Annex

Adapting humanitarian action to the effects of climate change: An ALNAP lessons paper

ALNAP

ALNAP is a global network of NGOs, UN agencies, members of the Red Cross/ Crescent Movement, donors, academics and consultants dedicated to learning how to improve response to humanitarian crises.

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Technical contributions
The lessons paper benefited from the technical steer of Krishna Vatsa (Indian National Disaster Management Agency), Takeshi Komino (Asian Disaster Reduction and Response Network), Carol Devine (Médecins Sans Frontières), Manu Gupta (Sustainable Environment and Ecological Development Society), Puji Pujiono (Pujiono Centre, Indonesia), Gaëlle Nizery (EU Civil Protection and Humanitarian Aid Operations department), Catherine-Lune Grayson (International Committee of the Red Cross), Atle Solberg (Platform on Disaster Displacement), Eric Sam Vah (Plateforme d'Intervention Régionale de l'Océan Indien - French Red Cross) as well as ALNAP's secretariat under Alice Obrecht and Jennifer Doherty's supervision.

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1 Detailed methodology

1.1 Background

ALNAP Lessons Papers aim to improve the performance of humanitarian action by synthesising lessons from previous responses. These papers are aimed principally at agency and NGO staff who design and implement humanitarian responses.

This lessons paper aims to help humanitarian actors to respond to the effects of climate change on the frequency and severity of climate-related disasters and extreme weather events by identifying important lessons from previous complex disasters.

ALNAP commissioned Groupe URD, All India Disaster Mitigation Institute (AIDMI) and Prepare[1] to produce this lessons paper. The primary audience of the lessons paper will be staff (including country leads and technical leads) who design and implement humanitarian projects in low- and middle-income countries and want to understand how to take climate change into account in their work. The secondary audience is humanitarian policymakers who can help this first group to make changes.

1.2 Establishing the scope of the lesson paper

To understand the needs of these user-groups, the researchers interviewed humanitarian practitioners and held a focus group discussion with 16 farmers in India (men and women, including smallholders). This group was intended to represent the diversity of end-users. It was made up of:

- Representatives of Global South NGOs acting in countries already heavily impacted by climate change and working in disaster response, adaptation and/or preparedness programmes
- Representatives of international NGOs with significant experience in disaster response, adaptation and/or preparedness programmes
- Representatives of humanitarian UN agencies
- Representatives of the Red Cross/Red Crescent Movement, working at the operational level
- Representatives of a national disaster management agency (NDMA)/ civil protection organisation responding to climate change disasters and interacting with humanitarian agencies

- People who are affected by climate change crises and are the first responders in a disaster

This group of 13 interviewees is not sufficiently large for the results to be considered representative; rather, the aim was to gather qualitative rather than quantitative data.

The discussions were organised around the following questions:

- How is climate change affecting vulnerability in your area?
- Is your organisation acting on climate change, and if so, how?
- What do your colleagues need to know about in order to make their humanitarian work better?

The exchanges were structured around the following table:

	Existing climate change disasters			New disasters	Catastrophes
	Same "as usaual" (droughts, floods, etc.)	In different places or at a different time	More frequent and or intense	Heat waves, rising sea levels, glaciers melting, etc.	e.g. mega cyclone + Covid 19
Mitigation activities					
Adaptation programmes					
Anticipation programmes					
Preparedness programmes					

The interviewees confirmed that climate change is having an impact on the frequency and nature of crises where they are working. Extreme climatic events (floods, cyclones, droughts) are more frequent, sometimes combined, behave in new ways or create new kind of disasters (rising sea levels, melting glaciers, heatwaves, etc.). Some interviewees expressed concern that disasters of an unprecedented nature and magnitude could take place in the near future.

Climate change is having a wide variety of impacts throughout the world. Depending on where the interviewees worked, they had different priorities in terms of the type of climate change induced disasters (e.g. people working in the Sahel are more interested in new patterns of rainfalls; people working in India are more interested in new crises such as heatwaves). A sample of interviewees that reflected the relative global scale and impact of different climate effects would have to be very large indeed.

Overall, climate-related changes in disasters were making interviewees question their actions as humanitarian workers and how their organisations and the humanitarian system are responding to the climate crisis. The changing nature of emergencies means that humanitarians need to change the way they implement adaptation programmes, anticipatory programmes (early warning, early action) and crisis response. The interviews revealed that priority is given to adaptation, followed by anticipatory action and, to a lesser degree, response. Given the broad scope of the paper, the

research team together with ALNAP decided that mitigation of the impact of humanitarian aid was not a priority for this lessons paper as it was sufficiently covered by Groupe URD's previous work.[2]

1.3 Defining the research questions and sub-questions

One overarching research question emerged from the team's discussions and analysis:

> **On the basis of documentary evidence and expert knowledge, what changes are required in humanitarian action – policy, institutional structures, operations and programmes – to take account of the effects of climate change?**

The team used a series of criteria to select examples of disasters to ensure that the lessons paper was relevant – namely: the number of people affected (or at risk of being affected); disasters taking place in middle- and low-income countries; sudden-onset disasters, as they lead to urgent needs and more complex responses; the availability of learning/evidence for humanitarian action; and new types of climate change-related disaster.

On the basis of user interviews, preliminary discussions and an initial literature review, we decided to focus on two sub-questions:

- Specifically, what changes are required in humanitarian action (including adaptation, anticipation and response activities) to address known disaster types that are behaving in unexpected, atypical or new ways, as illustrated by tropical storm events?
- Specifically, what changes are required in humanitarian action (including adaptation, anticipation and response activities) to address new types of humanitarian disaster, as illustrated by heatwaves?

1.4 Criteria for what literature to include in the review

Type of studies

The research focused on literature produced between 2010 and 2021, and included academic articles, primary and secondary reviews, as well as grey literature such as evaluations and research papers (published and unpublished) produced by NGOs, international organisations, government agencies and think tanks.

Impacts of climate change on disasters

The nature of some disasters is changing as the result of climate change, causing new kinds of fragilities, new challenges for disaster response and

affecting new populations. Moreover, these 'new' types of disaster are less well documented than more 'traditional' disasters. The authors identified three disaster types:

1. 'Known disasters' – those of which we already have extensive experience and understanding but with new characteristics
2. 'Imperfectly understood disasters' – those that in some respects develop along familiar lines while in others present new, unexpected features that are difficult to predict
3. 'The unknowns' – Unprecedented, cascading or 'new' disasters, of which we have little or no understanding

The research focused on imperfectly understood and unknown disasters, using an example of each: tropical storms (typhoons, cyclones and hurricanes) and heatwaves, respectively.

Given that lessons from only two specific crisis types would not make it possible to respond to the more global question about adapting humanitarian aid to climate change, the research team also collected documents from non-specialised humanitarian literature to identify more general policy- and institutional-level lessons.

Geographic coverage

The research team gathered literature from various countries and continents (Asia, America, the Pacific and Latin America) in order to identify widely applicable lessons for the sector. Climate change is a global issue; however, as the primary audience for the lessons paper is staff working in humanitarian response in low- and middle-income countries (rather than people tackling climate change-related disasters in higher-income countries), the research team prioritised lessons from LMICs. The reviewed literature covered disasters in Africa, Asia (excluding G20), the Pacific (excluding G20) and Latin America (excluding G20).

Although lessons for addressing climate change challenges in higher-income settings were not a priority for the paper, some of the literature on disasters in higher-income contexts did offer transferrable lessons that could be applied in lower-income settings. As such, where the evidence-base in LMICs was sparse, the research team included evidence from higher-income contexts.

Types of responses

The lessons paper focuses on cross-cutting, policy level and structural changes, as well as changes needed at the response level. The changes are organised into two groups:

- Adaptation and resilience programming encompasses activities such as resilience building, disaster risk reduction, or climate change adaptation, which are seen as part of mitigation activities. These activities can take place at all levels, from the state/interstate level down to the community level.

- Early warning/early action, anticipation, preparedness and response includes activities at community, local, national or regional levels as well as preparedness, relief activities and emergency response.

1.5 Engaging an expert Advisory Group

The research team established a small expert Advisory Group, initially to confirm the above methodological choices. The Advisory Group served several different purposes, including:

- Reducing author bias by providing input on the most useful data to be extracted
- Supporting the synthesis process as part of the larger expert panel (described in Section 2) to ensure the final lessons are relevant for evidence users
- Contributing to evidence use by sharing the lessons paper with their networks.

The Advisory Group is partly based on the group of initial interviewees (13) and complemented with other experts and academics. Due to the type of issues covered by the lessons paper, the Advisory Group brings together perspectives from: field practitioners; policy; academia; experts of different genders; and experts from different regions affected by climate change.

The Advisory Group was included from the beginning to draw up questions and help to ensure that the final product was relevant and focused on the type of learning that staff designing and implementing humanitarian response need. The members also helped to reduce author bias by providing additional opinions on what type of issues were relevant to a specific topic. Advisory Group involvement in identifying important issues helped the authors to recognise when data was missing in the written evidence, thereby helping to identify evidence gaps.

Table 1: Advisory Group

Name	Affiliation
Krishna Vatsa	Indian National Disaster Management Authority
Takeshi Komino	Asian Disaster Reduction and Response Network
Carole Devine	Médecins Sans Frontières
Manu Gupta	Sustainable Environment and Ecological Development Society
Puji Pujiono	Puijiono Centre, Indonesia
Gaëlle Nizery	EU Civil Protection and Humanitarian Aid Operations department
Catherine-Lune Grayson	International Committee of the Red Cross
Atle Solberg	Platform on Disaster Displacement
Eric Sam Vah	Plateforme d'Intervention Régionale de l'Océan Indien – French Red Cross

1.6 Search method

Searches were carried out in English, but some documents gathered through other means (social media, interviews) were in French, Spanish or local Indian national languages.[3]

The search was conducted in two rounds for each of the three focus areas (general lessons, tropic storms and heatwaves) – the first using academic databases; and the second using the ALNAP HELP Library, recommendations from key informants and 'snowball sampling' from documents in the first round. The second round of searching aimed to consider specific questions and address specific gaps in the academic database search.

With respect to academic databases, the research team's first choice was Google Scholar. This database searches a greater number of documents than any other, includes both peer reviewed and grey literature, and searches the full text of documents. However, as Google Scholar does not allow multiple AND/OR fields, Web of Science was used when these strings were required.

Table 2: Search strings

Title	Search string	Databases
General lessons	Tags: ("climate change" AND "humanitarian") AND (Strateg* OR Policy OR Financ* OR fund*). Date: 2010-2021 Resource type: "Evaluation reports'' & "Research, reports and studies". Date: January 2016 to present. Tags: "climate" Resource type: "Evaluation reports". Tags: "early warning" OR "DRR" OR "Disaster preparedness" OR "Humanitarian Development Peace Nexus" OR "Resilience". Dates: January 2016 "Climate: Climate change adaptation" AND "Climate: R4 Rural resilience initiative" "Disaster Preparedness" OR "Disaster Risk Reduction"	Google Scholar ALNAP HELP Library Other databases (WFP, FAO, IFRC, START)
Tropical storms	"climate change" AND (cyclone* OR hurricane* OR typhoon* OR Storm*) AND ("early warning" OR "earlyaction" OR anticipation OR Adaptation OR resilience OR DRR OR "disaster risk reduction" OR Preparedness OR Response)	Web of Science ALNAP HELP Library Other databases (ODI, IFRC, WHO, Future Climate For Africa, ASSAR)
Heatwaves	heatwave AND "climate change" AND adaptation OR resilience OR DRR OR "Disaster risk reduction" OR anticipation OR "early warning" OR "early action" OR response	Google scholar ALNAP HELP Library

1.7 Screening the search results

The research team undertook a two-part screening process to select documents for analysis.

First, the team reviewed the titles and abstracts of all documents identified through the search. Second, the research team reviewed the full text of these screened documents and excluded or included them using the following criteria:

- Exclude: articles that do not relate to disasters (hazard events affecting multiple people at one time).
- Exclude: articles that do not relate to disasters affecting human lives and/or livelihoods.
- Exclude: articles that do not have an evaluative component/present lessons (such as purely descriptive articles).
- Exclude: articles which do not provide a full explanation of the methodology used.

Through searches, 1,200 documents were identified for heatwaves, 661 for tropical storms and 604 for the global/general focus area. Based on the analysis of titles and abstracts of the documents, 1,151 documents for heatwaves, 581 for tropical storms and 526 global/general studies were excluded as irrelevant to the research question and scope of the study. Please see Table 6 in Section 5 for a table displaying more details of the search results and process.

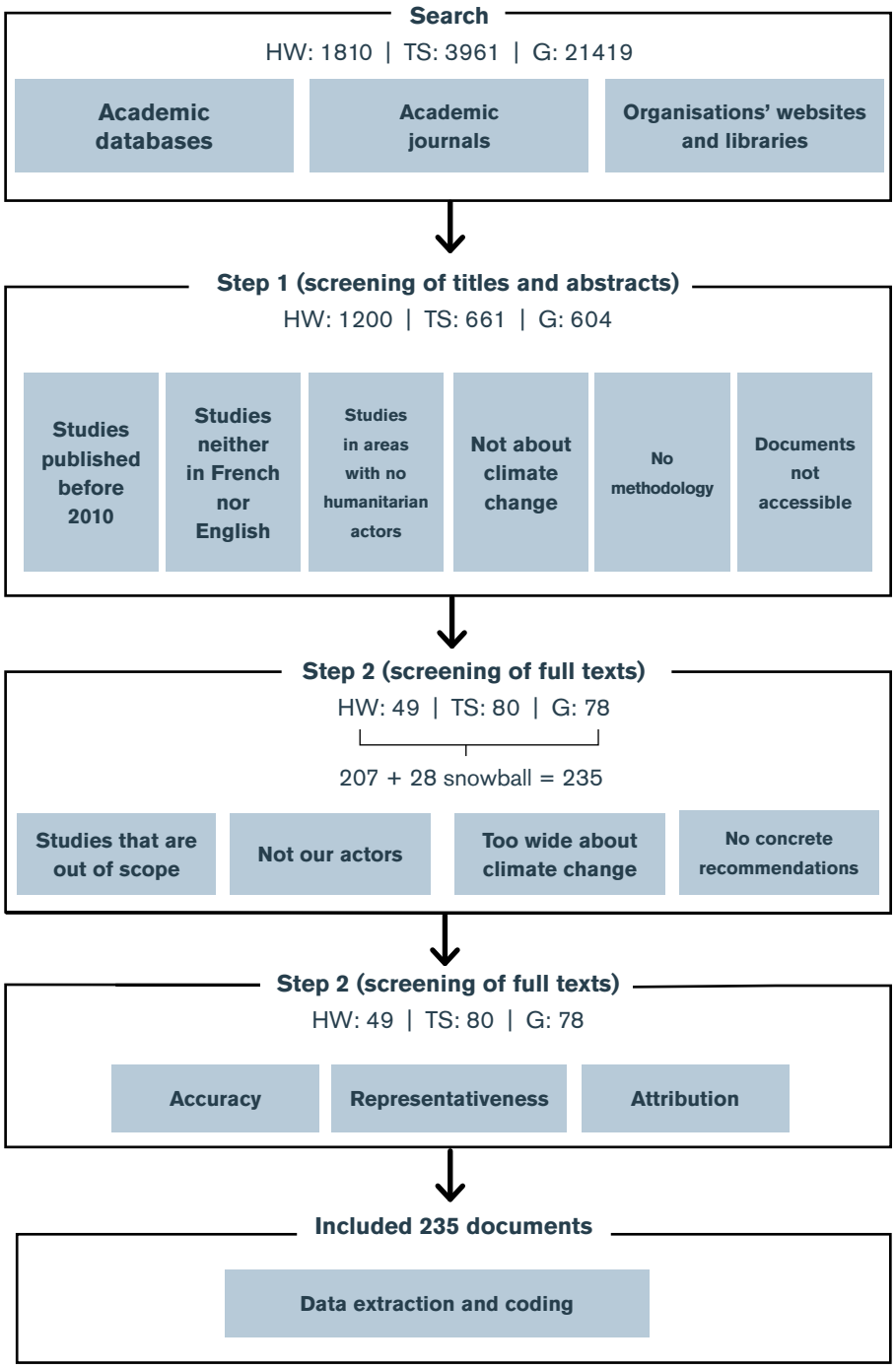
The remaining studies (heatwaves: 49; tropical storms: 80; global: 78) were organized into reference management software Zotero and another 28 were added through backward citation searches or shared by experts.

