



NOVA

University of Newcastle Research Online

nova.newcastle.edu.au

Erdiaw-Kwasie, Michael Odei; Abunyewah, Matthew; Yamoah, Owusua. "After the disaster comes destination thoughts': A review and conceptualization of consolidative disaster adaptive capacity model". *International Journal of Disaster Risk Reduction* Vol. 35, Issue April 2019, no. 101098 (2019)

Available from: <http://dx.doi.org/10.1016/j.ijdr.2019.101098>

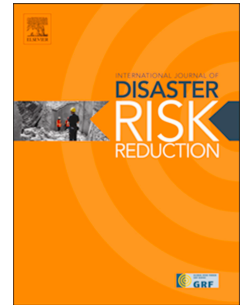
© 2019. This manuscript version is made available under the CC-BY-NC-ND 4.0 license
<http://creativecommons.org/licenses/by-nc-nd/4.0/>

Accessed from: <http://hdl.handle.net/1959.13/1403217>

Accepted Manuscript

'After the disaster comes destination thoughts': A review and conceptualisation of consolidative disaster adaptive capacity model

Michael Odei Erdiaw-Kwasie, Matthew Abunyewah, Owusua Yamoah



PII: S2212-4209(18)31182-8

DOI: <https://doi.org/10.1016/j.ijdr.2019.101098>

Article Number: 101098

Reference: IJDRR 101098

To appear in: *International Journal of Disaster Risk Reduction*

Received Date: 14 October 2018

Revised Date: 18 February 2019

Accepted Date: 18 February 2019

Please cite this article as: M.O. Erdiaw-Kwasie, M. Abunyewah, O. Yamoah, 'After the disaster comes destination thoughts': A review and conceptualisation of consolidative disaster adaptive capacity model, *International Journal of Disaster Risk Reduction* (2019), doi: <https://doi.org/10.1016/j.ijdr.2019.101098>.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

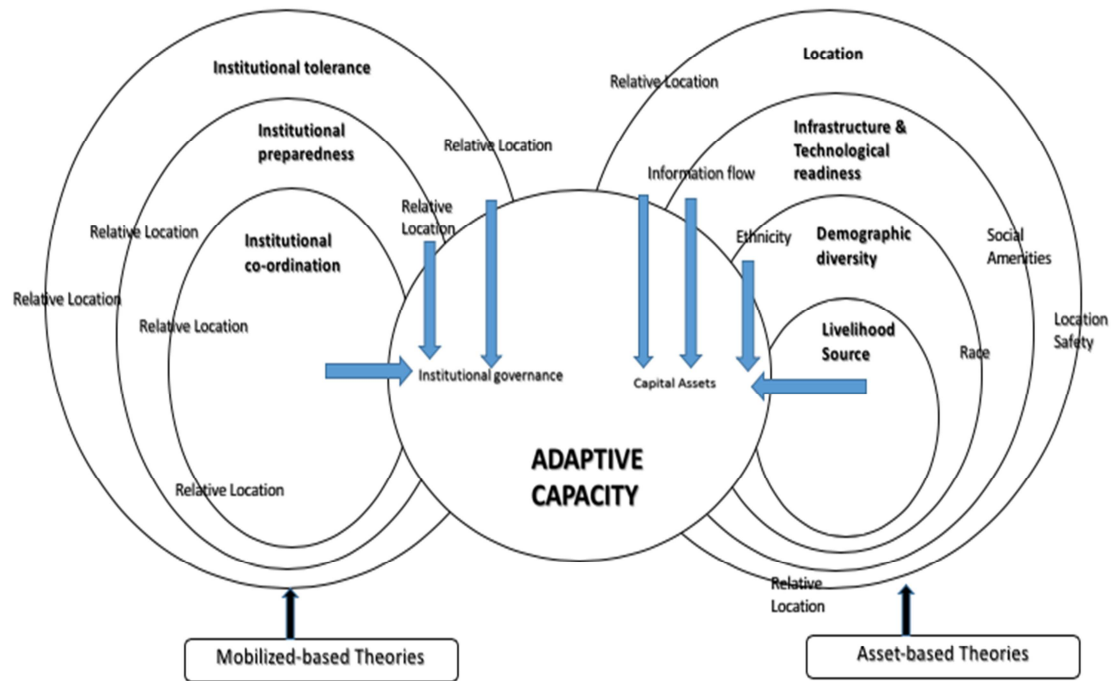
Michael Odei Erdiaw-Kwasie¹, Matthew Abunyewah², Owusua Yamoah³

¹Institute for Resilient Regions, University of Southern Queensland, Toowoomba, Australia.

²School of Architecture and Built Environment, University of Newcastle, Australia.

³Department of Geography and Planning, University of Toledo, USA

Figure 1: Consolidative disaster adaptive capacity model



‘After the disaster comes destination thoughts’: A review and conceptualisation of consolidative disaster adaptive capacity model

Abstract

Grounded on a disaster-based conceptualization of adaptive capacity, this paper proffers a dynamic perspective which incorporates both the capital assets and institutional governance dimensions of adaptive capacity into disaster management process, and highlights its migration implications. In doing this, the authors link livelihood model of migration with adaptive capacity model, and propose a consolidative model which captures improved adaptive capacity of destinations for disaster migrants. In a context in which literature on adaptive capacity of destinations and disaster migrants appears to be disconnected, this consolidative model integrates disaster-induced migration factors with institutional processes and asset elements of adaptive capacity. Recognising the importance of the disaster space in analyses of adaptive capacity, the proposed consolidative model offers novel research perspectives that emphasise the relevance of adopting an integrated adaptive capacity approach to concerns of disaster migrants’ management.

Keywords: Adaptive capacity; Natural disaster; Migration; Destination; Model development

1. Introduction

The veracity that natural hazards and disaster risk issues in communities have been extensively covered in three interrelated literature genres – vulnerability, resilience, and preparedness – is widely recognized (Beccari, 2016; Palliyaguru, Amaratunga, & Baldry, 2014; Paton & Johnston, 2017). With reference to this understanding of natural disaster, two streams of the knowledge are discernible (Paton & Johnston, 2017). The traditional pathway has relatively been more skewed to tackling community vulnerability, preparedness and resilience as disconnected streams towards addressing disaster issues. On the other hand, new approaches have evolved where the co-existence of vulnerability analysis, preparedness strategies and resilience policies are strongly emphasized (Ray-Bennett, 2018; Romieu, Welle, Schneiderbauer, Pelling, & Vinchon, 2010). Generally, following the conventional stream of knowledge, initiatives to identify adaptation needs and to improve adaptive capacity in terms of who and what are vulnerable, to what extent, in what ways, and what capacity exists to adapt to changing risks is imperative (Dinh, Balica, Popescu, & Jonoski, 2012).

For decades, considering the substantial funds expended annually on risk communication and hazard adaptability programs, it is in practice perceived that communities must have the ability to be more resilient after a disaster (Paton & Johnston, 2017). However, until recently, the place-based dimension of the aftermath disaster debates is under focused in the academic literature, hence relegating the relevance of destination community's preparedness in the whole disaster migrants' restoration process. As evident in the literature that nearby communities serve as ideal and strategic destinations to many disaster migrants, few models analyse the adaptive capacity readiness of such regions (Hess, McDowell, & Luber, 2012). It

is not surprising that Keogh, Apan, Mushtaq, King, and Thomas (2011) argue that the time has come to go beyond just disaster migrants coping strategies, to address the place-based aspect of the debate, particularly assessing the preparedness of alternative destinations for disaster victims.

Thus, there is an awakening call among scholars in disaster and community development studies to engage in works aimed at conceptualizing adaptive capacity development towards a more dynamic, robust and implementation-oriented perspective (Keogh et al., 2011; Paveglio, Carroll, & Jakes, 2010). The reason behind such conceptualization is to enhance the understanding on whether or not potential destinations of disaster migrants have adequate adaptive capacity to sustain the wellbeing of affected population. This evolving research stream highlights both conceptual developments and empirical investigations, particularly works related to the understanding of the internal and external factors that help to shape the adaptive capacity of host communities for disaster migrants (Ford & King, 2015; Kulig, Edge, Townshend, Lightfoot, & Reimer, 2013) and the design and structuring of adaptive capacity indicators and strategies (Berkes & Ross, 2013; Hinkel, 2011). Reflecting on adaptive capacity development and typologies for communities, there is a growing literature focused on the conceptualization of place-based models whose application in disaster planning and management is common (Cutter et al., 2008; Wilhelmi & Hayden, 2010). However, researchers do not always agree on the description of the various aspects of adaptive capacity models, their distinct content, and the theoretical foundations supporting various models (Plummer & Armitage, 2010; Zevenbergen, van Herk, & Rijke, 2017). As a result, there is the need for a consolidated perspective of existing adaptive capacity models.

