




Compound risks and complex emergencies require new approaches to preparedness

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Increasingly, we face compounding and interrelated environmental, socioeconomic, and political crises. Yet our approaches to these problems are often siloed, fragmented, and inadequate. The current pandemic, for instance, continues to collide with a number of other threats to human life and livelihoods. These include violent conflicts, displacement, insect swarms, droughts, heat waves, and structural inequality in the form of racism and gender discrimination. We believe we are at a critical juncture, faced with a need and responsibility to redesign

institutions to be proactive, agile, and socially just when confronted with increasingly likely compound risks.

Because the coronavirus disease 2019 (COVID-19) emergency is a protracted crisis that entails waves of infections over several months, the pandemic will inevitably continue to collide with other social and environmental shocks and disruptions, leading to increased risk of compound disasters (1). Globally, we have seen both extended and acute periods of stress on social and government systems driven by the



We need to redesign institutions to be proactive, agile, and socially just when confronted with compound risks that have become increasingly likely. Image credit: Dave Cutler (artist).

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COVID-19 pandemic as well as other natural and social hazards. When coupled with economic shocks, political fragility, and conflicts, these multiple stressors become concurrent drivers of complex emergencies that severely challenge domestic and international emergency response. Such crises present a need to better understand compound risks and prioritize collaborative action—we need to address neglected risk assessment challenges around communication, funding, governance, and social justice (2).

Thus, while the world continues to grapple with the COVID-19 pandemic, we must draw on existing knowledge and frameworks to ensure that disaster risk management can address compounded risks. We must learn from the current crisis to prepare better resource-deployment strategies, governance directives, and policy responses. These responses, in turn, must connect to short- and long-term risk management strategies, especially for ongoing, emerging, and future compound risk scenarios that are often not adequately addressed.

Risk Reduction Frameworks and Funding

Increasingly, COVID-19 and other types of emergencies, such as violent conflict, have forced the risk community to consider hazards across timescales, from several hours to multi-year and beyond, and see these hazards as both shocks and stressors (i.e., a longer-term strain on resources). The growing intensity of these compound events—as well as the heightened vulnerability related to COVID-19 and associated stress on existing disaster-response capabilities—demand quick action that entails both cooperation and creative, integrated approaches to assessment, communication, funding, and governance.

Frameworks to guide priorities for disaster-risk assessment exist, each often associated with different actors and timing of a crisis. The United Nations Office for Disaster Risk Reduction (UNDRR) acts as the secretariat for the Sendai Framework for Disaster Risk Reduction (2015–2030), which provides a multi-hazard approach to understanding risk. Though the framework itself is not intended to assess risk, a variety of global private and public organizations worked together to develop multiple implementation guides for how to approach the goals and indicators it sets forth. These Words Into Action Guidelines include a Risk Assessment for National Governments and use a multi-hazard approach [including a range of biological hazards and cascading events (3)].

Besides UNDRR, a number of other risk assessment frameworks and tools exist across the UN system, each intended to bolster coordination and cooperation of multiple inter-governmental organizations, non-governmental organizations, national and local governments. One such assessment is the Multi-sector Initial Rapid Assessment [MIRA (4)]. The MIRA acts as a joint needs-assessment tool that works across the humanitarian cluster system to provide assessment and analysis of needs, strategic response planning, and resource mobilization to address vulnerability, risk, and disruption to lives and livelihoods. Primary limitations to

risk assessments such as the Words Into Action Guidelines and the MIRA—as with many humanitarian assessments—relate to issues of sovereignty, integration, and timing (5). Other guidelines and processes related to risk assessment also exist within other organizations. For example, the International Federation of Red Cross and Red Crescent Societies (IFRC), World Bank and UN entities such as the World Food Programme (WFP), World Meteorological Organization (WMO), and Office for the Coordination of Humanitarian Affairs (OCHA), have operational protocols for preemptive action conditioned on inherently uncertain forecasts (6, 7).