The approach adopted to review the global/general documents was slightly different, relying more on grey literature and backwards reviews. Of the 43 documents returned by the initial search that met the inclusion criteria, 17 did not contain any specific lessons, and so they were excluded. Of the remaining 26, a large number (15) related to issues of migration, and had been written before the creation of the 2016 Migration Compact. As a result, much of the argument in these documents had been overtaken by events, and so these documents were also excluded. This left 11 documents for review.

The authors then conducted a number of secondary searches. A search of the ALNAP HELP Library, using the parameters: Resource type - 'Evaluation reports' & 'Research, reports and studies'; Date – January 2016 to present; Tags; climate. returned 23 results, of which seven included a statement of methodology, and so were included for review. The authors also looked in the evaluation databases of organisations that had been associated with climate change programming in the initial literature review. In the World Food Programme evaluation database, filtering by topics 'Climate: Climate change adaptation' and 'Climate: R4 Rural resilience initiative', returned four results which were included for review. In the FAO database, none of the results using the search term 'climate change' were related to humanitarian response. In the IFRC database, the option of searching for evaluations related to climate change was not available.

Finally, recognising that the majority of actions undertaken by humanitarian organisations related to climate change involved resilience programming, disaster risk reduction, early warning/early action and anticipatory programming, the authors undertook a third round of database searches to find examples of evaluations or research that related to these forms of programming in situations that might be related to climate change (particularly floods and droughts). In the ALNAP HELP Library, the search Resource Type: 'Evaluation reports'; Tags: 'early warning'; 'DRR'; 'Disaster preparedness'; 'Humanitarian Development Peace Nexus'; 'Resilience'; Dates: January 2016 to present returned 157 results, of which all those addressing multiple countries (16) were included in the review. Searches of the IFRC database using the terms Disaster Preparedness and Disaster Risk Reduction for the same dates returned 12 responses. The authors chose four of these (every third result) for inclusion in the review. 'Snowball' searches, using the bibliographies of selected documents, and searches of the websites of 'FAO in

emergencies'; Start Network and the Centre for Disaster Protection provided another 36 documents that met the inclusion criteria and were included in the review. The total number of documents reviewed was 78.



1.8 Data extraction and coding

The selected documents were entered into a coding software MAXQDA. The team established an original coding system and left room to change the codes during the coding process. As such, the coding system evolved with the needs of the researchers throughout the analysis. The complete table of codes and their frequency (i.e. number of times the code was found in all the documents) can be provided on request to ALNAP.

Quality appraisal

The research team appraised the quality of each document used for the study according to its accuracy, representativeness and attribution.

Accuracy: Is the information a true reflection of the situation?

Does the methodology include measures to ensure the accuracy of information collected? For example, were surveys pre-tested, or, if the research uses interviews or a literature review, were there attempts to triangulate?

Yes, explicitly – 2
Partially/implicitly – 1
No – 0

Representativeness: Does the information reflect the whole situation under review or only a part of it?

Does the methodology include measures to ensure that the group or phenomenon studied were representative of the group or phenomenon under consideration? For example, if the research used a survey, does it explain how the sample was designed to be representative? If the research uses interviews, does it explain how interviewees were selected to achieve balanced representation?

Yes, explicitly – 2
Partially/implicitly – 1
No – 0

Attribution: Is there a clear connection between the information collected and the conclusions/recommendations?

Does the methodology include measures to ensure that any conclusions, lessons or recommendations are based on the results of the study process, and not on other factors such as coincidence or the assumptions of the researchers? For example, if the research concludes x leads to y, were other potential causes eliminated by some form of control, or by consideration of alternatives? If recommendations are made, are these based on clear examples of what has worked before, or are they based on what the researcher believes should work?

Yes, explicitly – 2
Partially / implicitly – 1
No – 0

Each document received an overall grade out of six, which was then translated into percentages (6/6 = 100%, 5/6 = 84%, 4.5/6= 75% 4/6 = 67%, 3/6 = 50%, 2/6 = 33%, 1/6 = 17%, 0/6 = 0%). Documents without methodologies were excluded from the initial literature review.

Table 3: Total number of documents at each quality appraisal grade

Grade	# documents
100%	99
84%	53
75%	1
67%	48
50%	25
33%	8
17%	1
0%	0
Total	**235**

Table 4 presents each document used for the literature review after exclusions, with their respective quality appraisal grade.[4]

1.9 Identifying, refining and evaluating the lessons

The authors analysed the data extracted from the literature to frame lessons relating to the three focus areas. Findings and recommendations were triangulated and used as the basis of lessons. These were then presented to the group of 17 experts, who were invited to evaluate the importance of the lessons proposed and to identify evidence gaps in the underlying analysis (Section 2). The research team integrated the comments provided and developed a confidence rating system that is displayed for each included lesson (Section 3). The final lessons and the supporting documents can be found in Section 4.

Table 4: Documents included in the final literature review (n = 235)

Heatwaves	
Title	QA Grade
Papathoma-Koehle, M. et al. (2016). A common methodology for risk assessment and mapping for south-east Europe: an application for heat wave risk in Romania.	100%
Bakhsh, K. (2018). Adaptation strategies for minimizing heat wave induced morbidity and its determinants.	100%
Otto, F. (2015). Attribution of extreme weather events in Africa: a preliminary exploration of the science and policy implications.	67%
El-Fadel, M. and Ghanimeh, S. (2013). Climate change and temperature rise in the Greater Beirut Area: implications on heat-related premature mortality.	84%
Yengoh, G. and Ardö, J. (2020). Climate Change and the Future Heat Stress Challenges among Smallholder Farmers in East Africa.	100%

Pasquini, L. et al. (2020). Emerging climate change-related public health challenges in Africa: A case study of the heat-health vulnerability of informal settlement residents in Dar es Salaam, Tanzania.	100%
Ngwenya, B. et al. (2018). Heat Stress and Adaptation Strategies of Outdoors Workers in the City of Bulawayo, Zimbabwe.	67%
Błażejczyk, A. et al. (2018). Heat stress mortality and desired adaptation responses of healthcare system in Poland.	100%
Savić, S. et al. (2018). Heat wave risk assessment and mapping in urban areas: case study for a midsized Central European city, Novi Sad (Serbia).	100%
Phung, D. et al. (2017). Heatwave and risk of hospitalization: A multi-province study in Vietnam.	100%
Zander, K. et al. (2019). Human mobility intentions in response to heat in urban South East Asia.	100%
Agathangelidis, I. et al. (2019). Integrating Urban Form, Function, and Energy Fluxes in a Heat Exposure Indicator in View of Intra-Urban Heat Island Assessment and Climate Change Adaptation.	100%
Hess, J. and Ebi, K. (2016). Iterative management of heat early warning systems in a changing climate.	67%
Ebi, K. and Otmani del Bario, M. (2017). Lessons Learned on Health Adaptation to Climate Variability and Change: Experiences Across Low- and Middle-Income Countries.	67%
Krkoška Lorencová, E. et al. (2018). Participatory Climate Change Impact Assessment in Three Czech Cities: The Case of Heatwaves.	100%
Hanif, U. (2017). Socio-Economic Impacts of Heat Wave in Sindh.	100%
Kazak, J. (2018). The Use of a Decision Support System for Sustainable Urbanization and Thermal Comfort in Adaptation to Climate Change Actions—The Case of the Wrocław Larger Urban Zone (Poland).	100%
Cavan, G. et al. (2014). Urban morphological determinants of temperature regulating ecosystem services in two African cities.	100%
Keramitsoglou, I. et al. (2017). Urban thermal risk reduction: Developing and implementing spatially explicit services for resilient cities.	100%
Das, S. and Smith, S. (2012). Awareness As An Adaptation Strategy For Reducing Mortality From Heat Waves: Evidence From A Disaster Risk Management Program In India.	84%
Hess, J. et al. (2018). Building Resilience to Climate Change: Pilot Evaluation of the Impact of India's First Heat Action Plan on All-Cause Mortality.	100%
Harlan, S. and Ruddell, D. (2011). Climate change and health in cities: impacts of heat and air pollution and potential co-benefits from mitigation and adaptation.	100%
Kapwata, T. et al. (2018). Current and Potential Future Seasonal Trends of Indoor Dwelling Temperature and Likely Health Risks in Rural Southern Africa.	100%
Flores-Larsen, S. and Filipin, C. (2021). Energy efficiency, thermal resilience, and health during extreme heat events in low-income housing in Argentina.	100%
Oppermann, E. et al. (2017). Heat, health, and humidity in Australia's monsoon tropics: a critical review of the problematization of 'heat' in a changing climate.	67%
McGregor, G. et al. (2015). Heatwaves and health: guidance on warning-system development.	100%
AMC. (2018). Ahmedabad Heat Action Plan 2018.	67%
Lowe, D. et al. (2011). Heatwave Early Warning Systems and Adaptation Advice to Reduce Human Health Consequences of Heatwaves.	67%
Price, R. et al. (2021). Initiating a Multi-Party Collaboration for Adaption and Resilience to Urban Heatwaves: A Report Prepared for the Netherlands Organisation for Scientific Research : NWO Grant Number KI.18.043	100%

Yang, L. et al. (2020). Local actions to health risks of heatwaves and dengue fever under climate change: Strategies and barriers among primary healthcare professionals in southern China.	100%
Ziegler, T. et al. (2019). Shifting from "Community-Placed" to "Community-Based" Research to Advance Health Equity: A Case Study of the Heatwaves, Housing, and Health: Increasing Climate Resiliency in Detroit (HHH) Partnership.	100%
Zografos, C. et al. (2016). When exposure to climate change is not enough: Exploring heatwave adaptive capacity of a multi-ethnic, low-income urban community in Australia.	84%
ASSAR. (2019). ASSAR. Adaptation at Scale in Semi-Arid Regions 2014-2018.	100%
IFRC. (2019). City Heatwave Guide for Red Cross Red Crescent Branches.	67%
Peters, K. et al. (2015). Climate extremes and resilient poverty reduction.	100%
De Perez, E. et al. (2018). Global predictability of temperature extremes.	84%
Kirbyshire, A. and Aditi, P. (2017). Heat action plans: Scaling up India's ambition to protect the climate-vulnerable.	67%
IFRC. (2019). Heatwave Guide for Cities.	84%
Meier, C. and Abreha, A. (2019). Inter-Agency Humanitarian Evaluation of the Drought Response in Ethiopia.	100%
UNISDR. (2010). Emerging Challenges for Early Warning Systems in Context of Climate Change and Urbanization..	84%
Martinez, G. et al. (2020). Protect the vulnerable from extreme heat during the COVID-19 pandemic.	67%
Harlan, S. et al. (2006). Neighborhood microclimates and vulnerability to heat stress.	84%
Raven, J. et al. (2018). The Assessment Report for Climate Change in Cities (ARC3-2) Urban Planning and Design.	84%
NRDC. (2013). Rising Temperatures, Deadly Threat: Recommendations for Ahmedabad's Government Officials.	84%
Dicker, S. et al. (2021). Saving Lives and Livelihoods: The Benefits of Investments in Climate Change Adaptation and Resilience.	84%
Tropical storms	
Citations	QA Grade
Dasgupta, S. et al. (2014). Cyclones in a changing climate: the case of Bangladesh.	67%
IFRC. (2020). Addressing specific vulnerabilities through integrated climate and disaster risk governance: Lessons from the Philippines.	100%
Wilkinson, E. et al. (2018). 'Building Back Better': A Resilient Caribbean after the 2017 Hurricanes.	33%
Sarsycki, M. (2019). Building Resilience and Shaping the Future: Lessons Learned from the Experiences of Cyclone Idai in Southern Malawi.	100%
The Royal Society. (2014). Resilience to Extreme Weather.	100%
Kuroiwa, J. (2004). Disaster Reduction: Living in Harmony with Nature.	100%
Peters, K. et al. (2020). Climate Change, Conflict and Fragility: An Evidence Review and Recommendations for Research and Action.	84%
Duncalf, J. (2013). Final Independent Evaluation of the Coordinated Humanitarian Assistance to the populations most affected by tropical storm WASHI.	84%
Chang, C. (2011). Preparedness and storm hazards in a global warming world: lessons from Southeast Asia.	67%
Ovington, K. et al. (2017). Humanitarian Assistance In The Pacific: An Evaluation of the Effectiveness of Australia's Response to Cyclone Pam.	100%

Asian Development Bank. (2012). Intense Climate-Related Natural Disasters in Asia and the Pacific.	84%
Baker, J. (2020). Inter-Agency Humanitarian Evaluation of the Response to Cyclone Idai in Mozambique.	100%
Zurich Flood Resilience Alliance. (2020). Learning from Cyclone Idai and Cyclone Kenneth to Inform Long-term Disaster Risk Reduction Programming in Mozambique.	67%
Hirano. S. (2012). Learning from Urban Transitional Settlement Response in the Philippines: Housing, Land and Property Issues.	50%
Barber, R. (2013). Localising the Humanitarian Toolkit: Lessons from Recent Philippines Disasters.	67%
South, A. et al. (2011). Myanmar - Surviving the Storm: Self-Protection and Survival in the Delta.	50%
Edmonds, D. et al. (2020). Coastal flooding will disproportionately impact people on river delta.	100%
Rubiera Torres, J. et al. (2012). The Tropical Cyclone Early Warning System of Cuba.	100%
Time. (2020). The Importance of Redundancy in Emergency Notification Systems.	17%
Cosgrave, J. (2014). RESPONDING TO FLOOD DISASTERS: Learning from previous relief and recovery operations	84%
JLFILC. (2020). Role of faith network in disaster.	33%
Action Against Hunger. (2010). Floods Lessons Learnt.	33%
Doocy, S. et al. (2013). The Human Impact of Tropical Cyclones: a Historical Review of Events 1980-2009 and Systematic Literature Review.	84%
Government of Tonga. (2018). Post-Disaster Rapid Assessment: Tropical Cyclone Gita.	84%
Mahmood, J. (2013). Private sector engagement and collaboration with civil-military actors in disaster management in the Philippines: Typhoons Washi and Bopha and beyond.	84%
Kim, K. et al. (2021). Hurricane Scenario Generation for Uncertainty Modeling of Coastal and Inland Flooding.	100%
World Bank and United Nations. (2010). Natural hazards, unnatural disasters: the economics of effective prevention	100%
Madigan, S. (2019). Rapid gender and protection analysis: Tropical Cyclone Kenneth response Cabo Delgado province, Mozambique.	67%
Lam, E. (2016). Review RCRC Movement Response to Tropical Cyclone Winston: Final Report.	84%
Christian, P. et al. (2018). Safety Nets and Natural Disaster Mitigation : Evidence from Cyclone Phailin in Odisha.	100%
Sarsycki, M. (2019). Striving for Resilience: Lessons Learned from the Experiences of Drought and Cyclone Idai in Zimbabwe.	84%
Pacific Community. (2015). Tropical Cyclone Pam Lessons Learned Workshop Report.	67%
Grieve, T. and Gnilo, M. (2012). Tropical Storm Sendong: WASH Cluster Lessons Learned.	50%
Oxfam. (2013). Typhoon Haiyan - The Response so Far and Vital Lessons for the Philippines Recovery.	33%
Winterford, K. and Gero, A. (2018). Working Paper | Humanitarian Response for Development in Fiji: Lessons from Tropical Cyclone Winston.	100%
Winterford, K. and Gero, A. (2018). Humanitarian response for development: lessons from Tropical Cyclone Winston	100%
Rahmstorf, S. (2017). Rising hazard of storm-surge flooding.	50%
Bertin, X. (2016). Storm surges and coastal flooding: status and challenges.	100%

