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Why Does Making Connections Through Resilience Indicators Matter?

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Introduction

The year 2015 signalled a rare yet significant development in evolving global responses to global challenges, resulting in the adoption of a series of UN agreements, including the Sendai Framework for Disaster Risk Reduction (SFDRR), the 2030 Agenda and its Sustainable Development Goals (SDGs) and the Paris Agreement (Murray et al., 2017; UN, 2015; UNFCCC, 2015; UNISDR, 2015b). All three agreements were, in part, evolutions from previous instruments and signalled recognition that responses to change needed to alter from a reactive and reduction focus

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to one that builds resilience before, during and after change (Tozier de la Poterie & Baudoin, 2015). Research over the past decades has identified global challenges arising from mankind's development pathways that are increasingly impacting and superseding earth's natural systems, and are unsustainable (ICSU & ISSC, 2010; Mizutori, 2019). As a result, countries are faced with the growing challenge of managing increasing risks from climate change and climate variability, addressing increasing frequency and intensity of extreme events, and achieving the Sustainable Development Goals (Handmer et al., 2019; OECD, 2020).

The three agreements differ in structure, legal context and implementation mechanisms but share a common timeline running to 2030, as well as many parallels, particularly in the sense of their overall objectives (Dazé et al., 2018; Kelman, 2017a; UNFCCC, 2017). None of the frameworks engage with the full range of risk drivers of global environmental change, yet their interconnectedness provides an urgent basis for coherent implementation in keeping with the expectations and aspirations of modern world societies (Handmer et al., 2019; Ochs et al., 2020; OECD, 2020; UNISDR, 2015a; Paterson & Guida, this volume). The 2030 Agenda and the SDGs outline targets for a holistic plan of action for people, planet, prosperity, peace and partnerships to which the Paris Agreement and Sendai Framework pose specific drivers of change, as well as pressures that challenge the future achievement of these goals. However, even though they address pressures that are at variance with each other in time and space, ultimately, all of these agendas are about protecting the future of humanity on our planet, building resilience for individuals and communities at all scales and localities, and proactively mitigating their risk (Benzie et al., 2018; Challinor et al., 2018; Murphy, 2019; Murray et al., 2017).

A coherent response to and implementation of the three agendas are necessary because, for instance, extreme events are a fact of life in many areas of the world, but their frequency and magnitude can be increased by climate change, as can unsustainable practices that are the focus of the Sustainable Development Goals, thus acting as risk multipliers and altering the vulnerability and exposure profile of societies. Although it was recognised from the onset that these frameworks crossed existing policy areas and institutional arrangements (Dazé et al., 2018), coherence in their implementation has largely not materialised because of:

- Institutional arrangements—there are a wide range of organisations responsible for managing hazard exposures and reducing vulnerability that often miss potential synergies and duplicate efforts (OECD, 2020).
- Scales and spheres of concern—while the Paris Agreement addresses a largely global driver (climate change) that requires action starting from a national context, the Sendai Framework addresses more local impacts originating from short-term, high-magnitude, man-made disasters and natural hazards that usually originate from elsewhere. The Sustainable Development Goals are more outcome-focused on protecting the planet and the peace and prosperity of mankind whatever the source of disturbance, man-made or natural (PLACARD, 2019; UNDP et al., 2013; UNISDR, 2015a).

The danger of not realising synergies and coherence across the three frameworks is to risk systemic and cascading impacts that will have a long-lasting negative effect on the livelihoods and wellbeing of people, economies and countries, undermining sustainable development. Although international opinion has emphasised incorporating both climate change action and disaster risk reduction needs into development mechanisms, in practice, national-to-local implementation has remained largely sectoral and topic-focused. Building coherence across the three frameworks needs to overcome a range of challenges, as outlined below:

- As each framework has its own institutional arrangement that has established a thematic expertise over time, the question is how to balance autonomy with integration that could lead to greater effectiveness in building resilience across societies.
- Moreover, as each framework has built up its own independent knowledge base, challenges surround how to establish data management that allows for interrogation across disciplines and topics, as well as resolution for more informed policymaking, thereby building adaptive capacity for greater resilience across climate and disaster risk and enabling sustainable development.

