

The Midterm Review of the Implementation of the Sendai Framework for Disaster Risk Reduction 2015-2030

Literature Review

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Contents

1. Introduction.....	3
2. Methodology	4
3. Sendai Framework Priorities for Action	5
Priority 1: Understanding Disaster Risk	5
Priority 2: Strengthening disaster risk governance to manage disaster risk.....	8
Priority 3: Investing in Disaster Risk Reduction for Resilience.....	12
Priority 4: Enhancing disaster preparedness for effective response and to “Build Back Better” in recovery, rehabilitation and reconstruction.....	15
4. Thematic areas.....	18
Coherence.....	18
Expanded scope.....	20
Gender and inclusion.....	23
DRR in Urban Areas.....	25

1. Introduction

- 1.1 The Sendai Framework for Disaster Risk Reduction 2015 - 2030 (Sendai Framework) marked a shift in the thought and practice of disaster risk reduction (DRR) from the management of the impacts of natural hazards to a management of the underlying drivers of risk¹. Adopted at the Third UN World Conference on Disaster Risk Reduction in Sendai, Japan in 2015, and building upon the successes of the Hyogo Framework for Action 2005 - 2015, the Sendai Framework insisted upon a range of new emphases for DRR. This included an expanded scope of action that encompasses consideration of environmental, technological and biological hazards and risks – including pandemics and health resilience, a new focus on the role of data for measurable outcomes and a reiteration of the importance of local level governance structures for DRR interventions.
- 1.2 The framework remains the central touchstone across the DRR literature and beyond, providing a guiding light for policy and practical interventions, a basis for analyses of good practice and a continuing impetus for intersectoral and transdisciplinary approaches. The framework outlines 13 guiding principles, seven global targets and four priority areas in support of its goal to:

Prevent new and reduce existing disaster risk through the implementation of integrated and inclusive economic, structural, legal, social, health, cultural, educational, environmental, technological, political and institutional measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery, and thus strengthen resilience.
- 1.3 Despite this shared commitment, and over 30 years of concerted action from national governments, intergovernmental organisations, the UN system and non-State actors, disaster risk and its actualisation in disaster loss and damage continue to erode sustainable development in all regions of the globe, and threaten the health and wellbeing of humans and the ecosystems on which they depend.
- 1.4 The aim of this literature engagement is to assess the trajectory of the thinking embodied in the Sendai Framework in the six years following its publication (2015 - 2021). It will first consider the literatures catalysed by each of the four priority areas of the Sendai Framework before moving on to engage four cross-cutting themes: the coherence agenda, the expanded scope of DRR, gender and inclusion, and DRR in urban areas.
- 1.5 This engagement makes no claims to being comprehensive. The quantity and diversity of both academic and grey literature is such that an encompassing review has become impossible, with over 80 academic journals dedicated to DRR and related fields in English alone (Alexander et al 2019) and a further 'profusion of practitioner-driven literature' (Sarmiento et al 2019). Instead, the aim of this engagement is to gesture towards the key discussions which have occurred in the field of DRR as researchers and practitioners work to implement the provisions of the Sendai Framework by 2030. By doing so, it seeks to provide a clear and concise basis for discussion of the effects of the Sendai Framework with a view to maximising its effectiveness in the period 2022 - 2030.

¹ Building upon a deep-rooted literature emphasising prevention and the construction of vulnerability: see for example Hewitt 1983 and Oliver-Smith 1986.

- 1.6 2023 marks the midpoint in the implementation of a number of sustainable development frameworks agreed in 2015, including the *2030 Agenda for Sustainable Development*, the *Addis Ababa Action Agenda for Financing for Development*, the *Paris Climate Agreement*, and the *Sendai Framework*. Within this context, the UN General Assembly (UNGA) decided² to hold a "*midterm review of the implementation of the Sendai Framework 2015-2030*" (MTR SF).
- 1.7 This literature review is part of the Midterm Review of the Implementation of the Sendai Framework 2015 – 2030, which includes retrospective and prospective elements. It works to take stock, assess progress made and challenges experienced, identify emerging issues, uncover context shifts, build coherence with other frameworks, and make recommendations to renovate policy and risk governance, and risk management modalities able to contend with 21st century risks.
- 1.8 Recognising the import of the MTR SF, the UN General Assembly decided in 2021 on the modalities of the MTR SF; namely that the MTR process will conclude in a High-Level Meeting of the General Assembly in New York on 18-19 May 2023. This meeting will adopt a concise and action-oriented political declaration to renew commitment, accelerate implementation and inform the quadrennial review of the SDGs at the *ECOSOC High-level Political Forum on Sustainable Development* in July 2023, the deliberations of Member States and stakeholders at the *SDGs Summit* during the 78th Session of the UN General Assembly in September 2023, and COP28. It will further inform the recommendations from the Secretary General's *Our Common Agenda* report and the *Summit of the Future*.

2. Methodology

- 2.1 The material for this literature engagement was developed through a desk review of both Google Scholar and major academic literature and journals concerned with DRR, with a focus on the time period 2015 - 2021. It was then supplemented by the recommendations of UN system partners and the outcomes of semi-structured interviews with academic and professional stakeholders. This process was designed to ensure geographic, language and disciplinary diversity.
- 2.2 Given the role which stakeholder recommendations played in generating the inputs of this engagement, it is recognised that certain biases may remain. In particular, consideration of literature relevant to DRR produced in adjacent fields was not systematic. Furthermore, this engagement is not concerned with DRR practice, except where reflected in academic and grey literature. As a result, there may be specific conclusions of this review that will need to be verified through more focused information collection and analysis. This can be achieved through other processes contributing to the MTR, including comprehensive consultations, online dialogues and thematic studies.

² UNGA Resolution 75/216 of 21 December 2020

3. Sendai Framework Priorities for Action

Priority 1: Understanding Disaster Risk.

- High quality, accessible data has been recognised as key to effective disaster risk reduction, but questions remain about its production and distribution
- The systemic risk paradigm means that the understanding of disaster risk must encompass an appreciation of complexity, uncertainty and ambiguity
- Understandings of disaster risk open out onto a broader horizon including questions of justice, citizenship and rights.

3.1 The Sendai Framework is clear that disaster risk management 'should be based on an understanding of disaster risk in all its dimensions'. This emphasis has sparked in-depth discussion in the subsequent literature. One conversation, catalysed by the inclusion within the Sendai Framework of seven quantitative targets and subsequent development of 38 indicators to measure progress in implementation, has centred around the role of 'systematic and cyclical measuring, monitoring and reporting' (Migliorini et al 2019) in understanding disaster risk. There is a consensus that 'consistent, reliable, detailed and accessible' data (Corbrane et al 2015) is crucial for effective disaster risk management. It is recognised that quantitative data can capture many different aspects of disaster risk, from the physical nature of natural hazards and the vulnerability and resilience of at-risk populations to the indirect and cascading ramifications of the impact of disaster. In particular, there has been a trend to systematically account for disaster loss and damage to ensure good governance (Mizutori 2021) and 'motivate adaptive behaviour' (Doktycz, Abkowitz 2019), including through Post-Disaster Needs Assessment (PDNA) (e.g., Jeggle, Bogero 2018). Further effective uses of disaster risk data include the production of probabilistic and systemic risk assessments (e.g., WIA 2017, Adger et al 2018), people-centred multi-hazard early warning systems (WMO 2018) and comprehensive and high quality disaster databases which use a multi-systems perspective (Mizutori 2021; EUC 2018). As States seek to govern systemic risk, risk information should seek to 'monitor the evolution of risk' in all its dimensions, including local losses and extensive risk, as well as horizon scanning for trigger events (UNDP 2021). Platforms such as the Sendai Framework Monitor (SFM) and DesInventar Sendai seek to support risk-informed policy choices through the collation of 'robust data and statistics that are timely, accurate and accessible' (UNDRR 2020 - SFM snapshot).

3.2 However, though there is a consensus on the role that data could play in achieving the targets of the Sendai Framework, there is less agreement on how that data should be produced and distributed. Though risk assessment has long been positioned at the core of understanding disaster risk, there remains a 'bewildering variety' (Hagenlocher et al 2020) of approaches: one survey of composite indicators assessing risk, resilience and vulnerability identified a total of 106 methodologies and 2298 base indicators (Beccari 2016). Further, it is acknowledged that issues such as double counting, difficulties in attributing costs and intangible losses all mean that 'assessing the economic costs of disaster is very complicated' (Eckhardt et al 2019), whilst methodologies for assessing total loss and damage lack both consistency and the data needed to populate them (Doktycz, Abkowitz 2019). Beyond this diversity and uncertainty, there is also a concern that indicator

methodologies and databases could do more to grapple with the implications of the systemic risk paradigm, improving the ways they capture the interconnections between risk systems (Zaidi 2018) and rejecting the tendency to 'compartmentalise risk' (UNDRR 2019). This ongoing ambiguity about how data should be produced is matched by inefficiencies in how data is distributed, with considerations including a 'lack of standardisation, interoperability, data disaggregation and data protection', as well as economic, political and security concerns, limiting the circulation of data throughout and between governments (Migliorini et al 2019, UNDRR 2020 [Africa Coherence]). In these situations, though relevant data may exist, access may be labour and cost intensive for disaster risk reduction institutions and professionals, thus compromising uptake and efficient use.