Assumpção, T. et al. (2018). Citizen observations contributing to flood modelling: opportunities and challenges.	100%
Martín, Y. et al. (2017). Leveraging Twitter to gauge evacuation compliance: Spatiotemporal analysis of Hurricane Matthew.	84%
Yin, J. et al. (2012). Using Social Media to Enhance Emergency Situation Awareness.	100%
Mäkinen, M. and Wangu Kuira, M. (2008). Social Media and Postelection Crisis in Kenya.	50%
Kryvasheyeu, Y. et al. (2016). Rapid assessment of disaster damage using social media activity.	100%
Liu, X. et al. (2019). Assessing relevance of tweets for risk communication.	100%
Wentworth, C. (2020). Unhealthy Aid: Food Security Programming and Disaster Responses to Cyclone Pam in Vanuatu.	84%
Dunning, K. (2020). Building resilience to natural hazards through coastal governance: a case study of Hurricane Harvey recovery in Gulf of Mexico communities.	100%
Guo, C. et al. (2020). Evaluation of risk perception, knowledge, and preparedness of extreme storm events for the improvement of coastal resilience among migrants: A lesson from Hong Kong.	100%
Chambers, K. et al. (2020). Impact of Hurricane Harvey on Healthcare Utilization and Emergency Department Operations	100%
Guo, C. et al. (2020). Impact of information seeking, disaster preparedness and typhoon emergency response on perceived community resilience in Hong Kong.	100%
Serrao-Neumann, S. et al. (2018). Post-disaster social recovery: disaster governance lessons learnt from Tropical Cyclone Yasi	84%
Zou, L. et al. (2019). Social and geographical disparities in Twitter use during Hurricane Harvey	100%
Henstra, D. et al. (2020). The governance of climate change adaptation: stormwater management policy and practice.	100%
Priscoli, J. and Stakhiv, E. (2015). Water-related disaster risk reduction (DRR) management in the United States: floods and storm surges.	67%
Islam, S. et al. (2019). A Political Economy Analysis of Public Spending Distribution for Disaster Risk Reduction in Bangladesh.	84%
Tuhkanen, H. et al. (2018). A Typology Framework for Trade-Offs in Development and Disaster Risk Reduction: A Case Study of Typhoon Haiyan Recovery in Tacloban, Philippines.	100%
Bryant-Tokalau, J. (2018). Adaptation to Climate Change in the Pacific Islands: Theory, Dreams, Practice and Reality.	67%
Rodriguez, R. et al. (2017). Anduyog: A Web-based Application for Relief and Casualty Monitoring and Early Warning System for Local Government Units in the Philippines.	100%
Mohan, V. et al. (2020). Building community resilience to climate change: The role of a Population-Health-Environment programme in supporting the community response to cyclone Haruna in Madagascar.	67%
Ahsan, N. (2017). Can Strategies to Cope with Hazard Shocks be Explained by At-Risk Households' Socioeconomic Asset Profile? Evidence from Tropical Cyclone-Prone Coastal Bangladesh.	100%
Uddin, S. et al. (2020). Community resilience to cyclone and storm surge disasters: Evidence from coastal communities of Bangladesh.	84%
Ahmed, B. et al. (2016). Community Resilience to Cyclone Disasters in Coastal Bangladesh.	100%
Cox, J. et al. (2020). Disaster Preparedness and the Abeyance of Agency: Christian Responses to Tropical Cyclone Winston in Fiji.	67%
Jagnoor, J. et al. (2019).Exploring the impact, response and preparedness to water-related natural disasters in the Barisal division of Bangladesh: a mixed methods study.	100%

Ha-Mim, N. et al. (2020). Exploring Vulnerability-Resilience-Livelihood Nexus in the Face of Climate Change: A Multi-Criteria Analysis for Mongla, Bangladesh.	100%
Walshe, R. et al. (2020).Helices of disaster memory: How forgetting and remembering influence tropical cyclone response in Mauritius.	100%
Ahmed, I. (2016). Housing and resilience: case studies from the Cook Islands.	67%
Cuaton, G. and Su, Y. (2020). Local-indigenous knowledge on disaster risk reduction: Insights from the Mamanwa indigenous peoples in Basey, Samar after Typhoon Haiyan in the Philippines.	84%
Raza, T. et al. (2018). Localizing Disaster Risk Reduction and Climate Change Adaptation in Planners' and Decision Makers' Agenda: Technical Comprehensive Model, Quezon City, Philippines.	84%
Schultz, J. et al. (2020). Mitigating the Twin Threats of Climate-Driven Atlantic Hurricanes and COVID-19 Transmission.	67%
Grunewald, F. and Schneckenberg, E. (2016). Évaluation en Temps Réel : Réponse à l'Ouragan Matthew en Haïti.	84%
Simplerler, L. et al. (2020). Prioritization of stormwater management sites in urban areas.	100%
Sameen, S. (2018). Process inclusive Infrastructure: Notions towards Cyclone Resilience in Bangladesh.	100%
Bollettino, V. et al. (2020). Public perception of climate change and disaster preparedness: Evidence from the Philippines.	100%
Nehren, U. et al. (2017). Sand Dunes and Mangroves for Disaster Risk Reduction and Climate Change Adaptation in the Coastal Zone of Quang Nam Province, Vietnam.	84%
Colavito, K. et al. (2017). Social Vulnerability Mapping Considering Hurricane Hazards in a Changing Climate.	67%
Moyo, E. et al. (2015). Southern Africa's 2012-13 Violent Storms: Role of Climate Change.	100%
Le Dé, L. et al. (2018). Sustainable livelihoods and effectiveness of disaster responses: a case study of tropical cyclone Pam in Vanuatu.	67%
Zakrison, T. et al. (2020). The Medical, Public Health, and Emergency Response to the Impact of 2017 Hurricane Irma in Cuba.	67%
Kuleshov, Y. et al. (2020). Tropical cyclone early warnings for the regions of the Southern Hemisphere: strengthening resilience to tropical cyclones in small island developing states and least developed countries.	84%
Webb, J. (2020). What difference does disaster risk reduction make? Insights from Vanuatu and tropical cyclone Pam.	100%
Clissold, R. (2020). Women as recovery enablers in the face of disasters in Vanuatu.	67%
McNamara, K. et al. (2021). Women's capabilities in disaster recovery and resilience must be acknowledged, utilized and supported.	67%
Chakma, S. and Hokugo, A. (2020). Evacuation Behavior: Why Do Some People Never Evacuate to a Cyclone Shelter During an Emergency? A Case Study of Coastal Bangladesh.	100%
Dash, B. and Walia, A. (2020). Role of multi-purpose cyclone shelters in India: Last mile or neighbourhood evacuation.	84%
Erickson, T. et al. (2019). Environmental health effects attributed to toxic and infectious agents following hurricanes, cyclones, flash floods and major hydrometeorological events.	67%
Haque, U. et al. (2012). Reduced death rates from cyclones in Bangladesh: what more needs to be done?	67%
Keim, M. et al. (2006). The Oceans and Human Health.	67%
Miyaji, M. et al. (2020). A study on the use of cyclone shelters in Bangladesh.	100%

Nirupama, N. (2013). Vertical evacuation during cyclones: suitable for developing countries.	50%
Patra, M. et al. (2013). Health Hazards by Sea Cyclones in Odisha, the Supercyclone and the Phailin.	67%
Vaisala. (2017). Increased early warning capability for severe weather conditions.	50%
Liechti, K. et al. (2013). Flash-flood early warning using weather radar data: from nowcasting to forecasting.	84%
Paul, B. and Dutt, S. (2010). Hazard Warnings and Responses to Evacuation Orders: The Case of Bangladesh's Cyclone Sidr.	100%
Paul, S. (2014). Determinants of evacuation response to cyclone warning in coastal areas of Bangladesh: a comparative study.	100%
Corbett, J. et al. (2021). Survivor- and community-led crisis response: Practical experience and learning.	50%
Briones, F. et a. (2018). Local responses to disasters: recent lessons from zero-order responders.	100%
Bessette-Kirton, E. et al. (2019).Landslides Triggered by Hurricane Maria: Assessment of an Extreme Event in Puerto Rico.	84%
Bourque, L. et al. (2006). Weathering the Storm: The Impact of Hurricanes on Physical and Mental Health.	67%
Krausmann, E. et al. (2017). Natech risk assessment and management: reducing the risk of natural-hazard impact on hazardous installations	100%
Örtl, E. (2020). Natech Risk Management: Contributions to the UN/OECD Natech Project.	100%
Solinska-Nowak, A. et al. (2018). An overview of serious games for disaster risk management – Prospects and limitations for informing actions to arrest increasing risk.	100%
Briones, F. and Glantz, M. (2018). "Local responses to disasters: recent lessons from zero-order responders.	67%
Grunewald, F. (2020). Évaluation En Temps Réel De La Réponse Aux Inondations Du 4 Octobre 2020 Dans Les Alpes-Maritimes.	100%
Grunewald, F. (2020). Evaluation de la réponse à la tempête Alex dans les Alpes-Maritimes, Groupe Urd 2020.	100%
Parvin, G. et al. (2019). Evacuation scenarios of cyclone Aila in Bangladesh: Investigating the factors influencing evacuation decision and destination.	100%
Josey, S. et al. (2013). Chapter 5 - Exchanges Through the Ocean Surface.	100%
Held, I. et al. (2005). Simulation of Sahel drought in the 20th and 21st centuries.	100%
Zhang, W. et al. (2016). Changes of tropical cyclone tracks in the western North Pacific over 1979–2016.	100%
Marciano, C. et al. (2015). Changes in US East Coast Cyclone Dynamics with Climate Change.	100%
Johnson, G.C., and Wijffels, S. (2011). Ocean density change contributions to sea level rise.	84%
Sutton, R. et al. (2007). Land/sea warming ratio in response to climate change: IPCC AR4 model results and comparison with observations.	84%
Hong, J. et al. (2018). Community disaster resilience and social solidarity on social media: a semantic network analysis of the Sewol ferry disaster.	100%
Schultz, J. et al. (2018). The Need to Integrate Climate Science Into Public Health Preparedness for Hurricanes and Tropical Cyclones.	50%

General lessons	
Title	**QA Grade**
Clarke, M and De Cruz, I. (2015). A climate-compatible approach to development practice by international humanitarian NGOs	67%
Bronen, R et al. (2018). Climate change and displacement: Challenges and needs to address an imminent reality	84%
Development Aid and Adaptation to Climate Change in Developing Countries	100%
Warren, P. (2016). Forced Migration After Paris Cop21: Evaluating The "Climate Change Displacement Coordination Facility".	84%
Biermann, F and Boas, I. (2010). Preparing for a Warmer World: Towards a Global Governance System to Protect Climate Refugees	50%
Jayawardhan, S. (2017). Vulnerability and Climate Change Induced Human Displacement	67%
Nagoda et al. (2017). What Does Climate Change Adaptation Mean for Humanitarian Assistance? Guiding Principles for Policymakers and Practitioners	67%
IPCC. (2014). Summary for policymakers. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects	100%
Hall, N. (2016). Displacement, Development, and Climate Change: International Organizations Moving Beyond Their Mandates	84%
Arab European Foundation for Consulting & Training AEF. (2015). End of Program Evaluation Report for CBDRR program Community Based Disaster Risk Reduction.	100%
Sterret, C. (2015). Final Evaluation of the Climate Smart Community Based Disaster Risk Reduction Project in Vietnam - June 2015 - Viet Nam.	100%
Johnstone, M. (2020). USAID: Enhancing Disaster Risk Management Capacity of the Red Cross Societies in Palau, The Federated States of Micronesia and The Republic of the Marshall Islands.	67%
Perey, A. (2017). Decentralized Evaluation Final Evaluation of Disaster Preparedness and Response/Climate Change Adaptation Activities under the Office of Foreign Disaster Assistance Fund in the Philippines.	84%
Nyirenda, J. (2019). Decentralized Evaluation Mid-Term Evaluation of Integrated Risk Management and Climate Services Programme in Malawi from 2017-2019.	100%
WFP and Oxfam. (2016). Impact Evaluation Of The R4 Rural Resilience Initiative In Senegal.	100%
Consultores Sandes. (2020). External Evaluation of Cyclone Idai and Kenneth Response in Mozambique.	67%
Feeny, E. (2017). From Early Warning to Early Action in Somalia: What can we learn to support early action to mitigate humanitarian crises?	50%
Willitts-King, B et al. (2020). Risk-informed approaches to humanitarian funding: using risk finance tools to strengthen resilience.	84%
International Crisis Group. (2016). Seizing the Moment: From Early Warning to Early Action.	33%
Dalrymple, S, and Hanssen, S. (2020). Supporting longer term development in crises at the nexus: Lessons from Cameroon.	100%
Südhoff, R. (2020). THE TRIPLE NEXUS IN PRACTICE.	67%
Zahmore, L. (2019). The Triple Nexus in Practice: Toward a New Way of Working in Protracted and Repeated Crises.	50%
Maxwell, D and Hailey, P. (2020). Towards Anticipatory Information Systems and Action: Notes on Early Warning and Early Action in East Africa.	50%
Dikawar, V et al. (2019). Child poverty, disasters and climate change.	100%