Overcoming these challenges requires a coherence of approache that will build partnerships and place the assessment of climate change

and disaster risk reduction within a wider context of outcomes for sustainable development, framed by the goals and targets set out by the Sustainable Development Goals. This context recognises that the Sustainable Development Goals, climate change adaptation and disaster risk reduction as drivers of change represent a set of aspirational human rights around societal choices for what constitutes future sustainability. Coherence provides an opportunity to merge technical information that assesses risk from changes identified under each agenda with strategic and operational approaches to climate change adaptation and disaster risk reduction in sustainable development. This can be done horizontally across sectors, vertically at different levels of government, and, generally, through collaboration across stakeholder groups (Handmer et al., 2019; Murphy, 2019; OECD, 2020).

Such an approach recognises that exposure to risks increasingly has interdependencies and cascading effects within and across multiple sectors that cannot be addressed through any one of the agreements (GIZ, 2017; Kelman, 2017a). How this might be achieved is a sensitive issue because each agenda has its own procedural and technical requirements, especially in the context of measuring and reporting progress. Coherence should not be seen as a replacement for some areas of monitoring under each agenda but, rather, an opportunity for monitoring, reporting, verifying and evaluating their implementation across agendas for holistic, evidence-based, political decision-making (Murphy, 2019; Ochs et al., 2020; OECD, 2020).

Resilience as an Integrating Concept

None of the agendas address the full spectrum of challenges that global changes present and, to a degree, each agenda has a focus on describing the elements that constitute risk through a particular lens, using different time frames, scales, sectors and hazards (Paterson & Guida, this volume). A way to take a unifying approach across the three agendas is through a focus that centres on outcomes, and moves from describing risk to describing resilience to risk, whatever its source; resilience is a concept common to all three agreements and is seen increasingly in other agreements and

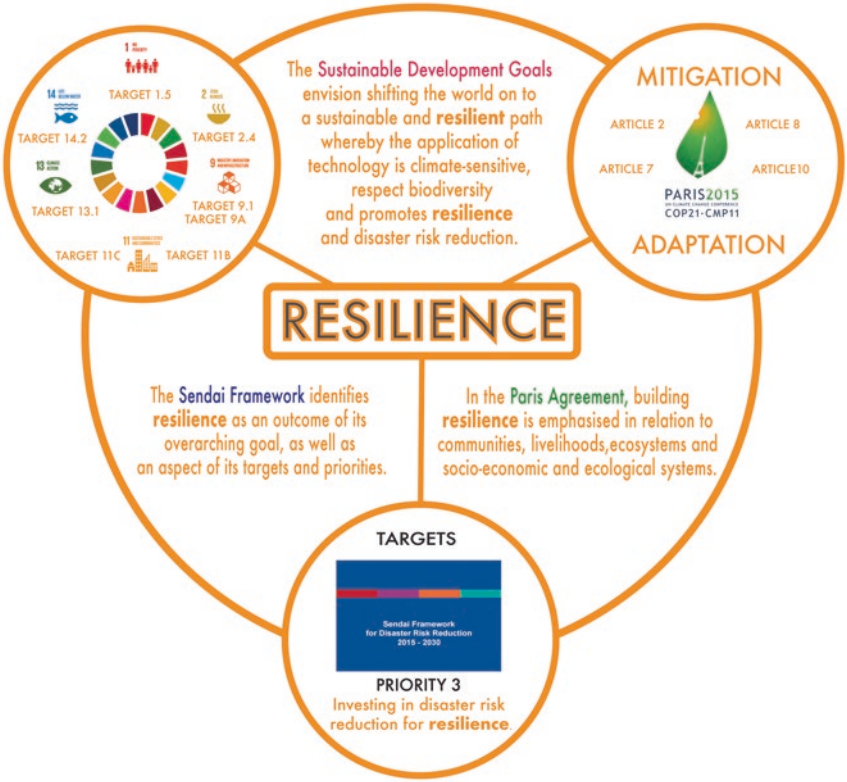


Fig. 2.1 While each agenda has its own set of objectives and aligned indicators, the sustainability of each depends on the successful implementation of the others. Otherwise, this could potentially lead to conflictory and contradictory outcomes. The application of a resilience lens provides a means of connecting all three agendas that have measures relating to resilient development. (Source: Adapted from Peters et al. (2016), Alcántara-ayala et al. (2017), OECD (2020). Image: Hester Whyte)

national strategies (Handmer et al., 2019). Resilience recognises societies' choices to address constituent elements that increase their exposure and vulnerability to change over short- and long-term horizons (Fig. 2.1), and provides a conceptual approach that engages with the full spectrum of shocks, stresses, disturbances and risk drivers to better reflect the range of risks that might affect a system (Carr, 2019; Lovell et al., 2016; Peters et al., 2016). Taken together, under the construct of the Sustainable

