Potential Non-Disasters of 2021

Abstract

Purpose: This short paper compiles some potential disasters that might not have happened in 2021 even though a major hazard occurred. No definitive statements are made of what did or did not transpire in each instance. Instead, the material offers a pedagogical and communications approach, especially to encourage deeper investigation and critique into what are and are not labelled as disasters and non-disasters—and the consequences of this labelling.

Design/methodology/approach: This short paper adopts a subjective approach to describing situations in 2021 in which a hazard was evident, but a disaster might not have resulted. Brief explanations are provided with some evidence and reasoning, to be used in teaching and science communication for deeper examination, verification, and critique.

Findings: Examples exist in which hazards could have become disasters, but disasters might not have manifested, ostensibly due to disaster risk reduction. Reaching firm conclusions about so-called "non-disasters" is less straightforward.

Originality: Many reports rank the seemingly worst disasters while research often compares a disaster investigated with the apparently worst disasters previously experienced. This short paper instead provides possible ways of teaching and communicating potential non-disasters. It offers an approach for applying lessons to encourage action on disaster risk reduction, while recognising challenges with the labels "non-disaster", "success", and "positive news".

Keywords

disaster risk reduction, lessons, mitigation, preparation, preparedness, prevention

Article Classification

Short Paper, Case Study

Introduction

The notion that a disaster cannot happen without people being affected is often traced back to Rousseau (1756). That is, environmental events, processes, and phenomena (often termed "hazards") exist, yet within many definitions, a disaster occurs only when adverse impacts on humanity are witnessed (Fritz, 1964; O'Keefe *et al.*, 1976; Quarantelli, 1985). Therefore, the argument goes, humanity can and should act to ensure that disasters do not occur, irrespective of the environment.

For example, on 14 August 2021 in Haiti, an earthquake produced a reported toll of 2,248 dead and 12,763 injured, categorizing the situation as a disaster (USGS, 2021b). It repeated the history of the 2010 Haiti earthquake in which vulnerability accrued over the long-term due to choices not to help people and a country prepare for a known seismic hazard (Mika, 2019). Many lessons should be learned and applied from failures to avert disasters, although often little changes fundamentally, as seen in Haiti's disasters.

Conversely, sometimes improvements do occur by applying disaster-related lessons (Glantz, 2015). Given how much discussion and analysis occurs after a disaster, typically reiterating similar lessons not applied, could improvements occur by compiling and communicating major hazards that did not necessarily become disasters? Fundamentally, could non-disasters help with teaching and communicating the importance of disaster risk reduction? Is it even productive to set up this question which creates a disputable disaster/non-disaster binary (see also Gaillard, 2022)?

To start exploring these questions, this manuscript compiles some potential disasters that did not happen in 2021 even when a major hazard affected people. Each potential non-disaster listed provides a summary of the situation and aspects for further investigation. The final section highlights teaching themes from the potential non-disasters. In the potential non-disasters described, no ranking is implied in the order presented. Disasters are frequently parameterised for ranking, with parameterisations and rankings then disputed (e.g. Marulanda et al., 2010). Useful future work would be examining and testing parameterisations, indices, and ranking systems for (potential) non-disasters.

In tandem, every example must remain open for discussion as any might represent a disaster in many ways. Hence, the title here of "Potential Non-Disasters". This list is for stimulating discussion, investigation, and critique to be used within education and science communication processes, not for making definitive statements. In particular, summaries (as always) miss nuances, details, depth, and direct experiences of people affected—especially when relying on brief media reports—which make the difference between a moniker of "disaster" or another term. In several examples, people died and infrastructure was destroyed, suggesting that it was a disaster for those directly affected, even if not more widely catastrophic or if not as disastrous as previous hazards in the same places.

Consequently, the question "Disaster for whom and in what way?" remains important (Aronsson-Storrier and Dahlberg, 2022; Quarantelli, 1985)—as with "Non-disaster for whom and in what way?" It could be better to refer to "less of a disaster" or "less disastrous" than to "non-disaster" or "disasters that did not occur". These vocabulary and communication issues must be addressed when trying to promote how disaster risk reduction might have led to "non-disasters", "successes", or "positive news", since such labels could be inaccurate and insensitive. Individuals, households, families, and localities can be devastated, even where wider-scale impacts are not documented. Critiquing terminology (e.g. Chmutina et al., 2021) must be part of the teaching and science communication discussion that this short paper aims to stimulate.

