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# **Connecting disaster risk reduction, climate change and sustainable development**

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Kaori Kitagawa

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## Connecting disaster risk reduction, climate change and sustainable development

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### Transforming Universities for a Changing Climate Working Paper Series, No. 2

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**January 2021**

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## Abstract

Many authors have critiqued the disconnectedness between disaster risk reduction, climate change and sustainable development. This paper summarises existing arguments as to why and how they should be connected. The paper's contribution is to develop a comprehensive understanding of disconnectedness and connectedness of these three areas and to reinforce the advantages of connecting them. There are acknowledgements in the Sendai Framework for Disaster Risk Reduction, the Paris Agreement and the Sustainable Development Goals (SDGs) that they share common goals. The agreements stress mainstreaming disaster risk reduction and climate change mitigation and adaptation in achieving the SDGs through inclusive approaches, capacity building and multi-stakeholder collaborations. However, the achievement so far has been limited due to the challenges of synthesising underlying paradigms as well as efforts of diverse institutions involved. Separation can result in one practice in one field undermining a longer-term aim in another. The key finding of the paper is the deep-seated nature of politics that inhibits the enhancement of the connectedness despite the great benefits of linking the three fields.



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## 1. Introduction

A number of authors have critiqued the disconnectedness between disaster risk reduction (DRR), climate change (CC) and sustainable development (SD), arguing for the benefit of linking them (e.g. Birkmann and von Teichman, 2010; Kelman et al., 2015; Lei and Wang, 2014; Schipper and Pelling, 2006; Thomalla et al., 2006). The synergies between the three fields have increased in the past decade (Peduzzi, 2019). However, the major disconnected features appear to remain, and this paper intends to summarise existing arguments as to why and how they should be connected. The paper therefore is a synthesis of the existing literature, rather than a presentation of new empirical data. The literature tends to approach the disconnectedness/connectedness topic from a specific angle; for example, Kelman's (2017) analysis focuses on the three international agreements of DRR, CC and SD to demonstrate how limited links there are. It should also be noted that the paper does not intend to capture the entirety of each field, but rather, focuses on its landmark reports in identifying its major position. The contribution of this paper is to develop a comprehensive understanding of disconnectedness and connectedness of these three areas and to reinforce the advantages of connecting them.

First, the definitions of the three concepts, as well as the leading bodies and their remits, need to be clarified. The United Nations Office for Disaster Risk Reduction (UNDRR; formerly UNISDR<sup>1</sup>) is the institution offering guidance concerning DRR. DRR aims to prevent new and reduce 'existing disaster risk and manage residual risk, all of which contribute to strengthening economic, social, health and environmental resilience, and ultimately to the achievement of sustainable development' (UNDRR, 2020a). Risks of all types of disasters are covered: small/large-scale, frequent/infrequent, sudden/slow-onset disasters, caused by natural or human-made hazards, as well as related environmental, technological and biological hazards. The multi-hazard management of disaster risk has been promoted at all levels as well as within and across all sectors (UNISDR, 2015). DRR is 'the policy objective of disaster risk management' (DRM) of which 'goals and objectives are defined in disaster risk reduction strategies and plans' (UNDRR, 2020a). This paper's focus is DRR, although DRM is used when appropriate.

CC is governed by the United Nations Framework Convention on Climate Change (UNFCCC), enacted on 21 March 1994. 197 countries have ratified the Convention so far, which are called Parties to the Convention. The Conference of the Parties (COP) is the supreme decision-making body of the UNFCCC, in which the implementation of the Convention is planned and reviewed (UNFCCC, 2020a). Two major actions against CC are mitigation and adaptation. The former tackles the causes of changing and more extreme weather and climate events by reducing anthropogenic greenhouse gas<sup>2</sup> emissions. CC mitigation is, in fact, 'pollution<sup>3</sup> prevention' activities, which have been practised for other human emissions, including 'persistent organic pollutants (e.g. PCBs and dioxins) and acid rain forming compounds (e.g. sulphur dioxide and nitrogen oxides)' (Kelman, 2017, p. 256). Each substance, therefore, requires 'its own social and technical' (Kelman, 2017, p. 256) mitigation measure. Adaptation is defined as 'the process of adjustment to actual or expected climate and its effects, to moderate harm or exploit beneficial opportunities' (IPCC, 2012, p. 5). In other words, climate change adaptation (CCA) seeks to reduce the risks posed by the impacts of CC (Kelman, 2017; Schipper et al., 2016). The paper looks at both mitigation and adaptation actions in CC, although the focus being the latter.

SD is a much broader concept referring to: 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs'. SD promotes 'concerted efforts towards building an inclusive, sustainable and resilient future for people and planet'. 'Economic growth, social inclusion and environmental protection', which are fundamental 'for the well-being of individuals and societies', have to be synthesised in the pursuance of SD (United Nations, 2020). The United Nation General Assembly (UNGA) adopted a resolution 'Transforming our world: the 2030 Agenda for Sustainable Development' on 25 September 2015 (UNGA, 2015). It set out a 15-year plan to achieve 17 Sustainable Development Goals (SDGs) and 169 Targets 'to end poverty, protect the planet and improve the lives and prospects of everyone, everywhere' (United Nations, 2020). This paper refers to SD in a generic sense, while the SDGs are discussed in specific contexts.

