action. Building incentives⁵² and understanding⁷ amongst parties increases action.

4. **Taking advantage of windows of opportunity** can accelerate resilience implementation. For example, the weeks following a hurricane is a good time to talk about climate change mitigation and resilience (Pelling 2011, Penalba 2012).^{17;52}

5. **Pre-disaster recovery planning** works to identify services central to emergency response and plan for the maintenance of these services during a crisis.⁵³

6. **Prioritising critical infrastructure** is facilitated by developing a methodology for choosing that asset prior to a shock.⁵⁴

7. **Pre-established finance facilities** in public budgets and in the private sector expedite critical infrastructure recovery following a disaster⁵⁴ and provide business with the financial liquidity to minimize interruptions.²⁵

8. **Collaboration with the private sector**, including non-profits, can fill skill shortages, help complete projects in a timely manner⁵⁵ and fill gaps in critical services.³⁸


9. **Complementing communication systems with response training** for local people helps them know what to do when those warnings are triggered.^{56;1}

10. **Redundant communication systems**, such as coupling cell phone warnings and community siren systems to communicate warnings, ensure that warnings are received by all residents.^{1;53}

11. **Community-sensitive communication** ensures that minority ethnic groups and vulnerable members of the community receive useful risk information.⁴⁶

12. **High social capital** in communities can increase access to new information.¹⁷

13. **Incorporating hazard risk in transport planning** can be accomplished through zoning and land use controls, standards for road and bridge design.⁵⁷



The US federal government will pay for local infrastructure damage after an event, but will not necessarily contribute to mitigating risk beforehand.⁶ In England, insurance companies are expected to provide accessible coverage, but government does not consult with them around zoning decisions.⁷

Impeding factors

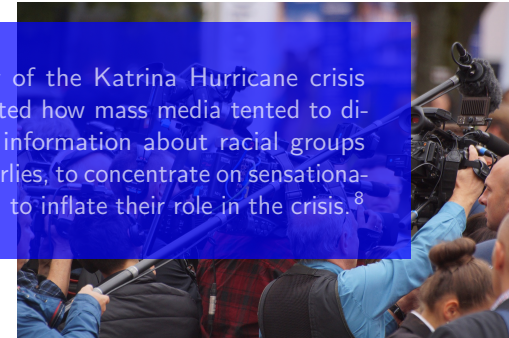
1. **Misalignment between control and responsibility at the urban level** can impede actions on resilience related to the provision of natural and man-made assets, as well as silos between departments and disciplines at this level.
2. **Professional fragmentation and dual priorities in construction** impede resilience strategies : architects, surveyors and engineers are usually employed as independent consultants.^{58;59} Conflicts can arise around the design of an infrastructure expected to serve dual purposes. While a levee might be crucial for risk reduction, it may have been built to primarily serve the shipping industry.⁶⁰
3. **Past decisions** impose constraints on current asset planning.⁵³
4. **Data gaps following disasters** reflect the absence of integrated documentation and limit how helpful different data sets are in guiding recovery operations.⁵⁴
5. **Coordination shortcomings** arise from lack of time for pre-disaster recovery planning, absence of interagency networks for communication, diverse priorities, lack of experience and lack of trust.³⁸
6. **Mismatch between political and resilience frameworks**, with the first based on short-term yield and the second on a long-term iterative process, makes implementation more complex.⁶¹
7. **Lack of realism in existing plans** hinders their execution in day-to-day work of the concerned professionals.⁶²
8. **Communication between organizations that does not reach down to the population**, and the absence of community participation in emergency response exercises, impedes warnings and residents' ability to act on warnings.⁵⁶
9. **The tendency of medias to select, inflate or report inaccurate information** is bad for information transmission to citizens.⁸⁷

The governance dimension and links between the three dimensions

As mentioned in the coding strategy, we considered the fourth dimension of the CRF (Leadership and strategy) and its related governance issues to be part of the other three dimensions. However, in cutting across themes we find three overarching streams : governance structures, learning from experience and information management, and climate change and adaptation.

Enabling factors

1. **Inclusion of communities and capacity for local governments** are stressed as important enabling factors. This includes supporting community initiatives, community consultation, trust in local knowledge and allowing local governments to take decisions, and requires inclusive and transparent governance.
2. **Enforcing resilience actions in planning** is also a recurrent point.
3. **A governance putting forward a long-term attitude**⁶³ is a good way to adress the contradiction between risk management (short-term) and resilience strategies (long-term).⁶⁴
4. **A holistic analysis including governance processes** and pressing for an understanding of institutions and their interactions is essential for designing solutions.⁶⁵
5. **Communication and learning processes** are another overarching theme. Learning from experience can be an efficient accelerator of urban resilience⁶¹, especially using organisational learning and experimentation strategies⁶⁶. Cross-sectoral communication⁶⁷ and learning-by-doing⁶⁸ also foster resilience implementation.
6. **Awareness** of professionals and citizens is stressed as important in all areas.
7. **Cross-dimension and cross sectoral adaptation to climate change** ensures this complex problematic is properly addressed.^{69;64}



A study of the Katrina Hurricane crisis highlighted how mass media tended to disregard information about racial groups and elderlies, to concentrate on sensationalism and to inflate their role in the crisis.⁸

Impeding factors

1. **Governance-sited contradictions** such as the lack of resources^{67;64}, the confrontation between urgent but short-sighted duty and long-term resilience goals, and bureaucratic hurdles⁶⁴ are recurrent barriers to implementation.
2. **Unclear responsibilities** of the various stakeholders will make implementation less likely to be managed.⁶⁷
3. **Challenges to learning and information sharing strategies** include heterogeneous populations⁶⁸ and a lack of comprehension of complex concepts.^{67;64}

Trade-offs

A number of articles examine the effects that efforts and programs to build resilience in one area might have on other domains. The focus on trade-offs offers a rich source of insights for urban resilience practitioners : it can help expose the consequences of certain actions, and allows decision-makers to realistically engage with the competing interests at play.

