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Resilient Greenway: A Participatory Planning Framework

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Introduction

Greenway as a network of “nature’s super infrastructure”—as part of green infrastructure that includes both man-made and natural ecological networks—providing ecological, recreational, and cultural values (Fabos, 1995) is a complex and dynamic social-ecological system. The structures and functions of greenways are shaped and formed by the interactions between natural and human systems. Under climate change impacts with intensified and more frequent extreme weathers, many greenway systems that are particularly in already natural disaster-prone areas would be likely to experience more aggravated social and ecological impacts. A resilient greenway thus is a greenway system that processes an adaptive capacity to absorb shocks and cope with disturbance to the system while maintaining the essential functioning of the system, and a transformative capacity to allow the system to learn and evolve toward sustainability.

Greenway systems pertaining ecosystem services have been identified as a critical instrument for climate change mitigation (e.g., carbon sequestration) and adaptation (e.g., reduce heat and floods, improve air and water quality) (Demuzere et al., 2014). Planning for resilient greenway system under climate change impacts is therefore both a remedy for and a challenge with climate change. The capacity of greenway system for climate change is influenced not only by the biophysical characteristics but also social-cultural and institutional context of the system (Matthews and Byrne, 2015). Ahern (2013) identified ecological principles for biophysical resilience of urban landscapes—biodiversity, ecological connectivity, multifunctionality, modularity, and safe-to-fail design—while others included participatory consensus-based decision-making process and the understanding of community’s perceptions and behaviours toward greenways as social-institutional components to the success of the greenway planning and design (e.g., Benedict and McMahon, 2006; Ryan and Walker, 2005).

This paper draws literature from resilience and participatory action research and proposes a resilient greenway participatory planning framework that is place-based and action-oriented to address both biophysical and social-institutional resilience of the greenway systems and apply to an on-going study in Kearny, Arizona, USA.

Background

Resilience thinking has provided a metaphor in planning and design and for understanding complex social-ecological systems in communities to cope with disturbances such as climate change (Pickett et al., 2004). The application of resilience thinking has moved away from the etymological roots of the word “resilio” meaning “to bounce back” that has been noted as the speed of return to the stable status in “engineering resilience,” which focuses on a single state of equilibrium or stability to which a resilient system would revert after a disruption (Holling, 1996). In contrast, a new ecological paradigm of non-equilibrium and multiscalar systems in “ecological resilience” represents the ability of an ecological system to continue functioning or to persist when disturbed, but not necessarily to remain the same state of the system (Holling, 1996; Pickett et al. 2004). Emerging resilience research has included “social resilience” and “community resilience” (e.g., Ride, 2011) as inter-linked “social-ecological resilience” to include humans in the complex systems at multiple scales (e.g., individual, household, community, region, globe) acknowledging the role that institutions can play for driving risks and adaptive capacity, as well as seeding transformative capacity to withdraw from undesirable systems and eventually transform toward sustainability (e.g., Walker and Salt, 2012). Therefore, resilience planning and design is essentially to enhance both the biophysical and social-institutional adaptive and transformative capacity of the system.

Participatory planning engaging with stakeholders and communities has multiple benefits. The process can increase public trust if it is conducted transparent and considering conflicting interests (Reed, 2008). In addition, it enhances social learning where information can be exchanged and adversarial viewpoints can be transformed as individuals learn to appreciate the legitimacy of alternative perspectives. Participatory planning can be used as an effective tool for spatial place-making and community planning create democratic framework for greenway planning (e.g., Hoover, 1995). Moreover, participatory workshops and emphasising adaptive management play important roles to assess social-ecological resilience outcomes and enhance adaptive and transformative capacity of the communities (e.g., Cheng, 2014). Through various tools and techniques used for understanding the issues, facilitating discussion, and brainstorming solutions, the participatory planning process includes a consensus building exercise for achieving common goals. In order for communities to achieve a common vision, participatory planning with consensus building exercise plays an important role in the decision-making process for issues that involve in complex social-ecological

relationships to ensure the success in the outcomes of plans as well as establishing stewardship for plan implementation, monitoring, and updates (Reed, 2008).

