

Meeting at the crossroads? Developing national strategies for disaster risk reduction and resilience

Relevance, scope for, and challenges to, integration

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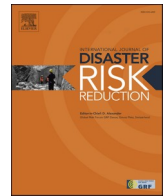
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Meeting at the crossroads? Developing national strategies for disaster risk reduction and resilience: Relevance, scope for, and challenges to, integration

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ABSTRACT

Increasing impacts from disasters and climate hazards have prompted international efforts to promote the development of national disaster risk reduction and resilience (DRRR) strategies intended to reduce mortality and other losses. The development of such strategies is the subject of target E of the Sendai Framework for Disaster Risk Reduction (2015–2030). Furthermore, an increasing understanding of the need to address the root causes of risk has led to calls for greater coherence between strategies that focus on DRRR, and those dedicated to climate change adaptation and sustainable development goals. The purpose of this paper is to increase knowledge on associated decision-making in general, and in Sweden in particular. We analyze the relevance and scope of a Swedish DRRR strategy, and identify drivers and barriers to integrated development and implementation. Based on document reviews, and interviews and group discussions with representatives in Sweden and six European countries, the results highlight a growing awareness that much remains to be learnt and shared between domains in order to progress towards integrated DRRR and more climate-proof sustainable development. In practice, most strategies are developed independently and related actors work in silos, leading to power struggles with negative impacts on national and local capacity. At the same time, windows of opportunity are appearing for the development of national DRRR strategies and increased policy coherence. We discuss these, and present some policy recommendations.

1. Introduction

Our world is increasingly exposed to impacts from hazards such as floods, heatwaves, drought, earthquakes and landslides [1,2]. These hazards interact with vulnerable conditions,¹ creating a complex

cocktail of climate- and non-climate-related risks [3]. The resulting escalating human and economic losses are jeopardizing sustainable development² and supporting calls for new governance approaches [1, 3].

The situation has prompted international efforts to promote the

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¹ *Vulnerability* refers to conditions due to physical, social, economic and environmental factors or processes that increase the susceptibility of an individual, a community, assets, or systems to the impacts of hazards [60].

² *Sustainable development* is generally defined as development that “meets the needs of the present without compromising the ability of future generations to meet their own needs” [61]:16).

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development of national strategies for climate change adaptation³ as well as disaster risk reduction and resilience⁴ (DRRR) aimed at reducing mortality and other losses. The development of such strategies is widely supported by the professional and academic literature (e.g. Refs. [4–6]). Here, we focus on the call for national DRRR strategies, which is encapsulated in target E of the Sendai Framework for Disaster Risk Reduction (2015–2030), itself the successor to the United Nations Hyogo Framework for Action (2005–2015). The Sendai Framework for DRRR was endorsed by the United Nations General Assembly and adopted by Member States in 2015 [7,8]. While its predecessor recognized the need to go beyond response and emphasized preparedness and recovery, the Sendai Framework puts more emphasis on addressing slow-onset disasters that originate in unsustainable development [9].

Target E of the Sendai Framework aims to substantially increase the number of countries with national and local DRRR strategies by 2020. The associated indicator (E–1) is defined as: “[The] Number of countries that adopt and implement national disaster risk reduction strategies in line with the Sendai Framework for Disaster Risk Reduction 2015–2030” [7]. All Member States must now address this goal, and initial results must be reported in 2020 ([7,10]).

While the Sendai Framework promotes the development of national DRRR strategies—a vision shared by the Paris Agreement on Climate Change [11], and the Agenda 2030 Sustainable Development Goals [7, 12]—there is little theoretical research, and hardly any empirical evidence regarding associated decision-making processes [8,13,14]. Such work is, however, urgently needed – both to feed back into theoretical knowledge and to develop practical implementations [1,7,8]. At the same time, there is increased awareness of the need to address the underlying, root causes of risk. This has led to calls for greater coherence between strategies that focus on DRRR, climate change adaptation, and sustainable development [7,15] in all associated policy documents.⁵ Policy coherence reflects the need to develop positive synergies, increase capacity to balance divergent objectives, and minimize potential negative side-effects [16]. This is seen in, for instance, efforts to reduce exposure and vulnerability, and increase resilience to adverse impacts of different hazards [17].

Accordingly, in Europe and worldwide, governments and cities are gradually putting in place strategies that address disaster risk, and climate variability and extremes. The goal is to increase resilience and, ultimately, support sustainable development [1,8,10,18]. Efforts are seen at multiple levels, ranging from global, to national and local, and are informed by international exchanges and learning via policy and professional networks [19]. Strategies can take various forms [20]. Policymakers have two, basic options, which are mutually supportive: mainstreaming (integrating) risk reduction considerations into existing sectoral policies and practices; or a dedicated approach that involves developing targeted, stand-alone strategies [3,13,14,20,21]. Both options have advantages and disadvantages, linked to local capacity and governance structures [20,22,23]. Which option is best in each context

³ *Climate adaptation* is, here, defined as the process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid, harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate change and its effects [1].

⁴ *Disaster risk reduction* is aimed at preventing new, and reducing existing (climate- and non-climate-related) disaster risk, and managing residual risk, all of which contribute to strengthening resilience and, therefore, sustainable development. *Resilience* is understood as the ability of a system, community or society exposed to hazards to resist, absorb, accommodate, adapt to, transform, 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 through risk management [60].