Some 2021 Disasters that Potentially Did Not Occur

Earthquakes and Tsunamis in Northern New Zealand

In northern New Zealand on 5 March, evacuations for tsunamis followed three earthquakes over moment magnitude 7.0. The earthquakes produced three measurable tsunamis, the highest wave for New Zealand being 0.31 metres (International Tsunami Information Center, 2021). Uninhabited Raoul Island experienced over 300 landslides and its measuring equipment was wrecked, so data are incomplete (Daly, 2021). Overall around New Zealand, there were no reported fatalities and minimal damage (Pearson, 2021) despite severe earthquakes, the potential for large tsunamis, and further hazards such as heat when people evacuated.

Despite the timely and successful evacuations, questions were raised about possible improvements to the alert and standdown systems (Pearson, 2021). Work would be useful to estimate the impacts if a major tsunami had resulted or if landslides or earthquake damage had blocked evacuation routes.

Cyclone Yaas in Bangladesh

Cyclone Yaas led to widespread damage across the Bay of Bengal (IFRC, 2021b). The storm made landfall in India on 26 May with six deaths reported and then three fatalities reported in Bangladesh (ECHO, 2021). In Bangladesh, the storm surge hit the coastline at a height of 1.8-2.4 metres, breaking embankments; affecting around 1.3 million people; and destroying 26,000 houses, 16,183 latrines/outhouses, and 1,986 water access points (IFRC, 2021b).

Yet Bangladesh was prepared for most hazard effects through the Bangladesh Cyclone Preparedness Program (Habib *et al.*, 2012)—with similar work in Odisha (Mohanty *et al.*, 2022)—prompting pre-emptive evacuations and up to 813 ready and trusted shelters plus 114 medical teams (Dhaka Tribune, 2021; The Daily Star, 2021). The evacuation centres were stated as being prepared for COVID-19 by using half their capacity to balance safety between infectious disease and cyclone hazards (Dhaka Tribune, 2021; The Daily Star, 2021). More detailed monitoring would help to understand the storm's impacts, the evacuation's impacts including who did not evacuate, and the return home in both countries.

Earthquake in Larissa, Greece

In Larissa in central Greece on 3 March, an earthquake with moment magnitude 6.3 at 8 kilometres depth (USGS, 2021c) destroyed roads and damaged infrastructure, most notably a school and a bridge (France24, 2021). Teachers safely evacuated the children from the school, likely preventing a disaster, while other residents safely evacuated into the streets. At least eleven people were injured (USGS, 2021c) and possibly one killed. After the initial earthquake, at least three significant aftershocks occurred, causing more damage.

This earthquake displayed ingredients to become a disaster. Even the evacuation could have posed a threat due to cascading hazards such as landslides and downed power lines (Tsionas *et al.*, 2016) as well as the COVID-19 pandemic (Gatopoulos and Kountouris, 2021). The reported limited consequences suggest that a disaster was avoided. Further investigation would help to know building codes in place and adhered to (see Sarhosis *et al.*, 2022) alongside the local knowledge regarding earthquake-related behaviour before, during, and after shaking.

Tropical Cyclone Ana in Fiji

45 days after Category 5 Tropical Cyclone Yasa made landfall on Fiji, Category 2 Tropical Cyclone Ana made landfall on 30 January. Ana's rain and storm surge led to coastal and inland flooding with agriculture and infrastructure damage (Fiji Meteorological Service, 2021; IFRC, 2021a). Two fatalities were reported, one from drowning and one unspecified (IFRC, 2021a), while several people remained unaccounted for in the immediate aftermath (Radio New Zealand, 2021). 14,755 evacuees moved into a total of 422 evacuation shelters despite 131 roads being closed directly after the storm, which seems to have saved lives, prevented injuries, and reduced disruption (IFRC, 2021a).