Development Goals, the different approaches of climate change and frameworks make for a more complete 'resilience agenda' that spans the development, humanitarian, climate and disaster risk reduction arenas (Dovers & Handmer, 1992; Handmer et al., 2019; Opitz-stapleton et al., 2019; UNFCCC, 2017; UNISDR, 2017a). Alignment across the three Agendas provides the opportunity to realise development that is resilient not only to current but to future risk.

'Measuring' Resilience

Synergies in monitoring and reporting provide opportunities for coherence through the interconnections between addressing climate change and disaster risk reduction, and achieving sustainable development (GIZ, 2017; UNFCCC, 2017). However, exploiting synergies is not without its own challenges:

- The Paris Agreement, although not without global ambition, is primarily implemented at national scales and focusses on one driver of change, whereas the Sustainable Development Goals and Sendai Framework include other drivers of change and scales leading to different monitoring and reporting requirements (Table 2.1).
- Although there are synergies between indicators for the Sustainable Development Goals and Sendai Framework, and the Sustainable Development Goals have one goal specifically addressing climate change, this intersection is absent between the Sendai Framework and the Paris Agreement, even though climate change will have significant impacts on the frequency and intensity of some disaster events.

In practical terms, this means that reporting under one framework cannot be assumed to cover the requirements of the other two frameworks, further supporting the notion that, while reporting requirements under all three agendas focus on input and output metrics, a focus on outcome metrics that address mankind's resilience to change offers opportunity for coherence across the frameworks.

Table 2.1 Comparison of the monitoring frameworks of the three agreements

	2030 Agenda for Sustainable Development and its SDGs	Sendai Framework for Disaster Risk Reduction	Paris Agreement
Objective of the agreement	To contribute to the achievement of sustainable development and serve as a driver for implementation and mainstreaming	To substantially reduce disaster risk and losses in lives, livelihoods and health, and in economic, physical, social, cultural and environmental assets	To achieve agreement on the global response to climate change, adaptation, mitigation and finance, and climate-resilient development
Quantitative goals or targets at global level	17 global goals with several targets each. Countries may define additional national targets	7 global targets. Countries may define additional national targets	Mitigation (below 2°C and pursuing efforts to 1.5°C). The global goal on adaptation is qualitative. Countries define their own targets (NDCs)
Purpose of monitoring	To measure global progress towards achievement of the SDG goals and targets	To measure global progress in implementation of the 7 Sendai targets	To conduct a global stocktake, i.e. 'assess the collective progress towards achieving the purpose of the Agreement.'

Source: Adapted from GIZ (2017), OECD (2020)

All three agendas include aspects that track across the other agendas (Fig. 2.1) with indicators to monitor progress towards defined targets at regional, national and local levels that address elements of 'resilience', and which encourage a shift from input and output indicators to outcome-based indicators (Adaptation Committee, 2018; UNDP, 2019; UNECE, 2020). Resilience as a core theme that unifies concepts across

all three agendas provides an opportunity to develop solutions that address global challenges in the short to longer term, on local and international scales, and balances environmental, social and economic considerations. Achieving such coherency across agendas requires inconsistencies and contradictions to be identified between them, as well as synergies, and this, in turn, requires targets and indicators that measure progress and contribute to multiple outcomes (UNFCCC, 2017).

In practice, each agenda has progressed along largely siloed lines which makes little sense given the short window of opportunity for tackling the interlinked challenges of climate change, ecosystem degradation, inequality and other social, economic and political challenges (GIZ, 2018), thereby missing opportunities for coherence building. Studies that have compared and contrasted indicators between the agendas have tended to focus on how indicators from one agenda can contribute to achieving targets from other agendas (e.g. Adaptation Committee, 2018). This has led to calls for greater development of metrics that allow for alignment of indicators across the three agendas (UNISDR, 2017a), requiring collaboration to collect relevant data and information, and shared national indicators (Adaptation Committee, 2018; Peters et al., 2016). Using the concept of resilience as a unifying characteristic provides an opportunity to fulfil technical objectives under each agenda whilst developing coherence in outcomes that contribute to sustainable development through country commitments under each agenda. Strategies for achieving the SDGs, Nationally Determined Contributions (NDCs), National Adaptation Plans (NAPs) and National DRR strategies.