- 3.3 A different line of thought catalysed by the Sendai Framework moves from the minute specification of risk by means of disaster data to an engagement with the complexity and uncertainty of the social construction of risk. The literature here builds from long-established insights into the production of vulnerability and resilience, touchstone concepts which have nevertheless been subject to 'diverse definitions and conceptualisations' (Kelman et al 2016) within and beyond the literature on disaster risk (see Kelman et al 2016 and Fekete et al 2014 for in-depth discussions). Further, the systemic characteristics of disaster risk, magnified by the compression of time and space associated with economic globalisation, create further challenges to risk understanding (UNDP 2021).
- 3.4 The key point of the social construction of risk is that disaster events are the realisation of processes of risk accumulation which are internal to the development endeavour. These processes are cast as 'risk drivers' that encompass a huge range of interdependent and recursive social processes, which are both drivers of risk accumulation and the outcome of this accumulation in themselves. This risk accumulation occurs at and between all locations, scales and sectors, conditioning exposure, vulnerability, resilience and hazards themselves, with disasters sometimes conceptualised as 'cascading' as a result of these interdependencies (see Pescaroli et al 2018). In this context, risk has come to be understood as systemic in the intertwined processes which lead to its accumulation, as well as the concatenating effects of the realisation of risk in intensive and extensive disaster events. These events are often characterised by the interaction of multiple hazards and secondary impacts, especially where recovery is protracted (Pescaroli and Alexander 2018). Systemic risk is characterised by four key properties (Renn et al 2021) which when taken together mean that 'surprise is the new normal' (UNDRR 2019):
 - Complexity - difficulty in identifying and quantifying causal links due to feedback loops, time delays and intervening variables
 - Uncertainty - low strength of confidence in cause and effect chains
 - Ambiguity - high variability of legitimate interpretations of a data set
 - Ripple effects - interdependency and impacts beyond the domain where risk is located
- 3.5 This conceptual move to systemic risk has brought with it some operational implications. At a minimum, it is clear that 'the era of hazard-by-hazard risk reduction is over' (UNDRR 2019) and that coherent approaches that cut across sectoral boundaries must be pursued. A major feature of systemic risk is a poor public perception of its severity, with risk drivers appearing remote, rendering scientific modelling all the more challenging. As a

result, it is crucial to 'combine analysis with communication' to improve public awareness of contemporary risk systems (Schwiezer, Goble, Renn 2021).

- 3.6 In addition, given the variety of scales and sectors through which systemic risk both accumulates and manifests, it is crucial to develop national policies and plans which integrate various aspects of State and society in governing sustainability and resilience (UNDP 2021), in line with the Sendai Framework's call for an 'all-of-society engagement and partnership' (UNDRR 2015).
- 3.7 Thus 'characterizing potential future influence of environmental, economic and social risk-sensitive drivers is critical for guiding strategic decisions that can help nations adapt to change, anticipate opportunities and cope with surprises', through, for example, scenario approaches that explore 'the nature of trade-offs that can arise and including them in system management' (UNDRR 2021).
- 3.8 Other actions appropriate to the systemic risk paradigm include investment in resilient infrastructure and the creation of risk metrics to inform development decisions for joint planning (FLACSO 2019). However, as the GAR Special Report on Drought 2021 identifies, 'scientific capabilities are often developed to address research questions, but are not tailored to an operational setting, and much less for improving knowledge, developing application prototypes and building resilient infrastructure as changes are occurring. Developing science and services of value for societal issues often need to be multidisciplinary and transdisciplinary, and performed in conjunction with a range of partners' (UNDRR 2021).
- 3.9 The overall picture which emerges from these actions is disaster risk reduction which is not isolated as an individual sector but part of the mainstream practice of sustainable development so that 'planning for extremes must now be closely integrated into planning for a new normality' (FLACSO 2019) and DRR becomes 'integrated within sustainable development by offering a contribution to social well-being and positive development of individuals and communities' (Hicks et al 2019). The creation of national sustainable development policies and strategies that fundamentally integrate risk reduction and resilience building is at the practical centre of this recognition (UNDP 2021). The perspective of systemic risk is therefore closely aligned with the operational move towards coherence in disaster risk management, in that it requires disaster risk reduction to move from an external input into the development process to an endogenous part of its DNA.
- 3.10 The recognition that disaster risk reduction is inherently involved with sustainable development decisions – decisions that deal inevitably with issues of 'value, ethics, morality and equity' (Lavell, Maskrey 2013) – has opened up the horizon of what it could mean to understand disaster risk. A holistic understanding of disaster risk in this context first acknowledges the processes which underlie 'unequal geographies of disaster risk reduction' (Blackburn and Pelling, 2018), recognising that factors such as 'gender, ethnicity, household or social status' structure the distribution of disaster risk and can lead to the 'intergenerational transmission of vulnerability and rising inequalities' (UNDRR 2019). From this perspective, systemic risk offers an opportunity to redress the 'insufficient attention to issues of power at micro and macro scales' (Wisner 2019) that has so far characterised research on risk and disasters.
- 3.11 First, systemic risk implies that disaster risk emerges from a deeply unequal world and that it needs 'to be considered in conjunction with other geopolitical, societal and technological



risks' (Shaw 2020). Second, and crucially, understanding disaster risk reduction in this way means that disaster risk need not be seen only as a product of a world constituted by inequality, but that DRR is an active intervention in redressing the inequalities of our world. Authors writing from this perspective have generated numerous insights. The concept of 'event violence' (Ray-Bennett 2018) builds from the premise that the vast majority of mortality from disaster events is avoidable and the empirical recognition that the 'poor and weak suffer the most' (Pettersen, Ray-Bennett 2018) to argue that disaster mortality is a matter of injustice rather than simply inefficacy.

- 3.12 Analysis of DRR in conflict-affected regions has revealed that disaster risk reduction can become bound up in issues of the social contract between citizens and State (Peters 2018). With over 50% of natural hazard-related mortality occurring in conflict-affected or fragile contexts (Peters 2017), frameworks which do not account for political and logistical complexities, as well as the socio-economic grievances driving conflict, risk becoming irrelevant to the 'majority of disaster-related deaths' (McGowran, Donovan 2021).
- 3.13 Furthermore, in line with the Sendai Framework's injunction to pursue DRR 'while promoting and protecting all human rights' (UNDRR 2015), there has been an ongoing concern with specifying how a rights-based approach to DRR could be operationalised (e.g., Somarrio and Venier 2018, UNOCHA Report of the Special Rapporteur on the right to development 2019, UNDRR young people), including through the paradigm of Right to the City (Merilainen et al 2019). Alongside engagement with the need for quality disaster data and the systemic nature of risk, authors in the field of DRR have made clear that disaster risk cannot be fully conceptualised without taking account of issues of justice, citizenship and rights - of politics and ethics.

Priority 2: Strengthening disaster risk governance to manage disaster risk.

- There is a consensus on the need for governance structures which include stakeholders from throughout governments, sectors and societies
 - Growing recognition of the need for adaptive approaches to risk governance that bridge structural and systemic changes and enable capacity, prototyping, learning and action at multiple scales to be better able to deal with surprises
 - The Sendai Framework's emphasis on the importance of local governance structures for DRR unlocks the possibility of engaged and inclusive processes, but also for a lack of capacity at local level to limit the effectiveness of DRR programming
 - The principle of participation is widely accepted on both normative and operational grounds, but continuous effort is required to realise the transformative potential of genuine inclusive participation
- 3.14 Questions around disaster risk governance are at the very heart of the Sendai Framework. The importance of "clear vision, plans, competence, guidance and coordination within and across sectors, as well as participation of relevant stakeholders" (UNDRR 2015) is a key concern throughout the framework. The basic conviction which informs this concern is that 'good disaster risk governance is the single most important factor in reducing disaster risk, particularly risk governance at the point of implementation' (GNDR 2015).



- 3.15 The central principle of governance design for DRR, both in the Sendai Framework and in the subsequent literature, is the multi-stakeholder, multi-scale nature of risk governance, both among and beyond government institutions (all of State institutions). This integrated form of governance is demanded by the complexity of the contemporary risk landscape (GNDR 2019). As well as the breadth of resources and expertise that such 'all-of-society' (UNDRR 2015) governance formations can mobilise, 'the redundancy provided by having multiple nodes of support (vertically and horizontally) offers backup, partial rather than complete failure when overwhelmed, and key nodes for interventions to maintain system integrity or to meet new and emergent values' (UNDRR 2021). This disparate and complex institutional structure underlies a complementary emphasis that 'accountability is an integral part of good governance' (Amaratunga et al 2019; also UNDP 2021), ensured through citizen participation in DRR decision-making and an 'enabling legislative environment' (Amaratunga et al 2019). Though navigating the move to new forms of more integrated governance networks may place pressure on the stability of existing relationships and networks (Tierney et al 2017), the importance of considerations of coherence and accountability to DRR governance is widely accepted.
- 3.16 This general emphasis on multi-stakeholder governance has been given practical substance by thinking on the relationship between disaster (risk) management agencies and other institutions of government. In particular, access to data relevant to disaster risk and to the mainstream of development and climate financing has been a source of concern. Further, based on the recognition that 'institutional arrangements are a cornerstone of structural coherence' (UNDRR 2020), there has been a particular emphasis on building links with 'parallel institutions' concerned with climate change and other forms of risk management (Raju, De Costa 2018).
- 3.17 Appropriate national governance processes vary widely, but include dedicated DRR functionalities located at high political level (UNDP 2021; UNDRR 2020), national DRR platforms with inter-ministerial and intersectoral representation (UNDRR 2020) and the integration of DRR planning into the mainstream of development planning cycles (Hare et al 2013 - catalyst, FLACSO 2019). Further, for those seeking to grapple with systemic risk, flexibility and continuous adaptation are key principles for governance (UNDRR 2019). Governance structures can be variously designed, then, but should always provide institutional space to "consider the interconnected elements and interdependencies among individual risks" (UNDRR 2019).
- 3.18 'Adaptive governance aims to deal with uncertainties and surprises inherent in transforming complex social, technological and ecological systems. It relies on iterative learning, planning, policymaking implementation and evaluation over time' (U.S. Global Change Research Program 2018, EEA 2019).
- 3.19 Thinking on multi-stakeholder governance also encompasses work beyond government, including on the science-policy interface and the broader role of academia. GAR 2019 makes it clear that 'the need for inclusive stakeholder expert processes for co-designing and co-generating solutions' sits at the core of designing governance structures (UNDRR 2019). A diverse range of scientists play a central role in DRR 'by driving methodological development and learning to inform disaster risk management (DRM) capability development' (Tagarev et al 2020), while there is an established history of scientific and technological innovation creating patented tools to help mitigate disasters (Hu et al 2018). The scientific community is increasingly shifting from an advisory role to 'co-designing