Peters, K et al. (2020). Climate change, conflict and fragility.	84%
UNDRR. (2020). Disaster Risk Reduction and Climate Change Adaptation: Pathways for policy coherence in Sub-Saharan Africa.	50%
Alcayna, T. (2020). How chronic gaps in adaptation finance expose the world's poorest people to climate chaos.	67%
Dicker, S et al. (2021). Saving Lives and Livelihoods: The Benefits of Investments in Climate Change Adaptation and Resilience.	84%
Wagner, M and Jamie, C. (2020). An Agenda for Expanding Forecast-Based Action to Situations of Conflict.	33%
UNEG Humanitarian Evaluation Interest Group. (2018). Detail of The Humanitarian-Development Nexus - What do evaluations have to say? Mapping and synthesis of evaluations.	75%
Gero, A and Dominey-Howes, D. (2010). Disaster risk reduction and climate change adaptation in the Pacific: The challenge of integration.	67%
Taylor, G et al. (2017). Evaluation of Multi-year Planning - February 2017.	100%
Sheel, M. et al. (2019). Evaluation of the early warning, alert and response system after Cyclone Winston, Fiji, 2016.	84%
Inter-Agency Humanitarian Evaluation. (2019). Executive Summary Inter-Agency Humanitarian Evaluation of the Drought Response in Ethiopia 2015-2018	84%
Zamora, N. et al. (2017). Final Evaluation, Endline and Learning from the Danish Red Cross' MADAD Programme.	100%
RCCC. (2018). Forecast-based financing: case studies from Togo and Uganda.	50%
UNDRR. (2019). Global Assessment Report on Disaster Risk Reduction.	84%
UNDRR. (2019). Global Assessment Report on Disaster Risk Reduction- Distilled.	84%
High-Level Panel on Humanitarian Financing. (2016). HLP Report Too Important to Fail Addressing the Humanitarian Financing Gap.	33%
Gros, C. et al. (2019). Household-level effects of providing forecast-based cash in anticipation of extreme weather events: Quasi-experimental evidence from humanitarian interventions in the 2017 floods in Bangladesh.	100%
IASC. (2021). IASC Key Messages - Common Narrative on the Climate Emergency and Humanitarian Action, Results Group 3 on Collective Advocacy.	50%
Jamie, C. and Harris, C. (2019). Impacts Before Instruments.	50%
Klause, A. et al. (2019). Independent Evaluation of the Linkage of Humanitarian Aid and Development Cooperation at the Swiss Development Cooperation (SDC).	100%
Inter-Agency Humanitarian Evaluation Steering Group. (2020). Inter-Agency Humanitarian Evaluation of the Response to Cyclone Idai in Mozambique- Executive summary.	100%
Development Initiatives. (2019). Key questions and considerations for donors at the triple nexus - lessons from UK and Sweden.	67%
Madajewicz, M. et al. (2013). Managing Risks To Agricultural Livelihoods: Impact Evaluation Of The Harita Program In Tigray, Ethiopia, 2009–2012.	100%
Levine, S and Venton , CC. (2019). Multi-year humanitarian funding.	84%
Featherstone, A et al. (2019). OCHA Evaluation of Country-Based Pooled Funds - Somalia Country Report.	100%
Tanner, T. et al. (2019). Scaling up Forecast based early action (FbA)-Lessons, challenges and future potential in Bangladesh.	84%
WFP. (2016). Submission by the World Food Programme to the Executive Committee of the Warsaw International Mechanism for Loss and Damage on best practices, challenges and lessons learned from existing financial instruments at all levels that address the risk of loss and damage associated with the adverse effects of climate change.	50%

Concern Worldwide. (2017). Tackling Food Crisis in Somalia: How resilience programming has reduced the impact of the current drought.	33%
Weingärtner, L. et al. (2020). The evidence base on Anticipatory Action.	67%
Poole, L. and Clarke, D. (2020). The Future of Crisis Financing: a Call to Action.	50%
Bodhi Global Analysis Ltd. (2021). The intersection between conflict, climate and hunger.	50%
ICRC. (2020). When Rain Turns To Dust Understanding And Responding To The Combined Impact Of Armed Conflicts And The Climate And Environment Crisis On People's Lives.	67%
IFRC. (2020). World Disaster Report: Come Heat Or High Water.	100%
Eriksen, S. et al. (2017). Courting Catastrophe? Humanitarian Policy and Practice in a Changing Climate.	50%
ALNAP. (2018). The State of the Humanitarian System.	100%
Lung, F. (2020). Being Timely: Creating Good Triggers And Plans In Disaster Risk Financing.	84%
World Bank. (2013). Ethiopia's Productive Safety Net Program (PSNP) Integrating Disaser And Climate Risk Management.	67%
Harris, C. and Cardenes, I. (2020). Basis Risk in Disaster Risk Financing for Humanitarian Action Potential Approaches to Measuring, Monitoring, and Managing it.	67%
Watts, N. et al. (2019). The 2019 report of The Lancet Countdown on health and climate change: ensuring that the health of a child born today is not defined by a changing climate.	100%
UNFCC. (2021). 2020 Was One of Three Warmest Years on Record.	50%
START. (2020). 10 Lessons From The First Three Years 10 Of Crisis Anticipation	50%
Murphy, R. et al. (2017). START DEPP: Linking Preparedness Response and Resilience in Emergency Contexts' Humanitarian Strand Final Report.	84%
Norwegian Red Cross. (2019). Overlapping vulnerabilities: the impacts of climate change on humanitarian needs.	67%
Allen, S. et al. (2012). Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation: Special Report of the Intergovernmental Panel on Climate Change.	100%
DFID. (2011). Saving lives, preventing suffering and building resilience: The UK Government's Humanitarian Policy.	50%
FAO. (2021). Scaling up existing, national social protection programmes to channel forecast-based anticipatory action.	50%
Dalrymple,S & Swithern, S. (2019). Key questions and considerations for donors at the triple nexus: lessons from UK and Sweden.	84%
Diwakar, V. et al. (2019). Child poverty, disasters and climate change.	100%
O'Brien, C. (2020). 10 Things You Wish You'd Always Known about Shock-Responsive Social Protection.	67%
Centre for Disaster Reduction and Airbel Impact Lab. (2021). Exploring a role for triggers and risk-informed financing in complex crises COVID-19 as a case study.	84%
Hahne, M. and Fröde, A. (2010). Adapting to Climate Change, Reducing Risk.	100%
Turnbull, M. et al. (2020). Start Fund: Evaluation of Crisis Anticipation.	100%
Obrecht, A. (2019). Shifting Mindsets. Creating a more flexible humanitarian response.	84%
IFRC. (2013). Community early warning systems: guiding principles.	84%

2 Incorporating expert knowledge

To improve the relevance of the lessons learned, the research team consulted an expert panel on the lessons arising in the literature review using an adapted Delphi method.[5] While a small advisory group was engaged early on in the project, this panel was created to share the emerging lessons with a broader group of experts with varied knowledge and experience.

2.1 The expert panel

Relevance to practitioners can sometimes be overlooked in evidence synthesis methods, which can result in generalised findings. The authors used an adapted Delphi method with a panel of experts to assess the relevance of the lessons to likely users of the paper, create ownership, ensure a collaborative approach and generate consensus through discussion with a panel of experts. The panellists also had an opportunity to provide additional information that was not found in the literature review. Here, the approach was used to gather inputs from a broader range of experts and practitioners of humanitarian and environmental responses than the small advisory group. This helped to:

- Mitigate researcher bias in the synthesis of lessons
- Add lessons or literature that had been missed
- Ensure that lessons were relevant
- Make identified lessons more specific and action-guiding, where possible, based on consensus across a representative body of experience

Setting up the experts group/Delphi panel:
Suggestions from both the Advisory Group and the initial user group helped in establishing the expert panel. They:

- Helped the authors to identify the most relevant lessons in their long list of lessons to be included
- Helped the group approach consensus on an issue.
- Helped identify and fill important gaps in the literature from their collective experience. As such, the views of the expert panel were used to triangulate the written data.

Composition of the panel (17 experts):

Experts were selected based on the following criteria:

- The person was likely to have strong knowledge of the subject area
- Institutional spread: Individuals from the UN system, donor agencies, INGOs, National NGOs, etc. who have worked on issues highlighted in the paper
- Geographical spread: Including experts from key areas such as South Asia, South East Asia, etc. i.e., from regions where the practitioners have worked on humanitarian issues being highlighted in the paper

Participants:

- Carol Devine, Médecins Sans Frontières, Project Team Lead, Climate Smart MSF
- Chris Mcdonald, Tearfund, Global Resilience Lead
- Krishna Krishnamurthy, World Food Program, Climate and Vulnerability Analyst
- Jon Gascoigne, Centre Disaster Protection Consultant
- Erin Coughlan de Perez, Tufts, Manager Climate Science
- Mike Weickert, World Vision International, Director of Humanitarian Response Operations
- Guillaume Devars, CARE, Program Manager Officer
- Moussa Sacko, Independent Evaluation Consultant (Mali) Consultant
- Dipankar Datta, Oxfam Bangladesh, Country Director
- Krishna Vatsa, Indian National Disaster Management Authority, Member
- Ilan Kelman, University College London, Professor
- Gaelle Nizery, Directorate-General for European Civil Protection and Humanitarian Aid Operations, Prevention Preparedness, Global Issues – Team Leader
- Manu Gupta, Sustainable Environment and Ecological Development Society, Co-founder and Executive Director
- Cathrine-Lune Grayson, International Committee of the Red Cross, Policy Advisor
- Emilia Wahlstrom, United Nations Office for Disaster Risk Reduction, Program Manager Officer
- Patrick Jacqueson, Food and Agriculture Organization, Senior Program Officer
- Matthias Amling, German Federal Foreign Office, Senior Desk Officer

The expert panel were engaged through one survey round and then were given the opportunity to review the full draft paper and to make comments and suggestions. Some lessons had lower rates of answers as the option 'Do not wish to answer' was made available to the respondents, given the technical nature of some lessons and the relatively broad scope that they covered; it is possible that not every member of the panel would have felt qualified to comment on the likely relevance of each of the lessons if their content fell outside their specific area of expertise and experience.

2.2 First and second rounds

In the first round, the experts were presented with a long list of lessons to be made that had been identified as a result of the literature review. The experts were asked to respond to questions about the importance of each of the lessons. They were also asked to provide input about other learnings not covered and related documentation that might not have been taken into account. This was done through an anonymous survey on Qualtrics to reduce bias related to power relationships within the humanitarian sector and the institutions in which the experts worked. Experts answered the following questions about each of the lessons:

Lesson X: Title of the lesson
Short description of the lesson.
5 Very high importance
4 High importance
3 Medium importance
2 Low importance
1 Not important
Not an accurate lesson
Do not wish to answer
- You selected 'Not accurate' please explain why. Please include evidence if possible (link or explanation of your experience) and suggest amendments if appropriate.
- For this lesson that you have scored as highly important, do you have any examples of how you have seen this lesson being addressed well? Please provide a brief description and/or a link to important documentation.
- Each participant was also asked if any lessons could be merged together and if they thought there were lessons missing.

In a more traditional Delphi panel, the authors would then have adapted the list of lessons based on the panel feedback and would have presented a shorter and rephrased list of lessons to the experts for an additional round of scoring and inputs. Given there was a substantial amount of consensus among the expert panel in the first round, resulting in limited alterations to the list of lessons, the authors decided not to conduct a second survey round. Instead, they developed a narrative synthesis for each of the selected lessons and provided the expert panellists the opportunity to review a full first draft of the report. Three experts reviewed the draft and provided their comments and insights via tracked changes.

3 Developing confidence indicators for the lessons

The confidence indicators for the lessons are based on three criteria: (1) the 'Importance' score assigned by the expert panel; (2) 'Relative frequency' of being cited within the different literature; and (3) The quality of the research documents used to inform that lesson.

Importance

The expert panel were asked to rank the importance of each lesson on a scale from 1 to 5. The average score was then calculated for each lesson.

NO IMPORTANCE: 0

LOW IMPORTANCE: >0 AND ≤ 2

MEDIUM IMPORTANCE: >2 AND ≤ 3

HIGH IMPORTANCE: >3 AND ≤ 4

VERY HIGH IMPORTANCE: > 4 AND ≤ 5

Relative frequency

The average frequency score for all lessons is 11. A relative frequency score enables the reader to compare the frequency with which a lesson is cited against others in the paper. The scale was established using the quartiles of the dataset of the frequencies for all lessons.

NO FREQUENCY: 0

LOW RELATIVE FREQUENCY: 1–7

MEDIUM RELATIVE FREQUENCY: 8–10

HIGH RELATIVE FREQUENCY: 11–13

VERY HIGH RELATIVE FREQUENCY: 14–28

Quality

The average quality score of all 235 documents is 75%. The scale to present the quality of each lesson was established based on the grades that each document received (see Section 1.8).

VERY LOW QUALITY: 0–17
LOW QUALITY: 18–33
MEDIUM QUALITY: 34–67
HIGH QUALITY: 68–84
VERY HIGH QUALITY: 85–100

4 Documents by lesson

Table 5 details which papers are cited in which lessons and the confidence scoring of each lesson.

Table 5 Documents by lesson

General Lessons		
Lesson	**Citations**	**Grades**
LESSON 1: Humanitarian actors should develop their ability to design and implement a range of programme types – resilience, disaster risk reduction, anticipation and response – to ensure an effective and joined up response	Eriksen, S. et al. (2017). Courting Catastrophe? Humanitarian Policy and Practice in a Changing Climate.	50%
	IASC. (2021). IASC Key Messages - Common Narrative on the Climate Emergency and Humanitarian Action, Results Group 3 on Collective Advocacy.	50%
	ICRC. (2020). When Rain Turns To Dust Understanding And Responding To The Combined Impact Of Armed Conflicts And The Climate And Environment Crisis On People's Lives.	67%
	IFRC. (2020). World Disaster Report: Come Heat Or High Water.	100%
	UNDRR. (2019). Global Assessment Report on Disaster Risk Reduction.	84%
	Allen, S. et al. (2012). Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation: Special Report of the Intergovernmental Panel on Climate Change.	100%
	DFID. (2011). Saving lives, preventing suffering and building resilience: The UK Government's Humanitarian Policy.	50%
	O'Brien, C. (2020). 10 Things You Wish You'd Always Known about Shock-Responsive Social Protection.	67%
	Dicker, S et al. (2021). Saving Lives and Livelihoods: The Benefits of Investments in Climate Change Adaptation and Resilience.	84%
	Jamie, C. and Harris, C. (2019). Impacts Before Instruments.	50%
	RCCC. (2018). Forecast-based financing: case studies from Togo and Uganda.	50%
	Tanner, T. et al. (2019). Scaling up Forecast based early action(FbA)-Lessons, challenges and future potential in Bangladesh.	84%
	FAO. (2021). Scaling up existing, national social protection programmes to channel forecast-based anticipatory action.	50%
	Number of included papers	**12**

LESSON 2: Humanitarian actors should respond to the uncertainty of the climate crisis by developing their ability to work flexibly and adaptively at individual, programmatic and organisational levels	Bronen, R et al. (2018). Climate change and displacement: Challenges and needs to address an imminent reality.	84%
	Gros, C. et al. (2019). Household-level effects of providing forecast-based cash in anticipation of extreme weather events: Quasi-experimental evidence from humanitarian interventions in the 2017 floods in Bangladesh.	100%
	ICRC. (2020). When Rain Turns To Dust Understanding And Responding To The Combined Impact Of Armed Conflicts And The Climate And Environment Crisis On People's Lives.	67%
	IFRC. (2020). World Disaster Report: Come Heat Or High Water.	100%
	DFID. (2011). Saving lives, preventing suffering and building resilience: The UK Government's Humanitarian Policy.	50%
	Obrecht, A. (2019). Shifting Mindsets. Creating a more flexible humanitarian response.	84%
	START. (2020). 10 Lessons From The First Three Years 10 Of Crisis Anticipation	50%
	Maxwell, D and Hailey, P. (2020). Towards Anticipatory Information Systems and Action: Notes on Early Warning and Early Action in East Africa.	50%
	Inter-Agency Humanitarian Evaluation. (2019). Executive Summary Inter-Agency Humanitarian Evaluation of the Drought Response in Ethiopia 2015-2018.	84%
	Sarsycki, M. (2019). Building Resilience and Shaping the Future: Lessons Learned from the Experiences of Cyclone Idai in Southern Malawi.	100%
	Willitts-King, B et al. (2020). Risk-informed approaches to humanitarian funding: using risk finance tools to strengthen resilience.	84%
	Dicker, S et al. (2021). Saving Lives and Livelihoods: The Benefits of Investments in Climate Change Adaptation and Resilience.	84%
	Tanner, T. et al. (2019). Scaling up Forecast based early action(FbA)-Lessons, challenges and future potential in Bangladesh.	84%
	Dalrymple, S, and Hanssen, S. (2020). Supporting longer term development in crises at the nexus: Lessons from Cameroon.	84%
	Zamora, N. et al. (2017). Final Evaluation, Endline and Learning from the Danish Red Cross' MADAD Programme.	100%
	ALNAP. (2018). The State of the Humanitarian System.	100%
	Weingärtner, L. et al. (2020). The evidence base on Anticipatory Action.	67%
	Jamie, C. and Harris, C. (2019). Impacts Before Instruments.	50%
	Number of included papers	**18**