Although these guidelines and protocols have led to advancements in disaster-risk reduction at the global level, it's not clear how well they apply to compound disasters. For example, gaps exist in guidance specific to prioritization of resources for various disaster impacts occurring at local levels (such as communities, cities, districts) within multi-hazard scenarios across a larger geographic scale (8). At the same time, the ability to anticipate and respond is constrained by a lack of available resources at the right place at the right time, limited governance and accountability, and an underestimation of uncertainty in forecasts for both climate and societal impacts, including social, economic, political, and infrastructural. The COVID-19 crisis further decreases disaster resilience and thus increases baseline risk and the potential scale of impacts on systems, lives, and livelihoods, which in turn increases vulnerability to future disasters.

To make better use of risk information, we need sustainable, flexible funding mechanisms from a replenishable pot at national and/or global levels. This is something organizations have started to consider and in some cases initiate. For example, the IFRC, with support from the Red Cross Red Crescent Climate Centre and German Red Cross, has implemented Forecast-based Financing (FbF) since 2015 and in 2018 established a multilateral funding mechanism for anticipatory action that expands the scope of the IFRC Disaster Relief Emergency Fund (DREF). Similarly, until recently, the UN's Central Emergency Response Fund was almost exclusively used for activities in response to disasters and emergencies (7). Building a financial mechanism that is distinct from project and development funds—one that disburses funds based on forecasts of critical need and replenishes those funds based on risk assessments of future impacts—has already produced some well-structured and governed mechanisms. Examples include measures taken ahead of impacts from flood in Bangladesh (9) and dzud (a period of extreme drought and cold) in Mongolia (10). We need to further develop such mechanisms to address compound risks and complex emergencies.

Pandemic Lessons Learned

It's critical to learn from pandemic-related compound risks, both locally and globally. For instance, in April 2020, Tropical Cyclone Harold wreaked havoc on small-island developing states in the Pacific. The COVID-19 pandemic meant that emergency preparation and

response faced barriers—experts were not able to arrive in advance of the storm, nor could they arrive quickly afterwards (11). Furthermore, COVID-19-related shifts in global and regional shipping and transportation led to a lower than usual number of resources (such as personal protective equipment, food, masks) to be deployed immediately after the storm, and national and international responders had to deal with quarantine restrictions both immediately after and at various intervals throughout response and recovery (12, 13).

Similarly, the compounding impacts from a 5.3-magnitude earthquake in Croatia last March led to a complex set of dilemmas for many Croatians owing to the ongoing pandemic. Even as they sought to minimize COVID-19 exposure by avoiding buildings and crowds, they sought to avoid dangerous building collapses as they fled from their homes into crowded city streets. How would this single disaster risk-reduction action (fleeing their homes) increase the risk of another crisis, in this case a COVID-19 infection? Croatian Minister of Health Vili Beros noted that although the earthquake is dangerous, “coronavirus is more so.” His declaration raised additional questions about how to best prioritize actions in the face of multiple disasters (14). Such dilemmas suggest that the disaster-risk community should start to compile insights for future compound risk scenarios. For example, lessons from both Cyclone Harold and the seismic event in Croatia could have been better applied in India and Bangladesh to prepare for Cyclone Amphan, by establishing quarantine protocols in advance that were designed specifically for disaster responders (15).

We must also identify “weak points” within critical infrastructures and socioeconomic networks that societies depend on (16). Understanding stress tolerances and vulnerabilities of these networks is key (17); it is likely that some disasters, such as pandemics, lower the resilience of these networks and expose them to the risk of critical failure, leading to weaker social and civic capital to leverage in crisis response, difficult economic circumstances that reduce availability financial resources in affected areas, and reduced capacity of critical infrastructure such as hospitals. This would exacerbate the challenges for emergency response in a compound disaster scenario. If these network stresses and thresholds are misunderstood, there is a heightened risk of unanticipated cascading impacts resulting from subsequent effects on interconnected systems, such as food systems (including production and distribution), health care, cultural norms, transportation networks, or, as with COVID-19, supply chains and economic activity as a whole.

COVID-19 has also emphasized how social disparities lead to differential impacts, a reminder that the Sendai Framework and current risk assessments do not adequately address structural inequalities or social injustice (18). For example, in the United States and other nations, much more could have been done to identify the potential direct and indirect impacts of the COVID-19 pandemic on disadvantaged persons and to prioritize impact assessments on underserved,

underrepresented, and adversely impacted communities (19). In summary, social justice must be a more central part of our frameworks, assessment, and anticipatory action.