and co-delivering solutions' (Shaw 2020), with an emphasis on techniques of communication for academic studies and the integration of science platforms with national level DRR processes where possible (Izumi et al 2019). The Global Risk Assessment Framework (GRAF) continues this trend by making the combined expertise of the global risk community available to national and regional decision makers, whilst Integrated Research on Disaster Risk (IRDR), the Coalition for Disaster Resilient Infrastructure (CDRI) and various regional Scientific and Technology Advisory Groups (STAGs) to UNDRR all seek to mobilise scientific knowledge for risk reduction. Universities are recognised as a key node in this network, contributing to DRR capacity building through 'education and research' (Seifi et al 2019), as well as by functioning as an 'incubator' for private sector innovation and developing business continuity plans to ensure educational continuity in emergency (Shaw 2020). Overall, scientific and academic organisations are pivotal partners for the implementation of the Sendai Framework, both expanding the frontiers of DRR through innovation and research and raising the level of DRR capacity throughout society.

- 3.20 In addition to these considerations of multi-stakeholder governance, there is focus in the Sendai Framework on decentralised structures of DRR. Strong territorial governance at the local level has been positioned as crucial to reducing systemic risk through addressing extensive risk and thereby strengthening resilience (UNDP 2021). The local level has come to be understood as a 'frontline' space where the impacts of realised risk (disasters) are felt first and therefore where "the most critical engagement of actors and actual implementation of global and national policies" occurs (Kita 2017).
- 3.21 Proximity to the manifestation of disaster risk supports the development of coherent approaches and the coherent implementation of global and national policy frameworks (Garschagen 2016). The key idea with decentralised DRR governance is to 'apply local knowledge to disaster management' (Bae, Jon, Woo 2016) to create 'context-specific risk management solutions' (Garschagen 2016) through 'local actor participation' (Harmennssen 2019). As well as incorporating local risk knowledge, it is also suggested that decentralised governance structures 'prepare for and respond to disasters more effectively relative to more centralised systems' (Ainuddin et al 2013 in Harmennssen 2019) due to 'short command chains and localised coordination of risk response measures' (Garschagen 2016). As the GAR Special Report on Drought 2021 identifies 'centralized and decentralized approaches can complement each other, especially when the actor network is broadened beyond a sender–receiver model of information communication or a provider–client consultancy approach' (UNDRR 2021). The argument for decentralised DRR institutions emerges from a vision of risk reduction which forefronts coherence, local knowledge and effective preparation and response.
- 3.22 There has also emerged criticism of the implementation of decentralised DRR governance. Critics of this localising attitude point to the fact that proclamations about the duties and powers of devolved institutions are rarely supported by adequate capacity building and financing (e.g. VfF 2019, GNDR 2019, Kita 2017, Scott, Tarazona 2011). Half of local governments still have no specific department for addressing risk (GNDR 2019), while an estimated eight out of ten members of at-risk communities either cannot access, or have extremely limited access to, funding to build their resilience (VfF 2019). Decentralised governance can therefore function as a means for national governments to delegate



responsibilities into a 'black box' (O'Neil et al 2014) local space where DRR is supposed to be people-centred and adaptable, but is in fact chronically under-resourced.

- 3.23 Further, it is not certain that aspirations for the inclusion of local perspectives are always realised by decentralisation: 'prospects for local participation and empowerment depend greatly on the overall political culture' (Garschagen 2016), whilst moves towards decentralisation can also generate a 'recentralising backlash' (Harmennssen 2019). Ultimately, it is crucial that States recognise that 'strong local capacity is a prerequisite' (Kita 2017), and that political decentralisation must be supported by fiscal decentralisation (Iqbal, Ahmed 2015), for effective and responsive decentralised DRR governance to be realised. Central government and national agencies must 'take the lead' (Amaratunga et al 2020) in support of sub-national institutions with consistent flows of authority, capacity and resources from the national State.
- 3.24 A broader debate linked to both the multi-stakeholder and decentralisation emphases of the Sendai Framework has been catalysed by the insistence upon 'full and meaningful participation of relevant stakeholders at appropriate levels' (UNDRR 2015). This push towards community engagement has been termed 'the socialisation of risk and resilience' (Tierney et al 2019). This seeks to engage people affected by disasters throughout the process of understanding and managing disaster risk, including in communicating their priorities to policy makers and incorporating their empirical, traditional and indigenous knowledge in DRR efforts.
- 3.25 Much more than mere 'participation', it seeks to redress exclusion, particularly of the most vulnerable segments of the population. Segments that can include poorer households, children, women and girls whose meaningful participation may be challenged by power relations within and across socio-economic systems, exclusion, capacities – and how these transcend into coping and mitigation strategies at the household level – and lack of public awareness on DRR. Addressing such obstacles involves planning and working for equity within a community, planning through vulnerability assessments the local level, and transferring knowledge from national to local levels (Alexander, de Milliano, Sekhar Bahinipati 2010, and Setiadi, Birkmann, Buckle in UNU-EHS 2010).
- 3.26 Further, given the range of legitimate interpretations which is characteristic of systemic risk, there is a need for 'a participatory discourse including civil society in order to reconcile normative conflicts' (Schwazer, Renn 2019). Participatory mechanisms seek to prioritise the perspectives and understandings of marginalised groups within a particular process of development (Chamber 1997). They can play a role in all aspects of the disaster risk management process, from inclusive vulnerability assessments and forms of communication (UNDRR 2019) to the training of community volunteers for search and rescue work (Community Involvement and Capacity Building for DRR, ELLA). Participation is an imperative from both an operational and normative perspective, ensuring that DRM activities make best use of available resources, whilst at the same time incorporating the voices and priorities of often silenced groups into the decision-making process and through activity that is supported by sustained funding.
- 3.27 It is important to note that 'participation' is not a panacea. It is an encompassing term for a set of processes that range from mechanisms for being guided by, informing and receiving feedback from a community through to integrating community representatives into each aspect of a decision-making process and placing final decision-making power in



their hands (Guidelines for Community Participation in Disaster Recovery, UNDP). Participatory practices can fall short of their transformative aspirations. For example, participation processes are often limited by project designs which don't account for the convenience of the people intended to be involved in them (VfF 2019). The term 'community', too, can function to limit genuine participation, especially where it suggests an essentialised and homogenous entity 'in complete isolation and disjunction from the larger social processes, economic networks and power relations in which a community is embedded' (Jyotiraj Patra in Community Involvement and Capacity Building for DRR, ELLA).

- 3.28 At the extreme, there is a danger that participatory activities could become 'symbolically appropriated by science as a way of legitimising development interventions' (Benge, Neef 2020; see also Green 2003) which are top-down in origin. Despite examples of good practice (ELLA), the practical success of participatory processes has been limited: "only 16% of people at risk feel included in assessing threats, preparing policies and plans, and taking action to reduce threats" (VfF 2019). The key question for researchers and practitioners moving forward is not whether communities participate in the DRM process, but rather what is the most productive manner for them to be involved and situated as 'full partners' (Wisner 2019). Given the radical outcomes that can emerge from the genuine engagement of marginalised individuals and community organisations, the debate here provides the grounding for a deceptively simple question: DRR for whom?

Priority 3: Investing in Disaster Risk Reduction for Resilience.

- Different mechanisms of integrating DRR activities with other streams of sustainable development funding have been outlined
- The possibilities of catalysing private sector institutions as a source of DRR funding and capacity have been explored
- Though arguments around the cost effectiveness of DRR interventions are widespread, dedicated public funding for DRR remains limited

- 3.29 Consistent with the call of the Sendai Framework, there has importantly been a focus on the possibilities for integrating DRR funding with other streams of funding and investment, including for sustainable development. There have been two stand-out points of emphasis in this debate. The first is a sectoral approach that focuses on the opportunities for specific DRR agencies and activities to access finance structures developed in adjacent fields such as sustainable development, climate change adaptation (CCA), water security, etc. For instance, there is a recognition that adaptation funding can and does play a key role in financing DRR activities, both as dedicated DRR projects and as part of CCA projects (ODI 2015b). The core of this argument rests on making investment in DRR projects more attractive and more straightforward for domestic and international decision makers, through processes such as analysing links between the SDGs and the DRR agenda (UNDRR 2015) and aligning DRR plans with national development plans (UNDRR 2019). The second approach to integrated financing is process-driven. It centres on introducing the attitude and techniques of DRR to sustainable development (including climate change adaptation) investments in order to ensure that 'all investment flows are disaster resilient' (ODI 2015), even where not explicitly dedicated to DRR or implemented by DRR agencies.