Given that adaptive capacity development literature tends to be segmented in the context of the various aspects of the disaster planning and management process (Mortreux & Barnett, 2017; Whitney et al., 2017), we need integrative models that provide a broader perspective on

adaptive capacity of host communities for disaster migrants. In particular, to offer such a perspective on community progression towards a more adaptive capacity assessment model from a place-based viewpoint, we undertake a critical review of existing adaptive capacity models literature to provide a descriptive, integrative adaptive capacity development model for communities on which further research efforts might build. Our consolidative model of adaptive capacity will stress on corresponding linkages between existing models of community capacity, and doing that will help to consolidate all essential elements that characterize existing adaptive capacity frameworks.

By adding this perspective, we work towards the development of a more comprehensive adaptive capacity model for disaster studies and practice. Our model differs notably from existing adaptive capacity models mainly from three perspectives. First, it highlights unconventional place-based variables such location, livelihood source, demographic diversity, and infrastructure and technological readiness which are relevant in disaster planning and management. From a research perspective, our integrative model also proffers an all-inclusive basis on which to build further conceptual and empirical case aimed at ensuring a fuller understanding of the role place-based approaches play in addressing disaster planning and management challenges. In particular, we argue that more prescriptive investigations should address the place-based factors that drive disaster-aftermath interventions. Apart from the theoretical contribution, we also provide reasons to rethink what in practice can be expected of communities that host disaster migrants, particularly in terms of how prepared such destinations are in supporting disaster victims. Committing to integrative adaptive capacity strategies would necessitate disaster institutions and practitioners to take a more place-based approach to remedy aftermath disaster challenges, which for many scholars will entail going beyond just their present-day social practices.

The structure of the paper begins with the introductory section. After the introduction, we first present a brief overview of disaster and community-related theories and define disaster as a community-based construct. In the third section, we focus on community development models, outline some key disaster responsive models, and then present a review of existing place-based models of adaptive capacity. On the basis of this conceptual background, the fourth section introduces and presents our proposed consolidative disaster adaptive capacity model, together with discussion on its key constructs that constitute it. The concluding section presents implications of the study findings, as well as the limitations of our work.

2. Literature review: Focus on natural disaster, migration and adaptive capacity

2.1 Natural disaster and migration patterns: Exploring the interlinked issues

The impacts of natural disasters on human lives and property are emotionally and financially costly with wide range of effects. For the past few decades, natural disasters have slowed the pace of both social and economic transformation of many developed and developing countries in the world (Garschagen et al., 2016; Guha-Sapir, Vos, Below, & Ponserre, 2012). It has also annihilated development efforts and interventions of low and middle income countries around the world (Jenkins et al., 2014; Wilhite, 2016). This is evident physically in disaster affected areas and global disaster reports. Disasters are multifaceted and occurs in different forms. Disasters are categorised into biological, geophysical, hydrological, climatological and meteorological. Among these categories, hydro-metrological (hydrological, climatological and meteorological) disasters accounts for more than 70 percent of all disaster occurrences and 60 percent of total losses globally (Guha-Sapir & Hoyois, 2015; Jha, 2010). In addition, geophysical disasters incur 40 percent of all damages caused by natural disasters (Okuyama & Sahin, 2009).

Increased hike in disaster occurrences and impacts have been linked to unequivocal warming of the climate, increased disaster risk vulnerability and exposure and low level of disaster

preparedness (Adger, 1996; Ashley & Strader, 2016; Cannon, 1993; Change, 2014; Koks, Jongman, Husby, & Botzen, 2015; Mechler & Bouwer, 2015; Schwab, Sandler, & Brower, 2016). With a widely held view that disasters are inevitable but with impacts mitigating strategies coupled with accurate future prediction on its occurrences and impacts (Kandel, 1992; Pelling et al., 2004; Smith, 2013), many technologies to detect and proactively respond to disasters have been invented. Though progress has been made in the forecast of disasters but still perfection to prediction has not still been achieved. The National Commission for the Forecast and Prevention of Major Risks in Italy forecasted the 2009 L'Aquila Earthquake yet migration of people in the associated areas was not successful (Ambrosetti & Petrillo, 2016). This is an indication that although disaster prediction is critical to safeguard wellbeing of disadvantage regions, expanded knowledge on the place-based viewpoint on the issue is equally significant. This has made it imperative to look at a broader view of approaches that incorporate disaster migration issues and community preparedness from an adaptive capacity perspective.

More recently, destination issues have emerged as critical but still under focused aspect of the disaster migration literature (Belasen & Polachek, 2013; Castles, De Haas, & Miller, 2013). The negative net gain associated with internally displaced population is directly linked with the choice of destination. Like most migrants, internally displaced population are more likely to relocate to nearby cities or towns. According to Ravenstien's laws of migration, he writes that "...migrants only proceed a short distance..." (Ravenstein, 1885, p. 261). The gravity model, which was influenced by Newton's Law of Gravity, captures the relationship between distance of flows. the amount of flow (M) between two places i and j is expressed as;

$$M_{ij} = P_i P_j / d_{ij} \dots \dots \dots (1)$$

Where P_i and P_j are populations of place i and j respectively and d_{ij} is the distance between them (Anderson, 2011, Ravenstein, 1885). Following the gravity model, the volume of flow between the origin and new destination for disaster migrants is likely to decrease as the distance between the two increases (also known as “friction of distance”). Over the years, despite advancement in migration models, technology and transportation modes, the effect of distance continues to be relevant in migration flows and patterns. This is particularly true for victims of all forms of disaster, particularly climate-induced ones whose impact is widespread (Waldorf & Do Yun, 2016).

The idea that distance is a friction in spatial interaction forms the basis of many theories that have been developed over the years to explain spatial interaction (Ravenstein, 1885; Wolpert, 1965; Zipf, 1946). As distance between origin and destination increases, it deters migrants from moving, hence an increase in flows between nearer locations. Ravenstein (1885) for example, emphasizes on the link between distance and spatial interaction and shared that, migrants tend to have more information on destinations that are closer to the origin than distant ones. Similarly, Zipf (1946), explained that the longer the distance between two locations, the higher the effort and cost required to cover. In the case of disaster migrants, the desire to monitor situations at home and the decision to either return after the disaster, propels them to migrate to closer destinations with easy access to their origin. The choice of destination is however not an individual decision but a collective decision of the household. Massey and Parrado (1998) shared that a key insight of this new approach focuses on collective migration decisions – typically families or households – who usually do not act only to maximize expected income, but also to minimize the impact of disaster risks and to reduce constraints related to a variety of market failures. The ability of the destination to provide for the needs of the entire household is a major issue when considering destination choices (Gubhaju & De Jong, 2009). This goes to support earlier assertions in literature that

the choice of destinations and the decision to even return to the origin after a disaster is influenced by the demographics of the household involved (Groen & Polivka, 2010).

2.2 Understanding adaptive capacity within the frameworks of natural disaster and migration

Adaptive capacity is context-specific and varies from country to country, from community to community, among social groups and individuals, and over time. It varies not only in terms of its value but also according to its nature (Holman & Trawick, 2011; Lockwood, Raymond, Oczkowski, & Morrison, 2015). The intrinsically broad concept of adaptive capacity – encompassing themes of governance, human, financial, and physical capital, social capital, policy and leadership, decision-making and governance, and community engagement – has posed a challenge to find a universally accepted definition both within and beyond the global environmental change domain (Coetzee, Van Niekerk, & Raju, 2016; Khir-Eldien & Zahran, 2016; Schneiderbauer, Pedoth, Zhang, & Zebisch, 2013). Despite the complexities and multidimensionality inherent to adaptive capacity function, there appears to be general consensus that the system characterises a set of processes that are formally or informally applied to distribute coping range to a given system (Berman, Kofinas, & BurnSilver, 2017; Engle, 2011; Nielsen & Reenberg, 2010). Among international organisations, definitions of adaptive capacity are commonly framed around processes and strategies aimed at assisting socio-ecological systems to manage and adjust to changing environmental and socio-economic conditions. According to the Jone, Ludi and Levine (2010), adaptive capacity broadly denotes the ability of a system to adjust, modify or alter its characteristics to moderate potential damage, take advantage of opportunities or cope with the consequences of shock or stress. Elsewhere, adaptive capacity is defined by the Intergovernmental Panel on Climate Change (IPCC) (2014) as the ability of a system to adjust to climate change. To the IPCC, information and skills, technology, institutions and equity, economic wealth,

infrastructure, constitute the principal determinants of adaptive capacity. In recent years, there has been a shift from capital asset base to mobilization of capabilities in defining adaptive capacity systems towards understanding the social or biophysical factors that helps to trigger and translate adaptive capacity into actions (Mortreux & Barnett, 2017; Nielsen & Reenberg, 2010). This notion importantly distinguishes adaptive capacity as a domain in itself which has since been refined and characterised through a number of efforts (Berman et al., 2017; Lockwood et al., 2015; Schneiderbauer et al., 2013).