Bhamra (2015) proposes a set of economic, social, environmental and governance indicators for resilience, but these are not directly aligned to the architecture of the three agendas. Peters et al. (2016) have recognised that there is variance in the way that resilience is addressed in each agenda (Table 2.2). ODI (2016) and Schipper and Langston (2015) have assessed resilience in the context of resilient development and recommended exactly how each of the goals, targets and indicators across the agendas relates to one another and how they should be mapped, including points of coalescence and difference.

Table 2.2 'Resilience' within the targets and priorities of the SDG, Paris and Sendai agendas

Sustainable Development Goals	Resilience is not defined but is explicitly included in 2 goals and 8 targets with the objective to reduce exposure to risk and vulnerability. Resilience is linked to a range of sectors and objectives, including reducing the impact of disasters on the poor and those in vulnerable situations (Target 1.5), increasing food security (Target 2.4) and protecting marine ecosystems (Target 14.2), as well as combatting climate-related hazards and natural disasters (Target 13.1)
Paris Agreement	Resilience is not defined, but is referred to as part of adaptation, and is linked with DRR to reduce vulnerability to climate change. Building resilience is emphasised in relation to communities, livelihoods, ecosystems and socioeconomic and ecological systems
Sendai Framework	Resilience is explicitly defined as 'the ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions', and is included in one of the seven global targets and one of the four priorities of action, as well as being firmly incorporated within the actions required at all levels

Source: Adapted from Peters et al. (2016)

Developing Synergies Among Indicators

To date, synergies across the three agendas in the context of resilience have identified resilience-related indicators from one agenda that can be aligned with those in the other two agendas (Alcántara-ayala et al., 2017; Peters et al., 2016), but there is no common indicator set based on indicators shared across all three agendas. However, opportunities that connect the Sustainable Development Goals with the Sendai Framework (Fig. 2.2) and/or the Paris Agreement (Table 2.3) could lead to outcomes addressing the complex and interconnected social, economic and environmental elements that challenge resilience to societal and planetary risks (Lenton, 2020; Rockström et al., 2009).

All three agendas include common ground that contributes towards building the resilience of people, economies and natural resources. Disaster

Fig. 2.2 Correlation between Sendai Framework global targets and SDG global targets through common indicators. (Source: Adapted from: https://www.preventionweb.net/sendai-framework/sendai-framework-monitor/common-indicators)

risk reduction cuts across different aspects and sectors of development. There are 25 targets related to disaster risk reduction in 10 of the 17 Sustainable Development Goals, firmly establishing the role of disaster risk reduction as a core development strategy with connections to resilience (PreventionWeb, 2019; UNISDR, 2015a). Equally synergies exist between climate action and the SDGs for resilience (UNDESA, 2019). For example, energy transitions envisaged in SDG 7, sustainable industrialisation under SDG 9, sustainable food production systems and resilient agricultural practices under SDG 2, and changing patterns of consumption and production in line with SDG 12 can all contribute towards resilience. However, in the case of climate adaptation, synergies with other agendas have tended to be oriented towards specific sectors.

Literature has emphasised the potential benefits of synergies in developing Monitoring and Evaluation frameworks in order to enhance societal and environmental resilience to change. Perhaps because of the stronger institutional structures addressing climate change, coordinated through the UNFCCC processes, many of these have been undertaken

Table 2.3 Examples of correlation between the SDGs and National Adaption Planning as a component of the Paris Agreement

Goal	Target	NAP
	1.b To create sound policy frameworks at the national, regional and international levels, based on pro-poor and gender-sensitive development strategies, and to support accelerated investment in poverty eradication actions	To create policy frameworks to support investments for CCA and resilience
	2.4 By 2030, to ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, and that help maintain ecosystems, strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters, and progressively improve land and soil quality	To mainstream CCA in agriculture and prioritise agriculture adaptation options in development to increase food security
	3.d To strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks	To get a better understanding of the health impacts of climate change and the building capacities required to address these risks through NAP