- 3.30 Here it is activities like risk sensitive budget reviews, the inclusion of disaster risk scenarios in development planning (UNDRR 2019) and the integration of DRR objectives into national development strategies (GIZ 2019) that take centre stage. In addition, the creation of funding processes and strategies which are centred around the federative concept of resilience (GFDRR 2021) offers an opportunity for increased resource mobilisation. This conversation around shared funding arrangements sits at the practical heart of the broader movement towards coherence. The success of attempts to integrate DRR funding with other streams of development finance at the national and international level will be a key factor in determining the trajectory of Sendai Framework implementation.
- 3.31 Further to these debates over the nature of public domestic and international funding, the Sendai Framework is recognised as 'a major turning point' (Shaw 2018) on the role of the private sector for DRR. With only 1.6% of total adaptation finance from private sources (GFDRR 2021) and the acknowledgement that 'the majority of current investment is still risk-blind' [ECOSOC Forum 2021], there has been reflection on the type of incentive structures which can be designed to 'unlock and enable private capital' (GFDRR 2021). One focus has been to support businesses to emerge from their 'risk indifference' (Sarmiento et al 2018) through the provision of 'climate-related risk data to inform capital investment planning', particularly localised climate risk and vulnerability data (GFDRR 2021), and case studies 'showcasing the benefits of resilient investments' (UNDRR 2021). The idea here is to allow private sector actors to make 'informed, efficient capital allocation decisions' (TCFD 2021) by revealing the nature of the already existing incentive structure for investment. There has been significant momentum in this direction, for example with the Task Force on Climate Related Financial Disclosures (TCFD) securing endorsements from over 1000 financial institutions responsible for managing \$194 trillion worth of assets (TCFD 2021).
- 3.32 A complementary focus has been not just to clarify but to shift the nature of the incentive structure. UNDRR recommends the development of policy frameworks and finance products tailored to the specific challenges faced by SMEs (UNDRR 2020) and mandating resilience-informed credit ratings (UNDRR 2019), while the GFDRR emphasises the importance of effective institutional arrangements for multi sector adaptation and incentives such as blended finance and credit enhancement (GFDRR 2021). In addition, UNDP notes that as international rating agencies begin to account for disaster and climate risk, the implementation and certification of resilience standards could allow countries 'to compete more effectively for foreign direct investments' (UNDP 2021). Though many private sector actors remain in practice disengaged from the disaster risk management process, this literature on incentive structures has identified promising avenues for future engagement.
- 3.33 Beyond the concern with incentives, there has been consideration of the potential for the private sector to exchange capacities and partner with DRR institutions. On one hand, some actors in the private sector are understood as benefiting from the transfer of products and capacities from public sector institutions, such as the provision of disaster risk scenarios (UNDRR 2019) or guidance on legal liabilities for company directors to disclose risk (UNDRR 2021).
- 3.34 On the other hand, the private sector is recognised as a source of resources and products which can support the endeavours of public sector institutions. In areas where capacity is lacking, for example, it is thought that 'the private sector can help fill the investment gap in

the provision of climate services" in areas such as automated weather stations and GIS systems, supported by productive subsidies to support the development of necessary infrastructure and products (USAID 2020). Private sector actors can provide support across the disaster risk reduction process, for example proactively investing in preparedness, managing supply chains and insurance during the response phase, and practising corporate social responsibility as recovery occurs (Shaw, Izumi 2015). One area in which the public sector institutions and private sector actors have been particularly active since 2015 is in mechanisms of risk transfer, which assure 'access to fast and cost-effective liquidity for disaster-affected people' (UNESCAP 2017), institutions and organisations. While such mechanisms tend to offer financial protection rather than promoting risk preventative investment and action, techniques such as parametric insurance and regional catastrophe pools have flourished, often requiring complex interactions of resources, information and capacity between private sector actors and government agencies at a range of scales: institutions such as the Caribbean Catastrophe Risk Insurance Facility (CCRIF) and the African Risk Capacity (ARC) demonstrate the benefits that such collaboration can bring.

- 3.35 Given that international assistance 'compares very poorly with the level of economic loss countries are experiencing' and levels of domestic financing remain unclear (UNDRR 2021), maximising the multiple benefits of engagement with the private sector will be fundamental to the success of DRR efforts in the coming years.
- 3.36 While there is a consensus on the need for greater funding for disaster risk reduction, conversations around investment have not flourished in the aftermath of the Sendai Framework in the same way as those around risk understanding and risk governance. The arguments around the need for investment at scale in DRR have remained broadly the same; it is clear that proactive investment in risk reduction represents a huge saving for countries in both loss and recovery from disaster (e.g., UNDRR 2021, GFDRR 2021).
- 3.37 The question for international and domestic financing is one of political will. Dedicated investments in DRR lag far behind comparable investments in settlements, infrastructure and services development (Ishiwatari, Surjan 2019) so that there is 'insufficient investment to prevent future disasters in areas where [damage, disruption and] high mortality is likely' (UNDRR 2021). In total, only 0.5% of total ODA from 2010 - 2019 was dedicated to DRR in the pre-disaster phase, a figure which represents only a marginal improvement from the 0.4% of the 1990 - 2010 period (UNDRR 2021).
- 3.38 These limitations of international support for DRR activities place a burden on domestic structures of DRR finance, which range from line ministry funding as part of broader responsibilities for development and the provision of basic services (ODI 2015) to the creation of standalone DRR funding structures or delegation of financial responsibility to sub-national entities (Ishiwatari, Surjan 2019). Though there are many examples of good practice, there is a general sense that DRR is still chronically underfunded in comparison to other aspects of sustainable development, and it remains true that 'financing the implementation of [DRR] strategies remains a challenge for many developing countries' [ECOSOC Forum 2021].



Priority 4: Enhancing disaster preparedness for effective response and to “Build Back Better” in recovery, rehabilitation and reconstruction.

- There has been sustained interest in the role of multi-hazard early warning systems (MHEWS) for DRR, anticipatory and forecast-based risk reduction and financing, including debates around the different components of DRR and consideration of the possibilities of community participation and the role of technology
- The imperative to Build Back Better (BBB) has received widespread attention, including in the context of the COVID-19 pandemic, but practical experience has demonstrated that BBB is ‘easier said than done’
- Further preparedness actions which have received sustained attention include the creation of resilient infrastructure networks, disaster preparedness and contingency plans and governance for disaster response

3.39 The provisions of Priority 4 of the Sendai Framework are diverse. They centre on preparedness, understood as ‘the knowledge and capacities developed by governments, response and recovery organisations, communities and individuals to effectively anticipate, respond to and recover from the impacts of likely, imminent or current disasters’. They also encompass the imperative to Build Back Better (BBB) via ‘the use of the recovery, rehabilitation and reconstruction phases after a disaster to increase the resilience of nations and communities through integrating disaster risk reduction measures into the restoration of physical infrastructure and societal systems’. This is an area of DRR which has received substantial practical attention; over 60% of total DRR projects were geared towards Priority 4 in 2015 (ODI 2015). Given the variety and quantity of activities identified in the Sendai Framework and subsequent literature as relevant to Priority 4, a qualitative survey here is not possible. Relevant literature includes:

- The creation of disaster preparedness and contingency policies and plans (e.g., UNDRR 2019, DG ECHO 2020)
- Secure financing for preparedness (e.g., OECD 2017, GFDRR 2020)
- Appropriate governance institutions and networks for disaster response and recovery (Nowell et al 2017, Mukherji et al 2021)
- The design, financing and implementation of resilient critical infrastructure networks (Keele, Coenen 2019, World Bank, Apec 2019, Gessesse 2021)

3.40 Among the most developed areas of research and practice concerned with preparedness after 2015 has centred around the design, implementation and accessibility of Multi-Hazard Early Warning Systems (MHEWS). Despite a wide variety in the specifics of the design and implementation of MHEWS (e.g., Neusner 2021, Khankeh et al 2019), it is agreed that effective EWS should in general comprise four interacting elements: risk knowledge, monitoring and forecasting, dissemination and communication, and preparedness and response capability (WMO 2018, Climate-ADAPT 2021, UNDRR 2006, IFRC 2012). A multiplicity of complementary principles and activities have been proposed to ensure the effectiveness and inclusivity of MHEWS. These include durable and integrated institutional arrangements across each of the four elements of MHEWS (Climate-Adapt 2021, WMO 2018), gender inclusion and diversity at various stages of design and implementation (Perera et al 2020), the connection where possible of existing early warning systems and



the tailoring where possible of EWS to specific sectors (Marchezini 2020), an emphasis on disseminating simple warnings using multiple channels (Ijjasz et al 2021) and the importance of political will and public trust in MHEWS institutions (Climate-Adapt 2021). Though reporting against the SFM could be improved (UNDRR 2019), this range of operational considerations is a key indication of progress in thinking around the design and implementation of MHEWS.

