



Lessons learned from COVID-19 response for disaster risk management

Adil Ashraf^{1,2}

Received: 8 December 2020 / Accepted: 20 February 2021 / Published online: 8 March 2021
© The Author(s), under exclusive licence to Springer Nature B.V. 2021

Abstract

Decision and policy makers in disaster management are compelled to look at alternative measures during the COVID-19 pandemic. They require integrated measures to both reduce the spread of COVID-19 and response to disasters. The measures to mitigate damage of disaster amid COVID-19 can become expensive and inefficient compared to single disaster responses, resulting in delays. Hence, a balance is crucial to successfully manage co-occurring disasters, and new holistic approaches are necessary to produce efficient responses during the COVID-19 outbreak.

Keywords COVID-19 · Disaster · Risk · Hazard · Management

1 Introduction

The global context towards sustainable development has essentially changed with the 2019 severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2 or COVID-19) pandemic. The world faces the greatest social, economic and environmental challenges (UNDP 2020). COVID-19 emerged from a probable zoonotic origin in the Hubei province of China in early December 2019. It rapidly spread throughout the world and was declared a pandemic by the World Health Organisation (WHO) on 11 March 2020 (WHO 2020a). As of 6 February 2021, the WHO reports 104,370,550 million confirmed cases and 2,271,180 confirmed mortalities in 223 countries across the globe (WHO 2020b). This pandemic is characterised by its rapid spread, differential recovery rate and susceptibility to elderlies and people with weak immune system (Shaw et al. 2020). This outbreak was declared as a public health emergency of international concern (PHEIC) by the WHO on 30 January 2020 and therefore requires an integrated international response (Kelland and Nebehay 2020). It is not just a health crisis but also a humanitarian and developmental challenge. It has severely affected the social, economic and environmental progress of countries with high rates of poverty, fragility and conflicts (UNDP 2020).

✉ Adil Ashraf
ashraf_adil@outlook.com

¹ IHE, Institute for Water Education, Westvest 7, 2601DA Delft, The Netherlands

² Ghent University, Coupure Links 653, 9000 Ghent, Belgium

COVID-19 as a health emergency has introduced many challenges to disaster management as disasters strike simultaneously during the pandemic (Chatterjee et al. 2020; Phillips et al. 2020). The restrictions imposed for COVID-19 can significantly constrain the flood emergency and recovery responses. One example of this is the impact of the COVID-19 lockdown as it reduces the measures for flood risk management in Bihar, India (Khan 2020). This can exacerbate the risks associated with flooding in the monsoon season in the region. As a result, the affected areas can become epicentres of the pandemic explosion (Htoon et al. 2020). With dual hazards, the concerned authorities are confronting unprecedented challenges to manage co-occurring disasters (Amarnath 2020; Quigley et al. 2019). In Bangladesh, the authorities faced challenges in implementing social distancing and other preventive measures for COVID-19 amid the cyclone Amphan (Htoon et al. 2020). In India, there is a double-edged problem of regular flooding and rising COVID-19 cases in crowded slums during monsoon season (Hollingsworth 2020). There are many lessons the world can learn from such a serious outbreak, which can be applied to compose efficient disaster management system (Chatterjee et al. 2020; Quigley et al. 2019). For instance, countries with early warning systems for floods such as Nepal used these systems for COVID-19 risk communication with its population (Htoon et al. 2020) which helped to efficiently contain the spread of the virus, comparatively to other South Asian countries such as India, Bangladesh and Pakistan (WHO 2020c). In addition, effective cooperation is also important at the national, regional and international levels. The role of communities, stakeholders and governments at the local level is gaining importance in response to floods amid COVID-19 due to imposed travel restrictions for the outside world (Htoon et al. 2020). The main response challenges to simultaneously address multiple disasters are response preparedness and trade-offs, compounded susceptibilities of vulnerable groups, and cooperation with civil society and frontline workers. There is also a need to revise standard operating procedures (SOPs) and contingency plans to enhance multi-hazard disaster management system (UNDRR 2020a). This pandemic therefore offers an opportunity to make the world resilient to multiple hazards by systematically evaluating lessons learned from the COVID-19 response for disaster risk management.

