

**Making effective use of international and transnational policy
frameworks and national policy instruments to implement the Sendai
Framework for Disaster Risk Reduction**

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ABSTRACT

States have many policy options at their disposal to manage the risks associated with natural hazards. Some options have been used extensively with varying levels of success, such as planning regulations and building codes. Others are less well developed and the disaster risk management (DRM) policy arena is less well developed than for example occupational health and safety. Moreover, the significant potential of transnational laws to support DRM has received little attention (Aronsson-Storrier 2017). Such laws could help promote cross-border collaboration and address the root causes of transboundary disaster risk, yet there is very little discussion of these in the Sendai Framework for Disaster Risk Reduction 2015-2030 (SFDRR). Until all options have been assessed and carefully developed, successful implementation of the SFDRR will be severely limited.

This paper assesses the potential for a fuller range of local, national and transnational policy, institutional, legislative, fiscal, and technical options to be used for DRM to support the implementation of the SFDRR: from transnational initiatives like the Draft Articles on the Protection of Persons in the Event of Disasters, to local regulations to mandate and govern public participation in local DRM decision-making. It proposes a regulatory framework for states that would enhance compliance with SFDRR requirements to engage all relevant stakeholders in DRM policy and practice. It also recommends greater recognition of:

1. DRM as a right.
2. A right to participate in DRM decision-making.
3. The transboundary nature of risk, and therefore the role of transnational governance options.
4. The range of governance instruments available to achieve these objectives.

1. Introduction

While disasters were previously viewed as either acts of god(s) or nature beyond our control, or ungovernable “by-products” of human activities, they are increasingly seen as human-made, “endemic to our life-style”, and susceptible to governance (Heyvaert 2011, 837). Decisions regarding where to allow/encourage development and how strictly to regulate it; how to produce energy; whether to invest in infrastructure like levees, dams, and early warning systems; and even decisions regarding acceptable levels of social inequality; can either produce or reduce risk (Tierney 2014). These decisions are by no means based purely on technical considerations or evidence of policy effectiveness (Wilkinson and Kelman, 2017, Wilkinson et al., 2017).

There is often a lack of public investment in DRM, for reasons including a limited understanding of risks and impacts, an absence of political buy-in for more visible post-disaster support initiatives, and the ready availability of international post-disaster assistance (Wilkinson and Kelman, 2017). Yet, before a disaster happens, states have many policy, institutional, legislative, fiscal, and technical options (often referred to as ‘public policy instruments’) at their disposal to accomplish their DRM goals. These are usually divided into two categories: economic (taxes, spending and incentives) and regulatory (voluntary and legal). Policy instruments can be used by different levels of government to influence the behaviour of public and private sector actors, particularly behaviour that creates exposure and vulnerability to hazards – i.e. they can be used to manage risk.

Land-use and building-control laws, for example, have been used extensively for DRM with varying levels of success (Wilkinson and Steller 2018). Yet despite an apparently growing interest in risk governance (see for example UNDP 2015; Wilkinson et al., 2014), other types of regulations to influence DRM practices are not well understood and were mentioned only superficially in government statements and reporting of progress on implementing the Hyogo Framework for Action (HFA) from 2005 to 2015 (Wilkinson et al., 2017). There is little sign yet of this changing under the SFDRR.

As the deadline for global reporting against Target E of the SFDRR¹ approaches, DRM stakeholders need to consider carefully how different policy options can be used to implement DRM strategies, particularly at the local level. This will require an evidence-based assessment of the utility of each option, to identify those that are effective

¹ Global Target (e): Substantially increase the number of countries with national and local disaster risk reduction strategies by 2020.

and those that are not. In summary, far greater effort should go into collecting and assessing empirical evidence of which policy choices are most effective in achieving DRM.

This paper outlines rights and responsibilities for DRM, which form the basis for the selection and development of suitable policy options, before looking in more detail at types and multiple tiers of legal standards, and how these can be used at all governance levels – from local to transnational- to reduce disaster risk. We then demonstrate how regulations can be used to enhance private and public participation in risk governance. The paper concludes with recommendations for making more effective use of transnational frameworks and secondary regulations to enhance implementation of the SFDRR.

2. Rights and responsibilities for disaster risk management

For the purposes of this paper, we assert that several basic principles of risk governance can be accepted at both the transnational and national level (described below). Once these principles are accepted greater emphasis can be placed upon the practicalities of DRM. The principles of risk governance are:

- (i) *DRM is a right (right to life, to family/private life, to self-determination, to participate, and to access information)*
- (ii) *DRM as a matter for international/transnational policy*
- (iii) *DRM as a public good (or with some public good characteristics)*

(i) DRM as a right

Disasters are now commonly understood to be socially constructed (rather than acts of god(s) or ‘natural’ phenomena), and as a result DRM is gradually shifting from a needs-based to a rights-based approach (Aronsson-Storrier 2017). Particularly relevant rights in the DRM context include the right to participate; to self-determination; to life; to family/private life and home; and to access information.

The Right to Participate

In addition to the technical advantages to be gained with greater access to local knowledge through public participation, the opportunity to participate in decisions regarding safety, security, and livelihood can be viewed as a fundamental right. Broad public participation is essential to address all of the competing rights that are relevant in the DRM context (Simoncini 2017, 94-95). Without community involvement, it is impossible to determine which

rights are likely to be impacted in a disaster scenario, or to make the necessary “normative or moral judgment about acceptability of risk and the tolerable burden that risk producers can impose on others” (Renn 2016, 209).

Alemanno (2016, 198-200) describes a shift in the rationale for risk regulation from the “harm principle” to “paternalism”. The harm principle claims that only regulation aimed at reducing risks to others generated by an individual’s behaviour is justified; otherwise, individuals know their own needs best and should be left to determine the level of risk they personally deem acceptable. In contrast, paternalism considers that regulation of an individual’s behaviour to protect them from risks they would otherwise accept is also justified. This is based on the significant body of research suggesting that individuals do not always make logical decisions regarding acceptable levels of risk, and the potential burden that accepting increased personal risk may have on society as a whole (for example, through an increased burden on public health resources).

However, even though individuals do not always make decisions that promote their self-interest, this does not necessarily mean that others will make more appropriate decisions for them. Individuals in positions of power who are involved in risk regulation may make decisions that support the welfare of others, or they may make decisions (consciously or unconsciously) that promote their own welfare or the welfare of particular groups at the expense of others.

Public participation therefore provides an important check on decision-makers. It helps ensure that they have all of the information they need to address the risks faced by all segments of society, and the rights of individuals that their decisions may impact. It also requires their decision-making process to be aired in public, where the reasons behind their decisions can be questioned for possible bias or lack of evidence.

Due to the importance and benefits of public participation in DRM, it is encouraging that it is receiving increasing attention, and that both the Global Assessment Report 19 and the UN High-level Political Forum on Sustainable Development will share a common theme: “empowering people and ensuring inclusiveness and equality”. However, this commitment is not yet reflected in key DRM instruments like the Sendai Framework – while replete with references to the need for science-based decision-making, local, traditional, and indigenous knowledge tends to fall into the background as an optional decision-making input (for example, 19(g), 24(h), (i)). While community views and expert opinion may often align, there is very little guidance on how to incorporate both or resolve any inconsistencies between them, although the Sendai Framework’s language suggests that “scientific” information is superior and to be preferred.