- 3.41 There has been a particular reflection on the necessity for community-based MHEWS (e.g., Marchezini et al 2018), based on the operational understanding that 'effectiveness of an emergency alert is directly related to the capacity of individuals and businesses to act upon it' (Ijjasz et al 2021). A concern here is to strengthen the complementary two-way flow of information (e.g., Perera et al 2020) - sometimes cast as 'last mile' and 'first mile' (Kelman, Glantz 2014) - between MHEWS institutions and communities at risk. A last-mile, people-centred perspective allows communities to participate in 'the formulation of the warning system' (Macherera and Chimbari, 2016a), as well as ensuring that MHEWS are based on accurate vulnerability data and produce warnings understood as legitimate (FAO, OCHA 2014). From this perspective it is the mutual communication rather than production of information which is critical to the success of EWS (Aitsi-Selmi et al 2016), including using emerging mechanisms such as social media (Kitazawa, Hale 2021). Even with this recognition, however, technological progress offers a clear opportunity for EWS to enhance their data production capacities. Recent advances in data collection, weather forecasting and hazard modelling, along with advances in remote sensing and artificial intelligence, are key to the future of EWS (Perera et al 2020b; DG ECHO 2020).
- 3.42 Despite this vibrant literature, challenges with the practical implementation of MHEWS (e.g., WMO 2021) and their tailoring to specific contexts (Marchezini 2020) and communities (Sufri et al 2020) are identified. Ongoing issues include an 'inadequate integration of local or indigenous and scientific knowledge into EWS' and a lack of sustainability of some community engagement mechanisms (Sufri et al 2020). Cross-boundary EWS can also be limited by 'international relations, governance, and data sharing issues' (Shaw 2020).
- 3.43 Nevertheless, improved EWS can 'facilitate formal and informal decision-making in a way that empowers vulnerable sectors and social groups to assess and mitigate potential loss and damage' (Pulwarty and Sivakumar 2014, Seager et al. 2015). Indeed, such EWS can support a 'prospective and proactive social process whereby networks of organisations conduct collaborative analyses and develop indicators that can help to identify when and where policy interventions are most needed, specific to geographic and stakeholder requirements' (GAR 2021), and so contend with the non-linearity and surprise that characterises systemic risk and the emergence of slow onset hazards (GAR 2021).
- 3.44 One connected vision of EWS includes systems which 'monitor key exposure and vulnerability indicators enabling real-time calculation of the potential loss and impacts' (UNDP 2021), whilst a need remains for 'the integration of different hazards into common early warning systems' to deal with highly complex events (Pescaroli et al 2018). While the movement in MHEWS since 2015 has been one of conceptual and technological progress, then, there remains opportunities for improvement and innovation in implementation in the coming years.
- 3.45 In addition to its focus on preparedness as an aspect of Priority 4, the Sendai Framework recognises that the recovery, rehabilitation and reconstruction phase of disaster is a



- 'critical opportunity' to Build Back Better (BBB) towards resilience. For DRR, the idea is that disasters offer 'institutional, financial, political and human opportunities' which can create positive externalities if they are strategically leveraged (Fernandez, Ahmed 2019) through the use of both structural and non-structural techniques (Bilau, Witt 2016).
- 3.46 There has been a sustained reflection on the empirical implications of this position. Operational frameworks for BBB include activities such as the creation of DRR indicators and an emphasis on community recovery and effective implementation (Mannakkara, Wilkinson 2014), or the development of a national disaster-recovery framework and the institution of processes which facilitate assessment of damage and needs post-disaster (UNDRR 2017).
- 3.47 The financial (e.g. Macaskill, Guthrie 2018), legislative (e.g. Basset et al 2017; UNDRR 2017 BBB) and governance (e.g. Mannakara and Wilkinson 2016, Mukherji et al. 2021) frameworks necessary to facilitate effective recovery and BBB have also received attention. The possibilities of converting the promise of BBB into practice have been outlined for activities such as housing reconstruction projects (Lam, Kuipers 2018) and renewable energy transition (Mochizuki and S. Chang, 2017), as well as for principles such as survivor-led response (Murphy et al 2018, Vahanvati & Beza 2017) and stronger, faster and more inclusive recovery (GFDRR 2018). The concept has gained fresh life in the context of the COVID-19 pandemic (e.g. OECD 2020, WVI 2020).
- 3.48 However, there remain operational obstacles to the implementation of BBB, such that the 'promise to not re-create or exacerbate pre-disaster vulnerabilities has generally been unfulfilled' (Fernandez, Ahmed 2019). The complexity and fragility of some contexts in which BBB is pursued (Wisner 2017), as well as a dependence on 'many factors that need to progress in parallel' for effective recovery (GFDRR 2018), can create serious capacity limitations for BBB (e.g. Seneviratne 2011). These practical challenges mean "major opportunities for 'development from disasters' are still being missed in the post-disaster context" (Lloyd-Jones et al 2016).
- 3.49 There also exist more conceptual critiques of the way BBB is being realised, such as the idea that concern for the built environment and economy can overshadow social and psychological recovery (Mannakara, Wilkinson 2015) or the recognition that BBB must address power dynamics rather than just technical solutions (ODI 2013). Ultimately, despite a widespread commitment to BBB as a core part of DRR, practical experience has shown that it is 'easier said than done' (Fernandez, Ahmed 2019).

4. Thematic areas

Coherence.

- Coherence as an operational imperative for DRR has emerged in the context of a global policy framework which explicitly recognises the relationships between different fields of development and conceptual work which facilitates the interoperability of concepts such as risk, vulnerability and resilience.
- The definition of coherence has been the source of ongoing debate, though all thinking on the subject can be linked to the Sendai Framework's Guiding Principles of "all-of-society" and "all of State institutions" engagement.
- Various operational implications have been identified, with a prominent focus on coherent governance structures, financial arrangements and data usage.

- 4.1 Perhaps the key development in the years after 2015 has been an extended consideration of risk, resilience and vulnerability in a range of development sectors linked to DRR. The lens of risk has emerged as a powerful mode for interpreting the multiple processes which drive unsustainable development, and connecting fields including but not restricted to: climate change adaptation (e.g., IPCC 2020, Le Roux et al 2019, Adger et al 2018), ecosystems-based approaches (e.g., UNDRR 2020, Sudmeier-Rieux et al 2021), health and planetary health (e.g., Whitmee et al 2015, Pongsiri et al 2019), food systems (e.g., FAO 2021, WRI 2021, FAO 2019, CIRAD 2019), water systems and water security (e.g., OECD 2020, WCDRR 2014) and sustainable development (e.g. Hulbert et al 2019, Sage 1998). Thinking and policy in climate change adaptation in particular overlaps with DRR; the term 'climate risk' (e.g., McKinsey 2020) has taken its place alongside disaster risk as a means of specifying the challenges of 'living in the Anthropocene' (Mizutori 2020) and as one aspect of the integrative paradigm of systemic risk.
- 4.2 The concept of risk retains elements of consistency across these domains, understood broadly as the 'probability of an outcome having a negative effect on people, systems or assets' (UNDRR website) and driven by a range of interconnected and mutually reinforcing risk drivers, including climate change, urbanisation and socio-economic precarity (Mizutori 2020; Glasser 2020). Risk is the 'manifest consequence of our development choices' (FLACSO 2019) which are repeatedly and dangerously transgressing our planetary boundaries (Stefan et al 2015; Ripple et al 2021). This shared understanding of risk across a range of development sectors provides the backdrop for the interoperability of concepts such as 'vulnerability' (e.g., Schneiderbauer et al 2017, Kelman et al 2016) and 'resilience' (e.g., Tiernan et al 2019, MacAskill and Guthrie 2014), which play crucial roles in catalysing risk reduction work across disciplinary and sectoral boundaries (Peters 2016; Fekete 2014). The ultimate implication is that DRR as the proactive management of disaster risk is therefore 'indivisibly linked with the achievement of development goals' (UNESCAP 2018) and should be understood as a 'practice that permeates all sectors' (Sarmiento 2018) rather than a sector of development in itself.
- 4.3 Embedded in this context, the Sendai Framework recognises the post-2015 development agenda as a 'unique opportunity to enhance coherence across policies, institutions, goals, indicators and measurement systems' (UNDRR 2015). Alongside the Paris Agreement and



the 2030 Agenda for Sustainable Development (2030 Agenda), the Sendai Framework sits at the core of a series of commitments made in 2015 to “climate sensitive risk-informed development” (GNDR 2019). Each of these frameworks establishes connections between sustainable development, climate change adaptation (CCA) and DRR: for example, the 2030 Agenda incorporates 25 targets related to DRR across 10 different Sustainable Development Goals (SDGs) (UNDRR 2015), whilst the Paris Agreement identifies “areas of cooperation central to DRR” (UNDRR 2019).