2 Multiple disasters amid COVID-19

Managing disasters amid the COVID-19 pandemic is an emerging challenge (Phillips et al. 2020). In situations where disaster managers are dealing with multiple disasters at once, response to one disaster can exasperate another disaster. An example of this is the hindrance to safe evacuations during flooding due to the COVID-19 travel restrictions (UNDRR 2020a).

Only a few months after the COVID-19 pandemic was declared, various climate hazards have been reported within the timescale of the pandemic, endangering public health and infrastructures further. As the nature of threats varies and such hazards are ubiquitous throughout the world, it has become a global problem. Many hazards are already causing interruptions or probably will do so in the coming months (Fig. 1 based on dataset provided in the supplementary file). The most immediate hazards are storms, floods and droughts resulting in disruptions amidst the pandemic (Phillips et al. 2020). The category 5 tropical cyclone Harold passed over the Solomon Islands, Vanuatu, Fiji and Tonga within less than a month after the start of the outbreak causing widespread destruction in large areas of these developing island nations (UNDRR 2020a; WMO 2020). Flooding in Ottawa

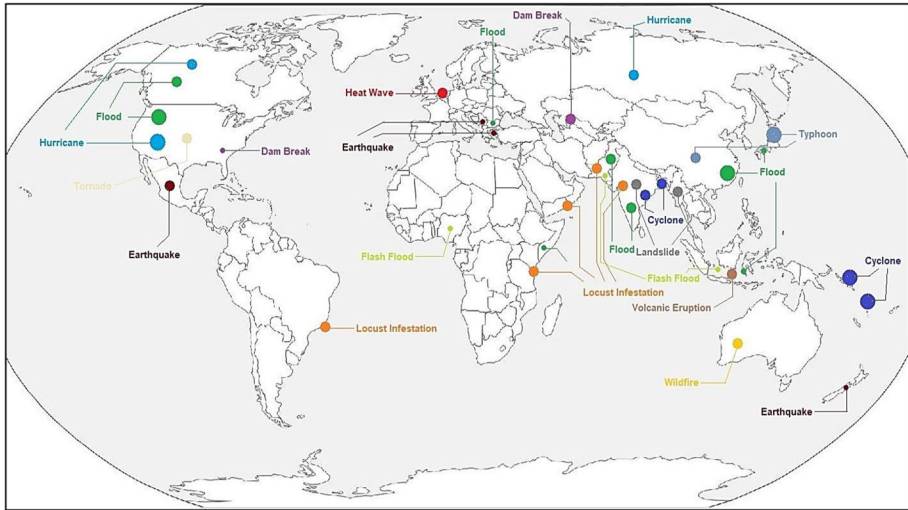


Fig. 1 Climate hazards during the COVID-19 outbreak throughout the world for the period October 2019 - August 2020 based on dataset provided in the supplementary file. Only a few months following the COVID-19 pandemic, various climate hazards have reported with the pandemic and endangered public health and infrastructure

City and the province of Manitoba in Canada was exacerbated due to the pandemic restrictions and preventive measures (Manitoba 2020; Ottawa 2020). The authorities in Japan stopped receiving volunteers for rehabilitation works due to COVID-19 in areas damaged by Typhoon Hagibis. This eventually delayed the disaster recovery operations (CB 2020; CWSJ 2020; NCSW 2020; Osumi 2020). The government and humanitarian assistance organisations faced a dual challenge of managing cyclones and COVID-19 in highly dense refugee camps in Cox' Bazar, Bangladesh (ISCG 2020). The local authorities in South Africa struggled in implementing physical distancing to prevent the spread of COVID-19 in informal settlements during flooding events. Zimbabwe faced a serious shortage of water due to drought causing food insecurity amid COVID-19. This subsequently affects the South African countries where public and emergency services are stretched and response to dual disasters is further impaired (FEWSNET 2020). Extreme heat waves, as already experienced in Florida and the south-western United States (US), can affect emergency services and hospitals in cities. This can also result in high morbidity and mortality rates during the pandemic (NOAA 2020). In addition, wildfires overlapped with response to the COVID-19 pandemic in the US causing disruption of preventive measures for wildfires and training programmes for firefighters (Groom 2020). This is already apparent in Australia where extreme bushfires have led to an increase in the COVID-19 morbidity rate (Wu et al. 2020).