To ensure protection of this right to participate in DRM, despite this apparent preference for science-based assessment in documents like the Sendai Framework, decision-makers must actively seek to foster community involvement. A sample policy for accomplishing this goal is included in Box 4.

Self-determination

The right to participate is closely related to the right to self-determination, defined as the right of peoples to “freely determine their political status and freely pursue their economic, social and cultural development” in common (Article 1 of the International Covenant on Civil and Political Rights (“ICCPR”) and the International Covenant on Economic, Social, and Cultural Rights (“ICESCR”). It also appears in Articles 1 and 55 of the UN Charter, has arguably reached the status of *jus cogens* (or non-derogable peremptory norm), and is an *erga omnes* right which can be invoked by and places obligations on all states.²

The right to self-determination is most clearly respected where communities have both decision-making power over important DRM measures (for example, whether to relocate to avoid a potential risk, or to remain and implement risk-reduction and adaptation measures) and viable options to ensure that this choice is free and able to be implemented. There is a tendency to contrast expert and community views and focus on how to “choose” between them. However, it is unlikely that those living in high risk locations will choose to remain in a situation that puts their life at risk if they are aware of this danger, and have viable alternatives that are both culturally appropriate and reduce risk.

² See *Legal Consequences for States of the Continued Presence of South Africa in Namibia (South-West Africa) Case*, Advisory Opinion [1971] ICJ Rep. 16, at [122]-[127]; *Western Sahara Case*, Advisory Opinion [1975] ICJ Rep. 12 at [54]-[59]; *Case concerning East Timor (Portugal v Australia)* [1995] ICJ Rep 90, at [29], [31]; and *Legal Consequences of the Construction of a Wall in the Occupied Palestinian Territory* [2004] ICJ Rep. 136 at [88], [156].

Box 1. Manam Island and the importance of public participation and self-determination

The indefinite relocation of Manam Islanders to mainland Papua New Guinea on the advice of volcanologists illustrates the importance of the rights to participate and to self-determination. Traditionally Manam Islanders would relocate to a nearby mainland community temporarily during increased volcanic activity, avoiding conflict with the local residents due to the short duration of their stay and by bringing gifts from the island. However, their desire to return home after they believed the threat had passed was overruled by advice from volcanologists regarding the risk of further eruptions (Connell 2017, 81).

But requiring Manam Islanders to stay on the mainland may have created other risks – in addition to the many who have returned home without government support or services, “almost as many people have been killed as a result of inter-communal clashes since 2005 as have been killed as a result of eruptions of the Manam volcano since 1954” (Ferris 2017, 25). Manam Islanders’ DRM approach addressed two important risks – the volcano, and potential conflict with mainlanders over limited resources. Had the government consulted with Manam Islanders (and mainlanders) before deciding to indefinitely relocate them, it may have been able to work with them (and volcanologists) to develop a more resilient solution.

Right to Life

The right to life appears in key transnational legal instruments like Article 6(1) of the International Covenant on Civil and Political Rights (“ICCPR”), which has been ratified by 169 states, and Article 2(1) of the European Convention on Human Rights (“ECHR”), which formed the basis for several claims in *Budayeva* and *Öneryıldız*. Both decisions helpfully outline the obligations of states to protect the right to life in disaster risk scenarios.

In *Budayeva v Russia*, the European Court of Human Rights (“ECtHR”) found that the authorities were aware that Tynrauz was prone to mudslides, that key protective infrastructure was damaged, and that the “only way to avoid casualties” was to “establish observation posts to warn civilians in the event of a mudslide”. Despite repeated warnings, these measures were never implemented. The town was then hit by a succession of mudslides, during which eight people died, 19 were alleged to be missing, and the lives of many others were threatened. The Court found that Article 2 of the ECHR entailed a “positive obligation on States to take appropriate steps to safeguard the lives of those within their jurisdiction”, which the state did not fulfil in this case.

The Court in *Budayeva* also found that the state has some discretion to choose preventive measures and “an impossible or disproportionate burden must not be imposed on the authorities”. This exception is particularly relevant for states struggling to fund DRM measures. However, this results in uneven protection of the right to life, with those in states that lack the funds to address risks, or in areas more prone to “unavoidable” risks, more exposed to infringement of the right.

The ECtHR also addressed the right to life in relation to (more clearly) “human-made” disasters in *Öneryıldız v Turkey*, where a methane explosion at a municipal rubbish tip killed 39 people living in adjacent

unauthorised settlements. The Court found a violation of the victims' Article 2 rights because "State officials and authorities did not do everything within their power to protect them from the immediate and known risks to which they were exposed."

Turkey's arguments that the victims should bear some responsibility as they had constructed houses near the rubbish tip without authorisation were rejected – the Court found that the authorities were aware of these dwellings, even charging council tax on the properties, and had not attempted to relocate the inhabitants. These findings are significant, as unauthorised dwellings may be more likely than other dwellings to be built in areas exposed to greater risk, may lack safety features required by building codes, and may be ignored by authorities who (like those in *Öneriyıldız*) mistakenly believe that they are not responsible for the safety of those residing in unauthorised dwellings.

Right to private/family life and home

The right to private/family life and home appears in both the ICCPR (Art 17), and the ECHR (Art 8). This right was addressed in the context of risk in *Lopez-Ostra v Spain*, where a waste treatment facility next to the applicant's home caused pollution, requiring her to relocate to avoid its effects. The fact that the facility was built by a private company did not prevent the ECtHR from finding that the state owed the applicant a duty, as the municipal authorities "could not be unaware" of the issues.

However, as with the right to life, the state's capacity to address these issues will be relevant. In *Lopez-Ostra*, the state had significant control over the source of risk – the facility was within its jurisdiction, and was reliant on approval from the authorities for its operation. It will be much harder for states to provide remedies for complex, transboundary risks, such as those posed by climate change.

Right to information

In addition to its significant findings regarding the right to life, the ECtHR in *Budayeva* and *Öneriyıldız* made important findings regarding access to information, even though this right does not appear in the text of the ECHR. In *Budayeva*, the Court found that the state had a duty to "adequately inform the public about any life-threatening emergency". In *Öneriyıldız* the Court made a similar finding, but also noted that respecting the right to information would not absolve the state of its remaining duties as outlined above.

While this right is absent from the ECHR and other key international instruments like the ICCPR and ICESCR, the Rio Declaration does recognise this right in Principle 10, regarding the need for public participation in environmental matters.

Collectively, the sets of right described above constitute a right to DRM, and to participate in the development of DRM policies. They confirm that states have obligations to implement DRM measures, and to inform and empower communities to play a central role in their development.

(ii) DRM as a matter for international/transnational policy frameworks

International, or transnational³, law refers to all law that is not domestic. It provides benchmarks against which national DRM practices and standards can be measured, as discussed above regarding the relevant rights in the DRM context.

While the rights discussed above assist when addressing risks contained within state borders, they are less helpful in the context of transboundary risks. This is due to their limited assistance in addressing the root causes of risk that are outside a state's borders. Decisions like *Budayeva* may require early warning systems and other risk-reduction and adaptation measures to address transboundary risks, but do not on their own provide a clear pathway for requiring another state to take action to reduce the transboundary risk being generated.