⁵ For example, target 17.14 of the Agenda 2030 Sustainable Development Goals calls upon countries to enhance policy coherence for sustainable development across all sectors, actors, governance levels, and timeframes.

is also a function of how the existing policy landscape does, or does not, already fulfill the United Nations criteria for DRRR strategies⁶ with respect to the four priority areas identified in the Sendai Framework [7]:

1. *Understanding disaster risk*: Disaster risk management should be based on an understanding of all dimensions of disaster risk: vulnerability, capacity, exposure of persons and assets, hazard characteristics, and the environment. Such knowledge can be used for risk assessment, prevention, mitigation, preparedness, and response.
2. *Strengthening disaster risk governance to manage disaster risk*: Disaster risk governance at the national, regional and global levels is very important for prevention, mitigation, preparedness, response, recovery, and rehabilitation. It fosters collaboration and partnership.
3. *Investing in disaster risk reduction for resilience*: Public and private investment in disaster risk prevention and reduction, through structural and non-structural measures, is essential to enhance the economic, social, health, and cultural resilience of persons, communities, countries and their assets, as well as the environment.
4. *Enhancing disaster preparedness for effective response and to “Build Back Better” in recovery, rehabilitation and reconstruction*: The increase in disaster risk means that there is a need to strengthen response preparedness, take action in anticipation of events, and ensure capacities are in place for effective response and recovery at all levels. The recovery, rehabilitation, and reconstruction phases are a critical opportunity to build back better, notably by integrating disaster risk reduction into development measures.

However, knowledge on how to best develop and implement national strategies for DRRR in a particular context is scarce, and there are significant gaps in the policy literature that need to be filled [9,24–26]. More importantly, there are international calls to address a shifting risk landscape and broaden disaster management beyond response and crisis management, as the latter conflicts with current national approaches, often resulting in institutional stagnation [9,24]. The situation is no different in Sweden. By 2018, little progress had been made towards achieving target E, a point that was highlighted in a study by the Swedish Institute of International Affairs [5].

Against this background, the purpose of this paper is to increase knowledge about national DRRR strategy development in general and, in particular, in Sweden. The specific aims are to analyze the relevance and scope of a national DRRR strategy, and identify drivers and barriers to integrated development and implementation. Based on a literature review, interviews, and group discussions with representatives from key organizations such as the United Nations Office for Disaster Risk Reduction (UNDRR), key Swedish stakeholders, and leading actors in selected, pioneering countries (the Netherlands, Finland, Norway, Germany, the United Kingdom, and Croatia), the paper identifies current patterns in knowledge, approaches, and experience. It begins with a presentation of the methods (Section 2), before outlining the results and conclusions (Sections 3–4).

2. Methods

This exploratory analysis assesses the factors that influence the relevance and scope of national DRRR strategies, and associated drivers and barriers to development and implementation. It addresses the needs for policy change, acknowledging that it can make a valuable contribution to “policy structuring” to enable paradigm shifts [26–28] rather than problem solving, which, too often, does not address underlying structures and narratives [28].

⁶ These criteria are taken from the UNDRR document *Technical Guidance for Monitoring and Reporting on Progress in Achieving the Global Targets of the Sendai Framework for Disaster Risk Reduction* (pp. 115–116) and relate to national and local strategies.

Data were collected during 2018–2019 through interviews, group discussions, participatory observation, and document reviews (cf. Suppl. Material 1 & 2). The aim was to systematize current knowledge, approaches, and experience of key stakeholders. These stakeholders included officials working for the UNDRR, national, regional and local organizations in Sweden, together with key informants from six European countries, considered by UNDRR as pioneers in the implementation of national DRRR strategies (the Netherlands, Finland, Norway, Germany, the United Kingdom, and Croatia). This approach enabled us to complement Sweden-specific in-depth analyses with lessons from these countries.

The main focus of the analysis was Sweden. This was because, since 2018, the country has been actively engaged in meeting the Sendai Framework's target E. Efforts have been spurred by the increasing number of complex, larger-scale disasters, notably during the summers of 2016–2019. Moreover, the Swedish Civil Contingencies Agency (MSB), which is the national contact point for the Sendai Framework, gave us full access to all of its activities, formal and informal documentation, and partners.

A total of 34 semi-structured interviews, lasting 1–3 h were summarized and transcribed. These interviews addressed the relevance and scope of DRRR policy, and any drivers and barriers to its development and implementation, including policy coherence (Suppl. Material 1 & 2). Interviewees were purposively sampled to include all relevant DRRR fields and levels in Sweden, with the assistance of the MSB [29]; Suppl. Material 1). Several interviewees had held preparatory meetings within their employer before the interview and explicitly stated that their answers should be seen as representative of their organization. In addition, group discussions and participatory observation were conducted with the MSB and, notably, during two key events: 1) the annual German Forum for Disaster Risk Reduction (October 22–23, 2018 held in Berlin, Germany [30]); and 2) the annual meeting of the European Forum for Disaster Risk Reduction (November 21–23, 2018 held in Rome, Italy [31]).

Document reviews included the analysis of the key, academic literature, international, national and local policy documents and reports, as well as UNDRR guidelines for developing national DRRR strategies. Documents were selected based on information provided by the UNDRR and all participants in the study.

Qualitative coding was used to identify patterns in current knowledge and experience regarding the relevance and scope of national DRRR strategies, along with barriers and drivers for development and implementation [32,33]. Coding was guided by a thematic analysis, based on the aims of this study and reflected in the interview guide (Suppl. Material 2). The analysis was applied to both interview summaries/transcripts and the reviewed literature. Interview data were then triangulated with the literature and other documents. For Sweden, national policies and regulations were analyzed in relation to the Sendai Framework's four priority areas and interviewees' perceptions of them. The validity and feasibility of the preliminary findings and initial policy recommendations were discussed with key Swedish organizations and ministries in May 2019, before being revised and finalized.

3. Results

The following sections present the analysis of the relevance and scope of a Swedish DRRR strategy, and associated drivers and barriers to its integrated development and implementation. All findings are based on in-depth analyses of the situation in Sweden (cf. Section 2), supplemented by lessons from key informants in other pioneering countries (cf. Section 2 and Suppl. Material 3 for further details).

3.1. Relevance: why is there a need to develop a targeted, national strategy?

In Sweden, all interviewees concurred that a strategy that explicitly

targets DRRR is needed to strengthen political will and improve decision-making. Accordingly, the vast majority (all but two) recommended the development of a dedicated, national strategy. These views were, thus, congruent with UNDRR guidelines developed for the implementation of the Sendai Framework, and the professional and academic literature [5,6,8].