The challenge to establish a universally accepted definition of adaptive capacity has been met with further confusion as the distinctions among determinants of the concept at both national and local level is still not clear (Berman et al., 2017; Engle, 2011; Hasselman, 2017). Complicating this further, there seems to be no single method to assess adaptive capacity. Thus, studies apply different factors and indicators to capture the outcomes of entitlement processes, which makes it difficult to compare adaptive capacity study results (Mortreux & Barnett, 2017; Spiller, 2016). For example, Gupta et al. (2010) explained adaptive capacity from a socio-cultural perspective and summarised its definition as the characteristics of institutions that empower social actors either through planned measures or allowing and encouraging creativity in responding to short and long-term impacts, both ex ante and ex post. It is obvious that although the determinants of adaptive capacity are not independent of each other, the particularities of each demand their specific use, despite their more common application as synonymous terms. Efforts to differentiate these determinants of adaptive capacity system appeal to its key element of direction – a central tenet that has been captured through a number of images and analogies (Holman & Trawick, 2011; Park et al., 2012). This includes, for example, the use of different tools to establish a set of rules and incentives for an adaptive capacity analysis. Taking this example further, whereas governance dimension of adaptive capacity analysis focuses on key elements like legitimacy, inclusion and fairness,

leadership and accountability (Engle & Lemos, 2010), management dimension encompasses issues like innovation, adaptive management and risk behaviour (Engle & Lemos, 2010; Schneiderbauer et al., 2013).

Generally, adaptive capacity is broadly described with the use of terminologies such as adoption of adaptability, coping ability, management capacity, stability, robustness, flexibility, and resilience. While defining adaptive capacity according to these terms appears common, the added value of the approach itself remains contested. For example, Carter et al. (2015) noted that definitions are more useful analytically and for policy if assessed in terms of impacts on performance of individual elements of the determinants rather than just a set of normative principles. As the adaptive capacity system becomes increasingly dynamic and diffused, the utility of more descriptive terms capturing its numerous factors and the sophistication of their arrangement appears evident (Leys & Vanclay, 2011). However, literature findings indicate that approaches to adaptive capacity are not mutually exclusive and require contextualised interpretation (Berman et al., 2017; Jones, Ludi, & Levine, 2010).

3.0 An Overview of underpinning Theoretical models

3.1 Livelihood Model of Migration

Livelihoods are strategies that are adopted by individuals and households to provide their basic needs (Chambers & Conway, 1992; Scoones, 1998). The severity and impact posed by an anticipated hazard on people's livelihood is a major determinant of hazard-induced migration decisions (Dercon, 2002; Gray, Frankenberg, Gillespie, Sumantri, & Thomas, 2009; Gray & Mueller, 2012; Yang, 2008). In other words, comparatively, people are more likely to move if a disaster rubs off their means of livelihood rather than a disaster with no impact on livelihood. In theory and practice, migration has been seen to be a protective and adaptation response strategy towards disaster impact mitigation. Migration to protect lives and respond to disaster is motivated by the need for shelter and assistance, search for jobs or

increase demand on household's basic needs and family members who do not migrate (Hunter, 2005; Paul, 2005). People faced with disasters have several choices to make in order to reduce the impacts disaster poses on them. Choices made include and not limited to asset accumulation, livelihood diversification, and participation in risk reduction activities and in risk sharing networks (Ellis, 2000; Rosenzweig & Stark, 1989).

The livelihood models focus on the choices and strategies taken by individuals and households in response to disaster risk and the effects those choices and strategies have on migration decisions. According to the livelihood model, people are more likely to migrate from disaster affected areas if before the disaster, they had invested in strategies that support subsequent migration. The accumulation of financial capital, human capital (education) and social capital (contacts and networks) are examples of pre-disaster investment initiatives that support migration elsewhere (Gray et al., 2009; Gray & Mueller, 2012). For example, study findings suggest that financial capital accumulation has an ambiguous influence on migration as greater wealth can increase or reduce the likelihood of migration. Elsewhere, Brouwer, Akter, Brander, and Haque (2007) also revealed that people with low levels of income and capital move over a short distance ex-post a natural disaster. In addition, people with low income tend to migrate to camps or areas with low cost of housing as compare to the higher income population (Gray & Bilsborrow, 2013). Inversely, findings from Mallick and Vogt (2012) also portrayed that higher income population are more likely to remain after a disaster because of their ability to afford insurance and self-protection. On the other continuum, studies by Gray et al. (2009) disclosed that the liquidity of one's asset and extent of disaster impact influences people's migration decisions. Having land, house, farm and other immovable property impede movement, unless the property are damaged severely or the right to the property is not secure. Furthermore, a study by Banerjee, Black, Kniveton, and Kollmair (2014) proved that flood victims in Nepal who lost agricultural lands were more

willing to migrate than their counterparts whose lands were not affected. Severe damages increase outmigration decisions especially when opportunities exist in other places to re-establish one's livelihood. Empirical evidence from the 2004 Indian Ocean Tsunamis and 2005 Hurricane Katrina showed that more people migrated out of the damaged areas as compared to the less affected areas (Fussell, Sastry, & VanLandingham, 2010; Warner, Hamza, Oliver-Smith, Renaud, & Julca, 2010). In addition, people who were injured during the Indian Ocean Tsunamis in 2004 were five times more likely to migrate to other places (Gray et al., 2009)

The human capital accumulation as a pre-disaster investment response strategy to migration has also revealed mixed findings. Whereas less educated individuals are most likely to migrate after a disaster, more educated individuals are likely to stay (Fothergill, Maestas, & Darlington, 1999). In furtherance to this, evidence from Hurricane Katrina showed that the uneducated and non-skilled people migrated more than the educated ones (Fussell et al., 2010; Paxson & Rouse, 2008; Vu, VanLandingham, Do, & Bankston III, 2009). Conversely, the findings from Paul (2005) and Gray et al. (2009) also indicated that highly educated people are more likely to move after a disaster than the least educated ones. Drabo and Mbaye (2011) support this finding stating that the highly educated people are the ones who are skilled, have jobs and salary, thus able to afford migration cost. Also, because the educated ones are more likely to compete keenly with natives of the host destination for job opportunities, they are more likely to move.

Societal connections and network have been linked to the decisions people make either to migrate or not after a disaster (White & Lindstrom, 2005). Victims of the 2004 Indian Ocean Tsunami and the 2004 Bangladesh Tornado who lost social network through the death of family members and close relations were more likely to migrate to other places than others who had networks within the affected areas. Thus people who have strong societal

connections outside the affected areas have the propensity to move to those networks for assistance. Nevertheless, other studies such as Gray et al. (2009) also showed that a small section of people who had their property damaged and lost family members did not move. Although all these discussed factors have been incorporated into disaster impact strategies, and has helped strengthen the human element in disaster studies. However, a holistic attempt that can sufficiently capture both the human element and place-based component in a synergy to assess community preparedness is urgent and required.

3.2 Adaptive Capacity Models

Despite the growing literature based on conceptual notions of adaptive capacity systems, thoughtful study of the approaches required to adequately analyze the phenomenon is underdeveloped (Engle, 2011). It is highlighted in a number of literature that there is an absence of a clear, and consistent evidence-base determinants that is accessible to support adaptive capacity functions in carrying out their role (Ensor, Park, Hoddy, & Ratner, 2015; Whitney et al., 2017). In some cases, it is recognized that same instruments can have different effects in different settings (Fernandez-Gimenez, Batkhishig, Batbuyan, & Ulambayar, 2015; Grothmann, Grecksch, Winges, & Siebenhüner, 2013). At other times, there is also the potential for conflicts and contradictions between determinants adopted in combination, thus demanding very strategic considerations to ensure their agreement (Butler et al., 2015; Schultz, Folke, Österblom, & Olsson, 2015). Some of such analytical tools may require their combined use to achieve a given end (Butler et al., 2015; Chaffin, Gosnell, & Cosens, 2016). For example, the use of human and physical capital elements like labour and time, knowledge and information may require other supporting tools like governance for a higher outcome. It is observed that understanding the determinants present and their uses is of particular relevance in the context of modern adaptive capacity system – a domain of diffused and

pluralistic elements where different combinations of existing tools is critical (Bakkour et al., 2015; Coetzee et al., 2016; Gupta et al., 2010)

Broadly, the adaptive capacity conceptual dimensions can be described and categorized under the asset-based theories and mobilization-based theories (Mortreux & Barnett, 2017; Nielsen & Reenberg, 2010). The asset-based theories of adaptive capacity are largely associated with Sen's capabilities theory and the sustainable livelihoods assessments, which is described by many scholars in the field as the origin of the concept of adaptive capacity. The adaptive capacity literature shows that the five capitals (natural, physical, financial, social and human) of Sen's capabilities theory and the sustainable livelihoods assessments primarily constitute the adaptive capacity asset-based theories (Ellis, 2000; Gupta et al., 2010). To Eakin, Lemos, and Nelson (2014), these five capitals form the basis of what is sometimes called 'generic' adaptive capacity—the factors required to adapt to a (generic) range of threats. Asset-based theories and associated methods apply most meaningfully to households, and help to explain the behavior of different individuals within households whose actions shape the particular adaptations of any given household institution (Eakin et al., 2014; Mortreux & Barnett, 2017). For example, Pelling, High, Dearing, and Smith (2008) adopting trust as a key element of social capital showed how such relationships contribute to the accumulation of trust and reciprocity between stakeholders, assisting in the formation of planned adaptations to environmental change. Elsewhere, Brown et al. (2010) measured the extent to which financial resources like off-farm investment, off-farm employment, and/or the availability of cash to landholders impact their actions to undertake natural resource management. However, one key limitation of generic adaptive capacity is their diminishing explanatory power when applied to progressively larger institutions (Araya-Muñoz, Metzger, Stuart, Wilson, & Alvarez, 2016; Hurlbert & Gupta, 2017). This implies that, asset-based approach to adaptive capacity applied across large areas or to diversely scaled institutions may explain very little.