3 Future strategic actions

New holistic approaches are required to effectively respond to disasters while managing the COVID-19 outbreak. This is especially so given the likelihood that the debilitating impact of the COVID-19 outbreak will endure for the longest in those countries least equipped to

build resilience. The complexity of the dual risks cannot be managed by a single agency. Instead, an integrated global effort is needed to create an efficient disaster response with support from aid agencies and the international community. Improper response to disasters during the pandemic can increase the spread of COVID-19 and worsen effects resulting in additional human losses and socio-economic damage. For example, response where adequate physical distancing is not observed can result in the spread of COVID-19 in responders, volunteers and other staff members of disaster management. In addition, response to disasters can be inadequate to reduce damage under strict COVID-19 measures. Hence, an in-depth assessment of disaster responses amid COVID-19 and lessons learned from COVID-19 response is needed in order to create an efficient disaster management for disasters striking simultaneously. It will help in devising policies and approaches to better manage co-occurring disasters of e.g., flooding in a future where COVID-19 may be endemic in populations.

4 Integrated policy response for multi-hazards management

An integrated policy is required for managing disasters during the pandemic. A few papers have been published in this regard for managing floods amid COVID-19 (Ishiwatari et al. 2020; Simonovic et al. 2021). New approaches (e.g., Fig. 2) would aim to protect the most vulnerable and empower all people to make informed decisions enhancing resilience and reducing vulnerability with emphasis on appreciating multi hazard early warning systems.

Human wellbeing and inclusiveness alongside multi hazard early warning systems must be incorporated in disaster management. The main goal must be to protect elderlies, disaster management staff and first responders. The focus should be on priority areas based on early warning and forecasting systems (Amarnath 2020; Quigley et al. 2019). Multi-hazard early warning systems has useful lessons for managing co-occurring disasters and therefore can further be studied. These systems assure the capacity and willingness to prepare for a worst-case scenario. Local authorities can ensure the implementation of preventive

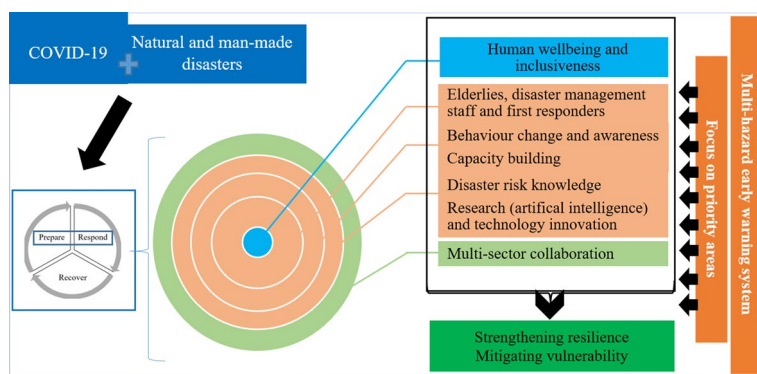


Fig. 2 Integrated policy response for managing disasters amid the COVID-19 pandemic. *Source:* Author

measures for COVID-19 to protect staff from the risk of infection. In addition, vulnerable populations need specific attention in disaster management. These groups are at high risks amid disasters and also during the pandemic (CWSJ 2020; UNDRR 2020b; UN-Habitat

2020). Local communities can play a vital role in response to disasters in the pandemic (UN-Habitat 2020) and can also be involved in capacity building. Local governments must support autonomy and enhance the capacity of local communities to respond to such disasters by improving technical and financial support (Ishiwatari 2012). Effective disaster risk knowledge and use of technology is essential in reaching and engaging communities in response operations (Quigley et al. 2019). It would also help in raising public awareness for implementing and improving community-based actions such as social distancing and self-awareness. Focus can also be given to machine learning and deep learning based simulation methods for disaster management. The involvement of scientists and WASH (water, sanitation, hygiene) experts would be beneficial. Multi-sector coordination is crucial particularly water, sanitation, emergency and healthcare sectors for an effective response (Htoon et al. 2020; GWOPA 2020). All these aspects would help in enhancing resilience and reducing vulnerability of the society. To conclude, a balance is crucial to successfully manage co-occurring disasters, and new holistic approaches are necessary to produce efficient responses during the COVID-19 outbreak.

