

Resilience Planning: an Innovative Approach in Dealing with Urban Vulnerabilities and Adaptation to Prioritise Opportunities for Uncertain Urban Futures

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Introduction

"As the world becomes less and less predictable the challenge cities and regions face is how to deal with change. The discussion about resilience may help decision-makers, inhabitants, and other stakeholders involved in urban and regional development find appropriate solutions"

(Muller, 2011: 3)

Recently, planning has focussed on achieving sustainable futures for cities. In order to achieve these futures, an understanding of theories and concepts of urban planning may enhance the practical tasks of spatial planning, policy development and practices. The concept of urban resilience is of a growing scientific prominence and is incorporated by planners within their planning practices. The literature focuses on resilience studies in planning with the objective of achieving sustainable futures of cities, with positive outcomes for the city and communities. Urban resilience can be defined as the *'ability of a city or urban system to withstand wide arrays of shocks and stress'* (Leichenko, 2011: 164) while maintaining functionality and identifying innovative ways to transform the city (Folke, 2006; Gunderson, 2010; Hamnett & Forbes, 2011). Consensus is needed around preparedness for a range of shocks and stresses associated with possible crises. For that, one of the most important roles is that of urban governance strategies, focussed on planning processes and practices in urban development (Chelleri & Olazabal, 2012).

This paper suggests water sensitive design as a driver for the adoption of resilience planning in selected cities. This combines practice with theory and uses the Sri Lankan capital of Colombo as the case study. This approach should enhance adaptive capacities to cope with urban vulnerabilities to extreme weather events (EWE) and climate change. The approach will strengthen spatial planning for future developments in Sri Lanka.

Urban vulnerabilities and adaptation: a need for resilience in planning

Contemporary planning has mainly focused on practices for problem solving to address specific urban planning issues (Chelleri & Olazabal, 2012). Many sustainability studies have focused on the ecological wellbeing of cities, but the concept of resilience has a broader focus on climatic change, development economies, disaster risk reduction and mitigation, urban landscape, urban poverty, governance and institutions and community development. In addition, achieving sustainability and resilience through different planning and policy domains are also important (Davoudi et al., 2012). Hence, incorporation of 'resilience' into urban planning and policies may ensure that the urban issues are addressed more efficiently, turning 'sustainability' objectives into actions that create resilient urban environments. Resilience planning involves the identification of urban vulnerabilities and the development of adaptive capacities appropriate to each of those vulnerabilities (Eraydin & Taşan-Kok, 2013; Muller, 2011). Successful implementation increases the level of resilience in cities.

Transitioning to water sensitive cities: a resilience planning approach

Despite the growing focus of resilience research in planning, there is a need to emphasise how nature can be incorporated into urban design and planning systems to enable adaptation and the development of innovative solutions in response to future vulnerabilities. This aligns with the implementation of the water sensitive cities (WSCs) concept, and the need to incorporate a resilience planning perspective to development of this capacity. Resilience planning necessitates the integration of land, air, water and the people into the planning and design of water sensitive cities. This integration may offer many benefits to overcome common environmental effects of microclimate and extreme weather.

Urban water plays a pivotal role in the achievement of a high quality of life. It is a significant natural resource and demand is rapidly increasing. WSCs as an environmentally responsive planning approach

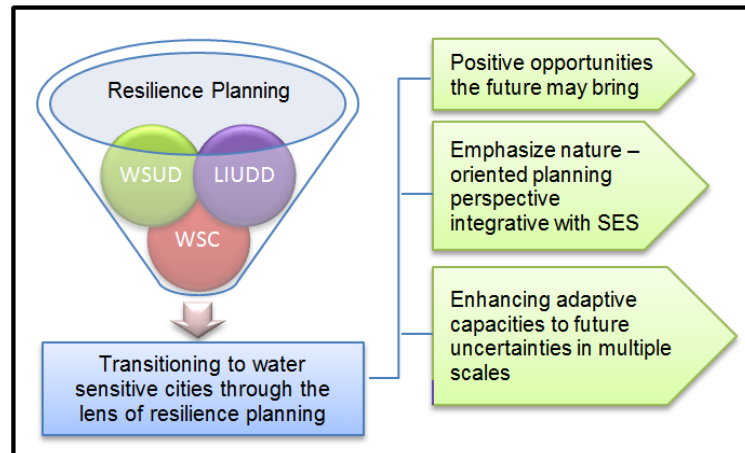
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focused on urban water can contribute to making the concepts of sustainable or liveable cities a reality. International Water Association (IWA) thematic programmes indicate that urban water has a critical role in the achievement of outcome realities for these concepts.