Adding to that, asset-based approach to adaptive capacity is further criticized for its theoretical assumption that capacity translates into action (Coulthard, 2008; Linnekamp, Koedam, & Baud, 2011). This is argued based on literature evidence which show that higher capacity households are not adapting as well as households with lower capacity. For example, in Nielsen and Reenberg (2010) study, households from the traditionally disadvantaged ethnic group Rimaaiibe were adapting better than the Fulbe, an ethnic group with traditionally higher social standing and wealth. The Rimaaiibe engaged in multiple livelihood strategies which enabled adaptation whereas the cultural values of the Fulbe, such as valuing living in isolation in the bush rather than the village, constrained their adaptation.

With regard to the mobilization-based approach to adaptive capacity, many scholars associate its determinants with urgent need to close the gap between capacity and action. This is realized by drawing much attention on the factors that mobilize capacity such that change is enacted. This shift to focus on mobilizing capabilities is captured in the definition of adaptive capacity by Nelson et al. (2010) as the preconditions necessary to enable adaptation, which includes the ability to mobilize these elements. Mobilization-based approach to adaptive capacity focuses on tools like management, governance and institutions, which constitute their distinct elements that support their application in adaptive capacity assessment. For example, in terms of the management dimension, literature findings show that key factors like innovation, adaptive management, and risk behavior are used for adaptive capacity assessment (Engle & Lemos, 2010; Tompkins & Adger, 2005). In Mortreux and Barnett (2017), study findings suggest that landholders' adaptive capacity can be supported or constrained by their approach to managing their properties. Similarly, Walker et al. (2006) observed that learning approach to management, adaptive management, is anchored on the basic fact that social-ecological systems are managed with incomplete knowledge and that, it is imperative to monitor management outcomes and adjust management strategies, activities,

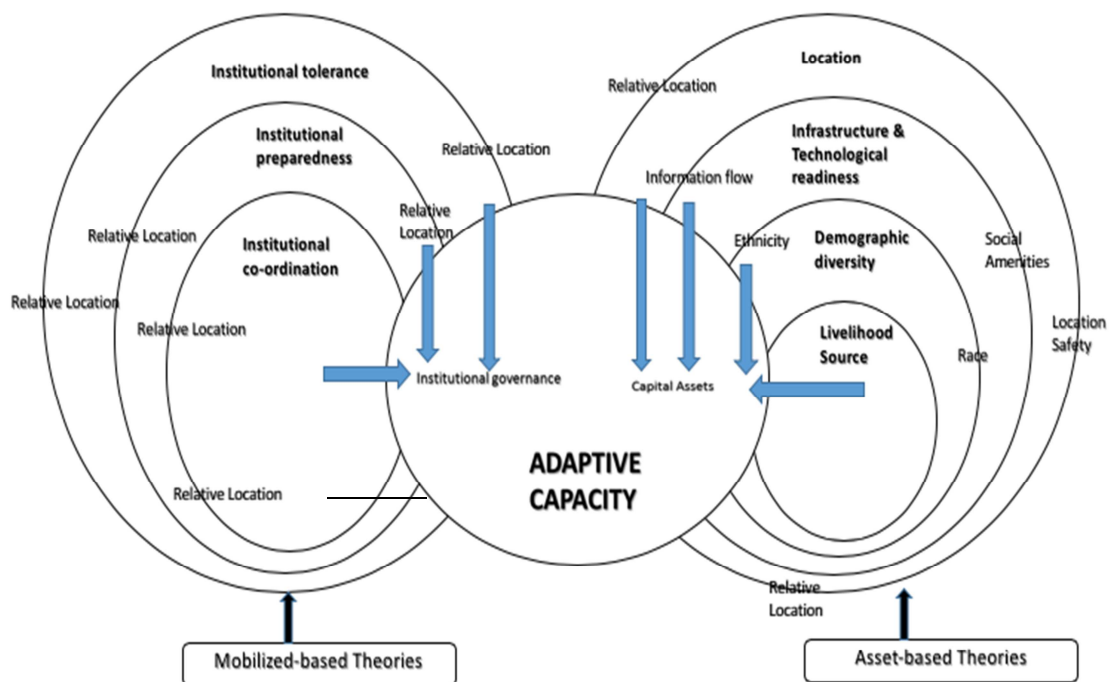
and practices based on the results of the assessment. In the case of governance as a dimension of adaptive capacity, key factors for assessment include legitimacy, accountability, inclusion and fairness, leadership, coordination and collaboration (Engle & Lemos, 2010; Gupta et al., 2010). To some scholars, governance institutions provide the mechanisms by which adaptive capacity is realized, particularly in the context of natural resource management (Engle, 2011; Plummer, Armitage, & de Loë, 2013). In an empirical study to test governance as a contributing dimension of adaptive capacity, Engle and Lemos (2010) study findings in 18 Brazilian river basins showed a positive relationship between integrated water governance and adaptive capacity. Also, Brooks and Adger (2005), found accountability and government responsiveness to citizen concerns as an integral governance indicators of positive climate change adaption.

While not necessarily pursuing an ultimate, universal model or definition to adaptive capacity – recognizing varied worldviews and applications that may deem relevant –there does appear to be the important need for improvements in the accumulation of insights on disaster aftermath strategies from adaptive capacity perspective. It is acknowledged that these differences in definitions and determinants are necessary to resolve the chaos that prevents capacity tools from becoming more action oriented. Moving forward, with this understanding of where we are in the current literature, a consolidative model of adaptive capacity that stresses on complementary linkages between existing models to provide a more comprehensive perspective on adaptive capacity of host communities for disaster migrants is imperative.

4.1 Consolidative disaster adaptive capacity model

The intrinsic dynamism in the concept of adaptive capacity has necessitated the essence for a more comprehensive framework whose application is cross-cutting but more responsive in scope. This synthesis framework offers the possibility to assess key indicators which constitute adaptive capacity of destinations for disaster migrants, particularly in terms of their readiness to absorb disaster-induced migrants without any natural distortion. Simply put, the proposed model argues that the ability of communities to accommodate disaster-induced migrants is much dependent on two central themes: (i) capital asset, and (ii) institutional governance. In this model, the key elements which constitute the capital asset phase of the model are: (i) location, (ii) demographic diversity, (iii) livelihood, and (iv) infrastructural & technological readiness. On the other hand, the institutional governance phase comprises three elements: (i) institutional tolerance, (ii) institutional preparedness, (ii) institutional co-ordination. The subsequent section of the paper explains further the relevance of each factor towards the aim of the proposed synthesis model.

Figure 1: Consolidative disaster adaptive capacity model



4.1.1 Institutional Governance Phase of the model

The discussion of institutional governance in the adaptive capacity literature is not new. As it constitutes a critical indicator for assessing adaptive capacity of destinations, the concept is underpinned by the mobilization-base theories. In this proposed model, we aim to expand knowledge on the institutional governance aspect of the adaptive capacity debates by highlighting three central issues in the context of disaster migrants' management. These issues are (i) institutional tolerance, (ii) institutional preparedness, and (ii) institutional coordination. We discuss these three facets of institutional governance and how they influence disaster migrants' management efforts.

Institutional Tolerance

Globally, the political atmosphere for migrants has been unwelcoming lately. The proposed model therefore identified institutional tolerance as a key element of the governance dimension of the adaptive capacity debate. To model proponents, the relevance of institutional tolerance in the post-disaster destination decisions is much centred on fostering a better *integration* and *inclusion* practices within post-disaster strategies. For example, in areas where there is less racial diversity, migrants are more likely to feel isolated and reserved. Tolerance, in both policies and actions towards accelerating migrant integration can facilitate the integration process in such scenarios. Racial biases in any setting including jobs, schools and social environments are bound to distract the successful integration of disaster-induced migrants.