A first general trade-off has to do with scale. There is a rich and diverse literature that establishes evidence of approaches and practices that enable the development urban resilience at the local level. Largely absent, however, is a consideration of the trade-offs involved in focusing on a community rather than a city-wide or larger scale. Resilience at one scale can impede resilience at a lower or higher scale⁷⁰, and an increase in local capacities does not always lead to risk-reduction and positive impacts on communities. A take-home message for practitioners, understanding that urban resilience operates at different scales, is not to lose track of the 'forest' when looking at the 'trees.' Another overarching consideration

We found evidence of trade-offs that run through the different dimensions of the CRF and warrant closer consideration by resilience practitioners and policymakers. The most important of these involved spatial trade-offs, trade-offs between individual and community, and trade-offs between efficiency and factors such as inclusiveness and preparedness.

is that the urban context itself is a trade-off, offering better communication linkages and more developed medical infrastructure, but also faster transmission of disease and more complicated evacuation and provision of relief.⁷¹

Trade-offs are also evident between different dimensions of resilience. Measures to increase economic resilience can have a negative effect on the mitigation of environmental risks. In New Orleans, for example, the business elite focused on "economic growth at all costs"⁴⁸ and Federal assistance to make low-lying areas safer increased the amount of development possible in low-lying, flood-prone areas. . . .⁴³

1. **Spatial trade-offs** : Design decisions for a man-made asset to guard against one hazard in one place may create increased vulnerabilities to another hazard or in another place.^{24;72} The development of flood flow zones and floodwater retention areas, for instance, may directly undermine agriculture and fishing-based livelihoods in those newly zoned areas.²³

2. **Individual and community** : Trade-offs are seen between community cohesiveness and the exercise of individual resilience : high levels of individual resilience, such as the ability to leave an area prior to a shock, can be in tension with community resilience, because the departure of those individuals takes away from the skills and resources available in the community.⁷³ Efforts to preserve social memory of experiences and events⁷⁴ can prompt community action, however, as these can include painful memories, discussing past events can also be paralyzing to some.⁷⁵ Security can come at the expense of individual freedoms, rights to privacy, and enjoyment in using urban spaces.⁷⁶ These trade-offs become all the more complex if people are affected by government security policies that are "driven by the demands of global economic, financial networks and the convenience of transnational elites".⁴²

3. **Efficiency** : In ensuring continuity of critical services following a disaster, a tension may emerge between efficiency and community involvement,⁷⁷ or speed of recovery vs. build-back-

The literature recognizes the role that inter-city networks can play in urban resilience and comparative work among cities may help to speed up the acquisition of knowledge around what works, why and where. Practitioners may stand to gain considerably by using and building networks as they develop strategies for urban resilience.

better imperatives.⁶ The desire to undertake actions quickly is often in tension with community consultations⁷⁷ that can be time consuming. In public health and health services, the redundancy and flexibility required for resilience is in tension with the onus on efficiency within healthcare organizations.³⁰ In the period following a disaster, supplementing overstretched local resources with external companies and experts provides added capacity, but risks disadvantaging and potentially displacing local actors.⁵⁵

These trade-offs are real and difficult. The weight of one or the other will vary over time, from place to place, and according to circumstance. The message we take home from evidence of trade-offs is that they should not be disregarded. Packaging resilience policies and adaptation solutions as "win-win" solutions may boost their political salience, but often obscures the uneven costs and benefits borne by different groups.²³

Knowledge gaps

Within the urban resilience literature, there is a tendency to present results that are based on output indicators rather than outcome indicators. This was a significant challenge in our knowledge synthesis, despite concerted efforts to find evidence on the outcomes of implementation efforts.

Across the urban resilience research base there is an absence of longitudinal studies that would enable us to better understand how cities and their people are affected by shocks and stresses, and the impact of implementing a given set of strategies.

Our results show that evidence within the CRF dimensions of infrastructure/ environment and economy society. The promotion of cohesive and engaged communities is one of the drivers of urban resilience with the most robust evidence base, and valuable lessons are available from studies conducted in various contexts. As the CRF suggests, engaged communities, social networks and integration can reinforce collective resilience.¹⁵ The health and well-being dimension of urban resilience has been treated more superficially within the resilience explicit literature. Additional insight may be available in other literatures such as public health, epidemiology, economic development or food security.

Finally, the overarching concept of governance (identified as "Leadership and Strategy" in the CRF) is treated only superficially in the available literature, with little to no evidence available on the substantive impact of governance mechanisms and institutional factors. Many papers call for multi-scale, multilevel, multi-stakeholder interventions but very few discuss the capacities and mechanisms needed to achieve these.

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