IWA refers to this as 'Cities of the future', which describe how this innovation can help cities to be sustainable or liveable by transitioning to WSCs.

As depicted in Figure 1, responding to the challenge of urban uncertainties, WSCs viewed within the lens of resilience planning provides opportunities to develop an environmentally responsive planning system to perceive environmental consequences happening at multiple scales. This approach can be framed-up within the socio-ecological systems (SES) perspective extending multiple opportunities to cities that cope with change while sustaining their main functions.

Figure 1: Transitioning to water sensitive cities adopting resilience planning



Potential practices towards transitioning to Water Sensitive cities: The Australasian Context

The concept of WSC has led to a water management transition framework that illustrates changeover across six typologies of city states based on a historical and future analysis of water management practices of Australian cities (Brown, Keath, & Wong, 2008). The framework indicates “temporal, ideological and technological contexts of different management paradigms, and is sensitive to other influencing contextual variables such as histories, ecologies, geographies and socio-political dynamics” (Howe & Mitchell, 2011:34) in the water environment. They explained that the transition of water management practices in cities has now in some locations (such as Australia) deviated from conventional practices to modern approaches, considering water as the pragmatic component in achieving sustainable or liveable cities.

Other, similar frameworks exist that potentially move water sensitive planning into a central role in the process of transitioning Australasian urban environments to a more resilient state. Water Sensitive Urban Design (WSUD) and the Low Impact Urban Design and Development (LIUDD) frameworks are based on sustainable urban water management practices in Australasia. Both approaches are based on the human-ecological interaction and so incorporating a resilience planning perspective may lead to the development of adaptation capacities to cope within urban vulnerabilities. The most basic idea of linking these theories is to explore the possibility of transitioning to water sensitive cities as a resilience planning approach to dealing with extreme weather events and climate change impacts of contemporary cities.

WSUD, an emerging approach in Australian cities, is an alternative to traditional urban water management (Brown & Clarke, 2007). WSUD considers the management of the entire interconnected network of urban water systems, thereby combining the functionality of all urban water through a nature-oriented framework (Hoyer et al., 2011). WSUD considers the management of all parts of urban water, but has been mainly applied in the area of sustainable storm water management practices. In parallel to this view, the LIUDD framework is an approach unique to the New Zealand urban context. It also focuses on urban ecosystem management and community wellbeing through sustainable urban development and storm water management practices. The objectives of the LIUDD principles incorporate the points made in the previous paragraph. Further, LIUDD aims to avoid a wide range of adverse ecological effects that typically occur during urban development, and it attempts to minimize these negative effects through alternative approaches to spatial planning (van Roon & van Roon, 2009).

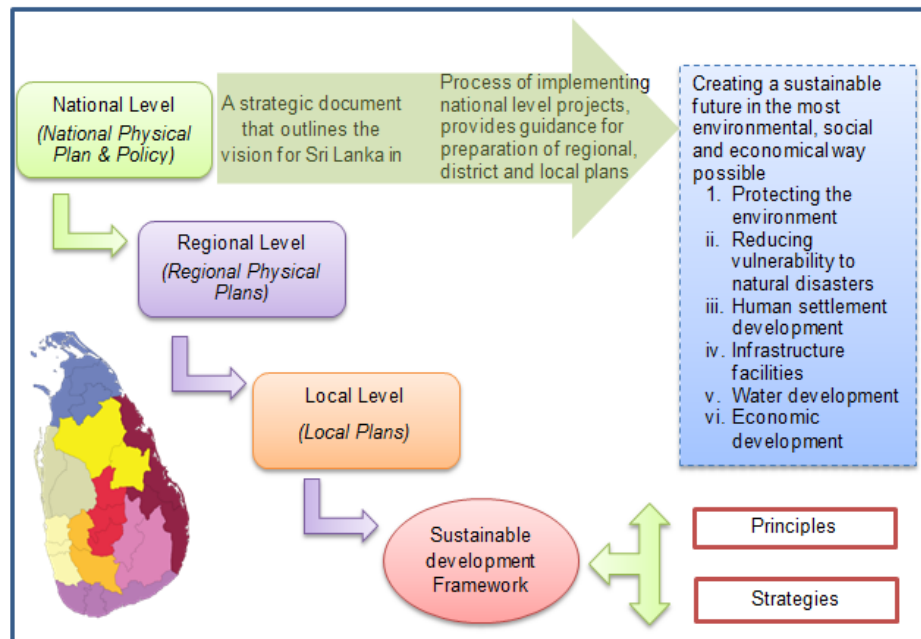
This paper describes the basis for a doctoral study, the objective of which is to explore implications for strategic spatial planning of introducing resilience planning and the water sensitive cities framework to Colombo. Planning methods will be used to enhance adaptive capacities of Colombo during shocks related to weather and climate change to deliver a safer urban environment to its community.