In assessing labour market from a migrants' perspective, long term job security remains at the fore when evaluating successful inclusion of migrants into new economies. Aside from providing migrants with income, it is one major way they see value in their skill and contribution towards the society. While governments continue to prepare their economy to be more adaptive to migrants' influx, efforts are still insufficient especially at the local level. For example, in Ghana, public trust remains a major limitation to a successful inclusion of

resettled population in environment where the performance of many assigned disaster institutions is questioned by migrants (Bratton and Gyimah-Boadi, 2016; Armah-Attoh and Awal, 2013; Abunyewah, Gajendran and Maund, 2018).

Elsewhere in Japan, a year after the 2011 tsunami, consultation between evacuees and local authorities had been organised regularly in order to come out with resettlement plan that meet the safety expectation of most evacuees. However, such consultation processes were undermined by financial and administrative obstacles which resulted in poor coordination among municipal institutions. Public institutions, especially the local-levelled ones, are therefore empowered to direct efforts to successfully integrate and include migrants in all dimensions including economic, social, cultural and legal; irrespective of race, ethnicity, age and gender. Adding to this, international organizations such as the European Union and United Nations view government tolerance as critical in post-disaster policies, and more recently, developing new frameworks and guidance to governments on successful integration and inclusion of migrants into their new environment.

Institutional Preparedness

The process of integrating displaced population is very complex and requires adequate preparation on the part of institutions in host destinations. In the consolidative disaster adaptive capacity model, we perceive institutional preparedness in two broad ways from migrants' perspective, namely: (i) awareness creation, and (ii) skillset upgrading. Both processes are highly interdependent and are much effective when there is a successful institutional preparedness agenda in place.

Governments institutions should develop more awareness creation programs to enlighten newly settled disaster migrants on basic human right entitlements such as freedom of movement, access to education and all other public services, the means of acquiring and disposing of property and accessibility to labour market. In many cases, particularly in

developing countries, institutional preparedness systems fail to recognise that equipping disaster migrants with timely and relevant information in the most impactful way constitute a critical component of successful outcome of the action. As a result, many migrants have lost trust and confidence in disaster management institutions both at the local and national levels. The model therefore suggests that a working institutional preparedness strategy views information as critical and ensures that basic knowledge is well spelt out to migrants from the onset of the resettlement. We argue that rethinking institutional preparedness this way will not only protect the basic rights of the migrants but also, help local institutions to become more functional due to the expectation of the migrants.

Given that the main problem with an institution-based preparedness initiative is the sideline of perspective of migrants, a sense of ownership is considered a critical component of ensuring effective stakeholder engagement in institutional preparedness planning. Agreeing with such a notion, the model posits that when thinking about institution-based preparedness, it must be one that embraces approaches where disaster migrants take the lead in decisions that affect them – rather than following in terms of identifying priorities, organising support, initiating programmes and evaluating these initiatives. In this model, we argue that skillset upgrading is necessary in order to allow disaster migrants to take ownership of preparedness activities. In other words, we perceive economic independence as an important element in successful institutional preparedness. Skillset upgrading may take the form of education, skills training, communication and language skills, and interpersonal relationship training. As institutional preparedness is basically about equipping institutions with information, resources and skillset to be able to foster joint decision with disaster migrants, the model suggests a need for a more two-way approach to preparedness.

Institutional Co-ordination

Generally, coordinating efforts in times of disaster has emerged as an effective tool in recent times; including coordination between countries, states and cities. During disasters, institutions coordinate efforts to reduce the potential impacts on the population at risk. Most policies and efforts have been directed toward horizontal coordination between organizations in the same location. However, in this model, we emphasise horizontal coordination between institutions in different locations. For locations in close proximity, coordination in terms of resources, knowledge and expertise among institutions can improve the institutional governance outcomes in the long term. When efforts are pulled together, the needs of the migrant population can be shared and provided for by both destinations. This is critical when dealing with internally displaced populations such as disaster migrants. While some destinations may not be able to provide all the needs of the displaced population, pulling resources of two or three communities together can provide the needed resources to support the entire population. While such coordination is sometimes problematic, effective planning and institutional collaborations between both destinations can reduce anticipated challenges.

4.1.2 Capital Asset Phase of the model

Location

Location in this context is classified into relative location, location safety and demographic footprint. Comparatively, disaster induced migrants are more likely to move to communities closer to them than those far away. Thus, this framework posits that a disaster-induced migrant destination community is much ideal when it is in proximity to the disaster affected point, safe from crime and other disaster hazards as well as spatially sufficient to receive more people. This is because neighbouring communities generally have common environmental, physical and socio-economic characteristics. In situations where the disaster devastated community is nearer to several other communities, migrants consider other

secondary factors such as locational safety. The synthesis framework describes locational safety as a concept which involves the protective ability of the destination community from crime and other related disasters. Adding this, the synthesis model makes a case that demographic footprint is equally relevant to assessing the adaptive capacity of destinations for disaster migrants. This implies that for a place to be considered an ideal destination for migrants, understanding of not only the size is critical but also, other major components such as the current demographic capacity load of such community. From a locational perspective, it can be said that regardless of proximity, destination with large size but with unsustainable demographic footprint should be least prioritize for disaster migrants against small communities with reasonable demographic load. The reason being that the latter will still be ideal destination for disaster migrants given that, the influx of disaster migrants do not jeopardise its in-built spatial mechanism.

Infrastructure and Technological Readiness

Infrastructure and technology are key facilitators and catalyst to development in the lives of people, thus an increase in both public and private investment on them. Socially, a prepared community must have adequate infrastructure to accommodate the additional population to reduce pressure on existing amenities. Detailed assessment of existing infrastructure and needs will reveal deficiencies or surpluses that exist in host community in terms of health, education, housing and recreational opportunities. As acknowledged that the needs of migrant population vary, need assessment efforts must be responsive to this diverse demands for all the population across age, gender and ethnic groups. During disasters, information dissemination is viewed a critical factor in the mitigation process, and thus, families usually prefer to stay more connected than ever in order to ensure that each member of the family is safe. This contemporary shift in preference in disaster mitigation strategies has rendered

potential destinations for disaster migrants much more ideal if such areas are technologically ready. Two key reasons accounts for such preference. First, disaster migrants are able to reconnect to families and friends whom they may have lost contact due to the impacts of natural hazards. The consolidative model therefore emphasises that ideal destination tends to be ones which offer the enabling environment to migrants to reconnect to members in their social network who for some reasons may have lost ties with them. The other reason is that migrants consider destinations that are technologically ready as much safer, particularly in terms of them being much more updated on emergency warnings. More recently, the enormous role technology plays during emergency situations is well recognised and this has rendered technological resources as critical pull factors for disaster migrants. Thus, preferably, many migrants are more likely to move to destinations where they can be informed of disaster warnings and updates than regions where they can hardly access updates via social media and other online neighbourhood forums on future occurrences.

Demographic Diversity

The variability in terms of age, sex, culture, religion, race and ethnicity among disaster migrants is critical in decisions that relates to ideal destinations. One of the strongest indicators for destination decisions for disaster migrants is demographic diversity. The consolidative model argues that disaster migrants are more likely to move to places where inhabitants have similar demographic characteristics as themselves. Our model proposes that the relevancy of ethnicity and race as major components of demographic diversity is evident in both the developing (Africa and Asia) and developed continents (Europe and America) context. In Africa, for example, countries are comprised of several ethnic groups, and thus disaster migrants prefer to move to places where they can find people from similar ethnic backgrounds. Similarly, in the western countries, people are most likely to move to places

with inhabitants from their race. For instance, an inhabitant of Black-American community is ideally more likely to migrate to a Black-Americans populated region. This is because, they are more likely to become accustomed with life in those communities than non- black American communities. Also, with regards to age, youthful migrants consider regions with more ‘urban’ blood as ideal targeted destinations than the aged-dominated areas. Our model therefore shares that regions with a more diverse demographic base tends to have a greater pull-factor index, which renders them ideal destinations for migrants.

Source of Livelihood

One of the intriguing push factors of disaster-induced migration has been the destruction of livelihood through disaster occurrence. Disaster migrants move to places where their livelihood can be improved and sustained. In our consolidative model, livelihood comprises of employment opportunities that meet their inherent talents and skills, lower cost of living and high standard of living. For instance, during Hurricane Katrina in 2005, evacuee choice of destination communities was dependent on their need for supportive resources such as disaster assistance, affordable housing, employment opportunities, and public services. This underscores the foregoing discussion that, disaster migrants prioritize sustainability of their livelihood in new destinations after a disaster. The degree to which disaster migrants are networked socially is an indication of the support they will obtain towards restoring their source of livelihood. Thus, in many cases, it is ideal for migrants to move to destinations where they are strongly socially connected to receive physical, emotional and psychological support. Given the critical role that livelihood sustainability plays in destination decisions of migrant population, the consolidative model emphasises on the need for potential destinations to create and support varieties of livelihood opportunities that can enrich, diversify and sustain migrants’ livelihoods.