- 4.4 The ‘fundamental ethos’ (Kelman 2017) shared by these three agreements has catalysed the conceptual underpinnings for coherent approaches. These centre around the positioning of disaster risk as emerging from the effects on vulnerability, exposure and resilience of an ‘ecosystem of independent risk drivers’ (FLACSO 2019), including climate change, which are understood as internal to the process of development rather than an external shock to it. The fields of DRR, CCA and sustainable development all variously address these risk drivers, so that “common actions will simultaneously support the achievement of the goals and targets” of the three agreements (UNDRR 2019).
- 4.5 To this conceptual case has been added an operational observation: that coherence ‘brings gains in efficiency and effectiveness’ (UNDRR 2021), ensures that activities are taken without duplication (UNDESA 2020) and allows decision-makers to manage trade-offs and compromises (GNDR 2019). The momentum towards coherent approaches for DRR in the post-2015 period, has emerged from an integrated global strategic framework supported by a combination of conceptual work and operational necessity.
- 4.6 Coherence as a concept has been specified in a variety of complementary ways, each linked with the Sendai Framework’s insistence on ‘all-of-society’ and ‘all of State institutions’ engagement. Coherent approaches seek to overcome and avoid scenarios in which policy processes ‘are developed independently and related actors work in silos’ (Wamsler, Johannessen 2020) as a result of the divergent histories of different fields of development (e.g., UNDRR 2020) and the ‘inertia of existing organisations and mechanisms’ (Kelman 2017). Different aspects of coherence include processes at the strategic, operational and technical level (OECD 2020), as well as conceptual, institutional and financial considerations (UNDRR 2020). Vertical coherence refers to coherence between actors at local, regional, national and global levels (GNDR 2019), whereas horizontal coherence refers to coherence across sectors of governance and development (OECD 2020). Spatial, temporal and equality dimensions of coherence have also been proposed (UNESCAP 2018).
- 4.7 This diversity of understandings of coherence should not be understood as representing fundamental disagreement but rather as complementary ways of specifying ‘the approach and deliberate processes and actions within a country to integrate – as appropriate – the implementation of the Sustainable Development Agenda, Sendai Framework for Disaster Risk Reduction, and Paris Agreement; in order to increase efficiency, effectiveness, and the achievement of both common (e.g., resilience) and respective goals’ (GIDRM 2019).
- 4.8 A range of specific actions support the process of coherence. Foremost among them are the mainstreaming of DRR concerns into broader development planning and the alignment of distinct policy processes with common objectives (GIDRM 2019). Another coherence activity is integration, or ‘drawing together of activities at the local level to achieve maximum impact’ (GNDR 2019). A further distinction can be made between levels of coherence, ranging from cooperation in the form of processes like knowledge-sharing and



multi-stakeholder meetings through to more developed mechanisms for 'building partnerships and acting together' which characterise collaboration (GNDR 2019). Other coherent activities include dedicated actions which address 'underlying drivers of incoherence' (Sandholz 2020), such as disconnections between planning and implementation, discontinuity due to turnover of staff and politicians, and hierarchical political and bureaucratic structures (Sandholz 2020). Taken together, this range of actions can be understood to support and give content to the multiple processes of coherence specified above.

- 4.9 There has been an extended operational consideration of entry points for organisations and practitioners looking to begin working in a coherent manner, particularly with regards to climate change adaptation (e.g., Zuccaro et al 2020). Governance arrangements are viewed as crucial to the operationalisation of coherent risk reduction, whether in the form of a 'recognised coordination entity' (OECD 2020) or through cross-sectoral peer learning platforms and integrative legal frameworks (UNDRR 2020). A key point here is to capitalise on already existing planning processes, such as the creation of DRR strategies at the national and local level and the planning cycle for the creation of national sustainable development strategies, following the 'demonstrated successful approach' to the development of National Adaptation Plans (NAPs) (GIDRM 2019).
- 4.10 Considerations of coherent financing have also been important, with specific mechanisms that have been considered, including risk sensitive budget reviews (UNDRR 2020), the inclusion of risk assessments into project planning (OECD 2020), and mechanisms to ensure risk-informed development cooperation (ECOSOC 2021). Furthermore, it is recognised that the effective use of data can be a catalyst to coherence, with 'common data and information requirements' in each field (GIDRM 2019) leading to possibilities for development of risk metrics to inform joint planning (FLACSO 2019) and interactive and integrated monitoring, reporting and evaluation processes (Mysiak et al 2017). Other possible entry points for coherent processes include awareness raising throughout government (UNDRR 2015, Saunders et al 2020), coordination mechanisms for early warning systems (UNDRR 2020) and building on existing informal mechanisms of inter-sectoral collaboration (Smucker, Oulu, Nijbroek 2020).

Expanded scope.

- The Sendai Framework expanded the purview of DRR to encompass natural or man-made hazards, as well as related environmental, technological and biological hazards and risks
- This included insisting on the importance of health resilience, and an already wide-ranging field of literature at the intersection of health and DRR has been supplemented by considerations of the implications of the COVID-19 pandemic
- Key conversations in the area of technological hazards and risks have centred on best practice and continued uncertainties in the context of chemical and industrial accidents and Natech risks

- 4.11 In parallel with the emphasis on coherence with complementary fields of development practice, the Sendai Framework also conceptually enlarges the purview of DRR to encompass a multi-dimensional, multi-risk approach. The framework notes that the scope



of disaster risk reduction has been broadened significantly to include human-induced (anthropogenic) hazards and risks, with health resilience a key concern (UNDRR 2015).

- 4.12 Since 2020, the “unprecedented health, economic and geopolitical crisis” (Djalante et al 2020) of the COVID-19 pandemic has catalysed a particular interest in the biological aspects of this expanded scope. In general, biological hazards “are of organic origin or conveyed by biological vectors, including pathogenic microorganisms, toxins and bioactive substances”, which can lead to severe economic and environmental losses as well as impacts on human and animal health (UNDRR 2017).
- 4.13 The key conceptual motif of the importance of COVID-19 for thinking about disaster risk has been that of demonstration. COVID-19 has offered a ‘stark demonstration’ of the systemic nature of risk, with characteristics of complexity, uncertainty and non-linearity as a ‘health disaster quickly became a socioeconomic one with long-term impact’ (UNDRR Stakeholder Engagement Mechanism 2020). COVID-19 has also demonstrated the limitations of existing risk governance, risk management and preparedness practices in the context of biological hazards (Jacobsen 2020, UNDRR Stakeholder Engagement Mechanism 2020). In particular, the pandemic has revealed the need for ‘more alignment between different global strategies and local interventions’ (Raju, Niekerk 2020) and the continued possibilities for greater financial coherence, with only 17% of post-COVID funds going towards a green economy to Build Back Better (OECD 2021). More practical work inspired by COVID-19 include reflections on conducting multi-hazard DRR in the context of the pandemic (UNDRR Africa 2020), the lessons for DRR governance of the pandemic (UNDRR 2020) and ways in which existing disaster resilience strategies can contribute to responses to COVID-19 (Djalante et al 2020, UNDRR Stakeholder Engagement Mechanism 2020). This body of literature remains at an early stage, but the consistent emphasis is that COVID-19 – like the climate crisis – is illustrative of aspects of anthropogenic drivers of risk, risk accumulation and propagation across socio-ecological and technological systems, and in adequacies in risk governance and risk management.
- 4.14 This thinking about the COVID-19 pandemic is supported by a concern with health resilience throughout the Sendai Framework. There are more than 30 explicit references to health in the Sendai Framework; these include commitments to inter alia improve the resilience of national health systems by integrating DRR into emergency care; include people with life threatening and chronic disease in the design of DRM plans; and enhance recovery schemes to provide psychosocial support and mental health services (Aitsi-Selmi, Murray 2015; see Gray et al 2020). These references have been taken up in a series of empirical, conceptual and operational conversations.
- 4.15 Empirically, there has been a concern to specify the complex empirical relationship between disaster and health, ranging from mortality and morbidity directly attributable to disaster through ramifying epidemiological and mental health implications (e.g., Makwana 2019) to indirect pathways such as long-term impacts on livelihoods (e.g., GAR 2021) and ‘political, social, and economic progress’ (Lo et al 2017).
- 4.16 From the perspective of healthcare systems there is ‘a vicious cycle in which weak health systems provide fertile grounds for deterioration of public health and natural hazards into disasters while on the other hand, disasters further decimate already weak health systems’ (Olu 2017). Conceptually, authors have noted the overlap between DRR and healthcare, as both fields share a long-term temporality and a focus on ‘mitigating, reducing, preventing,



and preparing for harm or damage' (Kelman, Harris 2021), as well as a concern with outcomes affected by a range of 'socio-political, economic and cultural dimensions' (Raju, Van Niekerk 2020).

- 4.17 There have been a wide range of operational reflections as part of 'the rapid development of the field of Health Emergency and Disaster Risk Management (Health EDRM)' (Wright et al 2020), which aims to 'reduce the health risks and consequences of emergency' and build the resilience of communities and health systems (WHO 2019). The *Bangkok Principles* systematised a set of seven measures for countries looking to implement the health aspects of the Sendai Framework, including the integration of health concerns into DRR planning, the integration of DRR into health education and training, and the inclusion of health indicators in early warning systems (UNDRR 2016). Another key resource in this space is the Health Emergency and Disaster Risk Management Framework (WHO 2019), which represents a sustained reflection on the operationalisation of DRR principles to ensure 'highest possible standard of health and well-being for all people who are at risk of emergencies, and stronger community and country resilience, health security, universal health coverage and sustainable development' (WHO 2019).
- 4.18 In the years after 2015, literature at the intersection of health and DRR has developed two important strands: empirical work to 'build the evidence base' (Lo et al 2017) and operational reflection to consider actions for the implementation of the health aspects of the Sendai Framework.
- 4.19 The expanded scope of the Sendai Framework has also facilitated conversations about man-made and technological hazards. This grouping encompasses "chemical and industrial accidents, nuclear and radiological emergencies as well as accidents in the transport sector and those associated with the particular case of "Natech" hazards". Though there has been some consideration of man-made and technological hazards on their own terms (e.g., UNDRR 2018, OECD/NEA 2018), including the risk of cyber attacks (e.g., UNDRR 2019), the most sustained attention in this area has been directed towards Natech hazards. Natech events are 'joint disasters that combine natural and technological hazards and that feature very complex consequences owing to amplifying effects between the two types of hazard' (UNDRR 2018), such as the Great East Japan Earthquake and Fukushima Daiichi nuclear disaster of 2011. While Natech hazards are generally considered 'high consequence and low probability events', they have been steadily increasing in frequency in recent years (Cruz, Suarez-Paba 2019) due to 'the development of potentially dangerous industries and population growth that brings human habitat closer to industrial areas subject to high natural hazard risks' (Shaw 2020).
- 4.20 Trends in the Natech literature include a consideration of the long-term impacts of Natech events (e.g., Fukushima Booklet Committee 2018), an exploration of the potential of interdisciplinary approaches in the field and a 'shift from geological to hydrometeorological hazard related research' in recent years (Cruz, Suarez-Paba 2019). Though it is recognised that national-level Natech risk assessments should be at the core of DRR approaches (UNDRR 2018) and though some methodologies have been proposed (e.g., Krausman et al 2017, Mesa-Gomez et al 2020), in practice the 'amplified uncertainty' of Natech risk assessment (Girgin et al 2019) has led to a continued need for guidance on risk assessment and analysis (OECD 2020).