Acknowledgements The author thanks the Erasmus+ International Master of Science in Environmental Technology and Engineering (IMETE) for supporting the MSc programme at UCT Prague (Czech Republic), IHE Delft (Netherlands) and Ghent University (Belgium). The author also expresses his gratitude to Deltares (Netherlands) for providing support during the summer internship project on which this paper is based on.

Compliance with ethical standards

Declarations All views expressed in this paper are of the authors own and do not necessarily reflect the official positions of his affiliated organisations.

Conflicts of interest The author declares that there is no conflict of interest.

References

- Amarnath, G.: Why nations must prepare for natural disasters amid the current Covid-19 pandemic. Water Risks and Development Resilience (WRDR), International Water Management Institute (IWMI). <https://www.iwmi.cgiar.org/2020/04/why-nations-must-prepare-for-natural-disasters-amid-the-current-covid-19-pandemic/> (2020). Accessed 10 August 2020
- CB: Damage by 2019 Typhoon no. 19. Cabinet Office. <http://www.bousai.go.jp/> (2020). Accessed 13 August 2020
- Chatterjee R, Bajwa S, Dwivedi D, Kanji R, Ahammed M, Shaw R (2020) COVID-19 risk assessment tool: dual application of risk communication and risk governance. *Progr. Dis. Sci.* 7:100109. <https://doi.org/10.1016/j.pdisas.2020.100109>
- CWSJ: Lessons from Hagibis: learning to cope with intensifying disasters in the age of new normal. Church World Service Japan. <https://www.preventionweb.net/publications/view/70765/> (2020). Accessed 17 August 2020
- FEWSNET: Zimbabwe famine early warning systems network. Famine Early Warning System Network. <https://fews.net/southern-africa/zimbabwe/> (2020). Accessed 18 August 2020
- Groom, N.: Trump administration halts wildfire prevention tool in California over coronavirus. Reuters. <https://www.reuters.com/article/> (2020). Accessed 8 August 2020
- GWOPA: What water and sanitation operators can do in the fight against COVID-19? Global Water Operators' Partnerships Alliance. <https://gwopa.org/what-water-and-sanitation-operators-can-do-in-the-fight-against-covid-19/> (2020). Accessed 19 August 2020
- Hollingsworth, J.: How does India, a country of 1.3 billion people, have around 1,000 coronavirus deaths? CNN. <https://edition.cnn.com/> (2020). Accessed 6 August 2020