5. Discussion & Implication

While we consider the independent effects of institutional governance and capital asset, an interesting extension of our model includes an examination of the relationships between these two elements as motives for adaptive capacity interventions. Building on our consolidative disaster adaptive capacity model, future research opportunities include disaster-induced migration factors with institutional processes and structures and asset elements of adaptive capacity towards strengthening adaptive capacity actions. The question of how institutional governance structures initially mobilise and capital assets forms in disaster migrants' destinations remains. Implicitly, we predict that institutional governance structures become more effective as they gain mobilization experience, but we do not address the question of how identified institutional elements overcome capital asset challenges in adaptive capacity actions

Another avenue for future research involves linking institutional and capital motivations to different types of disaster migrant's destination. In our model we do not consider the types of action taken by disaster migrants in response to prevailing conditions in new destinations, nor do we discuss how disaster institutional mobilization efforts may differ between disaster migrants' destinations. We suggest, however, that another implication of our model is that mobilisation-based institutional motives will potentially lead to different types of action from disaster migrants. We speculate that disaster migrant groups may attempt to directly react to decisions by local disaster institutions about their livelihood and wellbeing in their new destinations as a way of expressing their concerns to a broader audience. For instance, a disaster migrant groups in new destinations may engage in local protests intended to influence institutional decisions for inclusiveness and economic wellbeing.

Another issue that identifies a limitation of our model and thus offers an avenue for future research concerns identity-based action, which is largely underpinned by social capital. One

key underlying proposition of our model is the assumption based on social identity research that besides conditions in different destinations helping to explain the behaviour of disaster migrant groups, social identity that such groups claim is critical. We propose that it is one thing for disaster migrants to embrace new destinations and the other for them to join local groups working towards the formation of planned adaptation to possible future disasters. From an action-oriented identity perspective, after a hit of a disaster, migrants join groups that possess like-minded members with similar social identity on the grounds of race, ethnicity, interest-based. If disaster migrant groups are concerned only with this association-created identity rather than actual action-created identity, then we would not expect our identity-based action to hold true. Empirical study of identity-based action among disaster migrants across different destinations would be useful in exploring different types of identity-based motives in disaster studies.

Another challenge in empirically testing our model involves generating reliable and valid measures of relationship density among disaster migrant groups; institutional tolerance, past disaster actions; capital asset ownership; identity-based motivations in new destinations; types of institutional mobilization; and interests across stakeholder groups. Social researchers often employ survey instruments to capture relationship data (Ref); while time consuming, this technique directly measures relationship variables, such as identified institutional governance indicators in our model with capital asset factors across different disaster migrant groups, for which there are few proxies. In terms of understanding the how and why disaster migrant groups integrate into new destination and groups, we believe the greatest challenge will be to accurately capture measures of migrant groups' interest and identity motives. Interviews and surveys at the individual level would help researchers understand the degree to which a stakeholder group is driven by each motive.

6. Conclusion

Literature findings illustrate the myriad of ways in which adaptive capacity of destinations for disaster migrants is critical in the design and implementation of disaster mitigation initiatives, assessment of the performance outcomes of these initiatives, communicating the implicit and explicit institutional roles in the process with affected population, and attempt to build a destination case for disaster migration. Despite the plethora of disaster frameworks and the relevance that literature recognizes to destination perception of disaster migration activities, there are no specific approach for evaluating the link between disaster migration and destination adaptive capacity. We argue that the lack of specific integrative model hinders deeper understanding of the impacts of adaptive capacity elements on destination decisions among disaster migrants. With the aim of overcoming such limitations, we propose a consolidative disaster adaptive capacity model that integrates the current literature about disaster migration models with adaptive capacity models. The model is based on two dimensions: (i) institutional governance phase, (ii) capital asset phase. The proposed consolidative model of the paper aims to help play out a rebalancing of institutional governance factors with capital asset indicators in adaptive capacity of disaster migrants' destinations.

The contributions of this study are relevant and useful for both the academic and practitioners' community. By establishing the implicit and explicit roles that the institutional governance factors and capital asset indicators have on the totality of the adaptive capacity of migrants' destinations, the consolidative model allows a comparative assessment to be made and, hence, the ability to develop adaptive capacity improvements through benchmarking to the best performing parameters. Moreover, the ability to present model parameters in continuum offers opportunities to observe the performance of each identified indicators during testing in a particular destination circumstance. Such analysis of the performance of parameters captured in the consolidative model supports disaster managers in understanding

and handling adaptive capacity improvement initiatives in new destinations for disaster migrants. In the whole, the consolidative disaster adaptive capacity model can be considered as a base map for assessing the relationship among knowledge base of disaster migrants, institutional competencies, and capital asset of destinations; thus facilitating the shaping of destination decisions among disaster migrants, institutions and practitioners.

As common with all generalizing conceptualizations, we cannot overlook the limitation of the proposed model that needs a redress in future studies. We recognized the active role of institutional governance factors in shaping, rather than simply reflecting, adaptive capacity frameworks. In our proposed model, we argue that the nature and balance of adaptive capacity does not only result from overall capital asset features of the destination but also from the roles of the organisational environment in shaping them. Moreover, disaster institutions, for example, often assume an active and even political role in shaping mitigation initiatives after a disaster, which we have argued as crucial and more effective when such actions are sensitive to the capital asset domain. We further share that such a well integrative system helps to foster and mould destinations with a more responsive adaptive capacity. However, it remains open to future research whether different social issues identified in the model are more effectively and efficiently addressed by institutional governance than by capital asset aspect of adaptive capacity. Adding to this, with such a proposed consolidative model, the paper sees a potential to change the destination perspective of disaster migration and adaptive capacity as possible. We therefore believe that this paper has started this iterative process by conceptually integrating the current literature about disaster migration models with adaptive capacity models.

The research propositions we generate in our model await empirical testing. One challenge in this type of research is a suitable operational setting, in which one can identify specific stakeholders with the ideal disaster and migration experience who can sufficiently represent

the larger population under study. We envision field studies that will help validate the conceptual discussion presented in this paper. By doing so, the accuracy of the institutional governance phase and the capital asset phase of the consolidative disaster adaptive capacity model can be verified, hence leading to a well-refined and tested holistic model.

References

- Abunyawah, M., Gajendran, T., & Maund, K. (2018). Profiling Informal Settlements for Disaster Risks. *Procedia engineering*, 212, 238-245.
- Adger, W. N. (1996). Approaches to vulnerability to climate change. *CSERGE GEC WORKING PAPER*.
- Ambrosetti, E., & Petrillo, E. R. (2016). Environmental disasters, migration and displacement. Insights and developments from L'Aquila's case. *Environmental Science & Policy*, 56, 80-88.
- Anderson, J. E. (2011). The Gravity Model. *Annual Review of Economics*, 3(1), 133–160.
- Araya-Muñoz, D., Metzger, M. J., Stuart, N., Wilson, A. M. W., & Alvarez, L. (2016). Assessing urban adaptive capacity to climate change. *Journal of environmental management*, 183, 314-324.

- Armah-Attoh, D., & Awal, M. (2013). Tax administration in Ghana: perceived institutional challenges. *Afrobarometer Briefing Paper*, 124(1).
- Ashley, W. S., & Strader, S. M. (2016). Recipe for disaster: how the dynamic ingredients of risk and exposure are changing the tornado disaster landscape. *Bulletin of the American Meteorological Society*, 97(5), 767-786.
- Bakkour, D., Enjolras, G., Thouret, J.-C., Kast, R., Mei, E. T. W., & Prihatminingtyas, B. (2015). The adaptive governance of natural disaster systems: Insights from the 2010 mount Merapi eruption in Indonesia. *International journal of disaster risk reduction*, 13, 167-188.
- Banerjee, S., Black, R., Kniveton, D., & Kollmair, M. (2014). The changing hindu kush himalayas: Environmental change and migration. In *People on the Move in a Changing Climate* (pp. 205-227): Springer.
- Beccari, B. (2016). A comparative analysis of disaster risk, vulnerability and resilience composite indicators. *PLoS currents*, 8.
- Belasen, A. R., & Polachek, S. W. (2013). 17 Natural disasters and migration. *international Handbook on the Economics of migration*, 309.
- Berkes, F., & Ross, H. (2013). Community resilience: toward an integrated approach. *Society & Natural Resources*, 26(1), 5-20.
- Berman, M., Kofinas, G., & BurnSilver, S. (2017). Measuring Community Adaptive and Transformative Capacity in the Arctic Context. In *Northern Sustainability: Understanding and Addressing Change in the Circumpolar World* (pp. 59-75): Springer.
- Bratton, M., & Gyimah-Boadi, E. (2016). Do Trustworthy Institutions Matter for Development? Corruption, Trust and Government Performance in Africa.