In this context, transnational legal frameworks could assist by recognising the transboundary nature of many risks. Yet very little guidance exists at the transnational level. The Sendai Framework largely addresses measures that states themselves should undertake. While it includes a target to “enhance international cooperation”, along with measurable indicators for this target, it does not address the reduction of transboundary risk, or include a target to increase adoption of transnational DRM policies.

Similarly, the International Law Commission's (“ILC”) Draft Articles on the Protection of Persons in the Event of Disasters (“Protection Articles”) focus on states' obligations to protect those within their borders from disaster. They do not create enforceable obligations on states to avoid inflicting disaster risk on other states, to remedy any harm inflicted, or to assist other states in the event of a disaster.

The Protection Articles do include a duty on the affected state to seek assistance from other states or international organisations if “a disaster manifestly exceeds its national response capacity” (Article 11). But without a reciprocal duty to provide assistance, this may have little impact on the behaviour of other states.

³ There's a growing trend in the literature to use transnational rather than international, recognising that there is very little truly international law – most of what we refer to as international law is based on regional legal arrangements like the EU. Even supposedly international instruments like the Sendai Framework and the International Law Commission's draft rules, receive greater attention and adherence in some parts of the world than others.

Other instruments may assist here, such as the ILC's Draft Articles on the Responsibility of States for Internationally Wrongful Acts ("Responsibility Articles"), which provide that a state may pursue remedies against another state where that state has committed an "internationally wrongful act" (Articles 2 and 42). The ILC's Draft Articles on the Prevention of Transboundary Harm from Hazardous Activities ("Transboundary Harm Articles") may provide the "international obligation" required by the Responsibility Articles. The Transboundary Harm Articles place an obligation on states to "take all appropriate measures to prevent significant transboundary harm or at any event to minimize the risk thereof" (Article 3).

However, none of these Articles have binding treaty status. The UNGA has taken note of the Responsibility Articles and the Transboundary Harm Articles, and recommended them to the attention of governments.⁴ The Protection Articles have not yet received the UNGA's recognition, as it deferred further consideration to its 73rd Session, commencing on 18 September 2018.⁵ The UNGA has deferred for "further examination" consideration of the ILC's recommendations for conventions on all three topics.⁶

Further efforts to establish binding conventions on these topics, and to coordinate this work with the Sendai Framework, could help establish a transnational legal framework capable of addressing transboundary disaster risk.

(iii) DRM as a public good

DRM is an area of public policy, but one that differs in important ways from sectoral areas such as education or health. Decision-making is often driven by crisis and requires high levels of multi-stakeholder cross sectoral cooperation and coordination. DRM measures have some of the characteristics of what economists refer to as 'public goods' because they are underprovided by the market, create externalities, are free from rivalry and are non-excludable (Wilkinson, 2012). For example, individuals and communities are unlikely to construct enough robust levees because they do not take into account the flood protection benefits that they might offer to others (Keefer, 2009). They may, however, construct levees that protect themselves, with a negative external impact on others, such as those who live outside the embankments.

⁴ UNGA Resolution 56/83, 12/12/2001, 2 and Resolution 71/143, 13/12/2016.

⁵ ILC, 'Analytical Guide to the Work of the International Law Commission: Protection of persons in the event of disasters'.

⁶ Most recently, Resolution 71/133, 13/12/2016, Resolution 71/143, 13/12/2016, and UNGA, 'Topical summary of the discussion held in the Sixth Committee of the General Assembly during its seventy-first session' (22/2/2017) [116]-[117].

Non-rivalry means that consumption by one individual does not reduce the availability of the good to others and non-excludability means that people cannot be excluded from using the good. Early warning systems (and in particular hazard alerts) are good examples of both these public good characteristics. There are also security and ethical arguments for governments maintaining control over weather and climate information, as well as a need to ensure that meteorological services, research institutes and other climate service centres maintain intellectual, economic, and political independence for generating knowledge.

Public policy is a system of principles to guide decision-making and action to deal with problems and opportunities. Disasters and human influences on hazards, such as anthropogenic climate change, are complex social problems, so the sets of policy responses (and lack thereof) are tricky to untangle and evaluate. From regional agreements on drought early warning systems to municipal land-use plans, public policies to galvanise action - and to avoid negative action - have been deployed in all countries and at multiple governance scales in one form or another (Wilkinson and Kelman, 2017).

As an agency for the state, government has a number of roles, from global to local, with regards to managing disaster and climate risks and building resilience (Wilkinson 2012). These are:

- *Governments as providers of risk management goods and services.* Examples include those measures that are often not well-provided by the private sector such as early warning systems; buildings, such as shelters and hospitals, to reduce loss of life and property during and after a disaster; and ecosystem services, such as restoration of mangrove belts and coral reefs, which in some circumstances might reduce the impact power from tsunamis and storm surges.
- *Governments as risk avoiders.* To reduce risk in society, governments not only have to provide public goods and services, but they also have to refrain from actions that generate risk. They are responsible for substantial investments in infrastructure, such as roads, hospitals, and schools. These need to be located, designed, built, and maintained in such a way as to minimise vulnerability to disasters.
- *Governments as regulators of private sector activity.* To prevent construction in high risk areas and ensure that infrastructure is safe from environmental hazards, governments can produce recommendations, standards, and regulations on building practices and land use and, in the case of regulations, invoke penalties for non-compliance.
- *Governments as promoters of collective action.* Not all DRM measures are within the public domain. Families, social groups, non-profits, and businesses also act. Government programmes, such as education

and communication strategies, can help to raise awareness of disaster risk and encourage people to develop community plans to prepare for and manage these risks, organising activities together so that no one is excluded.

- *Governments as coordinators of multi-stakeholder activities.* DRM requires coordinated action by public and private stakeholders. Flood risk management, for example, requires the participation of meteorological, hydrological, environmental, water, and sanitation authorities; public and private land users; community groups; planning departments; and civil protection departments. Governments can provide leadership and coordination, but community and private sector involvement is also needed.

These five areas describe the public policy landscape for DRM. For all the government roles identified above, a range of policy options or types, from legally binding to voluntary incentives or disincentives, can be adopted to deal with disaster risks.

Managing risk requires not only reducing those risks that already exist and threaten development but also taking action to manage development processes in such a way as to avoid risk generation and accumulation in the future (UNISDR 2015a). Policies therefore need to be understood in terms of three processes linked to development, as suggested in the SFDRR:

1. Avoiding the accumulation of new risk
2. Reducing existing risk
3. Building resilience of people and societies to residual risk (i.e., risk that cannot be effectively reduced or managed).

Governments have a variety of policy options and tools to encourage action in all these areas – although, as with all public policy approaches, there is no recipe for success – and national, sub-national, and supra-national governments or their institutions around the world have done so in many different ways (Wilkinson and Kelman, 2017). Common approaches that have been adopted are discussed below, along with a commentary on some of the most critical factors limiting progress on managing risk.

3. Public policy instruments for managing disaster risk

Risk is the product of three separate and distinct elements – the ‘vulnerability’ of ‘exposed’ persons and productive assets to a defined ‘hazard’ (UNESCO 1972). Many risks from natural hazards can be assessed (i.e. predicted,

characterised by temporal, spatial and physical parameters, and quantified) and managed, and are therefore susceptible to *ex-ante* governance. Risk governance is the sum of the many ways individuals and institutions, public and private, arrange their common affairs in relation to shared issues capable of management such as a natural hazard (Commission on Global Governance 1995; IRGC 2009; Walker et al. 2010; Bretton et al. 2015). It is a continuing process through which conflicting or diverse interests may be accommodated and co-operative action may be taken and includes formal institutions and regimes empowered to enforce compliance, as well as informal arrangements that people and institutions either have agreed to or perceive to be in their interest (Commission on Global Governance 1995, 4).