The most important rationales given by interviewees regarding the need to develop a national strategy were:

- Existing risk, vulnerability and capacities
- International stewardship, commitment and credibility
- Current DRRR practice and associated shortfalls
- The need to increase national will and support
- Risks associated with in-action or alternative approaches

Interviewees agreed that Sweden is facing increasing risk and vulnerabilities, together with reduced DRRR capacities, caused by societal and climatic change, while a false sense of security seems to prevail [34–38]. This is leading to institutional and policy stagnation at national level.

At the same time, global targets (including target E) are widely referred to in Swedish international development work [39]. In contrast, they have not been adequately addressed at national level. Interviewees agreed that insufficient thought has been given to how to implement the recommendations of the Sendai Framework. Consequently, long-term, multi-sector, all-risk plans and commitments are lacking (see below), calling into question Sweden's international stewardship, commitment, and credibility on the issue.

Currently, there is no overarching, long-term approach to DRRR and building resilience (e.g. setting priorities, addressing gaps and creating synergies). Moreover, there are other important shortfalls in current DRRR work, and fragmentation is creating a barrier to the development and implementation of a national strategy (Section 3.3).

In addition, most interviewees noted a lack of national support for DRRR. There was a shared concern that climate issues and the sustainable development goals dominate the political agenda. Resources allocated to civil protection and defense are increasing, while DRRR is neglected, and there lacking support for synergy creation across the different fields.

Another important argument was the high political cost and other impacts related to the risk of *not* developing a national strategy. There was widespread agreement among interviewees at both national and regional levels that a failure to develop a national strategy would not only be a missed opportunity to learn and improve current approaches and systems, but would also incur high political costs. Several negative consequences were noted, including an increasing number of disasters, societal incidents and associated impacts (as seen during the summer of 2018), along with financial losses due to uncoordinated or duplicate efforts.

Finally, the findings from the analyzed countries that have not yet developed a dedicated DRRR strategy confirmed that there are many challenges regarding alternative approaches. These include: i) the lack of a clear mandate, and dedicated DRRR budget; ii) weak indicators, and thus little control over DRRR and its mainstreaming at all levels (cf. Section 3.2); iii) poor cross-sectoral cooperation, which is particularly apparent in missing links between DRRR, climate change adaptation, and sustainable development (cf. Section 3.3); and iv) a focus on reactive, rather than development-oriented DRRR (cf. Section 3.3). Furthermore, DRRR approaches that are focused on combining safety with security (as in, for example, the Netherlands) were seen as falling short in terms of: i) the particularly broad focus, which is difficult to operationalize; and ii) a lack of links between DRRR, sustainable development, and climate change adaptation, which are set aside in favor of developing closer links with security. The risk of hijacking safety to support security, at the expense of DRRR, was acknowledged in all studied countries.

3.2. Scope: defining goals

Based on the shortfalls identified in Section 3.1, a targeted national strategy was said to be required (by all but two interviewees) in order to:

- Move DRRR up the political agenda,
- Outline the government's overall intentions,
- Identify gaps, pinpoint priorities and define concrete measures to achieve the outlined intentions, gaps and priorities and to, ultimately,
- Strengthen existing capacities and resources.

In this context, interviewees considered that the government should focus on increasing the visibility of DRRR work across all governance levels, as this would ensure coherence with Sweden's international commitments, and enhance its role as a forerunner. Furthermore, it would respond to national needs, support DRRR mainstreaming, create synergies, and establish a shared understanding of the way forward. The latter includes the integration of DRRR across all sectors, and into mandates, institutional structures, mechanisms, strategies and regulations at national, regional and local levels. This was expected to create a more coherent, comprehensive approach that would be intrinsically linked to climate change adaptation and sustainable development goals.

Interviewees highlighted three ways to achieve these intentions. First, there is a need to identify existing mechanisms and regulations related to DRRR, determine the links between them, and implement updates where necessary (e.g. link DRRR, climate change adaptation indicators and reporting mechanisms, and improve current risk, vulnerability and capacity assessments). Second, there is a need to delegate individual and joint responsibilities at all levels to enhance transparency and collaboration. And, third, there is a need to improve the system that monitors risks and learning at all levels.

Finally, interviewees noted several other ways to strengthen capacities and resources. These included strengthening the capacity of the MSB to implement the Sendai Framework. This was seen as key to the development of a comprehensive approach that would give adequate priority to sustainable development and climate-related issues. Another point was the crucial need to improve the ability at county (regional) level to provide guidance to the local level. The prevailing understanding was that the national strategy would only be relevant if it could provide regional- and local-level support for capacity development, with clear benefits at the local level. This, in turn, requires increased support (knowledge, capacity and financial resources) in order to translate the strategy's intentions into policies and practice at the local level. In this context, all interviewees agreed that a national DRRR strategy should aim to link existing policies at different scales. More specifically, 27 regulations and strategies were seen as relevant (Suppl. Material 4).

3.3. Drivers and barriers to development and implementation

This study identified several factors that support or hamper the integrated development and implementation of a targeted DRRR strategy in Sweden, related to the four priority areas of the Sendai Framework (Table 1). These factors were also identified in the other analyzed countries, highlighting that common challenges are found across different contexts (cf. Section 3.1).

3.3.1. The understanding of what constitutes (disaster) risk

Most interviewees considered that DRRR in Sweden was founded on a crisis response and preparedness approach, and that the understanding of (disaster) risk was limited (Priority 1, cf. Section 1). However, not all participants agreed with this conclusion. Although a few expressed the perception that current DRRR structures and systems are holistic this was not, however, confirmed by the conducted policy analyzes (see below). This illustrates how difficult it can be to reframe traditional (i.e. crisis management) approaches into the more development-oriented

Table 1

(Dis)enabling factors for integrated development and implementation, and their links to the UNDRR's four priority areas.