LESSON 3: Humanitarian actors should consider the impact of climate change in regions experiencing armed conflict and find ways to work with development actors and governments to deliver climate-related programming in conflict areas	ICRC. (2020). When Rain Turns To Dust Understanding And Responding To The Combined Impact Of Armed Conflicts And The Climate And Environment Crisis On People's Lives.	67%
	IFRC. (2020). World Disaster Report: Come Heat Or High Water.	100%
	Jayawardhan, S. (2017). Vulnerability and Climate Change Induced Human Displacement	67%
	IASC. (2021). IASC Key Messages - Common Narrative on the Climate Emergency and Humanitarian Action, Results Group 3 on Collective Advocacy.	50%
	UNDRR. (2019). Global Assessment Report on Disaster Risk Reduction.	84%
	Wagner, M and Jamie, C. (2020). An Agenda for Expanding Forecast-Based Action to Situations of Conflict.	33%
	Poole, L. and Clarke, D. (2020). The Future of Crisis Financing: a Call to Action.	50%
	Dalrymple, S, and Hanssen, S. (2020). Supporting longer term development in crises at the nexus: Lessons from Cameroon.	84%
	Zahmore, L. (2019). The Triple Nexus in Practice: Toward a New Way of Working in Protracted and Repeated Crises.	50%
	UNEG Humanitarian Evaluation Interest Group. (2018). Detail of The Humanitarian-Development Nexus - What do evaluations have to say? Mapping and synthesis of evaluations.	75%
	Klause, A. et al. (2019). Independent Evaluation of the Linkage of Humanitarian Aid and Development Cooperation at the Swiss Development Cooperation (SDC).	100%
	Number of included papers	**11**

LESSON 4: Humanitarian actors should improve their ability to evaluate and learn from resilience building activities, climate-related adaptation and anticipatory and preparedness efforts in order to focus resources on the most effective approaches	Dalrymple, S, and Hanssen, S. (2020). Supporting longer term development in crises at the nexus: Lessons from Cameroon.	84%
	ALNAP. (2018). The State of the Humanitarian System.	100%
	Perey, A. (2017). Decentralized Evaluation Final Evaluation of Disaster Preparedness and Response/Climate Change Adaptation Activities under the Office of Foreign Disaster Assistance Fund in the Philippines.	100%
	Weingärtner, L. et al. (2020). The evidence base on Anticipatory Action.	67%
	Tanner, T. et al. (2019). Scaling up Forecast based early action(FbA)-Lessons, challenges and future potential in Bangladesh.	84%
	Jamie, C. and Harris, C. (2019). Impacts Before Instruments.	50%
	Willitts-King, B et al. (2020). Risk-informed approaches to humanitarian funding: using risk finance tools to strengthen resilience.	84%
	DFID. (2011). Saving lives, preventing suffering and building resilience: The UK Government's Humanitarian Policy.	50%
	Dicker, S et al. (2021). Saving Lives and Livelihoods: The Benefits of Investments in Climate Change Adaptation and Resilience.	84%
	ICRC. (2020). When Rain Turns To Dust Understanding And Responding To The Combined Impact Of Armed Conflicts And The Climate And Environment Crisis On People's Lives.	67%
	Peters, K et al. (2020). Climate change, conflict and fragility.	84%
	UNDRR. (2019). Global Assessment Report on Disaster Risk Reduction.	84%
	Zahmore, L. (2019). The Triple Nexus in Practice: Toward a New Way of Working in Protracted and Repeated Crises.	50%
	Zamora, N. et al. (2017). Final Evaluation, Endline and Learning from the Danish Red Cross' MADAD Programme.	100%
	Number of included papers	**14**

LESSON 5: 'Dual-mandate' humanitarian organisations should address internal silos by undertaking joint analysis, creating cross-sectoral teams and restructuring where necessary	Dalrymple, S, and Hanssen, S. (2020). Supporting longer term development in crises at the nexus: Lessons from Cameroon.	100%
	Dikawar, V et al. (2019). Child poverty, disasters and climate change.	100%
	DFID. (2011). Saving lives, preventing suffering and building resilience: The UK Government's Humanitarian Policy.	50%
	Maxwell, D and Hailey, P. (2020). Towards Anticipatory Information Systems and Action: Notes on Early Warning and Early Action in East Africa.	50%
	Eriksen, S. et al. (2017). Courting Catastrophe? Humanitarian Policy and Practice in a Changing Climate.	50%
	IFRC. (2020). World Disaster Report: Come Heat Or High Water.	100%
	Inter-Agency Humanitarian Evaluation. (2019). Executive Summary Inter-Agency Humanitarian Evaluation of the Drought Response in Ethiopia 2015-2018.	84%
	Dokken, D et al. (2014). Summary for policymakers. In: Climate Change 2014: Impacts,Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects.	100%
	Klause, A. et al. (2019). Independent Evaluation of the Linkage of Humanitarian Aid and Development Cooperation at the Swiss Development Cooperation (SDC).	100%
	UNEG Humanitarian Evaluation Interest Group. (2018). Detail of The Humanitarian-Development Nexus - What do evaluations have to say? Mapping and synthesis of evaluations.	75%
	Zahmore, L. (2019). The Triple Nexus in Practice: Toward a New Way of Working in Protracted and Repeated Crises.	50%
	Number of included papers	**11**

LESSON 6: Development and humanitarian actors should decentralise decision-making to create programmes that fit the context and can overcome sectoral silos	Concern Worldwide. (2017). Tackling Food Crisis in Somalia: How resilience programming has reduced the impact of the current drought.	33%
	Peters, K et al. (2020). Climate change, conflict and fragility.	84%
	Sheel, M. et al. (2019). Evaluation of the early warning, alert and response system after Cyclone Winston, Fiji, 2016.	84%
	Klause, A. et al. (2019). Independent Evaluation of the Linkage of Humanitarian Aid and Development Cooperation at the Swiss Development Cooperation (SDC).	100%
	UNDRR. (2019). Global Assessment Report on Disaster Risk Reduction.	84%
	DFID. (2011). Saving lives, preventing suffering and building resilience: The UK Government's Humanitarian Policy.	50%
	Number of included papers	**6**
LESSON 7: Humanitarian actors should partner with development and climate actors, using joint analysis and common standards	Dalrymple, S, and Hanssen, S. (2020). Supporting longer term development in crises at the nexus: Lessons from Cameroon.	84%
	Allen, S. et al. (2012). Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation: Special Report of the Intergovernmental Panel on Climate Change.	100%
	Klause, A. et al. (2019). Independent Evaluation of the Linkage of Humanitarian Aid and Development Cooperation at the Swiss Development Cooperation (SDC).	100%
	IFRC. (2020). World Disaster Report: Come Heat Or High Water.	100%
	UNDRR. (2019). Global Assessment Report on Disaster Risk Reduction.	84%
	Zahmore, L. (2019). The Triple Nexus in Practice: Toward a New Way of Working in Protracted and Repeated Crises.	50%
	Taylor, G et al. (2017). Evaluation of Multi-year Planning - February 2017.	100%
	UNEG Humanitarian Evaluation Interest Group. (2018). Detail of The Humanitarian-Development Nexus - What do evaluations have to say? Mapping and synthesis of evaluations.	75%
	Number of included papers	**8**

LESSON 8: Humanitarian actors should co-design climate change programmes with vulnerable people and groups, ensuring that they understand and can discuss climate change, its effects and the potential impact on their lives and livelihoods	Harris, C. and Cardenes, I. (2020). Basis Risk in Disaster Risk Financing for Humanitarian Action Potential Approaches to Measuring, Monitoring, and Managing it.	67%
	Allen, S. et al. (2012). Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation: Special Report of the Intergovernmental Panel on Climate Change.	100%
	Johnstone, M. (2020). USAID: Enhancing Disaster Risk Management Capacity of the Red Cross Societies in Palau, The Federated States of Micronesia and The Republic of the Marshall Islands.	67%
	Featherstone, A et al. (2019). OCHA Evaluation of Country-Based Pooled Funds - Somalia Country Report.	100%
	Eriksen, S. et al. (2017). Courting Catastrophe? Humanitarian Policy and Practice in a Changing Climate.	50%
	Sterret, C. (2015). Final Evaluation of the Climate Smart Community Based Disaster Risk Reduction Project in Vietnam - June 2015 - Viet Nam.	100%
	IFRC. (2020). World Disaster Report: Come Heat Or High Water.	100%
	Levine, S and Venton , CC. (2019). Multi-year humanitarian funding.	84%
	Wagner, M and Jamie, C. (2020). An Agenda for Expanding Forecast-Based Action to Situations of Conflict.	33%
	ICRC. (2020). When Rain Turns To Dust Understanding And Responding To The Combined Impact Of Armed Conflicts And The Climate And Environment Crisis On People's Lives.	67%
	Zahmore, L. (2019). The Triple Nexus in Practice: Toward a New Way of Working in Protracted and Repeated Crises.	50%
	Tanner, T. et al. (2019). Scaling up Forecast based early action(FbA)-Lessons, challenges and future potential in Bangladesh.	84%
	Dokken, D et al. (2014). Summary for policymakers. In: Climate Change 2014: Impacts,Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects.	100%
	Dicker, S et al. (2021). Saving Lives and Livelihoods: The Benefits of Investments in Climate Change Adaptation and Resilience.	84%
	Clarke, M and De Cruz, I. (2015). A climate-compatible approach to development practice by international humanitarian NGOs.	67%
	IPCC. (2014). Summary for policymakers. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects	100%
	Number of included papers	**16**

LESSON 9: Humanitarian actors should design climate programmes with an understanding of how vulnerability occurs in that context, making sure that activities are relevant and accessible to marginalised groups in terms of resources, capacities and social networks	ALNAP. (2018). The State of the Humanitarian System.	100%
	Weingärtner, L. et al. (2020). The evidence base on Anticipatory Action.	67%
	Allen, S. et al. (2012). Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation: Special Report of the Intergovernmental Panel on Climate Change.	100%
	Sterret, C. (2015). Final Evaluation of the Climate Smart Community Based Disaster Risk Reduction Project in Vietnam - June 2015 - Viet Nam.	100%
	Klause, A. et al. (2019). Independent Evaluation of the Linkage of Humanitarian Aid and Development Cooperation at the Swiss Development Cooperation (SDC).	100%
	Arab European Foundation for Consulting & Training AEF. (2015). End of Program Evaluation Report for CBDRR program Community Based Disaster Risk Reduction.	100%
	Perey, A. (2017). Decentralized Evaluation Final Evaluation of Disaster Preparedness and Response/Climate Change Adaptation Activities under the Office of Foreign Disaster Assistance Fund in the Philippines.	100%
	Biermann, F and Boas, I. (2010). Preparing for a Warmer World: Towards a Global Governance System to Protect Climate Refugees.	50%
	Eriksen, S. et al. (2017). Courting Catastrophe? Humanitarian Policy and Practice in a Changing Climate.	50%
	Harris, C. and Cardenes, I. (2020). Basis Risk in Disaster Risk Financing for Humanitarian Action Potential Approaches to Measuring, Monitoring, and Managing it.	67%
	IFRC. (2020). World Disaster Report: Come Heat Or High Water.	100%
	UNEG Humanitarian Evaluation Interest Group. (2018). Detail of The Humanitarian-Development Nexus - What do evaluations have to say? Mapping and synthesis of evaluations.	75%
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	Concern Worldwide. (2017). Tackling Food Crisis in Somalia: How resilience programming has reduced the impact of the current drought.	33%
	Dalrymple, S, and Hanssen, S. (2020). Supporting longer term development in crises at the nexus: Lessons from Cameroon.	84%
	Gero, A and Dominey-Howes, D. (2010). Disaster risk reduction and climate change adaptation in the Pacific: The challenge of integration.	67%
	DFID. (2011). Saving lives, preventing suffering and building resilience: The UK Government's Humanitarian Policy.	50%

	Dikawar, V et al. (2019). Child poverty, disasters and climate change.	100%
	ICRC. (2020). When Rain Turns To Dust Understanding And Responding To The Combined Impact Of Armed Conflicts And The Climate And Environment Crisis On People's Lives.	67%
	IPCC. (2014). Summary for policymakers. In: Climate Change 2014: Impacts,Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects.	100%
	Levine, S and Venton , CC. (2019). Multi-year humanitarian funding.	84%
	Peters, K et al. (2020). Climate change, conflict and fragility.	84%
	Maxwell, D and Hailey, P. (2020). Towards Anticipatory Information Systems and Action: Notes on Early Warning and Early Action in East Africa.	50%
	Nyirenda, J. (2019). Decentralized Evaluation Mid-Term Evaluation of Integrated Risk Management and Climate Services Programme in Malawi from 2017-2019.	100%
	Sheel, M. et al. (2019). Evaluation of the early warning, alert and response system after Cyclone Winston, Fiji, 2016.	84%
	Jayawardhan, S. (2017). Vulnerability and Climate Change Induced Human Displacement	67%
	Hall, N. (2016). Displacement, Development, and Climate Change: International Organizations Moving Beyond Their Mandates	84%
	START. (2020). 10 Lessons From The First Three Years 10 Of Crisis Anticipation	50%
	Number of included papers	**28**
LESSON 10: Humanitarian actors should build on existing structures as the default approach to all climate-related activities, looking for local systems of administration and welfare systems that can take the lead where central government is weak or engaged in conflict	ALNAP. (2018). The State of the Humanitarian System.	100%
	Zahmore, L. (2019). The Triple Nexus in Practice: Toward a New Way of Working in Protracted and Repeated Crises. "	50%
	IPCC. (2014). Summary for policymakers. In: Climate Change 2014: Impacts,Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects	100%
	Dalrymple, S, and Hanssen, S. (2020). Supporting longer term development in crises at the nexus: Lessons from Cameroon.	84%
	UNEG Humanitarian Evaluation Interest Group. (2018). Detail of The Humanitarian-Development Nexus - What do evaluations have to say? Mapping and synthesis of evaluations.	75%
	Arab European Foundation for Consulting & Training AEF. (2015). End of Program Evaluation Report for CBDRR program Community Based Disaster Risk Reduction.	100%
	Maxwell, D and Hailey, P. (2020). Towards Anticipatory Information Systems and Action: Notes on Early Warning and Early Action in East Africa.	50%
	Number of included papers	**7**