1 United Nations International Strategy for Disaster Reduction

2 According to the IPCC (2007, p.82), 'greenhouse gases' are defined as: 'those gaseous constituents of the *atmosphere*, both natural and *anthropogenic*, that absorb and emit radiation at specific wavelengths within the spectrum of *thermal infrared radiation* emitted by the Earth's surface, the atmosphere itself, and by clouds. This property causes the greenhouse effect. Water vapour (H<sub>2</sub>O), carbon dioxide (CO<sub>2</sub>), nitrous oxide (N<sub>2</sub>O), methane (CH<sub>4</sub>) and ozone (O<sub>3</sub>) are the primary greenhouse gases in the Earth's atmosphere.... Beside CO<sub>2</sub>, N<sub>2</sub>O and CH<sub>4</sub>, the *Kyoto Protocol* deals with the greenhouse gases *sulphur hexafluoride* (SF<sub>6</sub>), *hydrofluorocarbons* (HFCs) and *perfluorocarbons* (PFCs)', which are referred to as 'fluorinated gases (F-gases)'.

3 Kelman defines greenhouse gases including CO<sub>2</sub> as 'pollutants' following legal decisions in the US 'because of their role in propagating climate change, not because of any direct health effects' (e.g. Johnson, 2009). General dictionaries consider 'pollution of all kinds can have negative effects on the environment and wildlife and often impacts human health and well-being.' (e.g. Encyclopedia Britannica, n.d.) Kelman uses 'pollution' from the viewpoint that many pollutants are not harmful up to certain quantities, but this does not stop them from being pollutants.



The current major international agreements in the areas of DRR, CC and SD are the following:

- The Sendai Framework for Disaster Risk Reduction (SFDRR) (UNISDR, 2015);
- The Paris Agreement (UNFCCC, 2015) from the COP21 meeting of the UNFCCC;
- The Sustainable Development Goals (SDGs) (UNGA, 2015).

All three agreements signed in 2015 share a fundamental aim of sustaining human life and preserving the planet. They also have a common timeframe of 2015–2030. The SFDRR and SDGs are voluntary agreements, as are the main parts of the Paris Agreement, even though the UNFCCC process which frames the COP meetings and agreements is meant to be legally binding in international law (Kelman, 2017).

The benefits of linking DRR, CC and SD have been addressed by some authors in the past couple of decades (e.g. Birkmann and von Teichman, 2010; Kelman et al., 2015; Lei and Wang, 2014; Schipper and Pelling, 2006). Broadly, the benefits are threefold. Merging overlapping administrations will lead to more cost-effective financial management (Begum et al., 2014; Venton and La Trobe, 2008). In tackling these complex global agendas, sharing knowledge and experience will enhance the decision-making process and outcome (Begum et al., 2014; Schipper, 2009). The third point is acquiring conceptual clarity around the three areas. This will enable integrated approaches to the agendas which are currently handled separately (Birkmann and von Teichman, 2010; Kelman and Gaillard, 2010).

There are acknowledgements in SFDRR (UNISDR, 2015), the Paris Agreement (UNFCCC, 2015) and the SDGs (United Nations, 2020) that they share common goals. The agreements stress mainstreaming DRR and CC mitigation and adaptation in achieving SDGs through inclusive approaches, capacity building and multi-stakeholder collaborations (Cadag, 2017). However, the achievement so far has been limited due to the challenges of synthesising underlying paradigms, administering three fields, as well as efforts of diverse institutions involved (Cadag, 2017; Kelman, 2017; Schipper et al., 2016; Schipper and Pelling, 2006). Separation can result in one practice in one field undermining a longer-term aim in another. Schipper et al. (2016) draw on an example of post-disaster shelters often provided by NGOs and humanitarian agencies. Their solutions are temporary due to funding availability with no prospects of sustainable housing. The response and recovery phases are separated into many projects.

Drawing on existing literature, this paper collates major discrepancies between DRR, CC and the SDGs to consider why and how they should be connected. The key finding is the deep-seated nature of politics that inhibits the enhancement of the connectedness despite the great benefits of connecting the three fields recognised in the above international agreements. The paper starts by discussing disconnectedness.