UNDRR Priority	(Dis)enabling factors
Priority 1	<ul style="list-style-type: none"> • The understanding of what constitutes (disaster) risk. E.g. dominated or not by crisis response and preparedness. • Data collection and monitoring regarding DRRR. E.g. including or excluding more frequent events (incurring socio-economic costs) and underlying risk factors. • Actor involvement and co-creation. E.g. (not) involving new actors, which also offers new perspectives.
Priority 2	<ul style="list-style-type: none"> • Legislation. E.g. existing laws and regulations (do not) create linkages between hazards, vulnerabilities, disasters and sustainable development. • Processes and (other) governance mechanisms. E.g. mechanisms and mandates of DRRR-related fields are (dis)connected. • Actor involvement and co-creation. E.g. (no) inclusion of perspectives and actors beyond response and preparedness.
Priority 3	<ul style="list-style-type: none"> • Budgets and financing. E.g. DRRR budgets do (not) only support crisis management; mapping existing connections (cf. Priority 1) and developing a strategy that helps in understanding the bigger picture can increase motivation and financing to implement DRRR measures. • Cost effectiveness. E.g. the cost effectiveness of DRRR and the relevance for the national and local economy is (not) demonstrated and the budgets (do not) support long-term investments. • Actor involvement and co-creation. E.g. (no) investment in involving a wider segment of society that could provide multiple resources and co-benefits for DRRR capacity.
Priority 4	<ul style="list-style-type: none"> • Legislation. E.g. recovery, including reconstruction and rehabilitation is (not) given adequate attention in policies and regulations. • Actor involvement and co-creation. E.g. (no) time and resources are made available to build longstanding capacity that draws on multiple actors for planning, learning and training.

understanding of DRRR proposed by the Sendai Framework.

A consequence of the current understanding of what constitutes risk is that there is little awareness, consideration, or communication of underlying risk factors. As a result, important fields (e.g. physical planning) and key stakeholders (including private actors and citizens) are said to be widely excluded from current DRRR approaches, resulting in siloed work: as one interviewee from a Country Administrative Board stated: "Currently, each topic has its own life". Rather than mutually supporting each other in an effort to increase policy coherence, each issue is addressed individually. A similar focus on reactive, rather than development-oriented DRRR was identified in other countries. As Margareta Wahlström, former UN Special Representative for the Secretary General stated during her interview, "Many countries feel that they have DRRR plans, but very often they are preparedness plans."

3.3.2. Data collection and monitoring

The current understanding of risk is reflected in a lack of systematic and comprehensive data collection and monitoring. In fact, data relating to slow- and rapid-onset, frequent and less-frequent, large- and small-scale events is currently neither monitored nor collected in Sweden [31]. This shows the lack of attention given to Priority 1 of the Sendai Framework (cf. Section 1, Table 1). As one interviewee from the Swedish Transport Administration noted: "We have no clue how often a road is closed off because of floods and how much it costs us. We don't know why it happens and how we can avoid it next time. When you work with traffic safety, you focus on the questions: Why does the accident occur? How do we prevent the next one? This thinking is not at all present when it comes to natural hazards." In addition, there is a lack of legislation and regulation regarding the monitoring of progress towards specific DRRR goals or indicators. An exception is the Agenda 2030 Action Plan [40], which includes the requirement to monitor progress. The governmental agency Statistics Sweden has been assigned this responsibility.

3.3.3. Legislation

The lack of a comprehensive understanding of risk, and insufficient data collection and monitoring, relates to the fact that current regulations are fragmented and/or do not explicitly address risk and associated resilience building. This is evidence of a clear lack of attention to Priority 2 of the Sendai Framework (cf. Section 1, Table 1). This was highlighted by most interviewees and also emerged from the analysis of policy. Consequently, there is no shared interest nor responsibility of the relevant actors at different levels to support cooperation and a more coherent and comprehensive approach to DRRR.

Sectoral actors tend to only work with legislation that addresses their sector. Such legislation, by nature, does not explicitly address overarching aspects such as linkages between hazards, vulnerabilities, disasters, and sustainable development. For example:

- Risk and civil protection actors base their work on local risk and vulnerability assessments, the Civil Protection Act [41]:778) and the Act on Measures related to Extraordinary Events [42–44]:544).⁷ However, none of this legislation reflects a comprehensive understanding of risk and risk reduction. Thus, it does not cover development-oriented measures that address a wider spectrum of risks and underlying risk factors such as those that are central to the Sendai Framework (slow-onset, smaller-scale, frequent hazards and climate variability). Typically, they address preparations for, and responses to, certain rapid-onset, large-scale disasters. They do not aim to prevent or mitigate risks, nor address the wider spectrum of hazards.
- Urban planners draw mainly upon the Planning and Building Act [45]:900), which refers to hazards such as flooding, erosion and landslides. However, the Act does not comprehensively consider all risk factors and associated measures (notably green, soft, and grey solutions) and is considered to be an exploitation-oriented legislation. The government's climate change adaptation strategy has led to significant amendments to the Act [45]:900).⁸ However, interviewees highlighted that hazards, vulnerabilities, and risk created by inadequate development processes must be considered more explicitly and systematically. For instance, while the Act [45]:900) states that society has to be built in a "safe way", there are no explicit links with DRRR. One interviewee from the City of Malmö stated: "With such phrasing it is not very clear what should be done".
- Environmental actors are guided by the Swedish Environmental Code [46]:808), and their role in creating and reducing risk is not made explicit. For instance, the Code notes that it "shall be applied in such a way as to ensure that human health and the environment are protected against damage and detriment, whether caused by pollutants or other impacts" [46]:808: Ch 1, 1§). However, the Code does not refer to hazards such as flooding, extreme heat and cold, drought, forest fires, or windstorms. Nor does it address their linkages with developmental and environmental work. In addition, the notion of 'climate change' is not mentioned once in the 110-page document [46]:808), despite the fact that environmental protection and development are supposed to be at the heart of policy.

Many interviewees acknowledged that this situation has resulted in separate processes and fragmented DRRR, especially at local level. In

⁷ Formally known as the *Act on Municipal and County Council Measures prior to and during Extraordinary Events in Peacetime and during Periods of Heightened Alert*.