Regulation (i.e. the purposeful governance of risk) may come in a variety of forms (ranging from slow-changing, rigid, top-down, structured national laws to dynamic, organic, bottom-up informal guidance), and from several sources. Formal laws are often supplemented by customary and religious law, cultural and social norms, functional normative systems and economic transactional normative systems. Legal and normative pluralism exists and at least six normative regimes have been identified, including those that have been characterised as external, collective, employer, personal, expert and negotiated (Wilkinson 2012; Jones et al. 2016; WDR 2017; Bretton et al. 2018a; 2018b).

Risk governance has a normative dimension - a set of definable 'good' qualities exist that provide for the effective integration of the key components of how risks are handled by DRM stakeholders. Many of these are contested and may vary between governance systems (for example, centralised versus decentralised forms of governance) but broadly, we argue that good risk governance entails (see Box 2 which cites UNISDR 2005, IFRC/UNDP 2015, and UNISDR 2015):

- Providing adequate attention to *ex-ante* measures to mitigate risk (as opposed to over-reliance on post-disaster response and recovery)
- Adopting a predictable, sustainable, and consistent approach to DRM at national and local levels (e.g. policies should not contradict each other)
- Strengthening DRM mandates by imposing roles and duties, creating rights and powers, setting and enforcing standards, encouraging accountability, participation and compliance, and discouraging and sanctioning non-compliance.

In summary, as discussed above, states have a positive duty to take appropriate steps to safeguard the lives and livelihoods of citizens (Bretton et al. 2015). They must have a legislative and administrative framework

designed to provide effective deterrence against threats to the right to life, including ex-ante regulatory measures. *Ex-post*, when lives have been lost, a prompt, diligent, independent and impartial official investigation process is required to ascertain not only what happened and any shortcomings, but also the state officials and authorities involved.

There are many sources of risk regulation including those that are external to those actions and behaviours that need regulating, collective or self-regulations, regulations that pertain to employers as well as personal, expert and negotiated regulation (see Box 2). This paper is particularly concerned with external sources of regulation and how they could play a more prominent role in risk governance. External sources of regulation include: (1) international/transnational laws and initiatives; (2) national laws dedicated to risk governance such as those creating, funding and mandating specialised research, monitoring and protection agencies and observatories; and (3) national sectoral laws such as those regulating land development and use, building standards, environmental protection, natural resources, and anti-corruption/bribery/price-fixing.

Box 2. Sources of risk regulation	
External regulation	<p>Sources, including national and international legal standards, that are situated entirely external to the risk governance stakeholders involved. These include:</p> <p>International/transnational – dedicated risk reduction (RR) governance laws International human rights and related laws such as those formulated by the European Court of Human Rights (Lauta 2014a, 2014b; Bretton et al. 2015, 2017; Scolobig 2015; Scolobig et al. 2014, 2017)</p> <p>RR initiatives championed by international entities such as the International Federation of Red Cross and Red Crescent Societies (IFRC) and the United Nations (UN) Development Programme. UN Hyogo Framework for Action, Building the Resilience of Nations and Communities to Disaster 2005-2015 (UNISDR 2005) IFRC/UNDR Handbook on Law and Disaster Risk Reduction (IFRC/UNDR 2015) UN Sendai Framework for Disaster Risk Reduction 2015-2020 (UNISDR 2015b)</p> <p>National - dedicated RR governance laws National, regional and local laws including primary legislation, secondary regulations and tertiary codes of practice and guidance notes (Lauta 2014a, 2014b; Scolobig et al. 2014, 2017; Bretton et al. 2015, 2017; Scolobig 2015; Bretton and Aspinall 2017; WBG 2017) The Robert T. Stafford Disaster Relief and Emergency Assistance Act 1988 in the USA is an example of national primary regulation. National case law including high profile criminal and civil law court cases such as the L'Aquila trial in Italy (Lauta 2014a, 2014b; Bretton et al. 2015)</p> <p>National -sectoral laws Laws regulating land development and use, building standards, environment protection, natural resources, and anti-corruption/bribery/price-fixing (IFRC/UNDP 2015; WDO 2017)</p>
Collective or self-regulation	<p>Technical and ethical standards determined by bodies of practitioners and experts (e.g. professional self-regulated associations) situated within the risk governance process. Bretton et al. (2015) noted that the International Association of Volcanology and Chemistry (IAVCEI) report entitled "Professional conduct of scientists during volcanic crises" (Newhall et al. 1999) is a rare example of an attempt to issue authoritative 'self-regulating' standards.</p>
Employer regulation	<p>Standards established by government agencies and other employers that must be followed by individuals due to their contractual employment or engagement.</p>

	*Bretton et al. (2015) differentiate between self-regulation standards and those dictated by employers.
Personal regulation	Individuals' personal standards based upon moral and ethical codes not dictated by their employers or outside agencies.
Expert regulation	'Traditional' standards of methodological probity for Mode-1 science determined by <i>ad hoc</i> communities of disciplinary specialists/peers. These standards were described by Weinberg (1972) and Nowotny (2003) respectively as the "criteria of traditional scientific excellence and quality control" and the "canons of scientific discipline".
Negotiated regulation	Stakeholder-negotiated standards that are the product of iterative processes of deliberation.

To facilitate necessary normative flexibility and evolution, national laws are often tiered. Primary legislation sets broad DRM duties of care; establishes duty holders, rights and rights holders; and mandates the creation and status of subordinate regulations. Secondary regulations provide hazard-by-hazard or role-by-role further and better particulars of the goals to be achieved and roles to be fulfilled. Tertiary codes of practice and related guidance gives practical advice and non-compulsory guidance on how to comply with the law in respect to selected matters (Bretton et al. 2015).

4. Developing a draft framework to regulate public participation in DRM

To explore in more depth how multiple tiers of law-based regulation can be used to reduce risk and control future risk, we take public participation as an example. As an international framework setting out principles and suggested practices for states, the SFDRR is at its core strongly supportive of stakeholder participation and consultation in all aspects of DRM (see Box 3). There are however very few countries⁷ that currently have primary legislation that imposes upon risk decision making bodies an enforceable obligation to consult at-risk individuals and communities. This does not mean that effective and structured stakeholder participation does not take place however. A recent example is documented in Potter et al. (2014) which presents an exploratory review of New Zealand's Volcano Alert System (VAL) system, and for the first time globally, describes the development of a new VAL system based on a qualitative transdisciplinary methodology that allowed it to be revised with direct input by its end-users. However, we note that the adopted terms of participation may be project or research limited, *ad hoc*

⁷ The International Federation of Red Cross and Red Crescent Societies (IFRC) and United Nations Development (UNDP) Handbook on Law and Disaster Risk Reduction (DRR) refers to legal provisions mandating the participation of civil society at national and sub-national levels in the Dominican Republic, Nigeria, Italy, Iraq, Namibia, Nicaragua and the Philippines.

(i.e. adopting an unrecorded and unstructured methodology) and/or not be based upon clear, recorded, enforceable duties and rights. In short, they are ephemeral by nature, in the gift of one elite stakeholder, and may reflect an inequality of social and power relations between stakeholders with no enforceable duties or rights. (see WBG 2017 for the role of law in ordering power).