Resilience thinking in planning practices: the spatial planning context in Sri Lanka

Sri Lanka is an island country geographically located in the northern Indian Ocean off the southern sub-continent in South Asia. The country has a tropical warm climate with the total land area extent of 65,610km². The length of the coastline is about 1340km. The total population in the country is over 20 million as per the most recent census in 2012.

The National Physical Planning Policy (NPPP) and the National Physical Plan (NPP) together form the key documents to promote the integrated spatial planning framework by the National Physical Planning Department in Sri Lanka while regulating the physical, environmental, economic and social development in the country. This integrated approach to development has formulated implementation of spatial planning at national, regional and local levels. As per Figure 2, in the country, linking three levels of the planning hierarchy has provided a strategic framework for balanced and equitable spatial development while ensuring that key principles and strategies of the NPP are adequately addressing the sustainable development framework.

Figure 2: Planning documentation hierarchy: Sustainable Development context in Sri Lanka



The western province is the most urbanized region in Sri Lanka. The Colombo Metropolitan Regional Structure Plan (CMRSP) provides an integrated approach to planning for the entire western region. The CMRSP has identified environmental sustainability as a key component of future development outcomes of Colombo. The NPPP and the NPP are underpinned by strategic guidelines to the CMRSP providing key components and the guiding principle to overall spatial development in the entire western province. Table 1 shows how the planning documents discussed above can potentially contribute to a resilient future for the country. However a mechanism is needed for adequately planning responses to future challenges and issues to ensure a resilient future.

In relation to integrated approach at three levels of planning, it is important to see how planning responses have been adopted to effectively create sustainable futures. Even though the primary concerns for sustainable development have been grounded within the policy objectives, the NPPP and the NPP have not adequately explained what strategic instruments are going to be implemented to ensure these futures. For instance, the NPP and CMRSP have not explained that planning instruments are most concerned with changing the spatial dynamics of urban systems. What does that mean for achieving sustainable development, which planning instruments would make this a reality and what are possible pathways for planning adaptive measures? These questions remain unanswered in the implementation of NPPP, NPP and the CMRSP.

There is no consensus on whether and how the plan and the policy will address adaptive capacities. The objective of enhanced adaptive capacities will require tolerance of disturbances from potential vulnerabilities, uncertainties and insecurities in urban systems. Spatial planning plays a role in providing a secure urban environment to people, property and its resources. As the preceding literature indicates, planning practices should focus on promoting adaptation as a principle element of planning. Therefore, in accordance with the provisions made by the NPPP (Figure 2), this study recognizes a potential approach to planning adaptive measures through WSCs as a resilience planning approach to change the urban environment in Sri Lanka.

Table 1: Planning documentation in Sri Lanka: NPPP, NPP and the CMRSP

Planning Documentation	Key components and Guiding principles 'Sustainable development'	Possible responses to uncertainties due to extreme weather and climate change
NPPP and the NPP	▪ Economic, Social and Environmental Sustainability as the key components ▪ Framework through principles of sustainable development for addressing issues and challenges that will be faced towards 2030 ▪ Environmental protection and social integration as a key priority	▪ Strategies to reduce possible vulnerabilities to natural disasters resulting from climate change and extreme weather ▪ Provisions for water resource development and urgent need to urban water management ▪ Intention to introduce WSUD to manage flood effects, storm water and water catchment
CMRSP	▪ Development of most urbanized region in Sri Lanka, known as Colombo Metropolitan Region ▪ Environmental Sensitivity Analysis determined as key principle of preserving ecologically sensitive areas as ecological zones excluding from planned development ▪ Implementation of strategies for urban agglomeration and growth centre concept in Western province ▪ Improve the quality of life of the people living in the region	▪ Plan has identified as 20% of the CMR being comprised on flood plains ▪ Threats to wetlands as garbage dumping sites ▪ Improper storm water management practices and micro level drainage issues

Transitioning to water sensitive cities: The case of Colombo in Sri Lanka

According to the National Policy on Disaster Management³ Sri Lanka has in recent decades recognised its vulnerability to small and medium scale disasters. The tendency and the frequency of recurring EWEs with the monsoon rainfalls have resulted in floods and landslides as annual occurrences while droughts and cyclones are occasional. One of the major reasons for these issues is climate change.

