

# Conceptualisation of Disaster Recovery: A Harmonisation of Theoretical and Conceptual Arguments for Effective Assessment and Comparison

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## Abstract

Despite the general recognition of the importance of disaster recovery in disaster management efforts, there is conceptual confusion among researchers and practitioners over the appropriate paradigm to assess disaster recovery. Whereas some writers argue that disaster recovery should be measured in relation to the pre-disaster conditions, others contend that disaster recovery should be measured in reference to a counterfactual state, which would have existed if the disaster had not occurred. This conceptual confusion has made it difficult to develop a comprehensive theory to explain disaster recovery. It has also created methodological challenges in comparing disaster recovery efforts across institutions and countries. Disaster recovery is the most poorly understood and least well researched among researchers and practitioners in the disaster management cycle. At the operational level, broad knowledge of what to do is still lacking, and thus the ability to act properly and effectively also is deficient. Although this problem has been recognised for over 25 years, little has been done to address it. This study sought to contribute to the building of knowledge and understanding on disaster recovery by harmonising the various arguments advanced to measure the concept. The study used the Darwin's evolution theory to explain the recovery processes following disaster. The main elements presented in the various conceptualisations of disaster recovery were discussed under the study and concluded that disaster recovery should be conceptualised as the deliberate incorporation of hazard mitigation mechanisms, through both endogenous and exogenous efforts, to restore disaster victims and impact areas to pre-disaster situation.

**Keywords:** Conceptualisation of disaster recovery, Disaster, Disaster recovery, Disaster recovery framework, Theoretical argument for disaster recovery

## 1. Introduction

Disasters are exogenous shocks that destroy and erode development gains of people, businesses and economies. Carter, Little and Mogue (2007) argue that disasters have longer-term adverse consequences on economic growth and development. At the macro level, disasters affect development through physical damage to infrastructure and productive capital, which in the long term may impact on productivity and growth (Heger, Julca & Paddison, 2008). In spite of the devastating impact of disasters, it is not practically possible to protect all areas against their occurrence. Thus, disasters are inevitable and as such there is always the need for swift recovery activities for effective physical, social, economic and psychological restoration.

Despite the general recognition of the importance of disaster recovery in disaster management efforts, Lloyd-Jones (2006) posits that there is conceptual confusion among researchers and practitioners over the appropriate paradigm to measure disaster recovery. Chang (2010) references three different ways to conceptualise recovery: returning to pre-disaster conditions, attaining what would have occurred without the disaster, or reaching a new stable state. Traditionally, post-disaster recovery consisted of restoring disaster impact areas to pre-disaster situations by repairing the physical damage that has been induced by a disaster (Smith & Wenger, 2006). However, Kennedy, Ashmore, Babister and Kelman (2008) and Lyons (2009) point out that rebuilding the built environment and infrastructure exactly as they were prior to a disaster often re-creates the same hazards and vulnerabilities that existed earlier. In other words, restoring disaster impact areas to pre-disaster standards would expose the communities to the same difficulties and vulnerabilities if another disaster occurs in the future.

Alesch, Arendt and Holly (2009) also argue that disaster impact areas hardly return to pre-disaster form as they struggle to build resilience in the post-disaster era. Lewis (2003) and Kijewski-Correa and Taflanidis (2012) note that recovery efforts present opportunity to address issues about vulnerability found in communities. As a result of witnessing the on-going impacts of disasters on communities, another concept emerged where post-disaster recovery was taken as an opportunity to not only to reconstruct what was damaged and return the community to its pre-disaster state, but also to seize the opportunity to improve its physical, social, environmental and economic conditions to create a new state of normalcy that is more resilient and sustainable (Boano, 2009; Khasalamwa, 2009).

In spite of the general recognition given to building more resilient and sustainable communities in post-disaster recovery, Mannakkara (2014) reports that the use of that paradigm in implementing and assessing recovery efforts has not been entirely successful. This was attributed to the poor understanding of the concept of

disaster resilient communities and failure to effectively bridge the gap between theory and practice through clear strategies, indicators and methodological frameworks (Boano, 2009; Khasalamwa, 2009; Lyons, 2009). This study addressed the conceptual confusion surrounding disaster recovery by providing an alternative conceptualisation of post-disaster recovery that can be used as a methodological framework for assessing recovery efforts.