Box 3. International frameworks and guidelines for regulation of public participation in DRM

The Sendai framework requires inter alia: (1) all-of-society engagement and partnership; (2) empowerment and inclusive, accessible and non-discriminatory participation and engagement with relevant stakeholders; (3) the collection, analysis, management and use of relevant data and practical information, and ensuring its dissemination, taking into account the needs of different categories of users; (4) the making of non-sensitive hazard-exposure, vulnerability, risk, disaster and loss-disaggregated information freely available and accessible; (5) the assignment of clear roles and tasks to community representatives within disaster risk management institutions and processes and decision-making through relevant legal frameworks; and (6) the undertaking of comprehensive public and community consultations during the development of laws and regulations to support their implementation.

The International Federation of Red Cross and Red Crescent Societies (IFRC) and United Nations Development (UNDP) Handbook on Law and Disaster Risk Reduction 2015 states that national laws must mandate the engagement of all relevant stakeholders, including civil society, the private sector, scientific institutions and communities in risk reduction decisions and activities.

Converting the high-level aspirations and norms of international/transnational initiatives (such as those set out in Box 3) at national and sub-national levels into effective, replicable, day-to-day risk governance practices is highly challenging. The scope and potential of the three tiers of law-based regulation referred to above therefore needs to be carefully considered. If relevant stakeholders (in particular, at-risk communities) are to participate in all stages of the risk governance cycle, a regulatory framework for consultation and participation is required. A draft regulatory framework for making consultation an integral and mandatory part of risk governance is introduced in Box 4. The framework is based upon the United Kingdom's Health and Safety (Consultation with Employees) Regulations 1996 and presented, not for adoption, but for the purposes of this paper's structured discussion of relevant matters.

Whilst attempting to draft regulations that would impose upon carefully selected DRM duty holders a legal duty to consult at-risk persons, we have identified many critical issues that would have to be addressed in detail within supporting tertiary codes of practice and guidance. These issues, which would be challenging within ad hoc informal consultation initiatives, would become even more so when formally structured and recorded so that they can be implemented, monitored and, if necessary, enforced. The challenges include those of defining with suitable and sufficient clarity, whilst retaining appropriate flexibility, who must consult whom, why, when and how.

Box 4. Introducing draft regulations to require consultation and participation in disaster risk governance

Note: The bold capital letters (A-L) in this box are used to identify issues of complexity and political judgement that are discussed in Box 5.

[A], being in exercise of the powers conferred upon him/her by [A] and of all other powers enabling him/her in that behalf, hereby makes the following Regulations:

Citation, extent and commencement

1. These Regulations, which extend to [Name of country], may be cited as the Natural Hazards - Health and Safety (Consultation) Regulations 2xxx and shall come into force on 1ST xx 2xxx.

Interpretation

2. (1) In these Regulations, unless the context otherwise requires—

“the [xxx] Act” means **[A - the primary legislation that conferred upon the relevant government minister/department powers to make regulations of this nature];**

consult means **[B - any formal or informal process: (1) for communication; (2) to discuss, ponder, exchange observations and views; or (3) to reflect upon information, issues and judgments concerning matters of mutual interest]**

natural hazard means **[C - any natural phenomenon, wherever located, that has the potential to create foreseeable risks to exposed persons within [name of country]]**

risk means **[D - the product of three separate and distinct elements - the ‘vulnerability’ of ‘exposed’ persons and productive assets to a defined ‘hazard’]**

risk governance means **[D - the sum of the many ways individuals and institutions, public and private, manage their common affairs in respect of the risks associated with natural hazards]**

DRM measure means **[D - any measure designed to avoid the creation of new disaster risks and reducing the existing and foreseeable risks including all preventive and protective actions: (1) to mitigate natural hazards; (2) to reduce the exposure of people, assets etc. (societal exposures); and (3) to reduce their vulnerability when exposed (societal vulnerabilities)]**

DRM duty holder means **[E - an individual or entity that has a duty to ensure, as far as reasonably practicable, the health, safety, wellbeing, property, livelihoods and productive assets of at-risk persons by reducing the foreseeable risks of natural hazards]**

at-risk person means **[F - every person that is exposed and vulnerable to the foreseeable risks of natural hazards]**

2(2) Unless the context otherwise requires, any reference in these Regulations to—

(a) a numbered regulation or schedule is a reference to the regulation or schedule in these Regulations so numbered; and

(b) a numbered paragraph is a reference to the paragraph so numbered in the regulation or schedule in which the reference appears.

Duty of DRM duty holders [E] to consult

3 DRM duty holders shall consult at-risk persons in good time on matters relating to their health, safety and wellbeing in relation to the foreseeable risks of natural hazards and, in particular, with regard to—

(a) the selection and introduction of any DRM measure;

(b) any natural hazard and related risk information he/she is required to provide to at-risk persons; and

(c) the planning and organisation of any DRM training he/she is required to provide to at-risk persons.

Persons [F] to be consulted

4(1) The consultation **[H and I]** required by regulation 3 is consultation with:

(a) at-risk persons directly **[G]**;

(b) in respect of any group of at-risk persons **[G]**, one or more persons in that group who were [selected/elected] by the persons in that group to represent that group for the purposes of such consultation (and any such persons are in these Regulations referred to as “representatives of at-risk persons”);

(c) ...**[F]**

(2) [Provisions detailing how consultation must take place when not undertaken with at-risk persons directly]

Duty of DRM duty holder to provide information

5(1) Where a DRM duty holder consults at-risk persons directly he/she shall, subject to paragraph (3), make available to those persons such information, within the DRM duty holder’s knowledge, as is necessary to enable them to participate fully and effectively in the consultation.

(2) Where a DRM duty holder consults representatives of at-risk persons he/she shall, subject to paragraph (3), make available to those representatives such information, within his/her knowledge, as is necessary to enable

them to participate fully and effectively in the consultation and in the carrying out of their functions under these Regulations [J];

- (3) Nothing in paragraph (1) or (2) shall require a DRM duty holder to make available any information—
- (a) the disclosure of which would be against the interests of national security;
 - (b) which he/she could not disclose without contravening a prohibition imposed by or under any enactment;
 - (c) relating specifically to an individual, unless he/she has consented to its being disclosed; or
 - (d) obtained by the DRM duty holder for the purpose of bringing, prosecuting or defending any legal proceedings; or to provide or allow the inspection of any document or part of a document which is not related to DRM.

Functions of representatives of at-risk persons

6. Where a DRM duty holder consults representatives of at-risk persons each of those representatives shall, for the period for which that representative is so consulted, have the following functions—

- (a) to make representations to the DRM duty holder on potential hazards and risks at the workplace which affect, or could affect, the group of persons he/she represents;
- (b) to make representations to the DRM duty holder on general matters affecting the health, safety and wellbeing of the group of persons he/she represents and, in particular, on such matters as he/she is consulted about by the duty holder under regulation 3; and
- (c) to represent the group of at-risk persons he/she represents in consultations at the workplace with **[the enforcers of these regulations - L]**.