Despite this success, anecdotes indicated that Ana was labelled as Category 2, so some people underestimated its dangers and consequences (Radio New Zealand, 2021). Suggestions were made that

Ana's Category 2 was perceived as being of much less concern than previous storms at higher categories. Tropical cyclone categorization is based on wind speed, not flooding or flood potential, meaning that people might not fully recognise possible impacts (Kantha, 2006). More work could examine how swift, decisive, and disruptive the evacuation and sheltering were, who did not follow instructions and subsequent consequences, and how destructive or severe Ana might have been without any action.

Earthquake in Victoria, Australia

On 22 September, the region around Mansfield and Melbourne in Victoria, Australia experienced an earthquake with moment magnitude 5.9 and depth 12 kilometres (USGS, 2021a)—one of this area's most powerful tremors since 1966 (Lu, 2021; Davey and Wahlquist, 2021; Wahlquist, 2021). No injuries were reported despite many damaged buildings, especially in Melbourne (Cassidy, 2021; Wahlquist, 2021). Several aftershocks ensued, again with no casualties reported (Lu, 2021).

Improved and enacted building codes seem to have had a major impact on preventing more destruction. In 1979, updated codes enforced more earthquake-resistant new buildings (Davey and Wahlquist, 2021). In fact, Melbourne's pre-1979 buildings and districts appeared to be the most damaged, without precluding some damage to newer buildings and noting that significant earthquake destruction in this area remains a strong possibility (Geoscience Australia, 2019). Further work should map damaged buildings according to their age and code compliance while considering casualties that could have occurred such as from falling bricks, which killed many during Christchurch's 2011 shaking (Brower, 2017).

Cyclone Seroja in Western Australia

On 3 April, Cyclone Seroja formed as a tropical depression near Timor-Leste and Indonesia, and then strengthened leading to lethal disasters in both countries through flooding and landslides (World Bank, 2022). For Timor-Leste, roughly 33,000 households were affected, 4,500 homes were destroyed or damaged, and 41 people died (UNRCO, 2021). Indonesia experienced approximately 248 fatalities and many more injured, with over 66,000 homes damaged and over 510,000 people affected (UNRCO, 2021).

Next, Cyclone Seroja made landfall in Western Australia on 11 April as Category 3 (Australian Bureau of Meteorology, 2021). In the cities of Kalbarri and Northampton, about 875 buildings were damaged, of which 32 were beyond repair (Ramsey, 2021) leading to at least 9,300 insurance claims (Insurance Council of Australia, 2022). One death was reported, due to electrocution from a falling power line (Christmass, 2021).

Available and affordable insurance can reduce a disaster's impacts (Kunreuther, 1968). Australia also enacted evacuations before the cyclone's landfall (Knaus, 2021). Comparatively, the Indonesian government might have been late in issuing warnings (Bataona and Da Costa, 2021), while people there often lack resources to respond to warnings or for long-term disaster risk reduction. More investigation could uncover the vulnerability factors causing the differing outcomes in the different countries. Additionally, how much did landslides, more than wind and water, play a role in these outcomes?

Floods in the Netherlands

Europe's 2021 summer floods affected several countries, killing 242 people across Germany, Belgium, Romania, Italy, and Austria (Sky News UK, 2021). The Netherlands seems to have had infrastructure damage without casualties (Eddy *et al.*, 2021; Kottasová & Krever 2021). Across southern Netherlands, 12,658 insurance claims were submitted including 2,100 for vehicle damage and 1,250 for commercial damage (NL times, 2021).

While the Dutch Government understandably declared the floods to be an official disaster, the consequences were reduced through long-term readiness and pre-emptive action. On 16 July, the Dutch Government had issued a mass evacuation warning for Limburg province. A new preparedness project had been completed a year before, in which a 5.3-square-kilometre floodplain acts as a floodway to divert excess water away from cities (Erdbrink, 2021a; Erdbrink, 2021b). Overall, significant damage occurred, but the situation could have been far more severe.