## **2. Laying a theoretical argument to explain the disaster recovery process**

Previous attempts have been made to lay down a theory to explain disaster recovery process, notable among them is the National Science Foundation (NSF) theory of recovery workshop in 2010. The workshop tasked both researchers and practitioners to setup agenda to develop a theoretical and conceptual framework for disaster recovery within a period of five years. However, no comprehensive theoretical and conceptual arguments have since been put forward to harmonise all the various views and approaches used to assess disaster recovery. This paper used the adaptation theory by Darwin (1872) to explain the disaster recovery process.

The theory of adaptation was used to explain an organism's ability to adapt to changes in its environment and adjust accordingly over time. According to Darwin, adaptations occur over a long period through learning and experience to make an organism better suited to new environment. This study, therefore, relates the process by which organisms adapt to new environment to disaster recovery process. In other words, the exposure of an organism to a new environment which threatens its survival was likened to disaster event which also poses threat to the physical survival and socio-economic development of victims as well as the survival and growth of businesses.

In disaster recovery, adaptation refers to the processes and support systems adopted by victims to adjust their activities to aid survival, rejuvenate their businesses, and recover from post-traumatic stress disorder. Socio-economic change is regarded as an adaptive response to catastrophic events, which disrupts the normal functioning of socio-economic actors and activities (Adger, Brooks, Bentham, Agnew, & Eriksen, 2004). Disasters always affect some parts of an integrated social system, and create tension between the affected parts and the other parts of the system. Such tensions could only be resolved by adaptive changes in the behaviour, relationship, support and effort from both the affected and non-affected parts. Adaptive changes in disaster recovery are necessary to re-establish equilibrium among societal parts. The 'adaptive equilibrium' forms the foundation for socio-economic rejuvenation from disasters.

However, Darwin (1872) outlines the five natural selection process which makes some victims re-establish equilibrium and recover more quickly than others. Natural selection describes the way victims adapt to disaster situations making them more able to survive and recover. The five natural selection process are explains as follows:

1. Variation is differences between individuals. In disaster recovery, differences among victims could be sex, literacy level, educational level, type of business, number of dependents, and size of social network. Such variations could explain differences in response rate among disaster victims towards recovery.
2. Variations can increase the likelihood of a victim recovering from disaster.
3. When there are too many disaster victims they must compete for limited resources and opportunities. However, this could limit the effectiveness of institutions and support systems for quick disaster recovery. As a result, victims with extensive and high social capital and network system are more likely to recover quickly than those with limited social network and capital.
4. Victims that successfully recover from disasters become more resilient to subsequent disasters and can share their experiences with relatives and neighbours. The implication is that victims with more disaster experiences may have more knowledge and skills to adapt to the situation and would be more aware of the available support systems to recover quickly from disaster than victims without any experience.
5. Over time the many small changes accumulate. Recurrence of disasters would reduce business size of victims, and deteriorate their socio-economic conditions. Losses through disasters would also make it a disincentive for insurance companies and other financial institutions to transact business with victims.

Darwin (1872) proposes two issues when habitat changes: habitat tracking and genetic change or extinction. Habitat tracking and extinction refers to when a victim uses his or her own resources to restore his or her socio-economic conditions to pre-disaster era. Thus, an individual's own resources in terms of savings and insurance packages provide the immediate source of relief to disaster victims. Consequently, when a victim has little or no resource backup for immediate relief, the results become precarious including collapse of businesses, post-traumatic stress disorders, and poverty. Genetic change, on the other hand, refers to when natural selection allows a victim with good social network, particular gender, and educational level to have an advantage over others in terms of securing support for recovery.

## **3. Harmonizing various conceptual arguments on disaster recovery**

Due to the lack of a coherent theory to explain the disaster recovery process and its multi-discipline nature,

disaster recovery means different things to different people in different professions in different organisations at different spatial locations, at different times and with different levels of development. For an engineer, disaster recovery may mean restoring electric power in disaster impact areas. For community development specialists or district majors, disaster recovery may mean repairing damaged facilities or replacing those that are destroyed. For municipal finance officers, recovery may mean re-establishing a property tax base that generates sufficient revenue to make the municipality solvent. To the ordinary citizen disaster recovery may mean removing the visual evidence of the disaster's physical effects.