Training, time off and facilities for representatives of at-risk persons and time off for candidates [J]

7. (1) Where a DRM duty holder consults representatives of at-risk persons, he/she shall—

- (a) ensure that each of those representatives is provided with such training in respect of that representative's functions under these Regulations as is reasonable in all the circumstances, and the DRM duty holder shall meet any reasonable costs associated with such training including travel and subsistence costs; and
- (b) [J]

(2) [A provision permitting representative of at-risk persons time-off with pay in order to perform his/her functions under these regulations?]

(3) [A provision permitting the provision of such facilities and assistance as a representative of at-risk persons may reasonably require for the purpose of carrying out his/her functions under these Regulations.]

Records

8 A DRM duty holder shall record: [K]

Enforcement and Criminal/Civil liability

9 Breach of a duty imposed by these Regulations shall [L]

Adopting the bold capital letters (A-L) in Box 4, in Box 5 below we identify issues of both complexity and political judgment that will need to be considered in draft secondary regulations, such as those described in Box 4. These issues would also have to be identified and addressed in supporting tertiary instruments (such as codes of practice and guidance) containing essential practical advice that would be essential to complement secondary regulations which impose duties, rights and other legal requirements only in general terms.

Box 5. Issues to consider and agree in drafting secondary regulations and complementary tertiary instruments for consultation and participation in DRM.	
Key: The capital letters (A-L) in this box were used in Box 4 to identify, within draft secondary regulations, issues of complexity and political judgement.	
A	What primary legislation empowers whom to issue these secondary subordinate regulations?
B	What is meant by "consultation"?
C	What is meant by "natural hazards" and does this expression include "climate change and/or "global warming"? How will any natural hazards, which are located wholly or partly outside the jurisdiction but put at-risk communities within the jurisdiction, be addressed?
D	What is meant by "risk", "risk governance" and "DRM measure"?

E	<p>Which risk governance stakeholders must have a binding authority and duty to consult at-risk communities?</p> <ul style="list-style-type: none"> • Civil protection agencies (i.e. public government entities and agencies) alone? • Publicly owned, managed, or regulated services and infrastructure stakeholders? • Employers and infrastructure providers in the private sector?
F	<p>Which at-risk communities should be consulted, given that consultation, as a non-sequential, non-linear iterative process, will differ from sequential linear processes in respect of who is involved?</p> <ul style="list-style-type: none"> • At-risk persons directly? • Representatives of at-risk persons? • At-risk communities that may be disproportionately exposed and/or vulnerable (by reason of gender, age, or disability) including women, children, and youth, persons with disabilities, poor people, migrants, indigenous peoples, person in informal and marginal settlements, and older persons? • Volunteers and organised national and international voluntary work organisations such as National Red Cross/Red Crescent Societies? • Scientific and communication experts and institutions? • Representatives of professional associations, financial institutions, businesses, schools and hospitals, cultural and religious interests? • Representatives of building and critical infrastructure planners, designers, land-use and building code/standard setters and approvers, and builders? <p>For the purposes of the previous question, do at-risk communities have duties, as opposed to rights, under a national constitution or national laws covering natural hazards/the environment?⁸ If not, will at-risk persons be given duties within these regulations?</p>
G	<p>What are the purposes (both general and specific) of consultation?</p> <p>Overall</p> <ul style="list-style-type: none"> • To facilitate “risk-informed” decisions by at-risk communities? • To induce changes in the safety and health behaviours of at-risk communities? • To protect the rights of at-risk communities, including their rights to participation in decisions that affect them? <p>At a general level</p> <ul style="list-style-type: none"> • To promote the collection, analysis, management, and use of relevant disaggregated data and practical knowledge, and ensure its dissemination, taking into account the needs of different categories of at-risk persons, as appropriate? • To promote stakeholder perceptions of fairness and trust, enhance the ‘process’ and ‘relational’ (i.e. ‘substantive’) legitimacies of DRM measures, and thereby encourage a culture of voluntary compliance? • To foster more equitable social and power relations between risk stakeholders with no previous enforceable duties or rights? <p>At a more specific level</p> <ul style="list-style-type: none"> • To gain and incorporate natural hazard and risk knowledge from disparate sources, including local, indigenous, experiential and circumstantial knowledge sources? • To gain and incorporate non-natural hazard and risk knowledge perceived by at-risk communities to be relevant to their health, safety and wellbeing and thereby supporting a multi-hazard approach to DRM? • To identify the sentiments, skills, experience, knowledge, capacities, resilience, concerns, exposures, vulnerabilities, needs, and mental models of diverse at-risk communities? • To identify the cultural, spiritual, linguistic, legal, political, economic, logistical, time, and resource drivers of at-risk communities? • To determine what kinds of hazard and risk analyses (e.g. the role, subjects, methods, and results of analysis) at-risk communities require and whether those analyses are appropriately balanced?

⁸ The IFRC/UNDP Handbook 2015 refers to legal provisions imposing duties upon individuals in Vietnam and Tanzania.

	<ul style="list-style-type: none"> • To determine how to exchange and disseminate timely, relevant, comprehensible and trusted data and knowledge with at-risk communities? • To identify and assess viable DRM options? • To make and implement DRM decisions? • To identify and assess evidence of non-compliance with planned DRM measures? • To review and assess the utility of existing DRM measures to identify what is working/not working in practice and why? • To identify needs for adequate time, financial and other resources? • To identify measures, mechanisms and legal/administrative incentives/sanctions to ensure duty holders (often public officials) comply with their duties? • To identify measures, mechanisms and incentives⁹ that (1) encourage engagement by at-risk persons with risk governance; and (2) support DRM behaviour such as; (1) the availability of land-use/development/planning approvals, building permits on compliance with building codes and standards,¹⁰ financial grants, and the availability, scope and reduced cost of risk transfer/sharing and/or insurance; and (2) the fear of legal and other penalties? • To identify measures, mechanisms and disincentives that: (1) discourage engagement by at-risk persons with risk governance; and (2) do not support DRM behaviour including evidence of bribery, corruption, price-fixing and the tolerance of avoidable risks? • To identify and assign clear roles, responsibilities and measures to at-risk communities?
H	<p>How?</p> <ul style="list-style-type: none"> • Directly? • By bespoke representation structures? • By use of existing structures of local government? • By campaigns? • By meetings? • By questionnaire? • By social media? • By on-line resources?
I	When and how often?
J	<p>What arrangements are necessary for the provision of information, education, training and funding for consultation?</p> <p>Do at-risk persons have an existing right to information under international/transnational human rights laws (as described in section 2 above), a national constitution or national laws covering natural hazards/the environment?¹¹ If not, will at-risk persons be given rights within these regulations?</p> <p>Will the duty holder have a duty to provide at-risk persons with timely, comprehensible and relevant information to ensure their own safety and not to put others at risk? Such information might include information on: (1) the foreseeable risks to their health, safety, wellbeing, property and productive assets and (2) existing and proposed future preventive and protective DRM measures to mitigate those risks.</p>
K	What records will be kept by whom for purposes of accountability, audit and review?
L	<p>What procedures and mechanisms are necessary:</p> <ul style="list-style-type: none"> • For oversight and open and transparent accountability? • To ensure duties are fulfilled and rights protected? • For criminal/civil law liabilities and legal/administrative sanctions in the event of evidence of an absence of or inadequate consultation?

⁹ The World Bank Group (2017) World Development Report 2017: Governance and the Law states that laws within enduring constitutions give potential spoilers an adequate pay for complying.

¹⁰ The IFRC/UNDP Handbook 2015 refers to Nicaragua which provides incentive by means of free building permits.