## 2. Disconnectedness

### 2.1 Separate developments, different principles

By the 1970s, the concern over environmental catastrophe was increasing due to an excessive emphasis on economic growth which threatened the survival of humanity and the planet. The levels of consumption which had industrialised certain parts of the world were unsustainable given that the resources of the planet would not be sufficient for everyone (Du Pisani, 2006). Economic growth, which was expected to resolve global inequalities was having the contrary effect. The new goal of SD was first recognised in 1972 at the UN Conference on the Human Environment, although the exact term was not necessarily used. The conference concluded managing 'development' and 'environment' together would benefit humanity more. It was the World Commission on Environment and Development – sponsored by the UN and chaired by Norwegian Prime Minister Brundtland – that introduced the concept of SD. Their report 'Our Common Future' produced in 1987 addressed the simultaneous relationships between social equity, economic growth and environmental preservation and clarified the three essential components of SD being society, the economy and the environment. The report also offered concrete policy recommendations for ongoing challenges in, for example, population, food security and biodiversity (Du Pisani, 2006). The Brundtland Report laid the foundation for the field of SD, including the advancement of the Millennium Development Goals. The present-day definition of SD referred to above is the exact one the report introduced.

In the field of DRM, a broad range of geophysical (e.g. earthquakes), human-made (e.g. terrorism) and biological (e.g. pandemics), as well as climate-related (e.g. storm surges and floods) risks and hazards have always been covered (Schipper et al., 2016). Until the 1970s, engineering measures such as levees and dams were mainstream solutions to DRM. The 'vulnerability' approach to disasters was a paradigm shift, which recognised disasters being an outcome of not only hazards but social environments. Currently, the principle of DRR lies in the reduction of disaster risks through decreasing exposure and vulnerability of people and society and increasing preparedness and resilience. This shift permitted the DRR domain to expand its scope incorporating development and humanitarian angles to address people's vulnerabilities caused by social injustice and inequalities (Cadag, 2017; DasGupta and Shaw, 2017; Mavrogenis et al., 2017).

CC, which covers only climate-related risks and hazards (Schipper et al., 2016), became a global agenda in the 2000s. In addition to greenhouse gas mitigation which had already been discussed in the UNFCCC, a need for adaptation approaches was recognised at the 2000 COP 11. Since then, the interest in CCA increased in both industrialised and less industrialised countries. Some industrialised countries that were reluctant to commit to the mitigation targets of the Kyoto Protocol shifted their focus to CCA (UNFCCC, 2020b). For less industrialised countries, adaptation was more achievable than mitigation. In this way, CCA has become 'a developmental priority' (DasGupta and Shaw, 2017, p. 15).



A report produced in 2012 by the Intergovernmental Panel on Climate Change (IPCC), a UN body set up in 1988 to assess science related to CC, recommends the integration of DRR and CCA for SD. However, IPCC (2012) clearly indicates the principle of CCA lies in the adjustments to reduce the potential negative impacts of CC, both climate extremes and gradual changes in climate (Clegg et al., n.d.; IPCC, 2012). Some authors such as Kelman et al. (2015) and DasGupta and Shaw (2017) critique the IPCC's approach for still isolating CC from wider disaster, vulnerability and development matters.

## 2.2 Different uses of the underlying key concepts

Having developed as separate fields, DRR and CC do not share the same definitions of the key concepts (Banwell et al., 2018; Begum et al., 2014). This inevitably has had impacts on the development and implementation of DRR and CCA policies (Cadag, 2017), and connecting them to SD agendas.

Adopting Banwell et al.'s (2018) analysis, **table 1** (below) summarises the differences between the uses of the key concepts in the fields DRR and CC.

With 'vulnerability' in particular, the different uses between DRR and CC are apparent and problematic (Cadag, 2017; Gaillard, 2010;

Kelman, 2017; Schipper et al., 2016). In DRR, vulnerability is defined as: 'The conditions determined by physical, social, economic, and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards (UNDRR, 2020c)'. Vulnerability is 'a product of historical socioeconomic processes characterised by injustice and prejudice' (Cadag, 2017, p. 189). Measures for vulnerability reduction aim to address such societal conditions (Kelman and Gaillard, 2010). In the field of CC, on the other hand, vulnerability means: 'The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt (IPCC, 2014, p. 128)'. The definition has broadened compared to a previous version, which treated vulnerability as 'a sole function of hazards' (Cadag, 2017, p. 189): 'the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, its sensitivity, and its adaptive capacity' (IPCC, 2007, p. 89). However, CC still relies on the projection of models in determining potential exposure and vulnerability of certain regions without considering social impacts (Cadag, 2017). Vulnerability is viewed as 'static and as a snapshot in time' (Kelman and Gaillard, 2010, p. 25), resulting in disregarding long-term research and practice in understanding vulnerability.