This has been insufficiently addressed in planning practices in Sri Lanka, and not adequately explained in planning documents. This timely and important issue requires immediate planning attention to determine how these anticipated vulnerabilities and disturbances can be tackled and how methods can be put into practice in the long term. Transitioning to WSCs combined with a resilience planning approach helps to prepare urban systems for unforeseen weather disturbances and climate change effects improving adaptation capacities. Planning practices need transformation to enhance adaptive capacities to deal with slow and sudden changes.

Colombo, the most urbanized city in Sri Lanka may be suitable for the incorporation of the WSC concepts into planning practices. Further, with respect to planning and policy discourses, as Table 1 indicates, Colombo has a sound spatial planning framework with interplay between CMRSP and the City of Colombo Development Plan⁴, enhancing opportunities for equitable and balanced development linking Colombo regional development with the local level. According to the CMRSP, a large part of the core area of Colombo regional development is comprised of environmentally sensitive areas for water such as wetlands, water bodies, and paddy lands. In addition, the ocean forms the west boundary and the Kelani River marks the northern-boundary. Therefore, the existing spatial pattern in Colombo may enable multiple water sensitive outcomes. Further, in response to EWE and climate change WSCs may encourage an integrated planning approach to resilience planning.

The integration of theories and the practices for strategic implementation of the approach

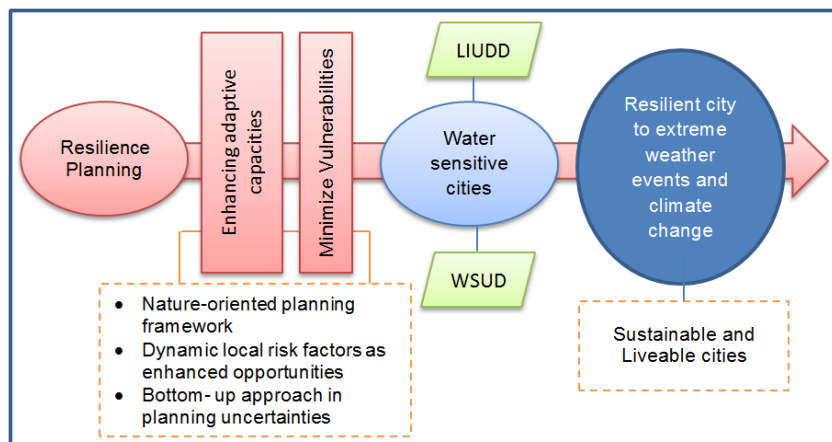
Figure 3 presents a new perspective by combining WSCs and resilience planning for EWEs and climate change disturbances. It incorporates dynamic local risk factors as opportunities for planning adaptation in uncertainties. Involvement of local factors integrates the geography and the people, easing opportunities for adaptation planning to vulnerabilities. Promoting local capacities while integrating with a nature-oriented planning framework like WSCs leads to a resilient urban system through responsive planning in

³ The Ministry of Disaster Management with the institutional support of National Council for Disaster Management and the Disaster Management Centre prepared the policy in 2013 according to the provisions made by the Sri Lanka Disaster Management Act No 13 of 2005. The main intention of preparing the policy was to ensure the sustainability and the resilience of the nation with the vision of "towards a safer Sri Lanka".

⁴ Implemented by UDA in 1999 after declared Colombo as an urban development area

an ever-changing environment. A bottom-up approach to planning builds capacities. WSUD and LIUDD provide frameworks for setting up priorities and opportunities for implementation of WSCs.

Figure 3: Transitioning to resilience in planning based on water sensitive cities framework



Keeping the relationship of all these concepts in mind, urban planning and design play a critical role in combining WSUD, LIUDD and other similar approaches into planning water sensitive cities. This will enhance the urban water cycle while responding to many other disturbances and impacts faced by contemporary cities through a sustainable nature-oriented planning framework. For example, the LIUDD framework provides a holistic approach to all aspects of development impacts over nature while

WSUD is highly focused on urban water supply and storm water management. WSC searches for the best alternative to urban water management and could contribute to future resilient cities in Sri Lanka.

Conclusion

One of the central positions of this research is to explore the possibility that the adoption of WSC provides insights into the transition to a more resilient city, while integrating land, water, air and people within cities. This approach can more efficiently and effectively pursue the level of resilience in modern cities, especially in moderating extreme weather events and managing microclimate to enhance adaptive capacities in Sri Lankan cities. Since urban systems are dynamic and vulnerable to changes and disturbances in nature, adequate attention must be paid to the loss of adaptive capacities of contemporary urban systems. Such losses can create insecurity in urban spaces and among communities, and hinders the sustainability of key planning components implemented through planning documents. Conversely, implementation of resilience planning combined with a WSC approach could reverse these negative trends.

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