Nevertheless, Kennedy (2009) opines that long after the debris is removed and the scars on disaster impact areas are covered, individuals and businesses continue to experience psycho-economic impact of disaster events. Some firms collapse because of their inability to adapt to changes in their operational environment, whilst some individuals undergo post-traumatic stress disorder with its debilitating toll on their health, economic activities and household welfare. A careful examination of the processes by which victims adapt and emerge from disaster situations are critical for the development of the disaster recovery discipline. The various conceptualisations to explain disaster recovery are, therefore, expected to lay strong foundation for the development of a logical and multidisciplinary theoretical framework for disaster recovery.

Smith and Wenger (2006) describe disaster recovery as "the differential process of restoring, rebuilding, and reshaping the physical, social, economic, and natural environment through pre-event planning and post-event actions." This definition highlights the reality that disaster recovery involves more than the physical reconstruction of the built environment, as suggested by earlier researchers such as Hass, Kates and Bowden (1977). The definition also implies that disaster recovery is not a simple linear process that is unilaterally applied to disaster victims in a particular geographical unit. It is influenced by key socio-economic and environmental dimensions, which explain the different response rates of disaster victims to recovery interventions. This explains why Anderson (2008) asserts that disaster recovery is an intricate and puzzling process that demands attention from many sectors of a society as well as outside interests.

Haddow, Bullock and Coppola (2008) contend that disaster recovery process necessitates harmonising the short-term needs to restore impact areas to normalcy with the longer-term goal of reducing future vulnerability. Disaster recovery processes involve issues, decisions and actions that should be made after the short-term needs have been addressed. Accordingly, the Federal Emergency Management Agency (FEMA) in the United States has adopted three temporal phases to explain its disaster response: emergency phase (24 hours to 2 – 3 weeks); relief phase (a week to half a year); and recovery phase (several weeks to 10 years). The aim is to ensure a balance between the short-term and long-term needs of victims to guarantee successful recovery to as many victims as possible. However, the associated timelines may differ across countries based on the type, intensity and impact of a disaster as well as resource availability.

In many cases, however, it is difficult to know if recovery has been achieved and the time it was accomplished because of several and different stakeholder goals for disaster impact areas (Anderson, 2008). Thus, while some researchers and organisations want disaster impact areas to return to their pre-disaster status, others want them to undergo change to realise a vision in which progresses are made in reducing risk. Consequently, disaster recovery is currently more conceptualised as a dynamic process without a distinct endpoint. According to Olshansky (2004), the use of recovery phases is believed to oversimplify the disaster recovery process and does not clearly depict how in reality, the overlapping roles and interactions from various stakeholders. Smith and Wenger (2006), therefore, recommend that more attention should be focused on the inequalities that are created by disasters and the recovery process.

Another conceptualisation is that disaster recovery should be measured in reference to a counterfactual state, which would have existed if the disaster had not occurred. An empirical study on managing post-disaster recovery of market fire victims in Ghana (Makola, Kantamanto and Kumasi Central markets) to test the conceptual framework (ref. to the Figure) showed that while some of the non-affected traders benefited from the disasters by capturing the suppliers and customers of the victims to expand their businesses, others complained of significant reduction in the number of people entering the markets due to fear of disaster recurrence leading to poor business performance (sales, working capital, employment levels and profitability). Since the business activities of the non-affected are indirectly influenced by the disasters, measuring disaster recovery against such counterfactuals (non-affected) could be misleading.

According to Lloyd-Jones (2006), disaster recovery involves the adoption of programmes and strategies to regain some semblance of normalcy following a disaster. In that context, disaster recovery has often implied a return to the status quo ex ante. Conceptualising disaster recovery through Lloyd-Jones' definition suggests working to return to conditions as they were before the event. Increasingly, the notion of restoring or replacing that which existed before the event has been diffused by incorporating measures to reduce risks to disaster impact areas from recurrence of a similar extreme event and building 'disaster resilient' and 'sustainable' communities. The principal argument of researchers projecting issues about disaster resilient and sustainable communities in disaster recovery is that restoring disaster impact areas to pre-disaster conditions would

introduce same hazards that led to the disaster and could trigger the recurrence of that disaster (Walker & Salt, 2006).

However, disaster recovery would remain an elusive concept without any reference to pre-disaster situations. This is because there would be no benchmark for assessing the adequacy of recovery efforts. An essential element used to characterise sustainable communities is resistance to disasters. Nonetheless, at what point could a community be described as disaster resilient or sustainable? Is it when a community suffers a minimal or no loss from a single event or multiple events? What levels of minimal losses would constitute disaster resilience? How many events would constitute the characterisation of a community as disaster resistant or sustainable community? What scale or magnitude of disaster event should a community resist before it could be termed as disaster resistant?