**Table 1. Definitions of the key terms related to DRR and CC (based on Banwell et al. 2018)**

Item	DRR	CC
<b>Risk</b>	The potential loss of life, injury, or destroyed or damaged assets which could occur to a system, society or a community in a specific period of time, determined probabilistically as a function of hazard, exposure, vulnerability and capacity (UNDRR, 2020b).	The potential for consequences where something of value is at stake and where the outcome is uncertain, recognizing the diversity of values. Risk is often represented as probability or likelihood of occurrence of hazardous events or trends multiplied by the impacts if these events or trends occur (IPCC, 2014).
<b>Hazard</b>	A process, phenomenon or human activity that may cause loss of life, injury or other health impacts, property damage, social and economic disruption or environmental degradation (UNDRR, 2020b).	The potential occurrence of a natural or human-induced physical event or trend or physical impact that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems and environmental resources (IPCC, 2014).
<b>Vulnerability</b>	The conditions determined by physical, social, economic and environmental factors or processes which increase the susceptibility of an individual, a community, assets or systems to the impacts of hazards (UNDRR, 2020b).	The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt (IPCC, 2014).
<b>Exposure</b>	The situation of people, infrastructure, housing, production capacities and other tangible human assets located in hazard-prone areas (UNDRR, 2020b).	The presence of people, livelihoods, species or ecosystems, environmental functions, services, and resources, infrastructure, or economic, social, or cultural assets in places and settings that could be adversely affected (IPCC, 2014).
<b>Capacity</b>	The combination of all the strengths, attributes and resources available within an organization, community or society to manage and reduce disaster risks and strengthen resilience (UNDRR, 2020b).	The combination of all the strengths, attributes, and resources available to an individual, community, society, or organization, which can be used to achieve established goals (IPCC, 2012).

Kelman (2017) further analyses the 'hazard-centric viewpoint' of the vulnerability identified in the language in Article 7 in the Paris Agreement: 'reducing vulnerability to climate change'. The focus on vulnerability to only CC may be appropriate, the Agreement being written for CC. However, 'the clause exposes a fundamental flaw in the framing of climate change' (Kelman, 2017, p. 255) because focusing on reducing vulnerability to only CC can undermine other disaster risks. Kelman (2017) discusses an engineering solution to intense tropical cyclones as an example. Installing heavy roofs tied to the walls helps reduce building vulnerability when hit by a cyclone but can increase casualties in case of an earthquake, as demonstrated in the 1995 Kobe earthquake. Many parts of the world experience both climate-related and non-climate-related hazards. Reducing vulnerabilities for both scenarios has to be considered, otherwise, one solution may exacerbate the other hazard impacts.

### 2.3 CC as a 'scapegoat'

Kelman and Gaillard (2010, p.24) argue that CC has become a dominant subject 'bringing science, policy, and practice back to focusing on nature'. This distracts from fundamental disaster and development concerns and allows avoiding responsibility. 'Climate change has been changing the characteristics of weather and climate phenomena, but did not cause the vulnerability to them (Kelman and Gaillard, 2010, p. 32)'. Yet, CC itself is treated as the major cause of disaster and development issues – as 'the source of threats to humanity'. Such perspectives have resulted in disconnecting CC from disaster and development discussions. For example, unfair land uses could fail development, which then could trigger disasters. As long as CC is used as a scapegoat to explain poor development and disasters, unfair land uses are overlooked, and similar situations repeat. To overcome people's vulnerabilities, non-CC issues such as land uses have to be examined. Instead of addressing the root causes of vulnerabilities, the CC community has focused too much on blaming those who are the worst emitters of greenhouse gases in tackling CC (Kelman and Gaillard, 2010).

### 2.4 Methodological differences

Lee coined the term 'scale mismatch' in 1993 arguing human responsibility needs to match 'the spatial, temporal, or functional scale of natural phenomena' (Lee, 1993, p. 561) to realise sustainable use of resources. Borrowing Lee's notion of 'scale mismatch', Cadag (2017) teases out the discrepancies between DRR and CC that hinder SD. Spatial and temporal scale mismatches refer to the key differences in methodologies deployed in DRR and CC.

A *spatial scale mismatch* is about disasters being studied at the micro-level of communities, towns and cities, as opposed to CC taking macro approaches covering a larger geographical area of a country and even a continent (Birkmann and von Teichman, 2010; Cadag, 2017; Lei and Wang, 2014). DRR employs community-based, bottom-up and participatory approaches, whereas CC policies are driven top-down by authorities, being disconnected to local communities (Lei and Wang, 2014; Mercer, 2010). Cadag indicates the field of CCA has not yet discovered a solution for 'localising CCA' (Cadag, 2017, p. 190). Some researchers apply

statistical downscaling methods (e.g. Gutiérrez et al. 2013 cited in Cadag, 2017), however, their reliability is critiqued by others (e.g. Pielke and Wilby 2012 cited in Cadag, 2017). Not having a reliable means for localising CCA has resulted in the application of regional-scale CC analysis, which covers many communities of the region. Under such circumstances, CCA plans become irrelevant because the broad analysis may not be able to address the specific conditions of every community. Alternatively, the plans may confuse communities if they already have community-based DRR plans. As Cadag (2017) indicates, localising CCA affects the processes of achieving SDGs, which also require translations between the international, national and local levels.