⁸ Specifically, the following amendments have been made: a) Municipalities must carry out a risk and vulnerability assessment (mainly flood and erosion) in relation to their comprehensive planning; and b) their detailed development plan can require a special permit for measures/developments that impair ground infiltration capacity. In other words, municipalities can refuse to issue building permits in at-risk areas.

addition, there are several gaps in the legislation, which limits the powers of local authorities to direct their DRRR efforts, especially on private land. In the context of boosting the development of housing, various changes to the legislation have reduced municipal requirements for private developers [45]:900, Ch 8, 4a §, Jan 1, 2015). Further changes have limited municipalities' ability to purchase land, although some adjustments are planned [47]. There are other gaps in the context of heatwave mitigation and stormwater management [42–44]:412; [48]. For example, municipalities are unable to act if measures are needed to reduce flood risk on private land [42–44]:412).

Furthermore, recovery, including reconstruction and rehabilitation has, so far, been given little attention in policies and regulations. The Civil Protection Act [41]:778) prescribes the elements of an effective response. In particular, municipalities are responsible for providing rescue services, and local decision-makers must establish an action plan. The Act also prescribes the role of municipalities following a disaster, for example, with respect to costs incurred. The government's critical infrastructure strategy also refers to reconstruction. However, recovery planning is clearly weaker than response and response preparedness planning. In the words of one interviewee from a city authority: "We are not very good at building back better. We have no preparation plans for that. We are good at acting on events. The work done after a disaster is unplanned."

3.3.4. Processes and other governance mechanisms

All interviewees noted the clear separation between political agendas, associated processes, and governance mechanisms that address DRRR, security, sustainable development, and climate change mitigation and adaptation. They also highlighted a disconnect between area-specific mechanisms at different levels. Here again, this reflects a lack of attention given to Priority 1 of the Sendai Framework (cf. Section 1, Table 1). An example is local risk assessments, which are conducted independently of national risk and capacity assessments, and other types of risk assessment carried out in the context of the national Climate Adaptation Strategy [49]. At the same time, some interviewees considered that long-term DRRR activities were often 'reallocated' to climate change adaptation or security portfolios. They suggested that this was an indication of the power struggles and reduced importance given to DRRR, compared to other political priorities. As the geopolitical situation evolves, DRRR is increasingly being overtaken by the security agenda (civil protection and defense), reflected in the reallocation of budgets, and a reduced focus on prevention, mitigation, and associated capacity development. Even in the context of new policy developments, governance structures for crisis management, sustainable development, and environmental considerations are separated. For example, an ongoing government investigation into water governance (to be finalized around October 2019) is focused on water quality, and makes no reference to hazards and associated risk.

Consequently, there is a lack of platforms for the consideration of long-term, multi-sector, all-risk plans and commitments (e.g. to set priorities, address gaps, and create synergies). In some countries, such as the United Kingdom and the Netherlands, the National Risk and Capacity Assessment provides a platform for different sectors to engage and commit to addressing DRRR. In Sweden, although the National Capacity Assessment was identified as having great potential to improve current approaches, its current form does not mobilise any wide-scale engagement.

Another challenge noted by many interviewees is the limited authority of the coordinating body responsible for implementing the Sendai Framework. The current focus on crisis management, and the limitations of guiding legislation (see above), make it difficult to support the integrated development and implementation of DRRR. A further consideration is that the Sendai Framework sets a global milestone for DRRR, but does not come with a legally-binding mandate (unlike other international frameworks).

At the same time, some interviewees expressed concerns that

developing another strategy might exacerbate the disconnect between existing processes and mechanisms. This was, however, seen as avoidable if the main aim of the strategy was to mainstream DRRR and create synergies across all sectors and levels (cf. Section 3.1). Data from the other, studied countries confirmed this observation. It also shows, however, that mainstreaming is challenged by differences in the life-cycle of strategies, priorities, and political standing, and that conflicts of interest and budgets can result if these issues are not explicitly addressed.

3.3.5. Budgets and financing

Currently, Swedish DRRR budgets were said to be mostly dedicated to supporting crisis management. There is, thus, a clear lack of financing and incentives to develop a national DRRR strategy. The resulting lack of interest in issues such as prevention and mitigation measures indicates the lack of attention given to Priority 3 of the Sendai Framework (cf. Section 1). To make matters worse, interviewees clearly stated that costs associated with dealing with hazards are increasing at local, regional, and national levels, which is also associated to the fact that different sectors responsible for DRRR are not working well together.

Furthermore, the longstanding Swedish policy of decentralizing power to municipalities hampers comprehensive risk governance, if not combined with adequate guidance and financial support from national and regional levels. The policy of decentralization was extended by amendments to the Planning and Building Act in 1996 [50]: 230), which requires risks to be included in comprehensive planning proposals. However, many interviewees noted that the current policy often leads municipalities to interpret their DRRR responsibilities very differently, especially as both legislation and associated support are ambiguous.

Finally, interviewees highlighted that it is crucial to demonstrate that mainstreaming DRRR is cost-effective for the national and local economy, both with respect to the process, and as an inherent component of strategy. This would require adjustments to budgets to stimulate more long-term investments (cf [51]).

3.3.6. Actor involvement and co-creation

The outcomes of the interviews and the literature review clearly highlighted that the *process* of developing and implementing an integrated national DRRR strategy is as important as the strategy itself. All interviewees noted, in this context, the importance of implementing cross-sectoral policies at the highest political level, with the active involvement of all ministries. This finding is consistent with OECD guidelines on policy cohesion, and our findings from studies of other countries [16,30,31].

