Disaster Recovery Annotated Bibliography - Infrastructure

This document was developed to provide information on the state of knowledge on disaster recovery. This document includes a list of articles collected in the Fall of 2018. To obtain relevant articles, a list of keywords was used to search Google Scholar and University Library Databases. These keywords were: “community disaster recovery”, disaster recovery”, “post recovery planning” “pre disaster planning”, and “national planning recovery”. An additional search of academic journals that are related to the planning field was then undertaken to ensure that articles from these journals were not overlooked. These journals included: Journal of the American Planning Association, Journal of Planning Education and Research, Applied Geography, Land Use Policy, Environment and Planning A, Planning Theory, Progress in Planning. After collecting articles, each article was then systematically reviewed to ensure relevance. The articles needed to address community level recovery (including issues related to housing, economic, infrastructure, planning, etc.) or note issues that affect recovery outcomes (e.g., differences in housing outcomes for rental versus owned housing). Next, we reviewed the reference list of identified articles to determine if any articles had been missed in the initial collection process. If there were additional articles that were missed, we collected the information and searched for the title of the article. After processing each article, the articles were then compiled into the Zotero software.

The Zotero bibliographic database is open to the public to view at:
https://www.zotero.org/groups/2278263/recoveryguidancetamu/items

Infrastructure

Articles focused on infrastructure such as transportation and utilities. These articles DO NOT include specific techniques about building or engineering infrastructures.


As emphasis is being placed on a system’s ability to withstand and to recover from a disruptive event, collectively referred to as dynamic resilience, there exists a need to quantify a system’s ability to bounce back after a disruptive event. This work applies a statistical technique from biostatistics, the proportional hazards model, to describe (i) the instantaneous rate of recovery of an infrastructure system and (ii) the likelihood that recovery occurs prior to a given point in time. A major benefit of the proportional hazards model is its ability to describe a recovery event as a function of time as well as covariates describing the infrastructure system or disruptive event, among others, which can also vary with time. The proportional hazards approach is illustrated with a publicly available electric power outage data set.

This paper discusses the critical role of transportation systems in disaster recovery and the development of any long-term economic effects from earthquakes, based on insights from the Kobe earthquake and other disasters. The occurrence of long-term effects on regional economies has been controversial in the disaster literature and are for the most part ignored in earthquake loss estimation models. However, events such as the Kobe earthquake clearly demonstrate that certain kinds of long-term impacts do occur, at least in catastrophic disasters. Moreover, performance and recovery of transportation systems appear to play a major role in the development of long-term impacts. This arises in large part because transportation infrastructure often requires substantially lengthier repair times than other lifeline systems. Focusing primarily on the Kobe earthquake, this paper identifies two particularly significant examples of long-term effects of the disaster: loss of business at marine ports, and the development of striking intra-urban spatial differentials in disaster recovery. In both cases, this paper argues, transportation loss served to accentuate existing social and economic conditions of vulnerability, alter the competitiveness of places (whether globally or within a region), and thereby lead to long-term loss.


Resilient infrastructure systems are essential for cities to withstand and rapidly recover from natural and human-induced disasters, yet electric power, transportation, and other infrastructures are highly vulnerable and interdependent. New approaches for characterizing the resilience of sets of infrastructure systems are urgently needed, at community and regional scales. This article develops a practical approach for analysts to characterize a community’s infrastructure vulnerability and resilience in disasters. It addresses key challenges of incomplete incentives, partial information, and few opportunities for learning. The approach is demonstrated for Metro Vancouver, Canada, in the context of earthquake and flood risk. The methodological approach is practical and focuses on potential disruptions to infrastructure services. In spirit, it resembles probability elicitation with multiple experts; however, it elicits disruption and recovery over time, rather than uncertainties regarding system function at a given point in time. It develops information on regional infrastructure risk and engages infrastructure organizations in the process. Information sharing, iteration, and learning among the participants provide the basis for more informed estimates of infrastructure system robustness and recovery that incorporate the potential for interdependent failures after an extreme event. Results demonstrate the vital importance of cross-sectoral communication to develop shared understanding of regional infrastructure disruption in disasters. For Vancouver, specific results indicate that in a hypothetical M7.3 earthquake, virtually all infrastructures would suffer severe disruption of service in the immediate aftermath, with many experiencing moderate disruption two weeks afterward. Electric power, land transportation, and telecommunications are identified as core infrastructure sectors.


Abstract In crisis situations, systems, organizations, and people must react and deal with events that are inherently unpredictable before they occur: vital societal functions and thus infrastructures must be restored or adapted as quickly as possible. This capacity refers to resilience. Progress concerning its
conceptualization has been made but it remains difficult to assess and apply in practice. The results of this article stem from a literature review allowing the analysis of current advances in the development of proposals to improve the management of infrastructure resilience. The article: (i) identifies different dimensions of resilience; (ii) highlights current limits of assessing and controlling resilience; and (iii) proposes several directions for future research that could go beyond the current limits of resilience management, but subject to compliance with a number of constraints. These constraints are taking into account different hazards, cascade effects, and uncertain conditions, dealing with technical, organizational, economical, and human domains, and integrating temporal and spatial aspects.