LESSON 11: Humanitarian actors and their partners should 'climate-proof' existing resilience, disaster risk reduction and preparedness activities and to ensure that they do not make people more vulnerable to the effects of climate change in the longer term	Allen, S. et al. (2012). Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation: Special Report of the Intergovernmental Panel on Climate Change.	100%
	ICRC. (2020). When Rain Turns To Dust Understanding And Responding To The Combined Impact Of Armed Conflicts And The Climate And Environment Crisis On People's Lives.	67%
	UNDRR. (2019). Global Assessment Report on Disaster Risk Reduction.	84%
	IFRC. (2020). World Disaster Report: Come Heat Or High Water.	100%
	IPCC. (2014). Summary for policymakers. In: Climate Change 2014: Impacts,Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects.	100%
	Jayawardhan, S. (2017). Vulnerability and Climate Change Induced Human Displacement.	67%
	Levine, S and Venton , CC. (2019). Multi-year humanitarian funding.	84%
	Hahne, M. and Fröde, A. (2010). Adapting to Climate Change, Reducing Risk.	100%
	Number of included papers	**8**

LESSON 12: Humanitarian actors and their partners should acknowledge the scale of the resilience challenge, being realistic about what can be achieved and clear about the limits of their respective capacities to contribute to resilience	DFID. (2011). Saving lives, preventing suffering and building resilience: The UK Government's Humanitarian Policy.	50%
	ALNAP. (2018). The State of the Humanitarian System.	100%
	Allen, S. et al. (2012). Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation: Special Report of the Intergovernmental Panel on Climate Change.	100%
	Dikawar, V et al. (2019). Child poverty, disasters and climate change.	100%
	UNDRR. (2019). Global Assessment Report on Disaster Risk Reduction.	84%
	Dicker, S et al. (2021). Saving Lives and Livelihoods: The Benefits of Investments in Climate Change Adaptation and Resilience.	84%
	Taylor, G et al. (2017). Evaluation of Multi-year Planning - February 2017.	100%
	IFRC. (2020). World Disaster Report: Come Heat Or High Water.	100%
	Murphy, R. et al. (2017). START DEPP: Linking Preparedness Response and Resilience in Emergency Contexts' Humanitarian Strand Final Report.	84%
	Sterret, C. (2015). Final Evaluation of the Climate Smart Community Based Disaster Risk Reduction Project in Vietnam - June 2015 - Viet Nam.	100%
	WFP and Oxfam. (2016). Impact Evaluation Of The R4 Rural Resilience Initiative In Senegal.	100%
	Zamora, N. et al. (2017). Final Evaluation, Endline and Learning from the Danish Red Cross' MADAD Programme.	100%
	Klausen, A. et al. (2019). Independent Evaluation of the Linkage of Humanitarian Aid and Development Cooperation at the Swiss Development Cooperation (SDC).	100%
	Levine, S and Venton, CC. (2019). Multi-year humanitarian funding.	84%
	UNEG Humanitarian Evaluation Interest Group. (2018). Detail of The Humanitarian-Development Nexus - What do evaluations have to say? Mapping and synthesis of evaluations.	75%
	Dalrymple, S, and Hanssen, S. (2020). Supporting longer term development in crises at the nexus: Lessons from Cameroon.	84%
	Eriksen, S. et al. (2017). Courting Catastrophe? Humanitarian Policy and Practice in a Changing Climate.	50%
	ICRC. (2020). When Rain Turns To Dust Understanding And Responding To The Combined Impact Of Armed Conflicts And The Climate And Environment Crisis On People's Lives.	67%
	Madajewicz, M. et al. (2013). Managing Risks To Agricultural Livelihoods: Impact Evaluation Of The Harita Program In Tigray, Ethiopia, 2009–2012.	100%
	Number of included papers	**19**

LESSON 13: Humanitarian actors and their partners should not conflate income with resilience; rather they should also consider other paths, particularly health and community empowerment	Dikawar, V et al. (2019). Child poverty, disasters and climate change.	100%
	Murphy, R. et al. (2017). START DEPP: Linking Preparedness Response and Resilience in Emergency Contexts' Humanitarian Strand Final Report.	84%
	IFRC. (2020). World Disaster Report: Come Heat Or High Water.	100%
	Levine, S and Venton , CC. (2019). Multi-year humanitarian funding.	84%
	Peters, K et al. (2020). Climate change, conflict and fragility.	84%
	Zahmore, L. (2019). The Triple Nexus in Practice: Toward a New Way of Working in Protracted and Repeated Crises.	50%
	Number of included papers	**6**
LESSON 14: Humanitarian actors and their partners should ensure that forecasting and early warning systems are reviewed after each disaster event, and routinely at fixed intervals over the longer term	START. (2020). 10 Lessons From The First Three Years 10 Of Crisis Anticipation.	84%
	Maxwell, D and Hailey, P. (2020). Towards Anticipatory Information Systems and Action: Notes on Early Warning and Early Action in East Africa.	50%
	Harris, C. and Cardenes, I. (2020). Basis Risk in Disaster Risk Financing for Humanitarian Action Potential Approaches to Measuring, Monitoring, and Managing it.	67%
	Jamie, C. and Harris, C. (2019). Impacts Before Instruments.	50%
	Sheel, M. et al. (2019). Evaluation of the early warning, alert and response system after Cyclone Winston, Fiji, 2016.	84%
	IFRC. (2013). Community early warning systems: guiding principles.	84%
	Number of included papers	**6**

LESSON 15: Designers of early warning, early action and anticipatory activities should build in flexibility	Gros, C. et al. (2019). Household-level effects of providing forecast-based cash in anticipation of extreme weather events: Quasi-experimental evidence from humanitarian interventions in the 2017 floods in Bangladesh.	100%
	Harris, C. and Cardenes, I. (2020). Basis Risk in Disaster Risk Financing for Humanitarian Action Potential Approaches to Measuring, Monitoring, and Managing it.	67%
	Willitts-King, B et al. (2020). Risk-informed approaches to humanitarian funding: using risk finance tools to strengthen resilience.	84%
	IPCC. (2014). Summary for policymakers. In: Climate Change 2014: Impacts,Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects	100%
	Lung, F. (2020). Being Timely: Creating Good Triggers And Plans In Disaster Risk Financing.	84%
	Wagner, M and Jamie, C. (2020). An Agenda for Expanding Forecast-Based Action to Situations of Conflict.	33%
	Jamie, C. and Harris, C. (2019). Impacts Before Instruments.	50%
	Maxwell, D and Hailey, P. (2020). Towards Anticipatory Information Systems and Action: Notes on Early Warning and Early Action in East Africa.	50%
	Nyirenda, J. (2019). Decentralized Evaluation Mid-Term Evaluation of Integrated Risk Management and Climate Services Programme in Malawi from 2017-2019.	100%
	Peters, K. et al. (2020). Climate Change, Conflict and Fragility: An Evidence Review and Recommendations for Research and Action.	84%
	Number of included papers	**10**

LESSON 16: Humanitarian actors and their partners should ensure that planned early actions are realistic, with implementation systems ready in place	Jamie, C. and Harris, C. (2019). Impacts Before Instruments.	50%
	Consultores Sandes. (2020). External Evaluation of Cyclone Idai and Kenneth Response in Mozambique.	67%
	RCCC. (2018). Forecast-based financing: case studies from Togo and Uganda.	50%
	START. (2020). 10 Lessons From The First Three Years 10 Of Crisis Anticipation	50%
	Levine, S and Venton, CC. (2019). Multi-year humanitarian funding.	84%
	Wagner, M and Jamie, C. (2020). An Agenda for Expanding Forecast-Based Action to Situations of Conflict.	33%
	Concern Worldwide. (2017). Tackling Food Crisis in Somalia: How resilience programming has reduced the impact of the current drought.	33%
	World Bank. (2013). Ethiopia's Productive Safety Net Program (PSNP) Integrating Disaster And Climate Risk Management.	67%
	Tanner, T. et al. (2019). Scaling up Forecast based early action(FbA)-Lessons, challenges and future potential in Bangladesh.	84%
	Zahmore, L. (2019). The Triple Nexus in Practice: Toward a New Way of Working in Protracted and Repeated Crises.	50%
	Willitts-King, B et al. (2020). Risk-informed approaches to humanitarian funding: using risk finance tools to strengthen resilience.	84%
	International Crisis Group. (2016). Seizing the Moment: From Early Warning to Early Action.	33%
	FAO. (2021). Scaling up existing, national social protection programmes to channel forecast-based anticipatory action.	50%
	Grunewald, F. and Schneckenberg, E. (2016). Évaluation en Temps Réel : Réponse à l'Ouragan Matthew en Haïti.	84%
	Number of included papers	**14**
LESSON 17: Early warning and early action systems will not be effective every time. Humanitarian actors and their partners should clarify what levels of uncertainty they are prepared to accept and plan to respond to disasters that were unanticipated or on a larger scale than expected	Concern Worldwide. (2017). Tackling Food Crisis in Somalia: How resilience programming has reduced the impact of the current drought.	33%
	Harris, C. and Cardenes, I. (2020). Basis Risk in Disaster Risk Financing for Humanitarian Action Potential Approaches to Measuring, Monitoring, and Managing it.	67%
	International Crisis Group. (2016). Seizing the Moment: From Early Warning to Early Action.	33%
	START. (2020). 10 Lessons From The First Three Years 10 Of Crisis Anticipation	50%
	Jamie, C. and Harris, C. (2019). Impacts Before Instruments.	50%
	Number of included papers	**5**

LESSON 18: Humanitarian actors and their partners should enhance preparedness for climate-related crises by pre-positioning emergency stocks and supplies, building capacity and providing information	ALNAP. (2018). The State of the Humanitarian System.	100%
	Weingärtner, L. et al. (2020). The evidence base on Anticipatory Action.	67%
	Allen, S. et al. (2012). Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation: Special Report of the Intergovernmental Panel on Climate Change.	100%
	Featherstone, A et al. (2019). OCHA Evaluation of Country-Based Pooled Funds - Somalia Country Report.	100%
	Jayawardhan, S. (2017). Vulnerability and Climate Change Induced Human Displacement.	67%
	Sterret, C. (2015). Final Evaluation of the Climate Smart Community Based Disaster Risk Reduction Project in Vietnam - June 2015 - Viet Nam.	100%
	UNDRR. (2019). Global Assessment Report on Disaster Risk Reduction.	84%
	UNEG Humanitarian Evaluation Interest Group. (2018). Detail of The Humanitarian-Development Nexus - What do evaluations have to say? Mapping and synthesis of evaluations.	75%
	WFP and Oxfam. (2016). Impact Evaluation Of The R4 Rural Resilience Initiative In Senegal.	100%
	Peters, K. et al. (2020). Climate Change, Conflict and Fragility: An Evidence Review and Recommendations for Research and Action.	84%
	Number of included papers	**10**

Lessons for tropical storms		
Lesson	**Citations**	**Grades**
LESSON 19: Tropical storms increasingly present new or unexpected patterns and can catch the population or responding institutions off guard; understanding the new risks entailed is central to preparing and responding	Inter-Agency Humanitarian Evaluation Steering Group. (2020). Inter-Agency Humanitarian Evaluation of the Response to Cyclone Idai in Mozambique-Executive summary.	100%
	Zakrison, T. et al. (2020). The Medical, Public Health, and Emergency Response to the Impact of 2017 Hurricane Irma in Cuba.	67%
	Chang, C. (2011). Preparedness and storm hazards in a global warming world: lessons from Southeast Asia.	67%
	Cuaton, G. and Su, Y. (2020). Local-indigenous knowledge on disaster risk reduction: Insights from the Mamanwa indigenous peoples in Basey, Samar after Typhoon Haiyan in the Philippines.	84%
	Grunewald, F. and Schneckenberg, E. (2016). Évaluation en Temps Réel : Réponse à l'Ouragan Matthew en Haïti.	84%
	IFRC. (2013). Community early warning systems: guiding principles.	84%
	Patra, M. et al. (2013). Health Hazards by Sea Cyclones in Odisha, the Supercyclone and the Phailin.	67%
	Vaisala. (2017). Increased early warning capability for severe weather conditions.	50%
	Liechti, K. et al. (2013). Flash-flood early warning using weather radar data: from nowcasting to forecasting.	84%
	Number of included papers	**9**

LESSON 20: Humanitarian actors and their partners, including affected populations, should improve disaster risk reduction in view of the increasing risks of tropical storm-related disasters in coastal and densely inhabited delta areas	Chang, C. (2011). Preparedness and storm hazards in a global warming world: lessons from Southeast Asia.	67%
	Rahmstorf, S. (2017). Rising hazard of storm-surge flooding.	50%
	Bertin, X. (2016). Storm surges and coastal flooding: status and challenges.	100%
	Ahmed, B. et al. (2016). Community Resilience to Cyclone Disasters in Coastal Bangladesh.	100%
	Priscoli, J. and Stakhiv, E. (2015). Water-related disaster risk reduction (DRR) management in the United States: floods and storm surges.	67%
	Allen, S. et al. (2012). Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation: Special Report of the Intergovernmental Panel on Climate Change.	100%
	South, A. et al. (2011). Myanmar - Surviving the Storm: Self-Protection and Survival in the Delta.	50%
	Sarsycki, M. (2019). Striving for Resilience: Lessons Learned from the Experiences of Drought and Cyclone Idai in Zimbabwe.	100%
	Wilkinson, E. et al. (2018). 'Building Back Better': A Resilient Caribbean after the 2017 Hurricanes.	33%
	Asian Development Bank. (2012). Intense Climate-Related Natural Disasters in Asia and the Pacific.	84%
	Nirupama, N. (2013). Vertical evacuation during cyclones: suitable for developing countries.	50%
	Dash, B. and Walia, A. (2020). Role of multi-purpose cyclone shelters in India: Last mile or neighbourhood evacuation.	84%
	Hirano. S. (2012). Learning from Urban Transitional Settlement Response in the Philippines: Housing, Land and Property Issues.	50%
	Edmonds, D. et al. (2020). Coastal flooding will disproportionately impact people on river delta.	100%
	Mahmood, J. (2013). Private sector engagement and collaboration with civil-military actors in disaster management in the Philippines: Typhoons Washi and Bopha and beyond.	84%
	Winterford, K. and Gero, A. (2018). Working Paper | Humanitarian Response for Development in Fiji: Lessons from Tropical Cyclone Winston.	100%
	Grunewald, F. (2020). Évaluation En Temps Réel De La Réponse Aux Inondations Du 4 Octobre 2020 Dans Les Alpes-Maritimes.	100%
	Vaisala. (2017). Increased early warning capability for severe weather conditions.	50%
	Liechti, K. et al. (2013). Flash-flood early warning using weather radar data: from nowcasting to forecasting.	84%
	Krausmann, E. et al. (2017). Natech risk assessment and management: reducing the risk of natural-hazard impact on hazardous installations.	100%
	Örtl, E. (2020). Natech Risk Management: Contributions to the UN/OECD Natech Project.	100%
	Number of included papers	**21**