- Brooks, N., & Adger, W. N. (2005). Assessing and enhancing adaptive capacity. *Adaptation policy frameworks for climate change: Developing strategies, policies and measures*, 165-181.
- Brouwer, R., Akter, S., Brander, L., & Haque, E. (2007). Socioeconomic vulnerability and adaptation to environmental risk: a case study of climate change and flooding in Bangladesh. *Risk analysis*, 27(2), 313-326.
- Brown, P. R., Nelson, R., Jacobs, B., Kokic, P., Tracey, J., Ahmed, M., & DeVoi, P. (2010). Enabling natural resource managers to self-assess their adaptive capacity. *Agricultural Systems*, 103(8), 562-568.
- Butler, J., Wise, R., Skewes, T., Bohensky, E., Peterson, N., Suadnya, W., . . . Puspadi, K. (2015). Integrating top-down and bottom-up adaptation planning to build adaptive capacity: a structured learning approach. *Coastal Management*, 43(4), 346-364.
- Cannon, T. (1993). A hazard need not a disaster make: vulnerability and the causes of 'natural' disasters. *Natural disasters: protecting vulnerable communities*. Thomas Telford, London, 92-105.
- Carter, J. G., Cavan, G., Connelly, A., Guy, S., Handley, J., & Kazmierczak, A. (2015). Climate change and the city: Building capacity for urban adaptation. *Progress in Planning*, 95, 1-66.
- Castles, S., De Haas, H., & Miller, M. J. (2013). *The age of migration: International population movements in the modern world*: Palgrave Macmillan.
- Chaffin, B. C., Gosnell, H., & Cosens, B. A. (2016). A decade of adaptive governance scholarship: synthesis and future directions.
- Chambers, R., & Conway, G. (1992). *Sustainable rural livelihoods: practical concepts for the 21st century*: Institute of Development Studies (UK).

- Change, I. P. o. C. (2014). *Climate Change 2014–Impacts, Adaptation and Vulnerability: Regional Aspects*: Cambridge University Press.
- Coetzee, C., Van Niekerk, D., & Raju, E. (2016). Disaster resilience and complex adaptive systems theory: Finding common grounds for risk reduction. *Disaster Prevention and Management*, 25(2), 196-211.
- Coulthard, S. (2008). Adapting to environmental change in artisanal fisheries—insights from a South Indian Lagoon. *Global Environmental Change*, 18(3), 479-489.
- Cutter, S. L., Barnes, L., Berry, M., Burton, C., Evans, E., Tate, E., & Webb, J. (2008). A place-based model for understanding community resilience to natural disasters. *Global environmental change*, 18(4), 598-606.
- Dercon, S. (2002). Income risk, coping strategies, and safety nets. *The World Bank Research Observer*, 17(2), 141-166.
- Dinh, Q., Balica, S., Popescu, I., & Jonoski, A. (2012). Climate change impact on flood hazard, vulnerability and risk of the Long Xuyen Quadrangle in the Mekong Delta. *International journal of river basin management*, 10(1), 103-120.
- Drabo, A., & Mbaye, L. (2011). Climate change, natural disasters and migration: An empirical analysis in developing countries.
- Eakin, H. C., Lemos, M. C., & Nelson, D. R. (2014). Differentiating capacities as a means to sustainable climate change adaptation. *Global Environmental Change*, 27, 1-8.
- Ellis, F. (2000). The determinants of rural livelihood diversification in developing countries. *Journal of Agricultural Economics*, 51(2), 289-302.
- Engle, N. L. (2011). Adaptive capacity and its assessment. *Global Environmental Change*, 21(2), 647-656.
- Engle, N. L., & Lemos, M. C. (2010). Unpacking governance: building adaptive capacity to climate change of river basins in Brazil. *Global Environmental Change*, 20(1), 4-13.

- Ensor, J., Park, S. E., Hoddy, E., & Ratner, B. (2015). A rights-based perspective on adaptive capacity. *Global Environmental Change*, 31, 38-49.
- Fernandez-Gimenez, M. E., Batkhishig, B., Batbuyan, B., & Ulambayar, T. (2015). Lessons from the dzud: Community-based rangeland management increases the adaptive capacity of Mongolian herders to winter disasters. *World Development*, 68, 48-65.
- Ford, J. D., & King, D. (2015). A framework for examining adaptation readiness. *Mitigation and Adaptation Strategies for Global Change*, 20(4), 505-526.
- Fothergill, A., Maestas, E. G., & Darlington, J. D. (1999). Race, ethnicity and disasters in the United States: A review of the literature. *Disasters*, 23(2), 156-173.
- Fussell, E., Sastry, N., & VanLandingham, M. (2010). Race, socioeconomic status, and return migration to New Orleans after Hurricane Katrina. *Population and environment*, 31(1-3), 20-42.
- Garschagen, M., Hagenlocher, M., Comes, M., Dubbert, M., Sabelfeld, R., Lee, Y. J., . . . Neuschäfer, O. (2016). World Risk Report 2016.
- Gray, C., & Bilsborrow, R. (2013). Environmental influences on human migration in rural Ecuador. *Demography*, 50(4), 1217-1241.
- Gray, C., Frankenberg, E., Gillespie, T., Sumantri, C., & Thomas, D. (2009). Population Displacement and Mobility in Sumatra after the Tsunami.
- Gray, C., & Mueller, V. (2012). Drought and population mobility in rural Ethiopia. *World Development*, 40(1), 134-145.
- Groen, J. A., & Polivka, A. E. (2010). Going home after Hurricane Katrina: Determinants of return migration and changes in affected areas. *Demography*, 47(4), 821-844.
- Grothmann, T., Grecksch, K., Winges, M., & Siebenhüner, B. (2013). Assessing institutional capacities to adapt to climate change: integrating psychological dimensions in the Adaptive Capacity Wheel. *Natural Hazards and Earth System Sciences*, 13(12), 3369.

- Gubhaju, B., & De Jong, G. F. (2009). Individual versus household migration decision rules: Gender and marital status differences in intentions to migrate in South Africa. *International Migration*, 47(1), 31-61.
- Guha-Sapir, D., & Hoyois, P. (2015). Estimating populations affected by disasters: A review of methodological issues and research gaps. *Brussels: Centre for Research on the Epidemiology of Disasters (CRED), Institute of Health and Society (IRSS), University Catholique de Louvain.*
- Guha-Sapir, D., Vos, F., Below, R., & Ponserre, S. (2012). *Annual disaster statistical review 2011: the numbers and trends*. Retrieved from
- Gupta, J., Termeer, C., Klostermann, J., Meijerink, S., van den Brink, M., Jong, P., . . . Bergsma, E. (2010). The adaptive capacity wheel: a method to assess the inherent characteristics of institutions to enable the adaptive capacity of society. *Environmental Science & Policy*, 13(6), 459-471.
- Hasselman, L. (2017). Adaptive management; adaptive co-management; adaptive governance: what's the difference? *Australasian Journal of Environmental Management*, 24(1), 31-46.
- Hess, J. J., McDowell, J. Z., & Luber, G. (2012). Integrating climate change adaptation into public health practice: using adaptive management to increase adaptive capacity and build resilience. *Environmental Health Perspectives*, 120(2), 171.
- Hinkel, J. (2011). "Indicators of vulnerability and adaptive capacity": Towards a clarification of the science-policy interface. *Global Environmental Change*, 21(1), 198-208.
- Holman, I. P., & Trawick, P. (2011). Developing adaptive capacity within groundwater abstraction management systems. *Journal of environmental management*, 92(6), 1542-1549.

- Hunter, L. M. (2005). Migration and environmental hazards. *Population & Environment*, 26(4), 273-302.
- Hurlbert, M., & Gupta, J. (2017). The adaptive capacity of institutions in Canada, Argentina, and Chile to droughts and floods. *Regional environmental change*, 17(3), 865-877.
- Intergovernmental Panel on Climate Change. Working Group II. (2014). *Climate change 2014: Impacts, adaptation, and vulnerability*. IPCC Working Group II.
- Jenkins, S., Wilson, T., Magill, C., Miller, V., Stewart, C., Marzocchi, W., & Boulton, M. (2014). Volcanic ash fall hazard and risk: Technical Background Paper for the UN-ISDR 2015 Global Assessment Report on Disaster Risk Reduction.
- Jha, A. K. (2010). *Safer homes, stronger communities: a handbook for reconstructing after natural disasters*: World Bank Publications.
- Jones, L., Ludi, E., & Levine, S. (2010). Towards a characterisation of adaptive capacity: a framework for analysing adaptive capacity at the local level, Overseas Development Institute. In.
- Kandel, W. A. (1992). 2. Population Growth, Urbanization, and Disaster Risk and Vulnerability in Metropolitan Areas: A Conceptual Framework. *Sign*, 525(1), 7-20.002.
- Keogh, D. U., Apan, A., Mushtaq, S., King, D., & Thomas, M. (2011). Resilience, vulnerability and adaptive capacity of an inland rural town prone to flooding: a climate change adaptation case study of Charleville, Queensland, Australia. *Natural Hazards*, 59(2), 699-723.
- Khair-Eldien, K., & Zahran, S. A. (2016). Climate Changes Vulnerability and Adaptive Capacity.