¹¹ The IFRC/UNDP Handbook 2015 refers to legal provisions granting rights to disaster information in Algeria, Serbia, El Salvador and Vietnam.

Any attempt to formalise and record the process of consultation with, and participation by, at-risk and other risk governance stakeholders will raise difficult and unavoidable issues that involve political values and judgments. One starting point is to decide what the paramount purpose of the deliberation process and/or discrete parts of it. It is surprising and unhelpful that neither the Sendai Framework nor the IRCC Handbook expressly addresses this critical issue. *Is the purpose of deliberation to help at-risk communities and other stakeholders to make better evidence-based, risk-informed decisions promoting and preserving their human rights and their autonomy to make risk-related decisions with which others (e.g. government civil protection authorities) may disagree?* Paragraph 19(d) of the SFDRR states that all-of-society engagement and partnership requires “empowerment”, which supports this idea of enhancing the interest of the vulnerable vis-à-vis less vulnerable and more powerful groups. *OR, is the purpose to influence openly and directly risk-related decisions and behaviours in order to produce a coherent and effective alignment of actions within the widest possible group of stakeholders?* The achievement of both goals within the same exercise may be unachievable in both theory and practice.

Once critical decisions have been made about the paramount purposes of deliberation, realistic norms can be considered that will form the guiding principles behind and enable the drafting of - relevant regulations, codes and guidance which are clear, certain, public, inclusive, flexible, adaptive and specific¹². If it is assumed that the goals of deliberation must also have the same characteristics and strive to be SMART (Specific, Measurable, Assignable, Relevant and Time-based), the scope and depth of the enterprise becomes daunting, but if international/transnational initiatives can encourage sharing of consultation experiences, the development of realistic norms of “good” deliberation is more likely to happen.

5. Conclusions and recommendations for SFDRR implementation

This paper argues for the need to move beyond the high-level aspirations and norms of international/transnational initiatives (such as those set out in Box 3) and to place far greater emphasis on the challenges of developing replicable, day-to-day risk governance practices at global, transnational, national and sub-national levels. We have identified the role that policy instruments, and in particular, secondary regulations that mandate governments to

¹² The World Bank Group (2017) World Development Report 2017: Governance and the Law states that laws within enduring constitutions are commonly inclusive, flexible, adaptive and specific

consult on DRM decisions, can play in implementing a national DRM strategy. More broadly, these kinds of regulations can be used to foster greater recognition of the rights, responsibilities and obligations of different actors across scales; specifically:

1. DRM as a right, by analogy from several well-established rights such as the rights to life and to private/family life.
2. A right to participate in DRM decision-making, in line with the right to self-determination and to access information.
3. The transboundary nature of risk, and therefore the role of transnational policy frameworks to encourage greater cooperation and provide recourse for transnational harm.
4. Recognition that the state has many policy options at its disposal to influence behaviour and fulfil its obligations to protect its citizens.

To take these recommendations forward, SFDRR implementation could helpfully:

1. Place the rights of individuals at the centre, by providing for public participation in national and local DRM strategies.
2. Encourage greater use of transnational DRM strategies.
3. Consider and address other relevant transnational instruments, such as the Draft Rules produced by the International Law Commission on the Protection of Persons in the Event of Disasters, the Responsibility of States for Internationally Wrongful Acts, and the Prevention of Transboundary Harm from Hazardous Activities.
4. Encourage a full exploration and application of relevant public policy instruments that can be used for implementing national legislation and national and local DRM strategies – including greater use of regulatory, fiscal and financial instruments.

We argue that to achieve realistic evolving risk governance standards, fresh and bold initiatives are needed to encourage the prompt, open and candid exchange of knowledge about the realities of which DRM working practices and arrangements (as opposed to general policies and goal-setting statements) have been devised, used and assessed for utility, measured in terms of measurable risk reduction or risk avoidance. A rare example of documented DRM practices is recorded by Bretton et al. (2018) who presented, in the context of five actual volcanic unrest simulation exercises, six complementary checklists based upon data, insights and practice pointers derived

from those exercises. They commended the use of checklists, supported by guidance notes, as a pragmatic way to create, test and develop acceptable standards of DRM practice.

We further argue that real progress will only be made when *ad hoc* and unrecorded DRM practices, such as those attempting stakeholder consultation and participation, are formally recorded and replicated. There is an overwhelming and obvious requirement for not only leadership, cooperation and coordination, but also the co-production of 'good DRM practices'. This must be the paramount thrust of future international initiatives and funding arrangements. In summary, we adopt and commend the axiom that states:

"Practice doesn't make perfect. Practice reduces the imperfection." (Beta 2011).

References

- Alemanno A (2016) 'Risk and Regulation' in A. Burgess, A. Alemanno, and J.O. Zinn (eds.) *Routledge Handbook of Risk Studies*. New York: Routledge.
- Aronsson-Storrier M and da Costa K (2017) 'Regulating disasters? The role of international law in disaster prevention and management' 26(5) *Disaster Prevention and Management* 502.
- Beta T (2011) Master of Stupidity <http://www.goodreads.com/book/show/8542012-master-of-stupidity>
- Bretton RJ, Aspinall W (2017) Risk assessments face legal scrutiny. *Nature* 550, 188 (12 October 2017) doi:10.1038/550188b
- Bretton RJ, Ciolli S, Cristiani C, Gottsmann J, Christie R, Aspinall W (2018) Volcanic Unrest Simulation Exercises: Checklists and Guidance Notes, *Advances in Volcanology*. Doi: 10.1007/11157_2018_34
- Bretton RJ, Gottsmann J, Aspinall WP, Christie R (2015) Implications of legal scrutiny processes (including the L'Aquila trial and other recent court cases) for future volcanic risk governance. *Journal of Applied Volcanology* 2015, 4:18. doi:10.1186/s13617-015-0034-x
- Bretton RJ, Gottsmann J, Christie R (2017) The Role of Laws Within the Governance of Volcanic Risks. *Adv in Volcanology*. doi: 10.1007/11157_2017_29
- Bretton RJ, Gottsmann J, Christie R (2018a) Hazard communication by volcanologists: Part 1 - Framing the case for contextualisation and related quality standards in volcanic hazard assessments *Journal of Applied Volcanology - Society and Volcanoes* 7:9. doi.org/10.1186/s13617-018-0077-x
- Bretton RJ, Gottsmann J, Christie R (2018b) Hazard communication by volcanologists: Part 2 - Quality standards for volcanic hazard assessments, *Journal of Applied Volcanology - Society and Volcanoes* 2018 7:10. doi.org/10.1186/s13617-018-0079-8
- Budayeva v Russia* App no 15339/02 (ECtHR, 20 March 2008).
- Commission on Global Governance (1995) *Our Global Neighbourhood*. Oxford University Press
- Connell J and N Lutkehaus (2017), 'Environmental Refugees? A tale of two resettlement projects in coastal Papua New Guinea' 48:1 *Australian Geographer* 79.
- Council of Europe (1950) *European Convention for the Protection of Human Rights and Fundamental Freedoms, as amended by Protocols Nos. 11 and 14*, 4 November 1950, ETS 5.
- Ferris E (2017), 'A Toolbox: Planning Relocations to Protect People from Disasters and Environmental Change', Georgetown: Georgetown University, UNHCR, and IOM.