There is considerable research interest on the meaning and measurement of resilience from a variety of research perspectives including those from the hazards/disasters and global change communities. The identification of standards and metrics for measuring disaster resilience is one of the challenges faced by local, state, and federal agencies, especially in the United States. This paper provides a new framework, the disaster resilience of place (DROP) model, designed to improve comparative assessments of disaster resilience at the local or community level. A candidate set of variables for implementing the model are also presented as a first step towards its implementation.


Abstract: This perspectives article uses a postdisaster school recovery research domain to examine two tenets of interdisciplinary research (IDR): integrative problem formulation and synthesis. Advancing interdisciplinary knowledge requires a roadmap of commonalities between disciplinary domains and outcomes of interest. Four school recovery domains - child trauma, educational learning outcomes, school safety, and household and community recovery - are presented to highlight common frameworks for IDR. A case study is also used to illustrate the value of interdisciplinary research and mixed-methods approaches, including statistics, geospatial analysis, and spatial statistics, for answering questions regarding how school contexts and location influence school recovery patterns.


The research examines the shift from flood-resistant policies and plans to flood resilience. We use a case study of New Orleans since Hurricane Katrina to illustrate this unfolding process and the emergence of a “living with water” approach to green infrastructure. The article highlights the challenges of this shifting policy landscape through the case of the Lafitte Greenway, a green infrastructure project that transformed a three-mile corridor of underutilized public land into a linear park running through flood-prone neighborhoods. Through the experience of creating this greenway, planners in New Orleans learned valuable lessons about US disaster rebuilding policies and how to implement green infrastructure in urban neighborhoods.
Natural hazards can cause a wide range of social and economic impacts both to the area directly affected by the hazards as well as to the broader community. Although community resilience is an important aspect that influences post-disaster response and recovery stages, it has not been explicitly studied by most scholars, and is rather taken to be embedded in the socio-economic landscape studied in the literature. Road structures such as bridges, culverts and flood-ways play a vital role in times of natural disasters as their functionality directly influences evacuation, rescue, recovery and reconstruction activities. In addition to the direct benefits derived from road structures, in the event of a disaster, they play a vital role in resilience by connecting individuals and communities. This paper identifies adaptation methods practiced by disaster affected communities targeted at increasing their accessibility and mobility, and analyses how such adaptation activities can minimise the negative effects brought on by the failure of road structures. The paper uses a recent case study from regional Queensland, Australia, to understand how adaptation options vary in rural areas and to explore possible methods to improve resilience of communities.


Researching traditional streetcars’ development impacts is challenging: most U.S. lines operate in downtown areas with many development stimuli. This article addresses that challenge through analysis of New Orleans building permits after Hurricane Katrina. We estimate how post-Katrina permit frequency changes with distance from streetcar stops, controlling for damage, proximity to commercial areas, and pre-Katrina demographics. We find that distance to stops strongly predicts building permits. Residential permits increase with distance to stops; commercial permits decrease. Findings confirm streetcars support commercial development, yet suggest potential displacement of residential uses. Implications for future streetcar projects in New Orleans and elsewhere are discussed.


Land readjustment (LR), a land management technique used to consolidate plots of land for unified planning of infrastructure, servicing, and subdivision (Doebele, 1982), has received increased attention in the past two decades as a planning tool following catastrophic events. The method involves all landowners contributing a portion of their plots for roads and public spaces. The landowners benefit by an increase in the value of their land after LR, while planning authorities are able to provide land for public facilities and infrastructure (Sorensen, 2000). Used for a wide variety of planning objectives such as consolidating agricultural land, converting rural land for urban use, and inner-city revitalization, LR has also extended to post-disaster urban reconstruction.

Spatial planning provides tools to government authorities that support integrated response strategies as part of the disaster management but regional communities outside of the metropolitan areas often lack the necessary capacity and resources to implement these approaches. Unlike in the USA, there are no guidelines for transportation planners in coping with post-disaster situations in Japan. There is a substantive literature on institutions, concepts of urban sustainability and resilience, community engagement and travel behavioral adjustments to natural disasters and man-made disruptions to transportation supply in the emergency phase but only limited research into travel demand modeling in the recovery phase. This paper focuses on the recovery phase – and constructs conceptual and operational demand and supply models for the recovery phase to help seek options for more sustainable outcome. The methodology is applied to the city of Ishinomaki, Japan, one of the many regional communities devastated by the March, 2011 earthquake and tsunami where only limited capacity and data are available. Future hypothetical scenarios for the city are analyzed to illustrate the potential practicality of the proposed methodology with the indicators of travel performance of the scenarios in the case study area. The paper concludes with implication to planning, including the full re-location of peninsular villages, and further research needs.