These questions could properly be answered when special reference is made to pre-disaster situations. Reference to pre-disaster situations would enable disaster management institutions and practitioners to clearly measure the impact factor of disaster as well as incremental progress towards achieving post-disaster recovery. Pre-disaster situations should, therefore, remain the minimum benchmark for measuring disaster recovery efforts and programmes. An appraisal of pre-disaster situations would give clear indicators and targets by which recovery efforts should aim to achieve.

However, in order to avoid the recurrence of disaster after restoration to pre-disaster events, hazard mitigation strategies should be deliberately incorporated into the restoration process. Disaster recovery should, therefore, be concerned basically with the reconstruction of infrastructure, and re-establishing the social and economic life of the disaster impact area with the deliberate incorporation of hazard mitigation measures as a major goal. This means that hazard appraisal and mitigation are critical elements in ensuring successful and complete post-disaster recovery. This process would make disaster victims more resilient to disaster.

Since disaster victims are the ultimate beneficiaries of post-disaster recovery efforts, their involvement in the identification and mitigation of hazards should be very paramount. This is because their ability to identify potential hazards and find mechanisms to control them is essential in avoiding the recurrence of disasters. In developing countries, social capital and community organisations with strong leadership are crucial for ensuring quick disaster recovery and providing maximum satisfaction to the community (Fujieda, Nakagawa, Shaw, Kobayashi & Kobayashi, 2004). National recovery programmes must, therefore, be accommodative and include local opinions into disaster recovery processes. It is also essential to provide communities the necessary skills, guidance and technical support to contribute effectively in the disaster recovery process.

From the above discussion, it can be concluded that the conceptualisation of disaster recovery should start by assessing the pre-disaster situation. Analysis of the pre-disaster situation would serve as a guide on what and how post-disaster recovery should be. Appraisal of pre-disaster situation would also inform the recovery process about the hazards victims were exposed to and how to reduce or eliminate the hazards during restoration to avoid or reduce recurrence of disasters. Disaster recovery could be said to have been achieved if hazard mitigation mechanisms are deliberately incorporated into the recovery process to restore disaster impact areas and victims to pre-disaster situation. The inclusion of hazard mitigation mechanisms would help to achieve sustainable disaster recovery as has been advocated by Gardoni and Murphy (2008), that sustainable recovery process would not only recreate pre-disaster situations, but would instead aim to ensure an improved quality of life for members of the disaster-stricken communities in both the immediate and long-term.

In other words, restoring disaster impact areas to pre-disaster situation without any deliberate effort to eliminate pre-disaster hazards could not be said to have achieved complete or sustainable disaster recovery. Accordingly, disaster recovery should aim to ensure that future generations are not undermined by the recovery efforts. The involvement of disaster victims in the identification and controlling of potential hazards is key in ensuring complete disaster recovery. Disaster recovery is, therefore, conceptualised as the deliberate incorporation of hazard mitigation mechanisms, through both endogenous and exogenous efforts, to restore disaster victims and impact areas to pre-disaster situation. Endogenous efforts explain the use of personal savings, insurance and other resources to ensure recovery, while exogenous efforts show external support from formal and informal institutions to ensure successful restoration of disaster victims.