LESSON 21: Humanitarian agencies need to reflect on the past, learn from the present and actively imagine the near, increasingly threatening future	Zakrison, T. et al. (2020). The Medical, Public Health, and Emergency Response to the Impact of 2017 Hurricane Irma in Cuba.	67%
	Schultz, J. et al. (2020). Mitigating the Twin Threats of Climate-Driven Atlantic Hurricanes and COVID-19 Transmission.	67%
	Winterford, K. and Gero, A. (2018). Working Paper | Humanitarian Response for Development in Fiji: Lessons from Tropical Cyclone Winston.	100%
	Wilkinson, E. et al. (2018). 'Building Back Better': A Resilient Caribbean after the 2017 Hurricanes.	33%
	Chang, C. (2011). Preparedness and storm hazards in a global warming world: lessons from Southeast Asia.	67%
	Baker, J. (2020). Inter-Agency Humanitarian Evaluation of the Response to Cyclone Idai in Mozambique.	100%
	Walshe, R. et al. (2020).Helices of disaster memory: How forgetting and remembering influence tropical cyclone response in Mauritius.	100%
	Keim, M. et al. (2006). The Oceans and Human Health.	67%
	Action Against Hunger. (2010). Floods Lessons Learnt.	33%
	Cosgrave, J. (2014). RESPONDING TO FLOOD DISASTERS: Learning from previous relief and recovery operations	84%
	Number of included papers	**10**
LESSON 22: Humanitarian actors and their partners should ensure that disaster responses to tropical storms should take account of potential secondary effects, such as flash floods, landslides and disease	Bryant-Tokalau, J. (2018). Adaptation to Climate Change in the Pacific Islands: Theory, Dreams, Practice and Reality.	67%
	Zurich Flood Resilience Alliance. (2020). Learning from Cyclone Idai and Cyclone Kenneth to Inform Long-term Disaster Risk Reduction Programming in Mozambique.	67%
	Henstra, D. et al. (2020). The governance of climate change adaptation: stormwater management policy and practice.	100%
	Rahmstorf, S. (2017). Rising hazard of storm-surge flooding.	50%
	Asian Development Bank. (2012). Intense Climate-Related Natural Disasters in Asia and the Pacific.	84%
	Patra, M. et al. (2013). Health Hazards by Sea Cyclones in Odisha, the Supercyclone and the Phailin.	67%
	Zakrison, T. et al. (2020). The Medical, Public Health, and Emergency Response to the Impact of 2017 Hurricane Irma in Cuba.	67%
	Erickson, T. et al. (2019). Environmental health effects attributed to toxic and infectious agents following hurricanes, cyclones, flash floods and major hydrometeorological events.	67%
	Doocy, S. et al. (2013). The Human Impact of Tropical Cyclones: a Historical Review of Events 1980-2009 and Systematic Literature Review.	84%
	Kim, K. et al. (2021). Hurricane Scenario Generation for Uncertainty Modeling of Coastal and Inland Flooding.	100%
	Number of included papers	**10**

LESSON 23: Humanitarian actors, their partners and affected communities should invest in new types of alarm and alert systems, giving priority to systems that transmit information and making use of all available options	Pacific Community. (2015). Tropical Cyclone Pam Lessons Learned Workshop Report.	67%
	Inter-Agency Humanitarian Evaluation Steering Group. (2020). Inter-Agency Humanitarian Evaluation of the Response to Cyclone Idai in Mozambique-Executive summary.	100%
	Zurich Flood Resilience Alliance. (2020). Learning from Cyclone Idai and Cyclone Kenneth to Inform Long-term Disaster Risk Reduction Programming in Mozambique.	67%
	Webb, J. (2020). What difference does disaster risk reduction make? Insights from Vanuatu and tropical cyclone Pam.	100%
	South, A. et al. (2011). Myanmar - Surviving the Storm: Self-Protection and Survival in the Delta.	50%
	Rodriguez, R. et al. (2017). Anduyog: A Web-based Application for Relief and Casualty Monitoring and Early Warning System for Local Government Units in the Philippines.	100%
	Kuleshov, Y. et al. (2020). Tropical cyclone early warnings for the regions of the Southern Hemisphere: strengthening resilience to tropical cyclones in small island developing states and least developed countries.	84%
	Assumpção, T. et al. (2018). Citizen observations contributing to flood modelling: opportunities and challenges.	100%
	Grunewald, F. and Schneckenberg, E. (2016). Évaluation en Temps Réel : Réponse à l'Ouragan Matthew en Haïti.	84%
	Time. (2020). The Importance of Redundancy in Emergency Notification Systems.	17%
	Rubiera Torres, J. et al. (2012). The Tropical Cyclone Early Warning System of Cuba.	100%
	Number of included papers	**11**

LESSON 24: Humanitarian actors should listen to affected people and communities, recognise the importance of their anticipatory capacity and champion further research on how traditional knowledge can inform us about risks and potential disasters	Le Dé, L. et al. (2018). Sustainable livelihoods and effectiveness of disaster responses: a case study of tropical cyclone Pam in Vanuatu.	67%
	Priscoli, J. and Stakhiv, E. (2015). Water-related disaster risk reduction (DRR) management in the United States: floods and storm surges.	67%
	Ha-Mim, N. et al. (2020). Exploring Vulnerability-Resilience-Livelihood Nexus in the Face of Climate Change: A Multi-Criteria Analysis for Mongla, Bangladesh.	100%
	Wentworth, C. (2020). Unhealthy Aid: Food Security Programming and Disaster Responses to Cyclone Pam in Vanuatu.	84%
	South, A. et al. (2011). Myanmar - Surviving the Storm: Self-Protection and Survival in the Delta.	50%
	Jagnoor, J. et al. (2019).Exploring the impact, response and preparedness to water-related natural disasters in the Barisal division of Bangladesh: a mixed methods study.	100%
	Cox, J. et al. (2020). Disaster Preparedness and the Abeyance of Agency: Christian Responses to Tropical Cyclone Winston in Fiji.	67%
	Serrao-Neumann, S. et al. (2018). Post-disaster social recovery: disaster governance lessons learnt from Tropical Cyclone Yasi	84%
	Madigan, S. (2019). Rapid gender and protection analysis: Tropical Cyclone Kenneth response Cabo Delgado province, Mozambique.	67%
	IFRC. (2020). Addressing specific vulnerabilities through integrated climate and disaster risk governance: Lessons from the Philippines.	100%
	Dunning, K. (2020). Building resilience to natural hazards through coastal governance: a case study of Hurricane Harvey recovery in Gulf of Mexico communities.	100%
	Tuhkanen, H. et al. (2018). A Typology Framework for Trade-Offs in Development and Disaster Risk Reduction: A Case Study of Typhoon Haiyan Recovery in Tacloban, Philippines.	100%
	Barber, R. (2013). Localising the Humanitarian Toolkit: Lessons from Recent Philippines Disasters.	67%
	Webb, J. (2020). What difference does disaster risk reduction make? Insights from Vanuatu and tropical cyclone Pam.	100%
	Zakrison, T. et al. (2020). The Medical, Public Health, and Emergency Response to the Impact of 2017 Hurricane Irma in Cuba.	67%
	Zurich Flood Resilience Alliance. (2020). Learning from Cyclone Idai and Cyclone Kenneth to Inform Long-term Disaster Risk Reduction Programming in Mozambique.	67%
	Clissold, R. (2020). Women as recovery enablers in the face of disasters in Vanuatu.	67%
	Bryant-Tokalau, J. (2018). Adaptation to Climate Change in the Pacific Islands: Theory, Dreams, Practice and Reality.	67%
	Cuaton, G. and Su, Y. (2020). Local-indigenous knowledge on disaster risk reduction: Insights from the Mamanwa indigenous peoples in Basey, Samar after Typhoon Haiyan in the Philippines.	84%
	Number of included papers	**19**

LESSON 25: Humanitarian actors, their partners and affected communities should invest in new information and communication technologies, from dedicated tools to user-generated data systems	Zakrison, T. et al. (2020). The Medical, Public Health, and Emergency Response to the Impact of 2017 Hurricane Irma in Cuba.	67%
	Mäkinen, M. and Wangu Kuira, M. (2008). Social Media and Postelection Crisis in Kenya.	50%
	Rodriguez, R. et al. (2017). Anduyog: A Web-based Application for Relief and Casualty Monitoring and Early Warning System for Local Government Units in the Philippines.	100%
	Kryvasheyeu, Y. et al. (2016). Rapid assessment of disaster damage using social media activity.	100%
	Liu, X. et al. (2019). Assessing relevance of tweets for risk communication.	100%
	Assumpção, T. et al. (2018). Citizen observations contributing to flood modelling: opportunities and challenges.	100%
	Yin, J. et al. (2012). Using Social Media to Enhance Emergency Situation Awareness.	100%
	Martín, Y. et al. (2017). Leveraging Twitter to gauge evacuation compliance: Spatiotemporal analysis of Hurricane Matthew.	84%
	Hong, J. et al. (2018). Community disaster resilience and social solidarity on social media: a semantic network analysis of the Sewol ferry disaster.	100%
	Zou, L. et al. (2019). Social and geographical disparities in Twitter use during Hurricane Harvey.	100%
	Number of included papers	**10**

LESSON 26: Local authorities, working with humanitarian actors and other partners, should develop alternative shelter and evacuation systems in regions that are not typically disaster zones, but which could be affected by tropical storms in future	Paul, B. and Dutt, S. (2010). Hazard Warnings and Responses to Evacuation Orders: The Case of Bangladesh's Cyclone Sidr.	100%
	Dash, B. and Walia, A. (2020). Role of multi-purpose cyclone shelters in India: Last mile or neighbourhood evacuation.	84%
	Chakma, S. and Hokugo, A. (2020). Evacuation Behavior: Why Do Some People Never Evacuate to a Cyclone Shelter During an Emergency? A Case Study of Coastal Bangladesh.	100%
	Sameen, S. (2018). Process inclusive Infrastructure: Notions towards Cyclone Resilience in Bangladesh.	100%
	Madigan, S. (2019). Rapid gender and protection analysis: Tropical Cyclone Kenneth response Cabo Delgado province, Mozambique.	67%
	Miyaji, M. et al. (2020). A study on the use of cyclone shelters in Bangladesh.	100%
	Zurich Flood Resilience Alliance. (2020). Learning from Cyclone Idai and Cyclone Kenneth to Inform Long-term Disaster Risk Reduction Programming in Mozambique.	67%
	Jagnoor, J. et al. (2019).Exploring the impact, response and preparedness to water-related natural disasters in the Barisal division of Bangladesh: a mixed methods study.	100%
	Solinska-Nowak, A. et al. (2018). An overview of serious games for disaster risk management – Prospects and limitations for informing actions to arrest increasing risk.	100%
	Parvin, G. et al. (2019). Evacuation scenarios of cyclone Aila in Bangladesh: Investigating the factors influencing evacuation decision and destination.	100%
	Number of included papers	**10**
LESSON 27: The likelihood of new forms of extreme climate effects and weather events caused by climate change necessitates improved dialogue and coordination between government and civil society on how to respond to and manage them	Peters, K et al. (2020). Climate change, conflict and fragility.	84%
	Sarsycki, M. (2019). Building Resilience and Shaping the Future: Lessons Learned from the Experiences of Cyclone Idai in Southern Malawi.	100%
	Henstra, D. et al. (2020). The governance of climate change adaptation: stormwater management policy and practice.	100%
	Barber, R. (2013). Localising the Humanitarian Toolkit: Lessons from Recent Philippines Disasters.	67%
	Wentworth, C. (2020). Unhealthy Aid: Food Security Programming and Disaster Responses to Cyclone Pam in Vanuatu.	84%
	Pacific Community. (2015). Tropical Cyclone Pam Lessons Learned Workshop Report.	67%
	Mahmood, J. (2013). Private sector engagement and collaboration with civil-military actors in disaster management in the Philippines: Typhoons Washi and Bopha and beyond.	84%
	Grunewald, F. (2020). Évaluation En Temps Réel De La Réponse Aux Inondations Du 4 Octobre 2020 Dans Les Alpes-Maritimes.	100%
	Winterford, K. and Gero, A. (2018). Working Paper | Humanitarian Response for Development in Fiji: Lessons from Tropical Cyclone Winston.	100%
	Number of included papers	**9**

LESSON 28: Humanitarian actors and partners – especially at local level – should recognise and support immediately following a disaster any effective informal first-response networks or citizen-led responses	Uddin, S. et al. (2020). Community resilience to cyclone and storm surge disasters: Evidence from coastal communities of Bangladesh.	84%
	South, A. et al. (2011). Myanmar - Surviving the Storm: Self-Protection and Survival in the Delta.	50%
	Grunewald, F. (2020). Évaluation En Temps Réel De La Réponse Aux Inondations Du 4 Octobre 2020 Dans Les Alpes-Maritimes.	100%
	Grunewald, F. (2020). Evaluation de la réponse à la tempête Alex dans les Alpes-Maritimes, Groupe Urd 2020.	100%
	Corbett, J. et al. (2021). Survivor- and community-led crisis response: Practical experience and learning.	50%
	Le Dé, L. et al. (2018). Sustainable livelihoods and effectiveness of disaster responses: a case study of tropical cyclone Pam in Vanuatu.	67%
	Briones, F. et a. (2018). Local responses to disasters: recent lessons from zero-order responders.	100%
	JLFILC. (2020). Role of faith network in disaster.	33%
	Number of included papers	**8**
LESSON 29: Women are key actors in managing unknown risks and should be properly supported and empowered in preparing and responding to new dynamics of tropical storms	Clissold, R. (2020). Women as recovery enablers in the face of disasters in Vanuatu.	67%
	McNamara, K. et al. (2021). Women's capabilities in disaster recovery and resilience must be acknowledged, utilized and supported.	67%
	Sameen, S. (2018). Process inclusive Infrastructure: Notions towards Cyclone Resilience in Bangladesh.	100%
	Jagnoor, J. et al. (2019).Exploring the impact, response and preparedness to water-related natural disasters in the Barisal division of Bangladesh: a mixed methods study.	100%
	IFRC. (2020). Addressing specific vulnerabilities through integrated climate and disaster risk governance: Lessons from the Philippines.	100%
	Barber, R. (2013). Localising the Humanitarian Toolkit: Lessons from Recent Philippines Disasters.	67%
	Pacific Community. (2015). Tropical Cyclone Pam Lessons Learned Workshop Report.	67%
	Madigan, S. (2019). Rapid gender and protection analysis: Tropical Cyclone Kenneth response Cabo Delgado province, Mozambique.	67%
	Oxfam. (2013). Typhoon Haiyan - The Response so Far and Vital Lessons for the Philippines Recovery.	33%
	Number of included papers	**9**

Lessons for heatwaves		
Lesson	**Citations**	**Grades**
LESSON 30: Humanitarian actors and their partners should formulate programmatic responses to the challenges presented by extreme heat and heatwaves	Dicker, S. et al. (2021). Saving Lives and Livelihoods: The Benefits of Investments in Climate Change Adaptation and Resilience.	84%
	Peters, K. et al. (2015). Climate extremes and resilient poverty reduction.	100%
	El-Fadel, M. and Ghanimeh, S. (2013). Climate change and temperature rise in the Greater Beirut Area: implications on heat-related premature mortality.	84%
	De Perez, E. et al. (2018). Global predictability of temperature extremes.	84%
	Allen, S. et al. (2012). Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation: Special Report of the Intergovernmental Panel on Climate Change.	100%
	Price, R. et al. (2021). Initiating a Multi-Party Collaboration for Adaption and Resilience to Urban Heatwaves: A Report Prepared for the Netherlands Organisation for Scientific Research : NWO Grant Number KI.18.043.	100%
	Papathoma-Koehle, M. et al. (2016). A common methodology for risk assessment and mapping for south-east Europe: an application for heat wave risk in Romania.	100%
	Number of included papers	**7**