Heyvaert V (2011), 'Governing Climate Change: Towards a New Paradigm for Risk Regulation' 74(6) *Modern Law Review* 817.

International Covenant on Civil and Political Rights (ICCPR) (adopted 16 December 1966, entered into force 23 March 1976) 999 UNTS 171.

International Covenant on Economic, Social and Cultural Rights (ICESCR) (adopted 16 December 1966, entered into force 3 January 1976) 993 UNTS 3.

International Federation of Red Cross and Red Crescent Societies (IFRC) and United Nations Development Programme (UNDP) (2015) *The Handbook on Law and Disaster Risk Recovery*. IFRC: Geneva, Switzerland.

International Law Commission, 'Draft Articles on the Protection of Persons in the Event of Disasters' (UN Doc A/71/10, 2016, para. 48).

International Risk Governance Council (IRGC) (2009) 'What is risk governance?' www.irgc.org

Lauta KC (2014a) *Disaster Law*. Oxford and New York: Routledge

Lauta KC (2014b) New fault lines? On responsibility and disasters. *EJRR* 2/2014 Vol. 3 No. 2, 137-145

Lopez-Ostra v Spain App no A/303-C (ECtHR, 9 December 1994).

Newhall C, Aramaki S, Barberi F, Blong R, Calavache M, Cheminee J-L, Punongbayan R, Siebe C, Simkin T, Sparks RSJ, Tjetjep W (1999) International Association of Volcanology and Chemistry (IAVCEI) Subcommittee for Crisis Protocols - Professional conduct of scientists during volcanic crises *Bulletin of Volcanology* 60: 323-334

Nowotny H (2003) Re-thinking Science: From reliable knowledge to socially robust knowledge. In: Lepenies W (ed) *Entangled histories and negotiated universals – Centers and peripheries in a changing world*. Frankfurt & New York: Campus Verlag.

Öneryıldız v Turkey App no 48939/99 (ECtHR, 30 November 2004).

Potter SH, Jolly GE, Neall VE, Johnston DM, Scott BJ (2014) Communicating the status of volcanic activity: revising New Zealand's volcanic alert level system. *Journal of Applied Volcanology* 2014, 3:13

Renn O (2008) *Risk Governance – Coping with Uncertainty in a Complex World*. London & New York : Earthscan.

Renn O and Klinke A (2016) 'Risk Governance: Concept and Application to Technological Risk' in Burgess A, Alemanno A, and Zinn JO (eds.) *Routledge Handbook of Risk Studies*. London: Routledge.

Rio Declaration on Environment and Development, UN Doc A/CONF.151/26 (vol. I); 31 ILM 874 (1992).

- Scolobig A (2015) Brief Communication: The dark side of risk and crisis communication: legal conflicts and responsibility allocation. *Nat. Hazards Earth Syst. Sci.* 15, 1449-1456, doi: 10.5194/nhess-15-1449-2015
- Scolobig A, Mechler R, Komendantova N, Schröter D, Patt A (2014) The co-production of scientific advice and decision making under uncertainty: Lessons from the 2009 L'Aquila Earthquake, Italy, *GRF Davos Planet@Risk*, Volume 2, Number 2, April 2014 71-76
- Scolobig A, Riegler M, Preuner P, Linnerooth-Bayer J, Ottowitz D, Hoyer S, Jochum B (2017) Warning System Options for Landslide Risk: A Case Study in Upper Austria, *Resources* 2017, 6, 37. doi:10.3390/resources6030037
- Sendai Framework for Disaster Risk Reduction (UN Doc A/RES/69/283, 23 June 2015).
- Simoncini M (2017) 'Disaster Risk Regulation in the European Union: The Path to Resilience' in A. Herwig and M. Simoncini (eds.), *Law and the Management of Disasters: The Challenge of Resilience*. London: Routledge.
- Tierney K (2014), *The Social Roots of Risk: Producing Disasters, Promoting Resilience*. Stanford: Stanford University Press.
- United Nations Educational, Scientific and Cultural Organization (UNESCO) (1972) Report of consultative meeting of experts on the statistical study of natural hazards and their consequences Document SC/WS/500 11pp. Paris: UNESCO.
- United Nations Development Programme (UNDP) Strengthening Disaster Risk Governance: UNDP Support during the Hyogo Framework for Action Implementation Period 2005-2015. New York: UNDP
- United Nations General Assembly Resolution 56/83, 12 December 2001 (UN Doc A/RES/56/83, 28 January 2002), Annex: Draft Articles on the Responsibility of States for Internationally Wrongful Acts.
- United Nations General Assembly Resolution 62/68, 12 December 2001 (UN Doc A/RES/62/68, 8 January 2008), Annex: Prevention of transboundary harm from hazardous activities.
- United Nations Office for Disaster Risk Reduction (UNISDR) (2005) UN Hyogo Framework for Action, Building the Resilience of Nations and Communities to Disaster 2005-2015.
- United Nations Office for Disaster Risk Reduction (UNISDR) (2015a) *Global Assessment Report (GAR) on Disaster Risk Reduction: Loss Data and Extensive Risk Analysis*, Geneva: UNISDR.
- United Nations Office for Disaster Risk Reduction (UNISDR) (2015a) *The Sendai Framework for Disaster Risk Reduction 2015-2030*, Geneva: UNISDR.

- United Nations Office for Disaster Risk Reduction (UNISDR) (2018) *Global Assessment Report on Disaster Risk Reduction (GAR19) Concept Note*, available at https://www.preventionweb.net/files/58255_gar19conceptnote18.05.2018final.pdf
- Walker G, Whittle R, Medd W, Watson N (2010) Risk Governance and natural hazards, Cap Haz-Net WP2 Report, Lancaster Environment Centre, Lancaster University, Lancaster <http://caphaz-net.org/outcomes-results>
- Weinberg AM (1972) 'Science and Trans-Science', *Science* 21, 177: 4045. doi: 10.1126/science.177.4045.211
- Wilkinson E (2012) *Transforming Disaster Risk Management: A Political Economy Approach*, London: Overseas Development Institute.
- Wilkinson E (2013) *Disaster risk governance in volcanic areas – A concept note form Work Package 4 of the Strengthening Resilience in Volcanic areas (STEVA) programme*. London: ODI.
- Wilkinson E, Comba E and Peters K (2014) *Disaster risk governance: Unlocking progress and reducing risk*. New York: UNDP.
- Wilkinson E and Kelman I (2017) 'From Policy to Action and Back Again for Disaster Risk Reduction Including Climate Change Adaptation', in Kelman I, Mercer J and Gaillard JC (eds) *The Routledge Handbook of Disaster Risk Reduction Including Climate Change Adaptation*. London: Routledge.
- Wilkinson E, Twigg J, Weingartner L, Peters K (2017) *Delivering Disaster Risk Reduction by 2030: Pathways to Progress*. London: Overseas Development Institute.
- Wilkinson E and Steller R (2018) *The Caribbean must think carefully about how and where to 'build back better' after the hurricanes of 2017*. London School of Economics and Political Science: Latin American and Caribbean Centre. <https://blogs.lse.ac.uk/latamcaribbean/2018/11/14/the-caribbean-must-think-carefully-about-how-and-where-to-build-back-better-after-the-hurricanes-of-2017/>
- World Bank Group (2017) *World Development Report 2017: Governance and the Law*. Washington, DC: The World Bank Group.