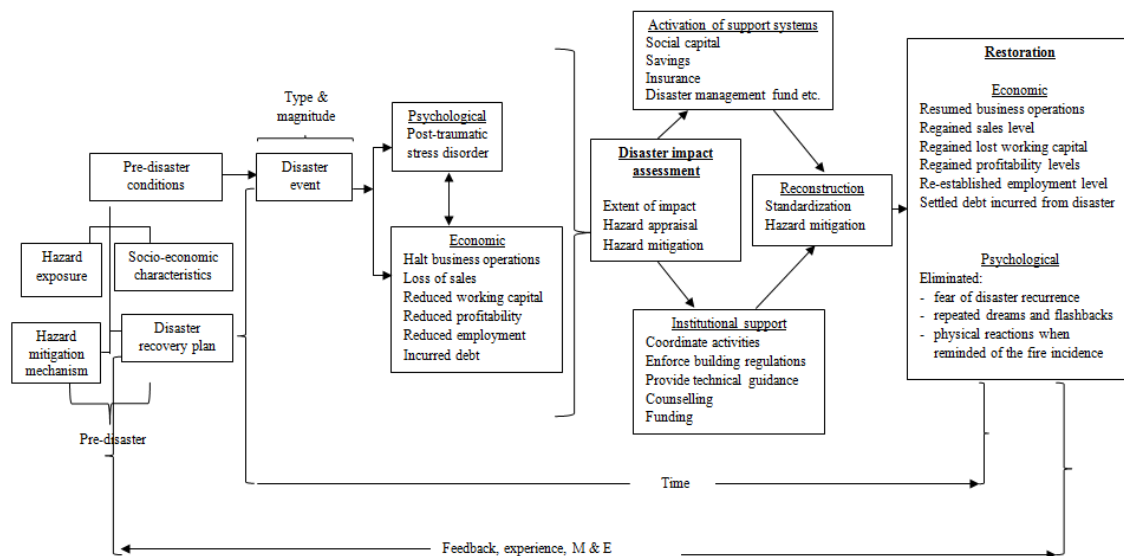
#### **4. Conceptual framework for managing post-disaster recovery**

This section presents a conceptual framework for managing post-disaster recovery. The Figure presents a framework for managing post-disaster recovery. The section was supported by an empirical study on managing post-disaster recovery of market fire victims in Ghana. This study was conducted by the author in 2015 to analyse the extent of recovery of fire victims in three markets (Makola, Kantamanto and Kumasi Central Markets) in 2012. The aim of this empirical support was to test the practicability of the conceptual framework as a model for measuring discovery. From the framework, disaster impact assessment should precede every recovery effort after disaster event. Thus, it very imperative that every post-disaster recovery efforts should be preceded by clearly focused assessment of the disaster impacts. Per the conceptualisation of disaster recovery,

managing post-disaster recovery is a function of both pre-disaster and post-disaster activities.

The extent of recovery from disaster is measured against the degree to which victims are getting close to pre-disaster situation with deliberate incorporation of hazard mitigation mechanisms in the process to avoid the recurrence of the disaster and vulnerability situations. As a result, disaster impact assessment should clearly examine pre-disaster conditions. This provides the benchmark for which disaster recovery could be measured against. In other words, an assessment of disaster recovery without any reference to pre-disaster situation may lack clear focus and baseline indicators or targets upon which recovery could be measured against. From the empirical study on the markets, they were exposed to electrical hazards through overloading of metres, non-standardised use of electrical cables to draw power, and illegal electrical connections; fire hazards from indiscriminate use of fire for different purposes, in different locations, at different times, and by different people; poor leadership to control and regulate activities in the markets; and poor knowledge in hazard mitigation mechanisms by the traders. Accordingly, disaster recovery efforts should try to deliberately assess these pre-disaster conditions and carefully institute measures to address them in the process. This is to help avert the recurrence of same or similar disasters in the future.

The level of disaster impact on people and businesses as well as the degree and speed towards disaster recovery largely depend on pre-disaster activities. The basic framework of disaster by Wisner, Blaikie, Cannon and Davis (2004) shows that the effects of disaster are determined by pre-impact conditions – hazard exposure and hazard mitigation practices. Alesch et al. (2009) also report that drawing a disaster recovery plan before a catastrophic event is critical for determining the impact of disaster, trajectory and speed of recovery. Accordingly, disaster impact assessment should examine and factor into the recovery process the level of pre-disaster hazard exposure, hazard mitigation mechanisms, disaster recovery plan as well as socio-economic characteristics of the victims. The empirical study showed that disaster victims who had disaster recovery plan (in the form of backup savings, insurance and business branches in other locations, among others), prior to the incidence, were able to quick start their recovery process ahead of those who did not have.



**Figure:** Framework for Managing Post-Disaster Recovery  
 Source: Authors' Construct (2017)

Pre-disaster management activities inform the type and magnitude of disaster, and impact of disaster on people and businesses. However, one should note that disaster impact assessment and recovery should be directed towards particular thematic issues including economic and psychological issues. This is because the level of damage and the progress of recovery are measured and interpreted differently depending on the thematic issue. Disaster causes damage to economic gains of victims which leave them with post-traumatic stress disorders. It should, however, be noted that the economic and psychological impacts from disaster are related. They both influence one another to produce the overall impact of disaster on people and businesses.