Taking Action

We must also find ways to better communicate about compound risk and the need for improved assessments to a wider public and policymakers. For members of the public to support and participate in emergency measures, they need to understand what’s at stake and how and why forward-looking action can be effective. To mitigate impacts from future disasters, it is critical to identify structural elements, whether political, cultural, or economic, that hinder improved risk-assessment processes and governance around compounding disasters (20). Furthermore, risk assessments must better capture the roles of decision making dynamics at multiple levels of government and how these dynamics also influence risk reduction and crisis management strategies.

Researchers and policymakers can take multiple steps to better our response. Collaborative dialogue among

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experts, decision makers, the media, and communities is critical for effective risk communication. In this era of deliberate misinformation, it is especially important to partner with trusted community groups, engage in multiple communication approaches, and clearly communicate what’s known, what’s not known, and why. Cognitive science can help in understanding how to frame these narrative approaches in a way that takes into account mental models and biases and builds trust to drive action (21). We should move past merely providing decision makers and citizens with potentially useful data, such as overlapping maps of various hazard types; risk researchers should tailor their explanations to the questions the public and decision makers are asking—which many times are nonbinary in context and involve complex analysis of who, where, and when in prioritizing disaster risk preparedness and response activities.

We need to create and redesign the institutional rules and administrative structures of response organizations and research institutions. They should be able to nimbly integrate multiple types of data and information into resource deployment and decision-making. Doing so successfully entails streamlining bureaucratic channels for cross-organizational collaboration, as well as promoting organizational cultures that encourage cross-disciplinary and multi-stakeholder planning. We can facilitate this by developing analytical frameworks and planning strategies that are more interdisciplinary and employ systems-thinking vis-a-vis compound disasters and their cascading impacts. This could include bringing in community groups and

universities, as well as convening discussions that break down silos. Anticipatory action should be a top priority, with contributions from public health, climate science, social work, law, and other realms. This type of enhanced collaborative network approach has been increasingly used in peace-building and natural-resource management, for example, in areas impacted by mining, environmental contamination, climate change, and social conflict (22).

Diverse cooperative networks should be involved, such as religious groups and neighborhood-focused grassroots organizations. For example, environmental justice organizations such as West Harlem Environmental Action, Inc. (WE ACT for Environmental Justice [WEACT]) in northern Manhattan provided advice, resources, and advocacy for vulnerable citizens in the face of extreme heat and COVID-19 (23). With a paucity of governance structures for risk assessments that are specific to compound risk scenarios and complex emergencies, we have an opportunity and a responsibility to build these in an equitable and inclusive way.

To make this all work we need new forward-looking, flexible funding mechanisms and strategies. These strategies should incentivize and strengthen the ability of institutions (public, private, civic, and academic) that currently work on specific risks to cooperate on risk assessment and disaster preparation that address compound risks. Current funding tends to focus on single-hazard types of disasters, such as floods, heat waves, and the effects of volcanic ash. However, there are signs of change, with initial steps from organizations such as the Global Risk Financing Facility, which

is providing three to five grants of up to \$15 million for development of financial mechanisms focusing on lending operations to dampen the impact from compound shocks (24).

Additional areas that need funding include 1) combined natural and social scientific core research on dynamics of compound disasters, especially in complex emergency settings, 2) urgent and/or short-term technical assistance for governments and other frontline actors, and 3) longer-term secondments for researchers to work in operational settings, as well as for decision makers to contribute to research agendas and projects that address pressing problems on the ground. This would support a two-way, iterative process between research and action that improves both.

Finally, but very importantly, concerns about social justice and inequities should be integrated into each of the recommendations above. The COVID-19 crisis once again highlights that social disparities linked to racism and exclusion enhance vulnerability to other risks (25). These inequalities heighten the risk and magnitude of compound disasters and complex emergencies, severely impacting the very communities that are least equipped to handle them. This compounding effect, as COVID-19 has made abundantly clear, makes society as a whole more vulnerable. Governments and institutions would be wise to devote more resources to addressing the social injustice and structural inequalities that lead to this vulnerability in the first place.

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