LESSON 31: Humanitarian and other actors should focus support to communities and socio-economic groups that are particularly exposed to the harmful effects of heatwaves as the threat of them increases	Peters, K. et al. (2015). Climate extremes and resilient poverty reduction.	100%
	IFRC. (2019). City Heatwave Guide for Red Cross Red Crescent Branches.	67%
	Flores-Larsen, S. and Filipin, C. (2021). Energy efficiency, thermal resilience, and health during extreme heat events in low-income housing in Argentina.	100%
	Harlan, S. and Ruddell, D. (2011). Climate change and health in cities: impacts of heat and air pollution and potential co-benefits from mitigation and adaptation.	100%
	Zografos, C. et al. (2016). When exposure to climate change is not enough: Exploring heatwave adaptive capacity of a multi-ethnic, low-income urban community in Australia.	84%
	Hess, J. et al. (2018). Building Resilience to Climate Change: Pilot Evaluation of the Impact of India's First Heat Action Plan on All-Cause Mortality.	100%
	Kapwata, T. et al. (2018). Current and Potential Future Seasonal Trends of Indoor Dwelling Temperature and Likely Health Risks in Rural Southern Africa.	100%
	Ziegler, T. et al. (2019). Shifting from "Community-Placed" to "Community-Based" Research to Advance Health Equity: A Case Study of the Heatwaves, Housing, and Health: Increasing Climate Resiliency in Detroit (HHH) Partnership.	100%
	Lowe, D. et al. (2011). Heatwave Early Warning Systems and Adaptation Advice to Reduce Human Health Consequences of Heatwaves.	67%
	Price, R. et al. (2021). Initiating a Multi-Party Collaboration for Adaption and Resilience to Urban Heatwaves: A Report Prepared for the Netherlands Organisation for Scientific Research: NWO Grant Number KI.18.043	100%
	Das, S. and Smith, S. (2012). Awareness As An Adaptation Strategy For Reducing Mortality From Heat Waves: Evidence From A Disaster Risk Management Program In India.	84%
	Pasquini, L. et al. (2020). Emerging climate change-related public health challenges in Africa: A case study of the heat-health vulnerability of informal settlement residents in Dar es Salaam, Tanzania.	100%
	Błażejczyk, A. et al. (2018). Heat stress mortality and desired adaptation responses of healthcare system in Poland.	100%
	Ngwenya, B. et al. (2018). Heat Stress and Adaptation Strategies of Outdoors Workers in the City of Bulawayo, Zimbabwe.	67%
	Papathoma-Koehle, M. et al. (2016). A common methodology for risk assessment and mapping for south-east Europe: an application for heat wave risk in Romania.	100%
	Kirbyshire, A. and Aditi, P. (2017). Heat action plans: Scaling up India's ambition to protect the climate-vulnerable.	67%
	Number of included papers	**16**

LESSON 32: Humanitarian actors should support efforts to secure reliable access to sustainable energy, which is needed for effective strategies for adapting to increasing heatwaves	Harlan, S. and Ruddell, D. (2011). Climate change and health in cities: impacts of heat and air pollution and potential co-benefits from mitigation and adaptation.	100%
	Kapwata, T. et al. (2018). Current and Potential Future Seasonal Trends of Indoor Dwelling Temperature and Likely Health Risks in Rural Southern Africa.	100%
	Pasquini, L. et al. (2020). Emerging climate change-related public health challenges in Africa: A case study of the heat-health vulnerability of informal settlement residents in Dar es Salaam, Tanzania.	100%
	Hanif, U. (2017). Socio-Economic Impacts of Heat Wave in Sindh.	100%
	El-Fadel, M. and Ghanimeh, S. (2013). Climate change and temperature rise in the Greater Beirut Area: implications on heat-related premature mortality.	84%
	Flores-Larsen, S. and Filipin, C. (2021). Energy efficiency, thermal resilience, and health during extreme heat events in low-income housing in Argentina.	100%
	Number of included papers	**6**
LESSON 33: Humanitarian actors should develop their understanding of the complex impact of extreme heat on livelihoods	N/A	N/A
LESSON 34: Partnership between humanitarian actors and government can support social protection to vulnerable groups in the event of extremely high temperatures or heatwaves	N/A	N/A

LESSON 35: Humanitarian actors should support and play their part in multisectoral approaches across shelter, urban planning, WASH and public health to help communities improve their capacity to withstand and respond to the effects of heatwaves	Kirbyshire, A. and Aditi, P. (2017). Heat action plans: Scaling up India's ambition to protect the climate-vulnerable.	67%
	McGregor, G. et al. (2015). Heatwaves and health: guidance on warning-system development.	100%
	Dicker, S. et al. (2021). Saving Lives and Livelihoods: The Benefits of Investments in Climate Change Adaptation and Resilience.	84%
	Flores-Larsen, S. and Filipin, C. (2021). Energy efficiency, thermal resilience, and health during extreme heat events in low-income housing in Argentina.	100%
	Harlan, S. and Ruddell, D. (2011). Climate change and health in cities: impacts of heat and air pollution and potential co-benefits from mitigation and adaptation.	100%
	Zografos, C. et al. (2016). When exposure to climate change is not enough: Exploring heatwave adaptive capacity of a multi-ethnic, low-income urban community in Australia.	84%
	Kapwata, T. et al. (2018). Current and Potential Future Seasonal Trends of Indoor Dwelling Temperature and Likely Health Risks in Rural Southern Africa.	100%
	Lowe, D. et al. (2011). Heatwave Early Warning Systems and Adaptation Advice to Reduce Human Health Consequences of Heatwaves.	67%
	Pasquini, L. et al. (2020). Emerging climate change-related public health challenges in Africa: A case study of the heat-health vulnerability of informal settlement residents in Dar es Salaam, Tanzania.	100%
	UNISDR. (2010). Emerging Challenges for Early Warning Systems in Context of Climate Change and Urbanization..	84%
	AMC. (2018). Ahmedabad Heat Action Plan 2018.	67%
	Raven, J. et al. (2018). The Assessment Report for Climate Change in Cities (ARC3-2) Urban Planning and Design.	84%
	NRDC. (2013). Rising Temperatures, Deadly Threat: Recommendations for Ahmedabad's Government Officials.	84%
	Harlan, S. et al. (2006). Neighborhood microclimates and vulnerability to heat stress.	84%
	Pasquini, L. et al. (2020). Emerging climate change-related public health challenges in Africa: A case study of the heat-health vulnerability of informal settlement residents in Dar es Salaam, Tanzania.	100%
	IFRC. (2019). City Heatwave Guide for Red Cross Red Crescent Branches.	67%
	Ebi, K. and Otmani del Bario, M. (2017). Lessons Learned on Health Adaptation to Climate Variability and Change: Experiences Across Low- and Middle-Income Countries.	67%
	Number of included papers	**17**

LESSON 36: Governments, researchers and humanitarian actors should share the financial burden of mitigation activities	McGregor, G. et al. (2015). Heatwaves and health: guidance on warning-system development.	100%
	Ebi, K. and Otmani del Bario, M. (2017). Lessons Learned on Health Adaptation to Climate Variability and Change: Experiences Across Low- and Middle-Income Countries.	67%
	Keramitsoglou, I. et al. (2017). Urban thermal risk reduction: Developing and implementing spatially explicit services for resilient cities.	100%
	Kirbyshire, A. and Aditi, P. (2017). Heat action plans: Scaling up India's ambition to protect the climate-vulnerable.	67%
	Dicker, S. et al. (2021). Saving Lives and Livelihoods: The Benefits of Investments in Climate Change Adaptation and Resilience.	84%
	Ziegler, T. et al. (2019). Shifting from "Community-Placed" to "Community-Based" Research to Advance Health Equity: A Case Study of the Heatwaves, Housing, and Health: Increasing Climate Resiliency in Detroit (HHH) Partnership.	100%
	Number of included papers	**6**
LESSON 37: Humanitarian actors should contribute to awareness-building among groups who do not understand the dangers of extremely high temperatures or heatwaves	Pasquini, L. et al. (2020). Emerging climate change-related public health challenges in Africa: A case study of the heat-health vulnerability of informal settlement residents in Dar es Salaam, Tanzania.	100%
	Bakhsh, K. (2018). Adaptation strategies for minimizing heat wave induced morbidity and its determinants.	100%
	Kirbyshire, A. and Aditi, P. (2017). Heat action plans: Scaling up India's ambition to protect the climate-vulnerable.	67%
	Hanif, U. (2017). Socio-Economic Impacts of Heat Wave in Sindh.	100%
	McGregor, G. et al. (2015). Heatwaves and health: guidance on warning-system development.	100%
	Number of included papers	**5**

LESSON 38: Advocate for greater investment into early warning against heatwaves	Peters, K. et al. (2015). Climate extremes and resilient poverty reduction.	100%
	IFRC. (2020). World Disaster Report: Come Heat Or High Water.	100%
	IFRC. (2019). City Heatwave Guide for Red Cross Red Crescent Branches.	67%
	Hess, J. et al. (2018). Building Resilience to Climate Change: Pilot Evaluation of the Impact of India's First Heat Action Plan on All-Cause Mortality.	100%
	Lowe, D. et al. (2011). Heatwave Early Warning Systems and Adaptation Advice to Reduce Human Health Consequences of Heatwaves.	67%
	Pasquini, L. et al. (2020). Emerging climate change-related public health challenges in Africa: A case study of the heat-health vulnerability of informal settlement residents in Dar es Salaam, Tanzania.	100%
	Keramitsoglou, I. et al. (2017). Urban thermal risk reduction: Developing and implementing spatially explicit services for resilient cities.	100%
	Błażejczyk, A. et al. (2018). Heat stress mortality and desired adaptation responses of healthcare system in Poland.	100%
	El-Fadel, M. and Ghanimeh, S. (2013). Climate change and temperature rise in the Greater Beirut Area: implications on heat-related premature mortality.	84%
	Hess, J. and Ebi, K. (2016). Iterative management of heat early warning systems in a changing climate.	67%
	McGregor, G. et al. (2015). Heatwaves and health: guidance on warning-system development.	100%
	Kirbyshire, A. and Aditi, P. (2017). Heat action plans: Scaling up India's ambition to protect the climate-vulnerable.	67%
	Number of included papers	**12**

LESSON 39: Humanitarian and other donors should invest more time and resources in better risk assessment and improved monitoring and evaluation of heatwave preparedness and adaptation programmes and activities	Zografos, C. et al. (2016). When exposure to climate change is not enough: Exploring heatwave adaptive capacity of a multi-ethnic, low-income urban community in Australia.	84%
	IFRC. (2020). World Disaster Report: Come Heat Or High Water.	100%
	Kirbyshire, A. and Aditi, P. (2017). Heat action plans: Scaling up India's ambition to protect the climate-vulnerable.	67%
	Otto, F. (2015). Attribution of extreme weather events in Africa: a preliminary exploration of the science and policy implications.	67%
	Papathoma-Koehle, M. et al. (2016). A common methodology for risk assessment and mapping for south-east Europe: an application for heat wave risk in Romania.	100%
	Ebi, K. and Otmani del Bario, M. (2017). Lessons Learned on Health Adaptation to Climate Variability and Change: Experiences Across Low- and Middle-Income Countries.	67%
	Dicker, S. et al. (2021). Saving Lives and Livelihoods: The Benefits of Investments in Climate Change Adaptation and Resilience.	84%
	Keramitsoglou, I. et al. (2017). Urban thermal risk reduction: Developing and implementing spatially explicit services for resilient cities.	100%
	UNISDR. (2010). Emerging Challenges for Early Warning Systems in Context of Climate Change and Urbanization.	84%
	Number of included papers	**9**
LESSON 40: Humanitarian and other actors should design their interventions in ways that engage affected communities in heatwave mitigation plans and programmes	Kirbyshire, A. and Aditi, P. (2017). Heat action plans: Scaling up India's ambition to protect the climate-vulnerable.	67%
	McGregor, G. et al. (2015). Heatwaves and health: guidance on warning-system development.	100%
	Das, S. and Smith, S. (2012). Awareness As An Adaptation Strategy For Reducing Mortality From Heat Waves: Evidence From A Disaster Risk Management Program In India.	84%
	Dicker, S. et al. (2021). Saving Lives and Livelihoods: The Benefits of Investments in Climate Change Adaptation and Resilience.	84%
	Zografos, C. et al. (2016). When exposure to climate change is not enough: Exploring heatwave adaptive capacity of a multi-ethnic, low-income urban community in Australia.	84%
	Ziegler, T. et al. (2019). Shifting from "Community-Placed" to "Community-Based" Research to Advance Health Equity: A Case Study of the Heatwaves, Housing, and Health: Increasing Climate Resiliency in Detroit (HHH) Partnership.	100%
	Zander, K. et al. (2019). Human mobility intentions in response to heat in urban South East Asia.	100%
	Hess, J. et al. (2018). Building Resilience to Climate Change: Pilot Evaluation of the Impact of India's First Heat Action Plan on All-Cause Mortality.	67%
	Number of included papers	**8**

5 Detailed database search

Table 6 Database search details

Database name	Search string used	Date of search	Total # hits	# excluded hits (Step1)	Main reason for exclusion (Step 1)	In Zotero
Lessons for heatwaves						
Google Scholar	heatwave AND "climate change" AND adaptation OR resilience OR DRR OR "disaster risk reduction" OR anticipation OR "early warning" OR "early action" OR response	04/05/2021 – 06/05/2021	17900 (but only 1000 most relevant screened)	821	Not relevant; outside of scope	35 (+144 in less relevant folders including 89 for G20 Countries)
ALNAP HELP Library	heatwave "climate change"	07/05/2021	161	153	Too wide about climate change; outside of scope; not relevant	8
Other database (ODI, IFRC, WHO, Future Climate For Africa, ASSAR)	heatwave	07/05/2021	Approximately 40	Approximately 30	Not relevant	6

General lessons						
Google Scholar	(“climate change” AND “humanitarian) AND (strateg* OR policy OR finance* OR fund*)	05/05/2021 - 07/05/2021	17600 (304 screened)	257	Not relevant; no concrete recommendations	30 (+17 having generic recommendations/ which are not based in practice)
ALNAP HELP Library	climate change policy	10/05/2021 – 12/05/2021	3819 (300 screened)	269	Not relevant; no concrete recommendations; recommendations not for our actors	23 (+8 having generic recommendations/ which are not based in practice)
Lessons for tropical storms						
Web of Science	TS=(“climate change” AND (cyclone* OR hurricane* OR typhoon* OR storm*) AND (“early warning” OR *early action” OR anticipation OR adaptation OR resilience OR DRR OR “disaster risk reduction” OR preparedness OR response))	04/05/2021 – 10/05/2021	3800 (but only 500 most relevant screened	428	Not relevant; outside of scope	72 (+37 in less relevant folders including 26 for G20 countries)
ALNAP HELP Library	Tropical storm “climate change”		161	153	Too wide about climate change; outside of scope; not relevant	8

Endnotes

1 A climate and humanitarian crisis initiative.

2 See in particular “Report on Environmental Footprint of humanitarian assistance for DG ECHO”, Groupe URD, 2020” and “The Environmental Implications of Cash Transfers”, Groupe URD, 2020.

3 These languages are those spoken within the research team.

4 The methodology for the Quality Appraisal grading process can be found on page 11.

5 The Delphi method is a consultation process with experts on a subject matter. Experts provide their predictions or their opinion on a subject/proposition in an anonymous process. Typically, several rounds are held, which allows the researchers to come closer to a consensus based on the views of multiple experts.

Related ALNAP publications

- Lessons Paper: A methods note
- ALNAP Lessons Paper: Responding to earthquakes
- Nepal Earthquake Response: Lessons for operational agencies

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