Table 2.3 (continued)

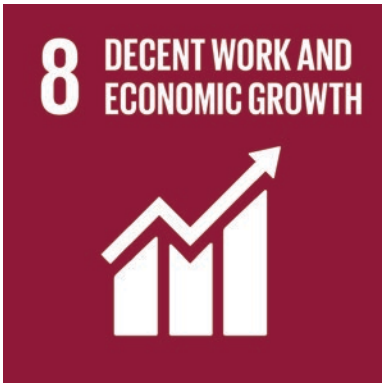
Goal	Target	NAP
	4.7 By 2030, to ensure that all learners acquire the knowledge and skills needed to promote sustainable development	To engage primary, secondary and higher education institutions in building capacities on CCA
	5.c To adopt and strengthen sound policies and enforceable legislation for the promotion of gender equality and the empowerment of all women and girls at all levels	To promote gender-responsive and gender-transformative policies with regard to CCA
	8.3 To promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation	To promote innovation and engagement of the private sector in CCA planning

Table 2.3 (continued)

Goal	Target	NAP
	16.6 To develop effective, accountable and transparent institutions at all levels	To strengthen institutional capacity for CCA coordination including M&E and stakeholder inclusion

Source: Adapted from Dzebo et al. (2019), Murphy (2019) and Module 1: Global policy context for climate change adaptation accessed on 12 April, 2021 from https://www.adaptation-undp.org/sites/default/files/uploaded-images/module_1_global_policy_context_for_me_of_adaptation.pdf

under the umbrella of climate change adaptation (Dzebo et al., 2017; GIZ, 2017; OECD, 2020; UNFCCC, 2017). In this context, resilience complements adaptation, in the sense that it invokes processes that secure flexibility in societal response, not only to current changes, but also to future changes, and as a way to embed these terms in wider notions of interconnected social, economic and environmental development expectations/aspirations (see Nelson, 2011; Osbahr, 2007; UNEP, 2017; Vasseur & Jones, 2015). Whereas the Sustainable Development Goals and the Sendai Framework have indicator sets, the Paris Agreement does not. Measuring resilience is conceptually difficult as it is relative to the nature of the shock and the desired societal outcome (Levine, 2014; Nelson, 2011). However, a review of literature reveals a set of indicators from the Sustainable Development Goals and Sendai Framework that link adaptation to change and address vulnerabilities in order to strengthen resilience (Table 2.4), thus leading to outcomes that demonstrate capacity to adapt to stresses and changes, and to transform to more sustainable futures.

Table 2.4 Indicators relevant to adaptation and resilience included in the SDGs and/or SFDRR

Nr.	Indicators relevant for resilience	Covered in SDG	Covered in SFDRR
1.	Number of deaths, missing persons and directly affected persons attributed to disasters per 100,000 population	1.5.1 11.5.1 13.1.1	A-1
2.	Number of directly affected people attributed to disasters per 100,000 population (including population injured or ill, whose dwelling is damaged or destroyed, and whose livelihood is disrupted or destroyed)		B-1
3.	Direct economic loss in relation to global GDP, damage to critical infrastructure and number of disruptions to basic services attributed to disasters	11.5.2	
4.	Damage to critical infrastructure attributed to disasters (including health and educational facilities damaged or destroyed, and critical infrastructure units and facilities)		D-1
5.	Direct economic loss attributed to disasters in relation to global GDP (including losses in agriculture, housing, productive assets and critical infrastructure, and cultural heritage damaged or destroyed)		C-1
6.	Direct economic loss attributed to disasters in relation to GDP	1.5.2	
7.	Number of disruptions to basic services attributed to disasters (including educational, health and other basic services)		D-5
8.	Number of countries that adopt and implement national DRR strategies in line with the Sendai Framework for Disaster Risk Reduction 2015–2030	13.1.2	E-1
9.	Proportion of local governments that adopt and implement local DRR strategies in line with national DRR	13.1.3	
10.	Number of countries that have communicated the establishment or operationalisation of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production (including a national adaptation plan, nationally determined contribution, national communication, biennial update report or other)	13.2.1	

(*continued*)

Table 2.4 (continued)