A *temporal scale mismatch* can be identified in policy and politics. Generally, sustainable DRR strategies, as well as CC strategies, particularly for mitigation, require longer-term perspectives and actions, given that they intend to 'prevent societies from falling back in their development as a result of devastating events' and 'help them to grow on a more secure and sustainable basis' (Birkmann and von Teichman, 2010, p. 175). However, certain areas of DRR measures tend to be short-term. In the response and reconstruction phases, humanitarian assistance focuses on 'event-related' interventions aiming for immediate outcomes (Birkmann and von Teichman, 2010; Lei and Wang, 2014; Schipper et al., 2016). This temporal difference poses a challenge to the integration of DRR policy and CCA policy in developing a common set of strategies for SD. A political mismatch prevails between the pursuance of change based on science that requires decades and political interest to bring results within a scale of years. The latter being the winner so far, donors and funded schemes end up focusing on short-term interventions (Cadag, 2017; Lee, 1993). This is particularly the case in CC, which requires longer-term approaches beyond any political cycles (Birkmann and von Teichman, 2010; Lei and Wang, 2014).

Besides these methodological mismatches, Lee (1993) originally referred to a *functional scale mismatch* to address different functional responsibilities that institutions hold in exercising specialism, which is discussed next.

### 2.5 Artificial separations in international agreements

According to Lee (1993), what holds institutions accountable is often guided by institutional 'traditions and political loyalties' (Reisner, 1986 cited in Lee, 1993, p. 562), rather than science or efficiency. Functional scale mismatches amongst DRR, CCA and SD derive from differences in the traditions and political loyalties of the leading bodies responsible for overseeing the agreements in the subject areas. In Cadag's (2017) terms, the 'distinct political economies' have led to their versions of interpretation, framework and objectives. Consequently, DRR and CCA, in particular, are not necessarily well-connected at different levels of administration. UNDRR facilitates DRR, the COP makes decisions regarding CCA, and some authors indicate that this vertical structure is carried on to policy formulation and implementation at regional- and national-levels (Begum et al., 2014; Cadag, 2017; Clegg et al., n.d.; Gaillard, 2010; Kelman, 2017). For example, Mall et al.'s (2019)



study on the South Asia region<sup>4</sup> demonstrates there is ‘a critical disconnection between policies for CCA and DRR’, which tend to be administered by different government departments ‘with little or no positive interactions’ (Mall et al., 2019, p. 23).

Such an ‘artificial separation’ (Kelman, 2017, p. 255) between DRR, CC and SD largely stems from the over-emphasis on CC mentioned earlier. Even in SFDRR, the impacts of CC on disasters and disaster risk are excessively emphasised, while other causes of hazards are taken lightly as if CC is the only ‘hazard influencer’ (Kelman, 2017, p. 255). What is behind all this is a political motivation ‘to regress to a hazard-centric viewpoint thereby downplaying the political root causes of disaster vulnerability’ (Kelman, 2017, p. 255).

In contrast to this overemphasis, the incorporation of CC in the SDGs is in fact too limited (Kelman, 2017). Goal 13 reads ‘Take urgent action to combat climate change and its impacts’, with a note indicating the entity that is responsible for CC agendas is UNFCCC. Only two more targets refer to CC in the SDGs:

1. 2.4 to ‘ensure sustainable food production systems and implement resilient agricultural practices...that strengthen capacity for adaptation to climate change...’;
2. 11.b to ‘substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards...mitigation and adaptation to climate change...’

Goal 7, to ‘Ensure access to affordable, reliable, sustainable and modern energy for all’, is about CC mitigation but does not mention CC at all.

In the Paris Agreement, CC is clearly linked to SD, which is ‘positive’ (Kelman, 2017, p. 255). However, the Agreement does not recognise the SDGs or UNGA’s resolution (2015). Some of the SDGs’ principles and targets such as ‘efforts to eradicate poverty’ (e.g. Article 2) and ‘environmental integrity’ (e.g. Article 6) recur in the Paris Agreement, but no reference to the SDGs themselves is made<sup>5</sup>.

Kelman (2017) concludes the SDGs and SFDRR already cover what is set out to cover in the Paris Agreement; nevertheless, the SDGs and SFDRR keep a distance from CC without involving themselves in it because it is UNFCCC’s remit. SD agendas, which require cooperation and collaboration, are currently dealt with by limited joined-up working. Why it is so is mainly ‘due to the inertia of existing organisations and mechanisms’ (Kelman, 2017, p. 257). Even though these international institutions are aware of such ‘artificial separations’ amongst themselves, their priority is to preserve ‘power and territory’. Such politics have resulted

in ‘policy inconsistency, redundant investment and competing approaches to addressing the same problems’ (Schipper et al., 2016, p. 221), and furthermore:

**inhibiting the most effective action on multiple sustainable development processes simultaneously, indicating how the best sustainable development science does not necessarily affect what occurs operationally at the international level (Kelman, 2017, p. 257).**

Despite the above historical, disciplinary, conceptual and political disconnectedness between DRR, CC and SD, there is a strong set of reasoning to connect these global agendas.