Resilient Greenway Participatory Planning Framework

A resilient greenway participatory planning framework is proposed to integrate participatory actions in each phase of the planning process: identify issues, conduct analysis and mapping, develop strategies, implement and evaluate plans (Figure 1). The planning process is a dynamic and revolving adaptive cycle. During each phase of the planning process, new issues might be revealed and identified through participatory actions when additional information, concerns and preferred solutions are provided and recognized by the community members. The plans are to enhance adaptive capacity of ecosystem and infrastructure functions to cope with change and achieve biophysical resilience of the greenway system. In the meantime, the participatory planning process engaging participatory actions help to enhance adaptive and transformative capacity to achieve social and institutional resilience of the social-ecological greenway system.

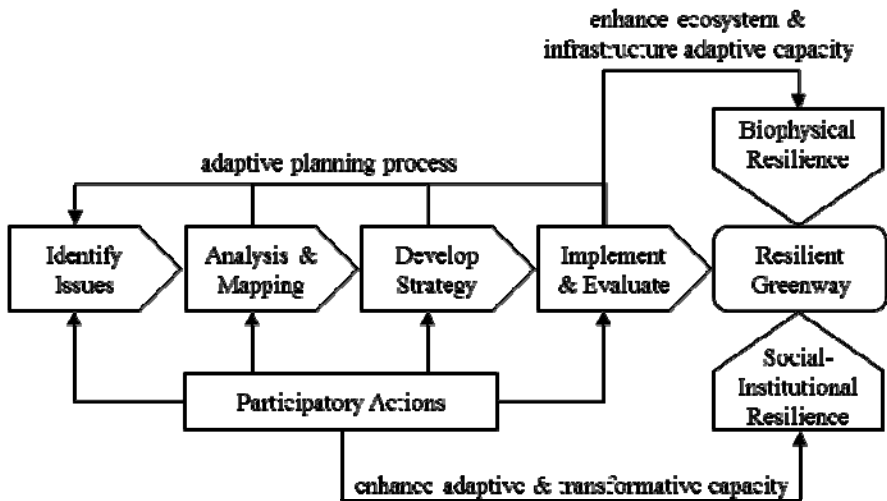


Figure 1. Resilient greenway participatory planning framework

Social-Ecological Systems of Study Area

The rural Town of Kearny with a population of 2000 is located in the middle stream of the Gila River basin and 140 kilometres southeast of the City of Phoenix, Arizona, USA (Figure 2). The town was a planned community

founded in 1945 by a mining company that has since supported local economy. Kearny consists of 40% Hispanic and 20% of population is over 65 years old; both are considered socially vulnerable groups. The population growth rate has been less than 1% in the past five years. The town is aging, the economy is stagnant, and the revenue is shrinking while the town's infrastructure is deteriorating. The town faces multiple natural hazards. For example, the two 100-year floods were 10 years apart in 1983 and 1993 and frequent fires occurred recently in 2013 and 2015.

The 2015 fire has destroyed over 570 hectares of riparian woodlands. The fire site currently is undergoing the exploitation phase in which the ecosystem is restructuring and species are competing with resources to grow in the adaptive cycle of resilience concept (Holling 2011). The invasive plant, Tamarix, is particular a nuisance to the native plant communities (e.g., Populus and Salix) due to its flammability and fast-growing habits. Currently, invasive plants are the front runner of the competition. However, the people of Kearny are chasing behind and seeking to control the invasive species while gaining recreational access to the river and assisting native plants and fauna to be restored in the Gila River greenway system.