4.21 A further obstacle to effective risk assessment is a lack of 'comprehensive natural-hazard and industrial data' (Girgin et al 2019). These factors have led to 'large gaps in the implementation of NATECH risk management practices in countries around the world despite the fact that NATECH accidents appear to be increasing' (Shaw 2020). Other points of emphasis as practitioners seek to implement preparedness principles in the context of Natech hazards include the creation of on-site emergency plans (OECD 2018) and the provision of current information to relevant stakeholders in real time (Kumasaki, King 2020).

Gender and inclusion.

- The 'all-of-society' approach advocated by the Sendai Framework has catalysed scholarship and practical action, but much remains to be done to achieve transformative outcomes
 - Though the importance of gender-conscious DRR programming is widely recognised, implementing DRR that considers gender in anything more than a 'checklist manner' remains a challenge
 - There are literatures capitalising on the Sendai Framework's emphasis on the inclusion of people with disabilities and youth, respectively, though practical implementation of the former is limited
- 4.22 The Sendai Framework recognises that a gender perspective should inform all programming for DRR, and that the role of women in DRR as participants and leaders should be promoted. This emphasis emerged as part of a sustained consideration of vulnerability and disaster (Gaillard 2017), and consists of two major components. The first has looked to specify and address the disproportionate effect of disasters on women and girls, including through violence in the aftermath of disaster (First et al. 2017). The key premise here is that the 'same extreme event could have different impacts on different people due to pre-existing unequal structures' (Yadav et al 2021) that influence access to the 'resources, skills and information' (Zaidi, Fordham 2021) necessary to cope with disaster. There has also been concern to note that 'ideas and understandings of masculinities and the roles and responsibilities of men in a society can result in men and boys experiencing higher mortality in some disaster contexts' (UNDRR website - Gender).
- 4.23 Ultimately, the operational point is that DRR interventions that do not actively include gender at the core of their programming can 'unintentionally worsen socio-economic inequities', leading to a form of maladaptation to disaster risk (UNDP 2016). The second key component of this literature complements the attention to the specific vulnerabilities of women and girls by focusing on their specific capacities and agency, and therefore the importance of the participation of women and girls throughout the DRR process and particularly in leadership positions (e.g., UNDRR 2020, GFDRR 2017, UNDP 2013). The inclusion of women and girls into the DRR process, especially as leaders and through women-focused organisations (UNDRR 2020), is understood as both contributing to the 'effectiveness and sustainability' (UNDP 2013, CARE 2017) of DRR interventions and realising 'basic human rights principles of accountability, participation, non-discrimination and inclusion' (UNDRR 2020).
- 4.24 Operational steps which build from this background include the involvement of women in policy-making (e.g., UN Women 2021, Chineka et al 2019), the creation of 'gender-specific indicators and data disaggregated by sex and age' (UNDP 2016, GFDRR 2017, UN Women



- 2021, UNDRR 2020), and the inclusion at the project design stage of impact assessments which reveal the differential effectiveness of DRR activities (GFDRR 2021).
- 4.25 However, whilst the Sendai Framework aspires to catalyse meaningful change in gender-conscious DRR programming, too often DRR practices still tend to 'accommodate the gender status quo' (Yadav et al 2021). Gender in DRR programming is often conceived of as a focus on the woman aspect of a woman-man binary, which means that DRR practices fail to grapple with both 'intersectionality within gendered experiences' (Yadav et al 2021) and 'the realities of diverse gender minorities in non-Western contexts' (Gaillard et al 2017), whilst 'gendered studies of men and disaster remain limited' (Gaillard et al 2017, Gutierrez, Gibbons 2020).
- 4.26 Indeed, the term 'gender' in literature concerned with disaster 'continues to be used as a synonym for women and girls' and frequently refers to binary physical sex categories (Zaidi, Fordham 2021); one study found only 12 journal articles which pushed beyond the gender binary of woman/man in the disaster literature from 2015 - 2019 (Rushton et al 2019). The cumulative effect of this limited understanding of gender is that women become 'simplified into a homogenous, monolithic category that experiences vulnerability in a universal manner' (Zaidi Fordham 2021). This outlook has operational implications. The lack of conceptual complexity or concern for empirical reality which characterises some engagement with gender in DRR, manifests practically by reducing gender to a concern which can be adequately addressed 'at the very end of the thinking process or superficially in a checklist manner' (Yadav et al 2021).
- 4.27 A more sophisticated engagement which positions gender as a 'starting point for thinking about DRR' could sit comfortably within the systemic risk paradigm, recognising that 'the root causes of inequalities in fact reflect multi-scalar and structural issues that range from deeply ingrained local cultural norms to global political ideologies' (Gaillard et al 2017). From this perspective, to begin with concerns of gender rather than end with them is to engage meaningfully with the complex and various vulnerabilities produced by global risk drivers. With repeated references to gender, the Sendai Framework may best be considered as a platform for a more thorough engagement with the complexities of gender and disaster, rather than a direct catalyst for best practices.
- 4.28 Along with a commitment to gender-inclusive DRR, the Sendai Framework is also 'one of the first global frameworks that explicitly includes the needs of people with disabilities' (UN Women 2021). It notes the importance of 'empowering ... persons with disabilities to publicly lead', insisting that a 'gender, age, disability and cultural perspective should be integrated into all policies and practices' (UNDRR 2015).
- 4.29 There has been limited development on this impetus in practice, however. Though it is well-established that people with disabilities are 'at a higher risk to adverse health outcomes due to inadequate access to resources, high levels of exposure to hazards, and an overall lack of integration with emergency responders' (Simpson et al 2021), the pathway to inclusive DRR for people with disabilities remain 'unclear' (Calgaro et al. 2021). It remains the case that 'the policy thrust of disaster risk reduction initiatives is in many instances tailored towards able-bodied people' (Lunga et al. 2019), with a lack of commitment to promoting the leadership potential of persons with disabilities reflective of an attitude which positions them as passive recipients of aid (UN Women 2021, Ronoh et al. 2017).

- 4.30 Other obstacles to effective DRR for people with disabilities include a lack of stable funding (Calgaro et al 2021) and genuine platforms for inclusion (Simpson et al 2021). Despite the impetus provided by the Sendai Framework, the practical implementation of DRR which is inclusive for people with disabilities remains limited.
- 4.31 A further demographic identified as requiring engagement by the Sendai Framework is children and youth, who are recognised as 'agents of change' and possible leaders in DRR (UNDRR 2015). The framing of young people in the disaster literature combines an awareness of vulnerability, recognising that youth can be hit first and longest by disaster, with a focus on capabilities (Cox et al. 2018) that resists the temptation to treat youth as a passive or homogeneous category (UNDRR 2020).
- 4.32 Important policy principles to inform youth-inclusive programming include a rights-based attitude to the role of young people in DRR, the importance of safeguarding and the need for a 'lifecycle' approach which recognises how young people change as they move through age categories (UNDRR 2020). There is a further recognition that climate change and the risks associated with it involve issues of intergenerational equity (UNDRR 2019) and that disasters urgently threaten access to rights such as education and health (UNDRR 2020).
- 4.33 In practice, young people are already DRR leaders in areas such as community mobilisation and resilience, policy advocacy, communications technology (Bessaha et al. 2021) and in the creation of community-centric Early Warning Systems (EWS) (Marchezini et al. 2017). The role that young people can play in knowledge mobilisation and communicating disaster risk is also well-established (e.g., Mitchell 2008, Pickering et al 2021).
- 4.34 It is therefore clear both that 'children and youth are already helping communities and countries address the four Sendai Framework priorities' (UNDRR 2020), and that there exists a conceptual framework and operational momentum to capitalise on this success. The engagement of young people for DRR is emphasised in the Sendai Framework and should be at the centre of its implementation in the years to come.

DRR in Urban Areas.