- Koks, E. E., Jongman, B., Husby, T. G., & Botzen, W. J. (2015). Combining hazard, exposure and social vulnerability to provide lessons for flood risk management. *environmental science & policy*, 47, 42-52.
- Kulig, J. C., Edge, D. S., Townshend, I., Lightfoot, N., & Reimer, W. (2013). Community resiliency: Emerging theoretical insights. *Journal of Community Psychology*, 41(6), 758-775.
- Leys, A. J., & Vanclay, J. K. (2011). Social learning: A knowledge and capacity building approach for adaptive co-management of contested landscapes. *Land Use Policy*, 28(3), 574-584.
- Linnekamp, F., Koedam, A., & Baud, I. (2011). Household vulnerability to climate change: Examining perceptions of households of flood risks in Georgetown and Paramaribo. *Habitat International*, 35(3), 447-456.
- Lockwood, M., Raymond, C., Oczkowski, E., & Morrison, M. (2015). Measuring the dimensions of adaptive capacity: a psychometric approach. *Ecology and Society*, 20(1).
- Mallick, B., & Vogt, J. (2012). Cyclone, coastal society and migration: empirical evidence from Bangladesh. *International Development Planning Review*, 34(3), 217-240.
- Massey, D. S., & Parrado, E. A. (1998). International migration and business formation in Mexico. *Social Science Quarterly*, 1-20.
- Mechler, R., & Bouwer, L. M. (2015). Understanding trends and projections of disaster losses and climate change: is vulnerability the missing link? *Climatic Change*, 133(1), 23-35.
- Mortreux, C., & Barnett, J. (2017). Adaptive capacity: exploring the research frontier. *Wiley Interdisciplinary Reviews: Climate Change*.

- Nelson, R., Kokic, P., Crimp, S., Martin, P., Meinke, H., Howden, S., . . . Nidumolu, U. (2010). The vulnerability of Australian rural communities to climate variability and change: Part II—Integrating impacts with adaptive capacity. *Environmental Science & Policy*, 13(1), 18-27.
- Nielsen, J. Ø., & Reenberg, A. (2010). Cultural barriers to climate change adaptation: A case study from Northern Burkina Faso. *Global Environmental Change*, 20(1), 142-152.
- Okuyama, Y., & Sahin, S. (2009). Impact estimation of disasters: a global aggregate for 1960 to 2007.
- Palliyaguru, R., Amaratunga, D., & Baldry, D. (2014). Constructing a holistic approach to disaster risk reduction: the significance of focusing on vulnerability reduction. *Disasters*, 38(1), 45-61.
- Park, S., Marshall, N., Jakku, E., Dowd, A.-M., Howden, S., Mendham, E., & Fleming, A. (2012). Informing adaptation responses to climate change through theories of transformation. *Global Environmental Change*, 22(1), 115-126.
- Paton, D., & Johnston, D. (2017). *Disaster resilience: an integrated approach*: Charles C Thomas Publisher.
- Paul, B. K. (2005). Evidence against disaster-induced migration: the 2004 tornado in north-central Bangladesh. *Disasters*, 29(4), 370-385.
- Paveglio, T. B., Carroll, M. S., & Jakes, P. J. (2010). Alternatives to evacuation during wildland fire: Exploring adaptive capacity in one Idaho community. *Environmental Hazards*, 9(4), 379-394.
- Paxson, C., & Rouse, C. E. (2008). Returning to new orleans after hurricane katrina. *The American economic review*, 98(2), 38.

- Pelling, M., High, C., Dearing, J., & Smith, D. (2008). Shadow spaces for social learning: a relational understanding of adaptive capacity to climate change within organisations. *Environment and Planning A*, 40(4), 867-884.
- Pelling, M., Maskrey, A., Ruiz, P., Hall, P., Peduzzi, P., Dao, Q.-H., . . . Kluser, S. (2004). Reducing disaster risk: a challenge for development.
- Plummer, R., & Armitage, D. (2010). Integrating perspectives on adaptive capacity and environmental governance. In *Adaptive capacity and environmental governance* (pp. 1-19): Springer.
- Plummer, R., Armitage, D., & de Loë, R. (2013). Adaptive comanagement and its relationship to environmental governance. *Ecology and Society*, 18(1).
- Ravenstein, E. G. (1885). The laws of migration. *Journal of the statistical society of London*, 48(2), 167-235.
- Ray-Bennett, N. S. (2018). Disasters, Deaths, and the Sendai Goal One: Lessons from Odisha, India. *World Development*, 103, 27-39.
- Romieu, E., Welle, T., Schneiderbauer, S., Pelling, M., & Vinchon, C. (2010). Vulnerability assessment within climate change and natural hazard contexts: revealing gaps and synergies through coastal applications. *Sustainability Science*, 5(2), 159-170.
- Rosenzweig, M. R., & Stark, O. (1989). Consumption smoothing, migration, and marriage: Evidence from rural India. *Journal of political Economy*, 97(4), 905-926.
- Schneiderbauer, S., Pedoth, L., Zhang, D., & Zebisch, M. (2013). Assessing adaptive capacity within regional climate change vulnerability studies—an Alpine example. *Natural Hazards*, 67(3), 1059-1073.
- Schultz, L., Folke, C., Österblom, H., & Olsson, P. (2015). Adaptive governance, ecosystem management, and natural capital. *Proceedings of the National Academy of Sciences*, 112(24), 7369-7374.

- Schwab, A. K., Sandler, D., & Brower, D. J. (2016). *Hazard Mitigation and Preparedness: An Introductory Text for Emergency Management and Planning Professionals*: CRC Press.
- Scoones, I. (1998). Sustainable rural livelihoods: a framework for analysis.
- Smith, K. (2013). *Environmental hazards: assessing risk and reducing disaster*: Routledge.
- Spiller, M. (2016). Adaptive capacity indicators to assess sustainability of urban water systems—Current application. *Science of the Total Environment*, 569, 751-761.
- Tompkins, E. L., & Adger, W. N. (2005). Defining response capacity to enhance climate change policy. *Environmental Science & Policy*, 8(6), 562-571.
- Vu, L., VanLandingham, M. J., Do, M., & Bankston III, C. L. (2009). Evacuation and return of Vietnamese New Orleanians affected by Hurricane Katrina. *Organization & environment*, 22(4), 422-436.
- Waldorf, B., & Do Yun, S. (2016). Labor migration and overeducation among young college graduates. *Review of Regional Research*, 36(2), 99-119.
- Walker, B., Gunderson, L., Kinzig, A., Folke, C., Carpenter, S., & Schultz, L. (2006). A handful of heuristics and some propositions for understanding resilience in social-ecological systems. *Ecology and society*, 11(1).
- Warner, K., Hamza, M., Oliver-Smith, A., Renaud, F., & Julca, A. (2010). Climate change, environmental degradation and migration. *Natural Hazards*, 55(3), 689-715.
- White, M., & Lindstrom, D. (2005). Internal migration. *Handbook of population*, 311-346.
- Whitney, C., Bennett, N., Ban, N., Allison, E., Armitage, D., Blythe, J., . . . Kaplan-Hallam, M. (2017). Adaptive capacity: from assessment to action in coastal social-ecological systems. *Ecology and Society*, 22(2).

- Wilhelmi, O. V., & Hayden, M. H. (2010). Connecting people and place: a new framework for reducing urban vulnerability to extreme heat. *Environmental Research Letters*, 5(1), 014021.
- Wilhite, D. A. (2016). *Droughts: A Global Assessment*: Routledge.
- Wolpert, J. (1965). Behavioral aspects of the decision to migrate. *Papers in Regional Science*, 15(1), 159-169.
- Yang, D. (2008). Risk, migration, and rural financial markets: Evidence from earthquakes in El Salvador. *Social Research: An International Quarterly*, 75(3), 955-992.
- Zevenbergen, C., van Herk, S., & Rijke, J. (2017). Future-Proofing Flood Risk Management: Setting the Stage for an Integrative, Adaptive, and Synergistic Approach. *Public Works Management & Policy*, 22(1), 49-54.
- Zipf, G. K. (1946). The $P_1/P_2/D$ hypothesis: on the intercity movement of persons. *American sociological review*, 11(6), 677-686.

‘After the disaster comes destination thoughts’: A review and conceptualisation of consolidative disaster adaptive capacity model

Highlights

- ✓ Destination thoughts constitute the core of planning and management decisions after a disaster
- ✓ Adaptive capacity of destinations and disaster migration remains a disconnected stream in the academic literature
- ✓ From a place-based perspective, we offer a consolidative disaster adaptive capacity model
- ✓ The proposed consolidative model offers novel suggestions that are relevant to improve disaster policies, practice and research.