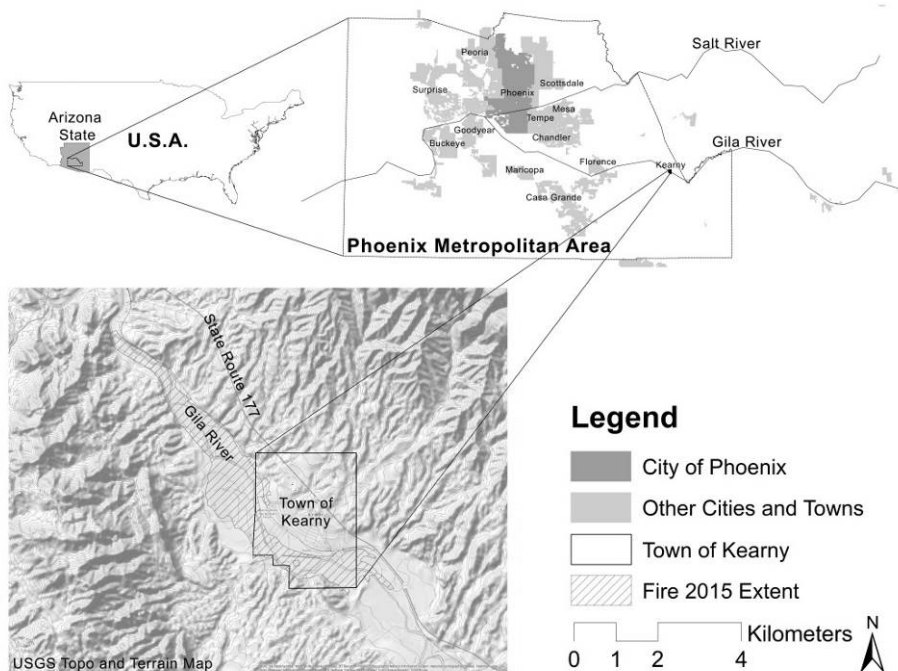


Figure 2. Study area of the Gila River greenway in the Town of Kearny, Arizona, USA, including the extent of 2015 fire that spurs the interest of case study

Goals and Objectives

The recent 2015 fire spurs the interest of applying the resilient greenway participatory planning framework in Kearny. The Gila River greenway system is facing multiple challenges in meeting all ecological, social, and economic goals in sustainability as well as resilience goal of enhancing the adaptive capacity of riparian and native ecosystems in addition to the capacity of the community to adapt to changes and transform to a sustainable state. The main objectives of the project are to 1) restore native riparian ecosystem, 2) mitigate fire and flooding hazards, 3) provide recreational access and amenities adaptive to landscape change (e.g., floods), and 4) use the restoration and recreation plans as a leverage to spur sustainable community development.

Methods

The planning process was designed as part of a landscape architecture design studio in Spring 2016 with 14 senior students at the Arizona State University instructed by the author Cheng. Three community meetings were held in Kearny on January 20, February 24, and April 1, 2016, in corresponding to the first three phases of the planning process (Figure 1). Participatory action methods included focus group discussion primarily with stakeholders in the first meeting. The second meeting was conducted in a design workshop format with four sessions including different participatory tools to engage the community and gather community's inputs: survey questionnaires, mapping exercises (e.g., favourite places, desirable routes to access river, preferred land use, places of significance for town gathering and identify), and semi-structured interviews. The survey questionnaires contain 68 questions related to demographic background, fire, water, mining, town characters, community's vision, preference of recreation activities and accessibility, festival and events, community involvement, favourite places, and general comments for improving quality of life in Kearny. In the third workshop, students firstly presented results from the last workshop and four collaborative preliminary master plans then engaged the participants with small group discussion for gaining their feedback on design strategies. Analysis and mapping were conducted through ArcGIS, computer-aided illustrations, literature review, and content analysis for the data collected from the participatory actions.

Results

The first public meeting were held with 11 local and regional stakeholders as well as ranch owners and local businessmen (Kaufhold, 2016). The second community design workshop was well attended by 32 community members, primarily local residents with a few regional stakeholders (Besich-Lira, 2016).

Discussion

It is the first time for Kearny, a rural small town, to be involved in a planning process led by “outsiders” (aka non-resident researchers and consultants). Warned by the Mayor before the second public meeting, the planning team was cautious about community’s reaction. According to the mayor, some residents who are sceptical about the participatory planning process and have concerns about any proposed design conflicting with self-interests in fact participated in the second design workshop. Many other community members were gracious about having the opportunity for engaging the community with common issues and possible solutions. However, there exist challenges to gain trusts and reach out all community members, including decision-makers (i.e., Town Council members), within a short period of four-month participatory planning process. Further research is needed to engage with the implementation and evaluation phase of the planning process and outcomes to assess the effects of participatory actions on building Kearny’s resilience capacity.

Conclusion

Social-ecological resilience relies on biophysical and social-institutional capacity in adaptation and transformation. Resilience in place-based and context-specific, particularly applies to greenway planning and design. Participatory action in the planning process is particularly critical to enhance social-institutional resilience. This paper proposes a resilient greenway participatory planning framework that can further apply transdisciplinary methodology in the process and apply different planning tools such as scenarios and visualization that help to facilitate consensus building among stakeholders and communities to achieve multiple goals of community-based resilience for long term sustainability.

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