After the disaster impact assessment, while victims use the assessment information to activate their support systems by generating resources from social networks, savings, insurance and disaster management funds, disaster management institutions use such information to coordinate disaster recovery efforts, establish and enforce building codes and regulations, and provide technical assistance to victims and counselling to the traumatised. From the empirical study, disaster victims with wide social network and capital were able to resume business operations earlier than those with small social network. Social capital support were in the form of labour, counselling and cash. In addition, whereas market fire victims with disaster recovery plans, prior to the

disaster, used their personal resources to resume operations, those without recovery plans largely relied on external support (friends, families, banks and state institutions). This shows how dynamics in post-disaster recovery activities are explained by pre-disaster conditions.

Reconstruction towards recovery continues after the establishment of clear institutional guidelines and generation of resources through support systems. The institutional guidelines and lessons from the assessment are used to establish standards for reconstruction. Hazard mitigation mechanisms are also adopted during the reconstruction to avoid the recurrence of disaster. It is expected that the adoption of standardisation and hazard mitigation mechanisms to reconstruct affected physical and economic resources through both institutional and individual efforts would enable victims to recover by achieving pre-disaster psycho-economic indicators. The incorporation of standardisation and hazard mitigation mechanisms in the reconstruction process would help to ensure sustainable disaster recovery. Some of the standards and regulations established by the state institutions were using only 6mm of electrical cables to draw power from the metres to the shops, certifying electrical companies who could work in the markets, and closing the markets after 6pm. Education programmes were also organised for the traders on hazard identification and mitigation mechanisms. However, it was revealed that the establishment and adoption of hazard mitigation mechanisms in the markets required strong institutional commitment and resources to monitor, enforce and sanction offenders. It also required the self-conviction of the victims for the need to change to stem the recurrence of disasters. This was because the victims were generally adamant to change and were also not ready to bear the associated cost. As a result, strong market leadership at the Kantamanto Market organised the victims to construct a common pavilion sheds with individual demarcations and uniform practices in terms of electrical wiring, construction materials, and use of fire. Such an organised system helps to eliminate the pre-disaster hazards and propels the market to a disaster resistant area of doing business.

However, the time taken between the disaster event and recovery is very paramount. This is because any small delay could disproportionately aggravate the negative impacts of disasters on people and businesses. Consequently, the time and sequence taken to complete assessment, activate support systems, establish institutional support system, and reconstruction are critical elements to guarantee quick, successful and sustainable disaster recovery. Delays in disaster assessment by state institutions in the three markets led to the further destruction of wares through rains and decay, while others complained of stolen goods which were not affected by the infernos.

After recovery, the disaster management institutions continue to monitor and evaluate activities in the disaster impact area to ensure that people uphold the standards and hazard mitigation practices. The 'District Disaster Management Committee', comprising the District Assembly, National Disaster Management Organisation, Ghana National Fire Service, Electricity Company of Ghana, and Ghana Water Company Limited, has stepped up its monitoring activities in the markets to ensure that traders are adhering to the set standards and regulations. The victims would also use their lessons and experiences in the disaster to strengthen their conditions to make them more resilient to subsequent disaster. From the empirical study, the traders have subscribed to 'susu' (small savings schemes), opening branches in other locations, diversifying their businesses, and subscribing to insurance policies to enhance their recovery processes in the wake of any other disaster in the future.

## 5. Conclusion

Disaster recovery is a critical stage in the disaster management cycle as disasters are inevitable. Clarity about the conceptualisation and measurement of disaster recovery is necessary enhance the development of discipline and boost recovery efforts. However, the most essential element in all disaster recovery arguments is to improve resilience of people and communities through clear-cut objectives and targets towards subsequent disasters. Disaster recovery is conceptualised as the deliberate incorporation of hazard mitigation mechanisms, through both endogenous and exogenous efforts, to restore disaster victims and impact areas to pre-disaster situation. This definition and conceptualisation of disaster recovery harmonise the critical tenets of all the various arguments advanced to explain the assessment of disaster recovery.

## References

- Adger, W. N., Brooks, N., Bentham, G., Agnew, M., & Eriksen, S. (2004). *New indicators of vulnerability and adaptive capacity* (Technical Report 7). Norwich: Tyndall Centre for Climate Change Research.
- Anderson, W. A. (2008). *Recovering from disaster: A summary of the October 17, 2007 workshop of the disasters roundtable*. Washington, DC: The National Academies Press.
- Boano, C. (2009). Housing anxiety, paradoxical spaces and multiple geographies of post tsunami housing intervention in Sri Lanka. *Disasters*, 33(4), 762-785.
- Carter, M. R., Little, P., & Mogue, T. (2007). Poverty traps and natural disasters in Ethiopia and Honduras. *World Development*, 35(5), 835-856.