- Htoon, K.Z., San, S.S.S., Khan, M.S.A., Radhakrishnan, M., Zevenbergen, C.: Coping with flood disasters: new lessons from COVID-19? Myanmar Water Portal. <https://www.myanmarwaterportal.com/> (2020). Accessed 6 August 2020.
- ISCG: Cyclone emergency preparedness update. Inter Sector Coordination Group. <https://www.humanitarianresponse.info/en/operations/bangladesh/document/cyclone-emergency-preparedness-update-march-2020> (2020). Accessed 30 August 2020
- Ishiwatari M (2012) Government roles in community-based disaster risk reduction. In: Shaw R (ed) Community-based disaster risk reduction. Emerald Group Publishing Limited, Bingley, pp 19–33
- Ishiwatari M, Koike T, Hiroki K, Toda T, Katsube T (2020) Managing disasters amid COVID-19 pandemic: approaches of response to flood disasters. *Progr. Dis. Sci.* 6:100096. <https://doi.org/10.1016/j.pdisas.2020.100096>
- Kelland, K., Nebel, S.: WHO officials rethink epidemic messaging amid pandemic debate. <https://www.reuters.com/> (2020). Accessed 25 August 2020
- Khan, M.I.: COVID-19: Bihar flood control works stalled amid lockdown. Down To Earth. <https://www.downtoearth.org.in/news/water/covid-19-bihar-flood-control-works-stalled-amid-lockdown-70157/> (2020). Accessed 7 August 2020
- Manitoba: High water response activity: COVID-19 pandemic adaptations. <https://www.gov.mb.ca/> (2020). Accessed 12 August 2020
- NCSW: Suspending volunteer center for disaster management. Nagano Council of Social Welfare. <https://www.csw-naganocity.or.jp/> (2020). Accessed 12 August 2020
- NOAA: Global climate report—March 2020. National Oceanic and Atmospheric Administration. <https://www.ncdc.noaa.gov/sotc/global/202003/> (2020). Accessed 12 July 2020
- Osumi, M.: Experts urge rethink of disaster response measures as Japan battles coronavirus. The Japan Times. <https://www.japantimes.co.jp/news/2020/05/03/national/experts-urge-rethink-disaster-response-measures-japan-battles-coronavirus/> (2020). Accessed 13 August 2020
- Ottawa: Ottawa City, Flood preparations are well underway. <https://ottawa.ca/en/news/flood-preparations-are-well-underway/> (2020). Accessed 19 August 2020
- Phillips CA, Caldas A, Cleetus R, Dahl KA, Declet-Barreto J, Licker R, Merner LD, Ortiz-Partida JP, Phelan AL, Spanger-Sieffried E, Talati S (2020) Compound climate risks in the COVID-19 pandemic. *Nat. Clim. Chang.* 10:586–588. <https://doi.org/10.1038/s41558-020-0804-2>
- Quigley MC, Attanayake J, King A, Prideaux F (2019) A multi-hazards earth science perspective on the COVID-19 pandemic: the potential for concurrent and cascading crises. *Environ. Syst. Decis.* 40:199–215. <https://doi.org/10.1007/s10669-020-09772-1>
- Shaw R, Kim YK, Hua J (2020) Governance, technology and citizen behaviour in pandemic: lessons from COVID-19 in East Asia. *Progr. Dis. Sci.* 6:100090. <https://doi.org/10.1016/j.pdisas.2020.100090>
- Simonovic SP, Kundzewicz ZW, Wright N (2021) Floods and the COVID-19 pandemic—a new double hazard problem. *WIREs Water* 8:1509. <https://doi.org/10.1002/wat2.1509>
- UNDP: COVID-19: UNDP's integrated response. United Nations Development Programme. <https://www.undp.org/> (2020). Accessed 5 August 2020
- UNDRR: Combating the dual challenge of COVID-19 and climate-related disasters. United Nations Office for Disaster Risk Reduction. <https://www.undrr.org/> (2020a). Accessed 7 August 2020
- UNDRR: Leave no one behind in COVID-19 prevention, response and recovery. United Nations Office for Disaster Risk Reduction. <https://www.undrr.org/> (2020b). Accessed 10 August 2020
- UN-Habitat: UN-Habitat COVID-19: Key messages. United Nations. <https://unhabitat.org/> (2020). Accessed 22 August 2020.
- WHO (2020a) Rolling updates on coronavirus disease (COVID-19). World Health Organisation. <https://www.who.int/> (2020a). Accessed 6 August 2020
- WHO: Coronavirus disease (COVID-19) pandemic. World Health Organisation. <https://www.who.int/> (2020b). Accessed 6 February 2021
- WHO: Coronavirus disease (COVID-19) dashboard. World Health Organisation. <https://www.who.int/> (2020c). Accessed 6 August 2020
- WMO: tropical cyclone harold challenges disaster and public health management. World Meteorological Organization. <https://public.wmo.int/en/media/news/tropical-cyclone-harold-challenges-disaster-and-public-health-management/> (2020). Accessed 16 August 2020
- Wu X, Nethery RC, Sabath MB, Braun D, Dominici F (2020) Exposure to air pollution and COVID-19 mortality in the United States. Preprint *Serve Health Sci.* <https://doi.org/10.1101/2020.04.05.20054502>