Nr.	Indicators relevant for resilience	Covered in SDG	Covered in SFDRR
11.	Total official international support (official development assistance (ODA) plus other official flows) for national DRR actions		F-1
12.	Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation, technology transfer and development actions	13.3.2	
13.	Number of countries that have integrated mitigation, adaptation, impact reduction and early warning into primary, secondary and tertiary curricula	13.3.1	
14.	Number of countries that have multi-hazard early warning systems		G-1
15.	Proportion of agricultural area under productive and sustainable agriculture	2.4.1	
16.	Change in water-use efficiency over time	6.4.1	
17.	Degree of integrated water resources management implementation (0–100)	6.5.1	
18.	Red List Index	15.5.1	
19.	Percentage of cities implementing risk reduction and resilience strategies aligned with accepted international frameworks (such as the Sendai Framework)	11.b.1	
20.	Proportion of government recurrent and capital spending on sectors that offer fewer benefits to women, the poor and vulnerable groups	1.b.1	
21.	International Health Regulations (IHR) capacity and health emergency preparedness	3.d.1	
22.	Extent to which (i) global citizenship education and (ii) education for sustainable development, including gender equality and human rights, are mainstreamed at all levels in: (a) national education policies, (b) curricula, (c) teacher education and (d) student assessment	4.7.1	
23.	Primary government expenditures (as a proportion of original approved budget) by sector (or by budget codes or similar)	16.6.1	
24.	Number of countries with mechanisms in place to enhance policy coherence of sustainable development	17.14.1	

Source: Adapted from Makinen et al. (2018), OECD (2020), UNEP (2017), UNISDR (2015a, 2017a)

Tools for Revealing Links Across Agendas

In order for resilience to be an integrating measure across all three agendas, reflecting the goals and objectives of each of them individually, as well as collectively, tools are required to enable the analysis needed to support and realise the conceptual evaluation that has been described here. To date, tools have been developed that provide a degree of analysis and evaluation across pairs of agendas. For instance, the Sendai Monitor Framework tracks implementation of the Sendai Framework targets with related SDG Goals and Targets (see https://sdg.iisd.org/news/unisdr-launches-online-tool-to-track-progress-on-achieving-sendai-framework-sdgs/ and UNISDR (2017b); Poljanšek et al. (2019)); and both the SCAN tool (Gonzales-Zuñiga, 2018) and the NDC-SDG Connections tool (Dzebo et al., 2019) identify links between climate mitigation actions and the Sustainable Development Goals. There are currently no specific tools that identify links between climate change adaptation and the Sustainable Development Goals. The majority of the tools available visualise connections between agendas based on academic and grey literature, and do not afford a facility for an interactive and iterative interrogation of the linkages that allow practitioners to explore 'what-if' questions around how actions and/or changes in policy/management decisions in one agenda might affect another agenda. Interlinkages across the Sustainable Development Goals and their targets have been recognised (ICSU, 2017; Le Blanc, 2015; Miola et al., 2019) and recently, tools have been developed that allow for interactive engagement between stakeholders in order to ask 'what-if' questions on how progress in one area of development affects other areas (Weitz et al., 2018). This approach has been further developed to include additional elements other than the Sustainable Development Goals in the analysis, such as specific policy instruments (Le Tissier et al., 2020). This tool, for instance, (https://knowsdgs.jrc.ec.europa.eu/enablingsdgs) could be used to explore how the resilience elements within the three agendas connect and interlink with each other.

Conclusion

The adoption of the UN agreements of the Sendai Framework for Disaster Risk Reduction, the 2030 Agenda for Sustainable Development and its SDGs, and the Paris Agreement created an opportunity to build coherence between overlapping policy agendas that significantly affect the future of humanity. Although each addresses aspects for the future security and wellbeing of humanity – mankind's ability to adapt to shocks that will materialise over varying scales in time and space – together, they provide a framing for resilience to risk, provided they can be implemented in support of each other (Kelman, 2017b). Each agenda recognises resilience as an integral feature for its implementation and success, and provides a means of building linkages and coordination to increase their effectiveness individually and collectively. This recognition is leading to the development of tools that could use shared targets and indicators across the three agendas and allow for alignment of policy and management processes in practice, thereby avoiding siloed approaches that have previously characterised the domains of climate change, disaster risk reduction and sustainable development.

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