In addition, interviewees highlighted that the coordinating body responsible for the implementation of the Sendai Framework needs to ensure that both external and internal actors are clearly identified and fully involved. Ensuring full actor involvement and co-creation was seen key to addressing all four priorities of the Sendai Framework. At the political level, cross-party agreement would ensure that plans extend beyond the electoral cycle, and a balance is found with short-term priorities [16]. This, however, would be only a first step in ensuring a more comprehensive understanding of risk, and a shared, strategic approach to mainstreaming DRRR across departments and sectors. The second step would be to identify national, regional, and municipal authorities (both policymakers and practitioners at all levels), universities/expert groups, private sector actors, and non-governmental and civil society organizations. In fact, most interviewees noted the need to include broader perspectives, by involving new actors. OECD guidelines on policy cohesion underline the importance of subnational and local involvement [16]. In this context, in Sweden interviewees highlighted particularly the need to strengthen the support at regional level to better support local-level actors. This approach has also been shown to be beneficial in other contexts (cf. Suppl. Material 3), for instance, water resource planning [52].

Interviewees also noted the need for civil society organizations, NGOs, and the private sector to be more actively involved, as this would provide a wider range of perspective and resources to draw on in DRRR work. Successful actor involvement and co-creation was said to rely on the establishment of a process that fosters trust, ownership, a shared understanding, joint responsibilities, motivation and consensus. These issues are related to several theoretical frameworks, such as social capital [53]. However, the process requires time and resources and learning from previous experience. For example, a representative from an NGO involved in rescue operations noted that their organization would benefit from regular training in between events, in order to support continuous learning and more effective response (relevant to Priority 4, [31]).

Some interviewees noted the challenge of managing this potentially large number of stakeholders. Positive examples were, however, put forward where similar processes had worked in the past. One illustration was the consultative process that was established in relation to the midterm review of the Climate Change Commission [34], which led to the development of the National Strategy for Climate Change Adaptation.

Finally, some interviewees considered that an analysis of gaps in current approaches was crucial for systematic development and implementation, and for strengthening actor involvement and co-creation in disaster risk governance (Priority 2 of the Sendai Framework). They argued that this could either be an integral component in the process of developing a national strategy, or a preparatory stage. Lessons learned from, for example, the Netherlands, suggest that it is advisable to follow a consistent methodology, and invite a consortium of experts (cf. Suppl. Material 3). Third parties, able to handle complex, technical data and projections can be invited to assist in the information search, and provide neutral advice [54]. Related analyses could focus on the four Sendai Framework priorities and seek to identify both weaknesses and strengths, as done in Germany (cf. Suppl. Material 3). Finally, the Dutch example shows that the role of policymakers is central in taking advice from third party experts forward.

4. Conclusions

The aim of this paper was to analyze the relevance and scope of a targeted, national DRRR strategy in Sweden, and identify related drivers and barriers to its integrated development and implementation. The results highlight increasing awareness of the need to develop such a strategy, strengthen political will, and improve decision-making in order to address current gaps and shortfalls. They also show that much can be learnt and shared between domains in order to progress towards integrated DRRR and more climate-proof, sustainable development. However, in practice, strategies, policies and regulations continue to be developed independently, and actors continue to work in silos, leading to power struggles with negative impacts at national, regional, and local level.

At the same time, various windows of opportunity are opening up. Our results show that a targeted, national DRRR strategy needs to tap into them to address, first and foremost, the risk management policy landscape, which has slowly shifted from crisis management to DRRR, while remaining linked to the same implementing institutions. In this context, ensuring adequate actor involvement and co-creation is key to addressing all four priorities of the Sendai Framework. Hence, a new internal and external “learning infrastructure” [55] is crucial in order to improve intersectoral communication, cooperation and knowledge co-creation. This process needs to overcome resistance to change due to path dependency. The latter refers to a phenomenon where present policy choices are constrained or shaped by institutional paths resulting from choices made in the past. These choices structure today’s perceptions of problems and goals, define the range of appropriate and feasible options, and determine the costs and benefits of policy changes [56]. Learning from other countries shows that this challenge can be met by

taking a more integrated approach to risk, and its root causes, through closer cooperation between scientists, policymakers, and other stakeholders. This would support the integration of internal and external knowledge systems and perspectives. Careful thought needs to be given to who is involved, and associated power constellations [57]. In this context, the importance of jointly identifying multiple perspectives, needs, synergies, and options before making a final decision on an approach has been stressed by conflict management practitioners [58].

Clearly, it is difficult to take policy recommendations from one place and implement them elsewhere [19]. However, empirical studies have shown that policy learning across scales and geographical contexts can be stimulated by improved infrastructure for the diffusion of knowledge, either unilaterally or within a small group of pioneer countries and international organizations [59].

Our results show that there are clear benefits in developing a dedicated, comprehensive strategy aimed at mainstreaming DRRR across all sectors. This strategy should identify connections and shared values found in legislation and associated mechanisms for risk reduction, climate adaptation, and sustainable development. Mapping existing connections and developing a strategy that helps in understanding the bigger picture is likely to increase motivation and financing to implement DRRR measures and, ultimately, accelerate progress towards fulfilling both national and global goals related to the Sendai Framework, the Paris Agreement on Climate Change, and Agenda 2030.

Declaration of competing interest

None.

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Appendix A. Supplementary data