- Chang, S. E. (2010). Urban disaster recovery: A measurement framework and its application to the 1995 Kobe earthquake. *Disasters*, 34(2), 303-327.
- Darwin, C. (1872). *The origin of species* (6th ed.). London, UK: Senate.
- Fujieda, A., Nakagawa, R. Y., Shaw, R., Kobayashi, H., & Kobayashi, M. (2004). *Roles of social capital and community organizations in the recovery process: Experience from Kobe and Gujarat Earthquakes*. Paper presented at First International Conference of Urban Disaster Reduction, Kobe, Japan, January 19, 2004.
- Gardoni, P., & Murphy, C. (2008). Recovery from natural and man-made disasters as capabilities restoration and enhancement. *International Journal of Sustainable Development and Planning*, 3(4), 1-17.
- Haddow, G., Bullock, J. A., & Coppola, D. (2008). *Introduction to emergency management* (3rd ed.). Burlington, Massachusetts: Butterworth-Heinemann.
- Hass, J. E., Kates, R. W., & Bowden, M. J. (1977). *Reconstruction following disaster*. Cambridge, MA: The Massachusetts Institute of Technology Press.
- Heger, M., Julca, A., & Paddison, O. (2008). Analysing the impact of natural hazards in small economies: The Caribbean case (UNU-WIDER Research Paper 2008/25). *Natural Hazards and Earth System Sciences*, 9, 913-925.
- Kennedy, J. (2009). Disaster mitigation lessons from "build back better" following the 26 December 2004 Tsunamis. In J. Ashmore, E. Babister, I. Kelman, & J. Zarins (Eds.), *Water and urban development paradigms* (pp. 297-302). London, England: Taylor and Francis Group.
- Kennedy, J., Ashmore, J., Babister, E., & Kelman, I. (2008). The meaning of 'build back better': Evidence from post-tsunami Aceh and Sri Lanka. *Journal of Contingencies and Crisis Management*, 16(1), 24-36.
- Khasalamwa, S. (2009). Is 'build back better' a response to vulnerability? Analysis of the post-tsunami humanitarian interventions in Sri Lanka. *Norwegian Journal of Geography*, 63(1), 73-88.
- Kijewski-Correa, T., & Taflanidis, A. (2012). The Haitian housing dilemma: Can sustainability and hazard-resilience be achieved? *Bulletin of Earthquake Engineering*, 10(3), 765-771.
- Lewis, M. (2003). Cause, consequence and control; Towards a theoretical and practical model of operational risk. *Journal of Operations Management*, 21(2), 205-224.
- Lloyd-Jones, T. (2006). *Mind the gap! Post-disaster reconstruction and the transition from humanitarian relief*. London, UK: Royal Institution of Chartered Surveyors.
- Lyons, M. (2009). Building back better: The large-scale impact of small-scale approaches to reconstruction. *World Development*, 37(2), 385-398.
- Mannakkara, S. (2014). *A framework for building back better during post-disaster reconstruction and recovery*. Unpublished doctoral thesis. University of Auckland. Auckland, New Zealand.
- Olshansky, R. B. (2004). *Toward a theory of community recovery from disaster: A review of existing literature*. Paper presented at First International Conference of Urban Disaster Reduction, Kobe, Japan, January 19, 2004.
- Rubin, C. B. (2009). Long term recovery from disasters – The neglected component of emergency management. *Journal of Homeland Security and Emergency Management*, 6(1), 1-17. doi:10.2202/1547-7355.161.
- Smith, G., & Wenger, D. (2006). Sustainable disaster recovery: Operationalizing an existing framework. In H. Rodriguez, E. Quarantelli, & R. Dynes (Eds.), *Handbook of disaster research* (pp. 234-257). New York, NY: Springer.
- Walker, B. H., & Salt, D. (2006). *Resilience thinking: Sustaining ecosystems and people in a changing world*. Washington, D.C: Island Press.
- Wisner, B., Blaikie, P., Cannon, T., & Davis, I. (2004). *At Risk: Natural Hazards, People's Vulnerability and Disasters* (2nd ed.). London, UK: Routledge.