Hazard research has made significant strides over the last several decades, answering critical questions surrounding vulnerability and recovery. Recently, resilience has come to the forefront of scholarly debates and practitioner strategies, yet there remain challenges implementing resilience in practice, the result of a complex web of research that spread across numerous fields of study. As a result, there is a need to analyze and reflect on the current state of resilience literature. We reviewed 241 journal articles from the Web of Science and Engineering Village databases from 1990 to 2015 to analyze research trends in geographic location of studies, methods employed, units of analysis, and resilience dimensions studied, as well as correlations between each of these categories. The majority of the studies analyzed were conducted in North America, used quantitative methods, focused on infrastructure and community units of analysis, and studied governance, infrastructure, and economic dimensions of resilience. This analysis points to the need to: (1) conduct studies in developing country contexts, where resilience is particularly important; (2) employ mixed-methods for additional depth to quantitative studies; (3) connect units of analysis, such as infrastructure and community; and (4) expand on the measurement and study of environmental and social dimensions of resilience.


The concept of community resilience is increasingly being embraced as a framework for enhancing disaster readiness and response capability. Understanding the resources that yield community resilience is a critical research challenge and has the potential to inform policies across the homeland community. Informants other than designated public officials are needed to provide a “grass-roots” perspective on community resilience. We surveyed a sample of school principals who served as “key informants” about the communities in which their schools were located. Our primary goals were first, to determine if our survey could provide a good measure of resilience adaptive capacities and, second, to evaluate the effectiveness of principals as key informants for the capacities of Social Capital, Economic Development,
Community Competence, and Information and Communication related to disaster responses. Using data from 887 principals (RR 17%), survey items loaded highly on their intended factors in exploratory factor analyses. In tests of within-subjects effects, mean scores for the capacities were significantly different from each other. A significant between-subjects effect showed that principal ratings of community resilience varied according to level of school poverty so that economic resources widely diverged by level of school poverty. We concluded that our survey was effective in measuring resilience capacities with a population of geographically diverse principals although responses were low. While principals are in a role to identify capacities and provide disaster leadership, engaging them was challenging and requires buy-in from district/state education institutions.


This study bridges a gap between public library and emergency management policy versus practice by examining the role of public libraries in the community resource network for disaster recovery. Specifically, this study identifies the opportunities and challenges for public libraries to fulfill their role as a FEMA-designated essential community organization and enhance community resilience. The results indicate there are several opportunities for libraries to enhance community resilience by offering technology resources and assistance; providing office, meeting, and community living room space; serving as the last redundant communication channel and a repository for community information and disaster narratives; and adapting or expanding services already offered to meet the changing needs of the community. However, libraries also face challenges in enhancing community resilience, including the temptation to overcommit library capacity and staff capability beyond the library mission and a lack of long-term disaster plans and collaboration with emergency managers and government officials. Implications for library and emergency management practice and crisis research are discussed.


“People first” is one of the guiding principle of post-earthquake recovery and reconstruction (PERR) in China. Residents’ satisfaction should be one of the objects of PERR. The article examines the satisfaction level of residents in Lushan county of Sichuan Province, an area stricken both by the Wenchuan Ms8.0 earthquake in 2008 and the Lushan Ms7.0 earthquake in 2013. Census data and factor analysis were used for analysis. Based on the result of data analysis, eight factors are selected to indicate residents’ satisfaction: the relation of resident, infrastructure and employment, social security, the effect of disaster mitigation, natural environment, social affair, owner-occupied housing, price of commodities. Based on result of this study, some recommendations are put forward.


Destructions resulted from natural hazards like earthquake, landslide, or flood in the urban roads and lifelines introduce their negative effects including the psychological damage to citizens as well as decreased urban functions that usually last for a long time. Thus, a quick and efficient recovery of infrastructures, lifelines, and service-providing facilities along with reducing reconstruction costs and time are essential. This paper proposed an approach that consists of four models for forming an algorithm in order to quantitating and integrating of the criteria that have decisive influence in the recovery of urban roadways after a natural disaster. Meanwhile, to aggregate and conclude the data that are collected by
means of presented functions and formulations, we applied fuzzy VIKOR technique as a compromise ranking method. The model outputs a priority list showing the revival of which urban paths stands in higher priority for recovery operation after a natural disaster. Results show that not only the model is able to precisely quantize the selected criteria and provide an action plan for post-event recovery prioritization, but also it offers an appropriate order of transportation roads priority for recovery operations. Finally, the results from the recovery model application to a roadway system in Tehran area are provided.