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References

- [1] IPCC, Intergovernmental Panel on Climate Change (IPCC), Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge, 2014.
- [2] World Economic Forum, Insight report. The global risks report 2019, Geneva. Available at: http://www3.weforum.org/docs/WEF_Global_Risks_Report_2019.pdf, 14 edition.
- [3] C. Wamsler, Cities, Disaster Risk and Adaptation, Routledge, London, New York, 2014.
- [4] N. Brooks, W.N. Adger, Assessing and enhancing adaptive capacity, in: B. Lim, E. Spanger-Siegfried, I. Burton, E.L. Malone, S. Huq (Eds.), Adaptation Policy Frameworks for Climate Change, Cambridge University Press, New York, 2005, pp. 165–182.
- [5] A. Haraldsson, G. Reischl, The Sendai Framework – Swedish Disaster Risk Reduction Governance, Utrikespolitiska Institutet & Myndigheten för Samhällsskydd Och Beredskap, Karlstad, 2017.
- [6] D. Henstra, J. Thistlethwaite, Overcoming barriers to meeting the Sendai framework for disaster risk reduction, Policy Brief No. 105, https://www.cigionline.org/sites/default/files/documents/PB%20no.105web_0.pdf, 2017.
- [7] UNISDR, Sendai Framework for Disaster Risk Reduction 2015-2030, United Nations Office for Disaster Risk Reduction, Geneva, 2015.
- [8] UNISDR, Words into Action Guidelines: Developing a National DRR Strategy and Planning for Implementation, United Nations Office for Disaster Risk Reduction, Geneva, 2019.
- [9] A. Aitsi-Selmi, V. Murray, C. Wannous, C. Dickinson, D. Johnston, A. Kawasaki, A.-S. Stevance, T. Yeung, Reflections on a science and technology agenda for 21st century disaster risk reduction, Int. J. Disaster Risk Sci. 7 (1) (2016) 1–29, <https://doi.org/10.1007/s13753-016-0081-x>.
- [10] European Commission (EC), Adaptation Strategies for European Cities – Final Report. Part of the Final Report of the Project ‘Adaptation Strategies for European Cities’, Compiled by Ricardo-AEA for the European Commission Directorate General Climate Action, EC, 2011.
- [11] UNFCCC, United Nations Framework Convention on Climate Change, 2015, December 12. Paris Agreement: FCCC/CP/2015/L.9/Rev.1. Retrieved from, https://unfccc.int/documentation/documents/advanced_search/items/6911.php?piref=600008831.
- [12] United Nations, Transforming Our World: the 2030 Agenda for Sustainable Development, 2015. A/RES/70/1.
- [13] C.J. Uittenbroek, How Mainstream is Mainstreaming? the Integration of Climate Adaptation in Urban Policy, PhD Thesis, Utrecht University, Utrecht, 2014.
- [14] A. Dewulf, S. Meijerink, H. Runhaar, Editorial for the special issue on the governance of adaptation to climate change as a multi-level, multi-sector and multi-actor challenge: a European comparative perspective, J. Water Clim. Change 6 (1) (2015) 1–8.
- [15] L. Schipper, F. Thomalla, G. Vulturius, M. Davis, K. Johnson, Linking disaster risk reduction, climate change and development, Int. J. Disaster Resil. Built Environ. 7 (2) (2016) 216–228.
- [16] OECD, Policy Coherence for Sustainable Development 2018: towards Sustainable and Resilient Societies, OECD Publishing, Paris, 2018, <https://doi.org/10.1787/9789264301061-en>.
- [17] IPCC, Intergovernmental Panel on Climate Change, in: C.B. Field, V. Barros, T. F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach, G.-K. Plattner, S.K. Allen, M. Tignor, P.M. Midgley (Eds.), Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge, UK, and New York, NY, USA, 2012, p. 582.
- [18] J. Perks, Adaptation Strategies for European Cities – Final Report. Ricardo-AEA. European Commission – Directorate General for Climate Action (2011), 2011. http://climate-dapt.eea.europa.eu/documents/18/11155975/Adaptation_Strategies_for_European_Cities_Final_Report.pdf. (Accessed 27 November 2016).
- [19] A. Cochrane, K. Ward, Researching the geographies of policy mobility: confronting the methodological challenges, Environ. Plan.: Econ. Space 44 (1) (2012) 5–12, <https://doi.org/10.1068/a44176>.
- [20] H. Runhaar, B. Wilk, Å. Persson, C. Uittenbroek, C. Wamsler, Mainstreaming climate adaptation: taking stock about ‘what works’ from empirical research worldwide, Reg. Environ. Change 18 (4) (2017) 1201–1210.
- [21] C. Wamsler, S. Pauleit, Making headway in climate policy mainstreaming and ecosystem-based adaptation: two pioneering countries, different pathways, one goal, Clim. Change 137 (1–2) (2016) 71–87.
- [22] M. Kok, B. Metz, J. Verhagen, S. Rooijen, Integrating development and climate policies: national and international benefits climate policy 8 (2008) 103–118, <https://doi.org/10.3763/cpol.2007.0436>.
- [23] C. Wamsler, C. Luederitz, E. Brink, Local levers for change: mainstreaming ecosystem-based adaptation into Swedish municipal planning to foster sustainability transitions, Glob. Environ. Chang. 29 (2014) 189–201 (Open Access).
- [24] J. Handmer, S. Dovers, Handbook of Disaster and Emergency Policies and Institutions, Earthscan, London, 2007.
- [25] T. Birkland, Lessons of Disaster. Policy Change after Catastrophic Events, Georgetown University Press, Washington DC, 2007, p. 216.
- [26] C. Johnson, S. Tunstall, E. Penning Rowsell, Floods as catalysts of policy change: historical lessons from England and Wales, Water Resour. Dev. 21 (4) (2005) 561–575.
- [27] W.N. Dunn, Public Policy Analysis: an Introduction, Pearson Prentice Hall, Upper Saddle River, NJ, 2004.
- [28] H. Wagenaar, Meaning in Action – Interpretation and Dialogue in Policy Analysis, Routledge, London, New York, 2011.
- [29] M.Q. Patton, Qualitative Research and Evaluation Methods: Integrating Theory and Practice, fourth ed., Sage, London, 2015.
- [30] GFDRR, The Annual German Forum for Disaster Risk Reduction, 2018. October 22–23 in Berlin, Germany.
- [31] EFDRR, 2018 European Forum for Disaster Risk Reduction Rome. (November 21–23 in Rome, Italy Participation and Observation by Åse Johannessen, 2018).
- [32] C. Urquhart, Grounded Theory for Qualitative Research: A Practical Guide, Sage Publications Inc, London, 2013.
- [33] B.G. Glaser, Theoretical Sensitivity: Advances in the Methodology of Grounded Theory, Sociology Press, Mill Valley, CA, 1978.
- [34] L. Andersson, A. Bohman, L. van Well, A. Jonsson, G. Persson, J. och Farelus, Underlag till Kontrollstation 2015 För Anpassning till Ett Förändrat Klimat, 12, SMHI Klimatologi Nr, Sverige, 2015. SMHI, SE-60176 Norrköping.
- [35] SOU, Säkerhet i Ny Tid. Betänkande Av Utredningen Om Sveriges Försvars- Och Säkerhetspolitiska Samarbeten. SOU 2016:57. [Safety in a New Time], 2016. Stockholm 2016.
- [36] SOU, Säkerhet i en ny tid. [Safety in a new time]. Sårbarhets- och säkerhetsutredningen. SOU 2001:41. Swedish Government Official Investigation, Fritzes Offentliga Publikationer, Stockholm, 2001. https://www.regeringen.se/contentassets/dc054ef38cde47dabf5aadf63dcab469/sou-2016_57.pdf.
- [37] C. Wamsler, E. Brink, Planning for climatic extremes and variability: a review of Swedish municipalities’ adaptation responses, Sustainability 6 (3) (2014) 1359–1385 (Open Access).
- [38] C. Wamsler, E. Brink, Interfacing citizens’ and institutions’ practice and responsibilities for climate change adaptation in Sweden, Urban Clim. 7 (2014) 64–81 (Open Access).

