



## Review Article

# Toward conceptual frameworks for linking disaster risk reduction and climate change adaptation



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## ABSTRACT

The priorities of disaster risk reduction (DRR) and climate change adaptation (CCA) agendas both include reducing vulnerability and enhancing resilience. Thus, it is crucial to link DRR and CCA to benefit simultaneously from risk reduction and adaptation measures. The article provides conceptual frameworks that could be useful for better understanding and promoting the integration of DRR and CCA by linking these approaches to accelerate risk reduction and adaptation measures at all levels (global, regional, national and local). This linkage could be an important basis for discussion in climate negotiations regarding the allocation of funds needed for tackling climate change, especially in developing countries. This article also identifies common features and practices for DRR and CCA in several sectors and documents the growing acknowledgment and affirmation of the need to integrate DRR and CCA into development policy and planning.

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## 1. Introduction

There is an increasing trend in the occurrence of natural disasters, and climate change only serves to aggravate the devastating impacts of these disasters [1]. This disaster trend has increased over time and climate-related disasters are the most commonly occurring disaster events [2–4]. According to the Center for Research on the Epidemiology of Disasters (CRED), the number of reported disasters has significantly increased from 294 in 1950–1959 to 3530 in 2000–2008 and 4210 in 2003–2013 [2,5]. In 2013, a total of 330 natural disasters were reported which was less than the average annual disaster frequency observed from 2003 to 2012 (388). This was mostly due to a smaller number of hydrological and climatological disasters (18% and 45% below the annual average of 2003–2012, respectively). Hydrological disasters (159) still had a largest share in natural disaster occurrence in 2013 (48.2%), followed by meteorological disasters (106%; 32.1%), climatological disasters (33%; 10%) and geophysical disasters (32%; 9.7%). A large number of people have already been affected, and economic losses are significant due to the increasing number of disasters worldwide [4,6]. The overall impacts of climate-related disasters may enhance the vulnerability of many societies and communities worldwide, especially those that are already vulnerable [7]. The approaches of disaster risk reduction (DRR) and climate change adaptation (CCA) tackle the impacts of shocks and stresses, and seek to make individuals, communities and societies more resilient and less vulnerable to them [8]. According to UNISDR [9], resilience defines as “the ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions” while vulnerability is “the characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard”. Cannon [10] emphasised that vulnerability must be understood as a set of socioeconomic conditions that are identifiable in relation to particular hazard risks, and therefore perform a predictive role that can assist in risk reduction whereas resilience is often confused as a concept, sometimes seen as the inverse of vulnerability, and by others as an independent quality. These confusions may be especially relevant in the context of policy for disaster risk reduction at the scale of community [10]. According to some literatures, high level of resilience infers low vulnerability and vice versa [10–14]. The pattern of highs and lows in the different components of vulnerability and resilience may vary between individuals, households, groups, and communities [10]. However, other studies rely vulnerability and resilience as separate, possibly overlapping but not its opposite [15–18]. A number of studies described a detailed of resilience and vulnerability, their sources and relationship, vulnerability and its causative processes in terms of disaster and climate related risks [19–30]. These descriptions are beyond of this article’s scope. Nevertheless, both DRR and CCA approaches are useful in reducing vulnerability and increasing resilience to the potential adverse impacts of climate-related extremes and disasters, even though a portion of risks cannot be fully eliminated [4]. In managing risks posed by climate change and climate-related disasters, the coordination and collaboration for linking DRR and CCA have already been noted by practitioners and policymakers as well as by leading national and international organisations [6].

Due to concerns over rising disaster frequency and severity, the World Conference on Disaster Reduction (WCDR) was held in Kobe, Hyogo, Japan, 2005, where the Vulnerability and Adaptation Resource Group (VARG) presented the discussion paper “Disaster Risk Management in a Changing Climate” to support a dialogue on the synergies and differences between approaches to disaster risk management (DRM) and CCA. At Kobe, the link between DRM and climate change was the subject of intensive formal and informal debates. The Hyogo Framework for Action (HFA) 2005–2015, titled “Building the Resilience of Nations and Communities to Disasters,” was adopted by the Conference [31] and calls were made for a stronger recognition of climate change concerns in DRR strategies that seeks to establish a multi-disciplinary, forward-looking approach [32]. A great deal of attention is now needed to integrate the DRR and CCA agendas conceptually as well as in practise at sub-national, national and international levels [33,34]. A functional linking of DRR and CCA within the context of poverty reduction and development has been recommended by UNISDR [35]. The recent special report of the Intergovernmental Panel on Climate Change (IPCC), titled “Managing the risks of extreme events and disasters to advance climate change adaptation,” has also drawn attention to potential linkages between DRR and CCA [4]. The increasing recognition of the inter-linkages and overlaps between CCA and DRR is also reflected in the key frameworks of the United Nations Framework Convention on Climate Change (UNFCCC).

With the wide-ranging impact of disasters, action is required to ensure that DRR is mainstreamed in policy agreements and is supported by an international DRR mechanism. Although politically challenging, this could be achieved by adopting a legally binding commitment to DRR with specific goals defined and signatory nations held accountable for their achievements, as is the case with the UN Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. The Hyogo Framework for Action 2005–2015 (HFA) expires in 2015, and a process is already in place to negotiate a new global agreement on DRR. However, the countries of the parties (CoP) on its fifteenth session in Copenhagen aspires that enhanced action and international cooperation on adaptation is urgently required to ensure the implementation of the Convention by enabling and supporting the implementation of adaptation actions aimed at reducing vulnerability and building resilience in developing countries, especially in those that are particularly vulnerable, such as least developed countries, small island developing States and Africa [36]. They agreed that

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