- Urban areas represent a crucially important and uniquely challenging context for DRR programming, a reality which is recognised in the Sendai Framework as well as the 2030 Agenda, the Paris Agreement and the New Urban Agenda
 - Key principles for DRR in urban areas include the mainstreaming of DRR into urban planning, the importance of inclusive DRR programming and the use of risk information, though practical implementation of these principles remains uneven
 - Informal settlements as a site of risk reduction have become particularly associated with the idea of 'everyday' risk and disaster
- 4.35 55% of the world's population currently lives in urban areas. The figure is expected to rise to 68% by 2050 (UNDESA 2018). A focus on DRR in urban environments, therefore, is a focus on the practical means of risk reduction for an ever-increasing majority of the global population, and will be absolutely pivotal to the success of the Sendai Framework in the coming years. As cities expand, more people, assets and systems are becoming exposed to hazards (UNDRR 2020).



- 4.36 Urban environments exhibit specific patterns of exposure, vulnerability and resilience as the 'concentration of people and complexity of systems' (Skidmore, Lim 2020) create the possibility for rapid and continuous risk accumulation. Other challenges common to urban contexts include 'precariousness of housing, fragile socio-environmental conditions, and exposure to natural and anthropogenic hazards' (Sandoval, Sarmiento 2020).
- 4.37 Key challenges for urban policy-makers concerned with disaster risk include environmental degradation, unplanned urban expansion and poor land management (UNDRR 2020). In addition, governance issues such as political exclusion, weak institutional arrangements and a lack of implementation capacity can hinder effective DRR (UNDRR 2020). In many cases this lack of implementation capacity can arise from the fact that at the sub-national level 'the authority to plan for DRR, and even the legal authority to carry out the necessary actions, [is] not matched by the resources and capacities for implementation' (UNDRR 2019).
- 4.38 As a general trend, there is a particular convergence of this weak governance capacity and rapid urbanisation to be found in smaller cities and cities in developing countries (Pelling et al. 2019, Hardoy et al. 2019), though the role of 'intermediate cities' as a space of policy innovation for risk management has also been noted (Wesely et al. 2020). In general, cities represent both a uniquely important context for risk reduction and a site which poses particular challenges of risk accumulation and governance.
- 4.39 The importance of DRR to the sustainable development of cities is affirmed by the Sendai Framework, the 2030 Agenda, the Paris Agreement and the New Urban Agenda. The Sendai Framework centres the importance of sub-national and local DRR strategies (Target E2) and recognises local government as 'the primary responsible authority during disasters'.
- 4.40 The New Urban Agenda, adopted in 2016, seeks to ensure that urbanisation functions as a force for sustainable development, including through an aim to 'enable households, communities, institutions, and services to prepare for, respond to, adapt to, and rapidly recover from the effects of hazards, including shocks or latent stresses' (NUA 2016). To this end, the NUA emphasises the importance of national urban policies dedicated to improving resilience through 'quality infrastructure and spatial planning' and the adoption of 'age- and gender-responsive policies and plans, and ecosystem-based approaches in line with the Sendai Framework' (NUA 2016).
- 4.41 Meanwhile, SDG 11 of the 2030 Agenda seeks 'to make cities and human settlements inclusive, safe, resilient and sustainable' including through the adoption of Sendai Framework indicators linked to reducing the impacts of disasters and increasing the development of local disaster risk reduction strategies.
- 4.42 The Paris Agreement is less explicit but invites cities and local authorities to 'scale up their efforts and support actions to reduce emissions and/or to build resilience and decrease vulnerability to the adverse effects of climate change and demonstrate these efforts'.
- 4.43 Campaigns which have sought to achieve the promise of this international policy framework by guidance and funding for DRR initiatives at the municipal level include the Making Cities Resilient (MCR) campaign - now the MCR2030 campaign - and the 100 Resilient Cities collaboration with the Rockefeller Foundation. Urban DRR is therefore well-supported by a range of global agreements that seek to capitalise on the demographic fact of urbanisation to achieve wide-ranging risk reduction outcomes.

- 4.44 Though there can be no universal prescriptions for effective urban DRR due to disparities of demography, environment and governance between different cities, some common governance principles can be observed.
- 4.45 First, mainstreaming the practice of DRR into the urban planning processes. There is a huge opportunity represented by the fact that of all the areas which will be urban by 2030, 60% had yet to be built in 2020 (UNDRR 2020). Risk-informed urban planning can facilitate safer settlements through the systematic consideration of locational and design aspects implemented through legislative and regulatory frameworks, ensure the provision of safe land and safe tenure for the urban poor and pursue the inclusion of a wide-range of DRR stakeholders (UNDRR 2020).
- 4.46 A second principle, closely linked, is that of inclusion for urban DRR. Recognising that 'questions of key functions, priorities and trade-offs cannot be tackled in a technocratic or scientifically objective manner' (Garschagen 2016) and that consensus can be profoundly difficult to realise (Jain et al 2021), the creation of 'dialogue and participation spaces' (Hardoy et al 2019), particularly spaces which include the most marginalised, allows DRR processes to focus on 'addressing socio-environmental and spatial (in)justices in urban areas' (UNDRR 2020). This principle of inclusion is facilitated by and should be taken to include the actions of local civil society actors involved in resource mobilisation and advocacy (Murray 2017). Taken together, these principles of mainstreaming and inclusion produce urban DRR practices which reflect the Sendai Framework's call for 'all-of-society' and 'all of State institutions' DRR.
- 4.47 A third principle revolves around the involvement of quality risk data in the process of DRR. There is a recognition that 'evidence-based risk data needs to be easy to identify and locate by local governments' (UNDRR 2019), whether through urban risk assessment and analysis (e.g., World Bank 2012, UNDRR 2019), the use of geospatial data (UNDRR 2019) or the creation of collated, disaggregated datasets (Osutaye et al 2017). There is also the thought that quality risk data is important in facilitating coherence between different sectors of local government (e.g., Valibeigi et al 2019), and that accurate data can support the inclusion of marginalised people in the DRR process as it legitimises 'representation of the urban poor' and allows issues to be 'reframed from a local perspective' (SDI 2018).
- 4.48 Taken together, the interlocking principles of mainstreaming, inclusivity and quality, accessible risk information are recognised to provide a background for effective urban DRR. These principles are part of a broader recognition that 'good governance is key to sustainable change' at the municipal level (Mizutori 2020 WUF). Specific guidelines and targets dedicated to urban DRR governance include the 10 Essentials for Making Cities Resilient (UNDRR 2017), the Checklist on Law and Disaster Reduction (UNDP 2015) and Target E2 of the Sendai Framework.
- 4.49 The literature assessing urban risk governance is relatively nascent and has a tendency towards 'narrow but deep' approaches which limits the possibility of drawing general conclusions on implementation (Murray 2017). Trends that have been observed include an 'absence of detailed disaggregated data' for urban DRR governance (Osuteye et al 2017), weak community engagement and a lack of capacity at local government level (Murray

2017). This latter is underscored by a survey of MCR participants which found that only '46.7% of surveyed governments have full authority and capacity to undertake' recommended local DRR actions, as well as the recognition that 'budgetary constraints represent the biggest challenge to local DRR' (UNDRR 2019).

- 4.50 There is significant overlap here with the broader literature on decentralised governance, particularly the sense that the promise of local DRR governance remains unrealised due to intersecting limitations of resources and authority. Ultimately, whilst principles of good governance receive some consensus in the literature, it is the implementation of these principles which will determine the success of the risk reduction agenda in urban environments.
- 4.51 Within this general context, there has been specific attention paid to DRR for slums and informal settlements. This is a reflection first of the amount of people who live in slums and informal settlements around the world - over 1 billion in 2018 (SDG 11 stats). As a result, a consideration of DRR in urban areas is incomplete without an analysis of informal settlements.
- 4.52 This attention also emerges from the specific risk profile of the residents of informal settlements who usually have 'higher levels of physical, economic, social and environmental vulnerability', higher exposure and lower levels of preparedness (Abunyewah et al 2018).
- 4.53 The expansion of informal settlements can also function to 'destroy natural protective ecosystems' which have historically mitigated risk (UNDRR 2019). From a governance perspective, residents of informal settlements also 'tend to be marginalised from the 'formal' development processes of cities' (Sandoval, Sarmiento 2020). The recognition of this risk profile has led slums and informal settlements to become particularly associated with conceptions of risk as extensive or even everyday (UNDP 2021, Satterthwaite, Bartlett 2017, Zerbo et al. 2020, Bull-Kamanga et al. 2003), and with 'frequent and extensive low-severity disasters' (UNDRR 2019).
- 4.54 This account of risk and disaster experienced as an ordinary and 'permanent threat' (UNDP 2009) to people in urban areas, and particularly those in informal settlements, forces questions for practitioners such as 'what is the difference between an everyday risk and a disaster risk?' (Satterthwaite 2017).
- 4.55 It also places attention on informal techniques and organisations of risk reduction and care (SDI 2018; Van Voorst 2015) which people engage in as a condition of ordinary existence. In this context, inclusion is again the fundamental principle for DRR governance, with the participatory production of data a key mechanism that 'legitimises representation of the urban poor' (SDI 2018).
- 4.56 Though a number of DRR strategies for slums and informal settlements have been proposed (Sarmiento et al. 2019, Abunyewah et al. 2018, World Bank 2012) and while it is recognised that 'participatory slum-upgrading practices may be a prerequisite for DRR' (UNDRR 2019), key obstacles to effective DRR for informal settlements remain. These include a lack of knowledge of existing arrangements and preferences (Yu et al. 2016) and a lack of consistent inclusion of resilience principles in urban planning (e.g., Sandoval, Sarmiento 2019).