- [39] Government of Sweden, Policy Framework for Swedish Development Cooperation and Humanitarian Assistance, Government Communication, 2016, 2016/17:60.
- [40] Regeringskansliet, Handlingsplan Agenda 2030: 2018–2020, Finansdepartementet (Fi 2018:3), Stockholm, 2018.
- [41] SFS, 778, Lag (2003:778) Om Skydd Mot Olyckor. [The Civil Protection Act], Svensk författningssamling, Stockholm, 2003.
- [42] SFS, 544, Lag (2006:544) Om Kommuners Och Landstings Åtgärder Inför Och Vid Extraordinära Händelser I Fredstid Och Höjd Beredskap. [Act on Municipal and County Council Measures Prior to and during Extraordinary Events in Peacetime and during Periods of Heightened Alert.], Svensk författningssamling, Stockholm, 2006.
- [43] SFS, 412, Lag Om Allmänna Vattentjänster 2006:412. [Public Water Services Act], Svensk författningssamling, Stockholm, 2006.
- [44] SFS, 637, Förordning Om Kommuners Och Landstings Åtgärder Inför Och Vid Extraordinära Händelser I Fredstid Och Höjd Beredskap. [Ordinance on Municipal and County Council Measures Prior to and during Extraordinary Events in Peacetime and during Periods of Heightened Alert], Svensk författningssamling, Stockholm, 2006.
- [45] SFS, Plan- Och Bygglag (2010:900) [Planning and Building Act], 900, Svensk författningssamling, Stockholm, 2010.
- [46] SFS, Miljöbalk (1998:808) [Environmental Code], 808, Svensk författningssamling, Stockholm, 1998.
- [47] SOU, Ett Snabbare Bostadsbyggande. Betänkande Av Byggrättsutredningen, 2018. SOU 2018:67. Stockholm 2018.
- [48] SOU, Vägar till Hållbara Vattentjänster. Betänkande Av Utredningen Om Hållbara Vattentjänster, 2018. SOU 2018:34. Stockholm 2018.
- [49] Government bill, Regeringens Proposition 2017/18:163. Nationell Strategi För Klimatanpassning, Government Offices of Sweden, Stockholm, 2017.
- [50] Government bill, Regeringens Proposition 1994/95:230. Kommunal Översiktsplanering Enligt Plan-Och Bygglagen mm, Government Offices of Sweden, Stockholm, 1995.
- [51] Å. Johannessen, R. Larsson, L. Blom, D. Karlsson, H. Aspegren, Tiden har runnit ikapp Sverige - Sju principer för god vattenstyrning och hantering, Vatten - J. Water Manag. Res. 75 (2019) 4.
- [52] Å. Johannessen, J.J. Granit, Integrating flood risk, river basin management and adaptive management – gaps, barriers and opportunities illustrated with a case study from Kristianstad, Sweden, Int. J. Water Gov. Spec. Issue 3 (2015) 5–24.
- [53] M. Woolcock, D. Narayan, Social capital: implications for development theory, research, and policy, World Bank Res. Obs. 15 (2) (2000) 225–249.
- [54] B. Gray, Collaborating – Finding Common Ground for Multiparty Problems, Jossey-Bass: San Francisco, London, 1989.
- [55] Å. Johannessen, Å. Gerger Swartling, C. Wamsler, K. Andersson, J.T. Arran, D. I. Hernández Vivas, T.-A. Stenström, Transforming urban water governance through social (Triple-loop) learning. Special issue, Environ. Policy Gov. 2019 (2019) 1–11.
- [56] J. Torfing, Rethinking path dependence in public policy research, Crit. Policy Stud. 3 (1) (2009) 70–83, <https://doi.org/10.1080/19460170903158149>.
- [57] T. Krick, M. Forstater, P. Monaghan, M. Sillanpää, C. van der Lugt, K. Partridge, C. Jackson, A. Zohar, From words to action: the stakeholder engagement manual, in: The Practitioner's Handbook on Stakeholder Engagement. Account Ability, the United Nations Environment Programme, and Stakeholder Research Associates, vol .2, 2005. Retrieved from: <http://www.unep.fr/shared/publications/pdf/webx0115xpa-sehandbooken.pdf>.
- [58] R. Fisher, W. Ury, B. Patton, in: Getting to Yes: Negotiating Agreement without Giving, second ed., Houghton Mifflin, 1991.
- [59] H. Jörgens, Governance by diffusion – implementing global norms through cross-national imitation and learning, in: W.M. Lafferty (Ed.), Governance for Sustainable Development. The Challenge of Adapting Form to Function, Edward Elgar, Cheltenham, 2004.
- [60] UNDRR, United Nations Office for Disaster Risk Reduction, 2017. Terminology. Updated 2 Feb 2017. Available at: <https://www.unisdr.org/we/inform/terminology>.
- [61] World Commission on Environment and Development, Our Common Future, Oxford University Press, Oxford, 1987.