### 3. Connectedness

#### 3.1 Association between DRR and SD

Since the 1970s, DRR research has emphasised it is the human dimension of disaster risk or the conditions of the society that make people vulnerable to disasters (Cadag, 2017). Studies of disasters involve an understanding of both the types of hazards which affect populations and the different levels of vulnerability of different groups of populations (Blaikie et al., 2004). To reiterate, in DRR, vulnerability refers to ‘the conditions determined by physical, social, economic and environmental factors or processes which increase the susceptibility of an individual, a community, assets or systems to the impacts of hazards’ (UNDRR, 2020b). Vulnerability, therefore, is affected by the:

**degree to which one’s social status (e.g. culturally and socially constructed in terms of roles, responsibilities, rights, duties and expectations concerning behaviour) influences differential impact by natural hazards and the social processes which led there and maintain that status. (Wisner et al., 2012, p. 19)**

There is thus a consensus in the DRR community that ‘disasters’ are the costs of the failures in development (Finucane et al., 2020; Gaillard, 2010; Kelman, 2017; Schipper and Pelling, 2006). Injustice and inequality yield marginalisation, which compels certain groups of people to be vulnerable to hazards (Finucane et al., 2020). Pursuing SD is about reducing vulnerabilities in societies, which means enhancing resilience to disasters, even without intending to address disaster risk. There are innovative initiatives which respond to the interests of the marginalised populations while reducing their vulnerabilities and disaster risks. For example, growing mangroves contribute to both preserving the environment and hazard mitigation – serving as a breeding ground for marine animals as well as a natural safeguard against storm surges (Cadag, 2017).

<sup>4</sup> The target countries are Afghanistan, Bangladesh, Bhutan, India, the Maldives, Nepal, Pakistan and Sri Lanka. They established an organisation known as the South Asian Association for Regional Cooperation (SAARC).

<sup>5</sup> Both the Paris Agreement and the SDGs were introduced in 2015. However, the drafts of the SDGs were available earlier. There was time for the Paris Agreement to make references to the SDGs (Kelman, 2017).

### 3.2 Placing CC within wider development contexts

In the 2014 report, the IPCC explains the mechanism of anthropogenic CC as the consequence of human activities represented by rapid economic and population growth since the pre-industrial era (Cadag, 2017; IPCC, 2014). The climate is not only changing but becoming more extreme, affecting the frequency and severity of hazardous events, leading to an increase in disaster risk and interference against SD (Forino et al., 2019). To reduce the impacts of such events, the levels of vulnerability and exposure of individuals and communities have to be improved. In this light, as Kelman (2017, p.257) argues, 'CC provides little which is new in the context of SD'. Separation only allows overlaps and inefficiency. For example, SDGs concerning food and livelihood security, health promotion and clean water provision are strongly related to CC. If CC worsens, achieving those SDGs will become extremely challenging soon (Forino et al., 2019).

Kelman (2017) also indicates the two actions in CC – mitigation and adaptation – are already covered in SD and DRR remits. 'Climate change mitigation is pollution prevention' – which has historically been part of SD; 'climate change adaptation embraces a suite of activities aimed at reducing risks and exploiting benefits from extremes or changes in the climate' – such activities are included in the DRR definition (Kelman, 2017, p. 256). The 'scientific conclusion' is that CC and its agreements should be embraced within SD discussions, instead of being prevented by political contentions.

### 3.3 'DRR including CCA'

The perspective to include CCA in DRR has increasingly been emphasised in recent years. Both DRR and CCA aim to manage and prepare for risks related to climate changes and extremes (Forino et al., 2019; Gaillard, 2010; Kelman et al., 2017; Schipper et al., 2016). Mainstreaming CCA into DRR is appropriate, given CCA and DRR share the same themes of vulnerability reduction, promotion of inclusiveness and long-term disaster risk management (Forino et al., 2019; Kelman, 2017; Schipper and Pelling, 2006).

Kelman's (2017, p. 257) concrete examples help understand the above point:

**Flood, weather, and drought risk reduction enacted for climate change adaptation is exactly the same as being enacted for wider disaster risk reduction.... Efforts to change crops and to extend growing seasons based on the changing climate fall directly within previous efforts to use local knowledge for enhancing food security specifically for disaster risk reduction.**

Moving towards including CCA in DRR is significant also because the response to CC requires coordinated and collaborative approaches amongst diverse stakeholders from transnational organisations to local communities (Birkmann and von Teichman, 2010; Schipper et al., 2016). UNDRR (2020d) proposes a concrete means to include CCA in DRR in its report on DRR and CCA strategies in 32 countries in sub-Saharan Africa. Analysing the

coherence between DRR and CCA strategies from 'strategic, conceptual, institutional, operational and financial aspects', the report concludes that linkages were 'more incidental than structural' (UNISDR, 2004, p. 46). Their proposal for achieving effective policy coherence is to apply the four priorities of SFDRR – understanding risks, governance, investments, preparedness and recovery – as the conceptual and operational framework for DRR including CCA (UNDRR, 2020d).