It would be useful to examine local perspectives on whether or not this was a disaster, especially in comparison to other countries and past Dutch floods—and how long people had spent preparing before July 2021. As well, the slow-rise flood with more warning time in the Netherlands compared to flash flooding elsewhere might have made a difference in impacts.

Discussion and Conclusion

From 2021's potential non-disasters, three significant teaching themes emerge. They are all standard, obvious baselines of disaster risk reduction, yet they appear clearly in analysing the instances presented here with hazards but perhaps not disasters. Thus, they integrate well with using current events for disaster-related pedagogy and science communication, especially on the importance of and possibilities for averting disasters. They also encourage critiquing approaches to thinking about how and why disasters, non-disasters, and instances between these two are identified, labelled, parameterised, compared, indexed, and ranked. As with "annual reports" and lists of the year's worst disasters (e.g. Insurance Information Institute, 2022), as well as comparing a current disaster with the allegedly "worst" in the past, such decisions are typically made without critique, justification, or consistency. Nor are the usefulness and useability for practical purposes typically investigated. The analyses here are thus important for education, training, and communication to recognise that neither disaster nor absence of disaster is a fixed concept. Practical implications emerge from misidentifying or mislabelling them, such as compensation, liability, resource allocation for disaster risk reduction, and institutional mandates to get involved.

The first teaching lesson is that damage from some hazards can be reduced, such as for earthquakes in Australia, while others require avoiding the hazard possibly through evacuations and sheltering, such as for cyclones in Bangladesh. Typically, a combination of actions works most effectively, especially for a combination of hazards (e.g. Pescaroli and Alexander, 2015). This lesson should inspire people to ask "Since actions can avoid disasters, how can I determine which actions to use?", thereby embracing the vast field of disaster risk reduction.

Second, when individuals, households, families, and localities experience the same hazard with similar parameters, different societal outcomes can be witnessed. Cyclone Seroja illustrates, as worse outcomes were seen in Indonesia and Timor-Leste despite experiencing a less severe storm compared to Australia. Places' and people's disaster-related activities can alter the severity of a hazard's impacts and the hazardousness of an environmental process or phenomenon, which is foundational for disaster risk reduction (O'Keefe *et al.*, 1976).

Third, as a staple from disaster research (e.g. Ripley, 2007), perceptions, understandings, and past experiences of hazards affect individual and collective actions. Tropical Cyclone Ana demonstrates through the reports that, at Category 2, it might have been downplayed by some people after they had experienced a stronger recent tropical cyclone. As with the first two lessons, the teaching and communications direction should be to galvanise disaster risk reduction by showing that successes can be achieved by taking appropriate action.

Thinking about, examining, and analysing potential non-disasters for highlighting the three pedagogical lessons presented here can assist in a deeper and broader understanding of why disasters arise and how they ought to be stopped. Learning from past disasters (e.g. Egner et al., 2015) contributes to creating a better future of avoiding disasters (Glantz, 2015). Doing so is important for disaster education given that disasters can still be seen and reported as 'natural', 'unavoidable', 'unpreventable', or 'unpredictable'. They are often examined after it is too late, rather than considering situations that could have been disasters but were not, in order to learn from successes as well as failures (see also Dufty, 2020). Instilling a culture of critique within pedagogy, while questioning fundaments of what are and are not disasters (Aronsson-Storrier and Dahlberg, 2022; Quarantelli, 1985), helps to better reflect on what ought to be done to avert disasters while understanding and communicating the meanings of "disaster" and "non-disaster"—and how those meanings differ among groups and contexts.

The questions, as always for disaster risk reduction, are how to learn from the past without neglecting ongoing changes and how to focus on reducing vulnerabilities. The "non-disasters" material and approach in this short paper provides inspiration by demonstrating potential successes to be emulated while providing a pedagogical and science communication baseline to be examined, refined, and improved—all while ensuring sensitivity to those experiencing hazards. Continuing to compile, analyse, and critique potential non-disasters—alongside data (e.g. Marulanda et al., 2010) and vocabulary (e.g. Chmutina et al., 2021) used and not used—contributes to providing some answers and thinking critiquingly when teaching and communicating.

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