### 3.4 Common objectives of DRR, CCA and SD

The interrelated connectedness discussed above leads to a conclusion that DRR, CCA and SDGs are all bounded by 'common objectives' (Cadag, 2017, p. 191; Tozier de la Poterie, 2017): reducing risks, protecting the environment and promoting sustainability and development. DRR and CCA should be situated within the wider social and economic development context to understand exposure and vulnerability in tandem with health, livelihoods, culture and politics (IPCC, 2012).

Integrating the three areas both theoretically and practically is a reasonable and realistic direction because separation could hamper the pursuance of the above objectives. For example, not engaging in DRR is likely to increase the negative impacts of disasters, which then obstructs the process of development. Conversely, certain economic development projects may raise greenhouse gas emissions enforcing CC resulting in increased disaster risks. Returning to the case of mangroves mentioned earlier, if they are removed to prioritise property development, undermining environmental protection and hazard mitigation, local communities can experience increased exposure and vulnerability (Kelman, 2017; Schipper et al., 2016).

Thus, 'it is no longer possible to speak about disasters, development and climate change, either adaptation or mitigation, in isolation of each other' (Schipper et al., 2016, p. 219). DRR and CCA cannot be separated since both consider poverty reduction and SD as essential components of vulnerability reduction. DRR including CCA enables the localisation of SDGs through addressing community-level issues around vulnerability. Investing in vulnerability reduction contributes to the processes of SD (Forino et al., 2019; Gaillard, 2010; Kelman, 2017; Schipper et al., 2016).





## 4. Common objectives of DRR, CCA and SD

A new framework (Figure 1) offered by Kelman (2017) comprehensively summarises the four aspects of the connectedness between DRR, CC and SD.

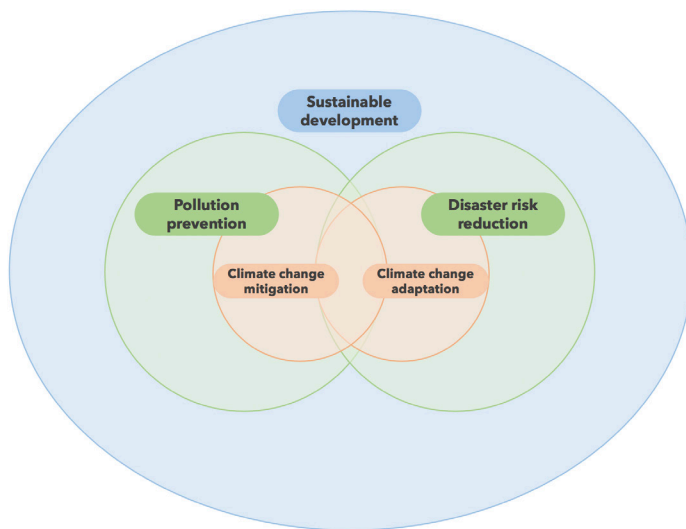
- SD is an overarching global goal, which encompasses DRR and CC;
- CC has two areas: mitigation and adaptation;
- CC mitigation is about pollution prevention; pollution prevention sits within SD;
- CC adaptation is included in DRR; DRR sits within SD.

To consider how to translate the framework into policymaking and implementation, Begum et al.'s (2014) sectoral exemplars which include CCA in DRR for SD can be helpful (table 2).

These exemplars indicate multi-stakeholder involvement is compulsory in every sector. In education, for instance, how to 'promote Education for Sustainable Development agenda

that incorporates DRR, quality learning, and environmental and climate change education (Anderson, 2010, p. 13)' needs to be considered. For the school curriculum, subject teachers, other school staff, pupils, parents, governors and academic experts on curriculum development as well as on DRR, CC and SD need to work together. Public campaigns involve collaborations amongst mass media, online platforms, advertising companies, designers, local residents, policy-makers and DRR, CC and SD experts. Similarly, a wide group of stakeholders collaborate in creating and delivering awareness-raising events and programmes. Thus, participatory and bottom-up approaches to 'knowledge co-production' have to be embedded in governance structures (Cadag, 2017; Delica-Willison et al., 2017; Mercer, 2010). Such partnerships enable the approaches that address the relationships between hazard influencers, including CC, and SD topics such as food security, water and health, without separating the subject of CC. In parallel, learning about the science of CC strengthens the public's knowledge base of chemistry, biology, physics and meteorology. Further applying vulnerability-oriented perspectives tackling the causes of vulnerabilities leads to the building of capacity and resilience of the population (Luna, 2017).

**Figure 1. Connecting DRR, CC and SD**  
(Adapted from Kelman, 2017, p. 257)



**Table 2. Common practices of DRR and CCA in several sectors (Begum et al., 2014, p. 368)**

Sector	Actions/ Practices
Agriculture	Altering crop strains to enhance their drought and pest resistance; Changing planting times and cropping patterns; Altering land topography to improve water uptake and reduce wind erosion
Forestry	Erosion protection and reserve forest protection; New and planned tree plantation and reduce deforestation
Water	Protecting water supply infrastructure and water supply sources; Developing flood ponds, water harvesting; Improved irrigation, desalination, non-water-based sanitation and improved watershed and trans-boundary water resource management
Health	Early warning & air-conditioning to address extreme weather events; Raise public awareness about water- and vector-borne diseases through watershed protection, vector control, and safe water- and food-handling; Enforcement of relevant regulations; and support for education, research and development on climate-related health risks
Education	Including DRR and CCA in the school curriculum; Campaigns in radio and television programmes and public poster; Awareness-raising for strategic intermediaries i.e. teachers, actors etc.

There is also an effort to utilise 'resilience' as an overarching goal for connecting 'the post-2015 frameworks' (Peters et al., 2016). The working paper issued by the Overseas Development Institute draws on the fact that 'resilience' appears frequently in all four international agreements<sup>6</sup>, and that the umbrella concept enables the integration of various areas which tend to be treated independently. The authors interpret 'resilience' as an outcome, rather than as an agenda or set of activities. Bringing together the different foci and contributions of the frameworks, the different foci and contributions of the frameworks will 'complete' resilience given 'building resilience will require action that spans the development, humanitarian, climate and disaster risk reduction arenas' (Peters et al., 2016, p. 10). Five recommendations emphasise collaboration and coordination of multiple agencies and stakeholders in avoiding duplication, maximising gains and balancing between risks and goals (Peters et al., 2016). Focusing on resilience as an overarching goal can also be identified in the European Environment Agency's report, *Climate Change Adaptation and Disaster Risk Reduction in Europe: Enhancing Coherence of the Knowledge Base, Policies and Practices* (European Environment Agency, 2017). The European Commission supports the 'coherence on sustainable development, DRR, and CCA...aiming to reinforce resilience to shocks and stresses, while boosting innovation, growth, and job creation' (Mysiak et al., 2018, p. 3138). Like Begum et al. (2014), Mysiak et al. (2018, p. 3139) also argue 'knowledge sharing', 'closer collaboration' and 'multi-stakeholder coordination' are the key to enabling the coherence between DRR, CCA and SD.

## 5. Conclusion

One of the main findings of this examination of the connected and disconnected features of DRR, CC and SD is the resurfacing of the interference of the politics of the international arrangement in pursuing these global agendas. The situation has remained unchanged since the 1990s when Lee (1993, p. 563) argued that scale mismatches were 'the product of politics as much as of science'. He addressed science factors as spatial and temporal scale mismatches, while political factors as temporal and functional mismatches. The latter is complex, given they involve negotiations and collaborations amongst a large number of establishments. Five years out of the 15-year timeframe have already passed since the three agreements were introduced in 2015. As Kelman (2017) suggests, political differences and motivations should be put aside to move forward towards the integration of the three areas projected in his framework.

Another point on politics that appears to be affecting the process of the integration is an over-emphasis on CC, which undermines vital development questions. Kelman and Gaillard (2015) critique 'the responsibility of climate change for all disasters' with an extreme example in which the 2004 Indian Ocean tsunami was linked to CC. Tsunami is a geophysical hazard, not a climate-related hazard. The claim that CC is the cause of disasters releases responsibility, without having to face poor development history,

vulnerabilities of communities and a lack of disaster preparedness. CC offers 'a convenient contemporary catch-all' (Kelman and Gaillard, 2010, p. 32) as the source of disasters. Instead of such misuse and abuse of CC, it should be treated as a rationale for effective DRR, environmental management and sustainability movements (Forino et al., 2019; Kelman and Gaillard, 2010).

One key term that frequently appears in all three fields is 'vulnerability'. Reducing vulnerability to hazards is stressed in SFDRR, the Paris Agreement and the SDGs. Largely, the root causes of vulnerability are social, economic and political, i.e.:

**persistent poverty, growing socioeconomic inequality, rural and urban livelihoods, poor development choices and pathways, poor governance, demographic change, rapid and unplanned urbanization and growing environmental degradation and loss of biodiversity.**  
(Schipper et al., 2016, p. 224)

The connectedness between DRR, CC and SD can only be progressed with the shift from 'hazard-centric' perspectives putting a blame on nature to 'human-centric' approaches accepting human responsibility for our doings.



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<sup>6</sup> The report includes the World Humanitarian Summit framework, besides SFDRR, the Paris Agreement and the SDGs.



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## List of abbreviations

### *In order of appearance*

disaster risk reduction (DRR)  
 climate change (CC)  
 sustainable development (SD)  
 the Sustainable Development Goals (SDGs)  
 the United Nations Office for Disaster Risk Reduction (UNDRR)  
 disaster risk management (DRM)  
 the United Nations Framework Convention on Climate Change (UNFCCC)  
 the Conference of the Parties (COP)  
 climate change adaptation (CCA)  
 the United Nation General Assembly (UNGA)  
 the Sendai Framework for Disaster Risk Reduction (SFDRR)  
 the Intergovernmental Panel on Climate Change (IPCC)









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