



**Flood
Resilience
Alliance**

Flood Resilience Measurement Framework (FRMC) of the Zurich Flood Resilience Alliance (ZFRA)

Colin McQuistan, Practical Action
Global Flood Partnership, November 2020

In partnership
with:

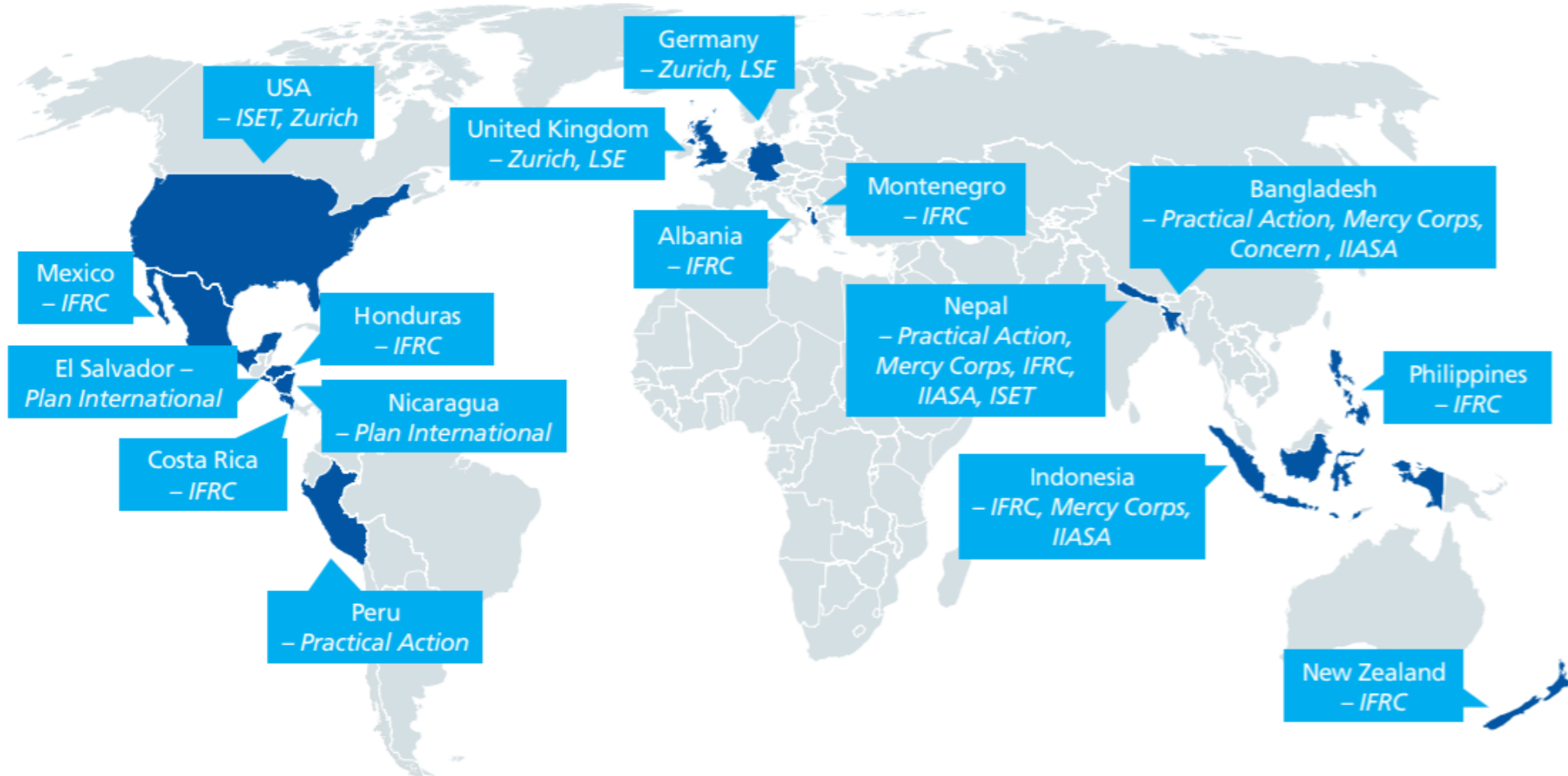


Who we are

In partnership with:



Country programmes



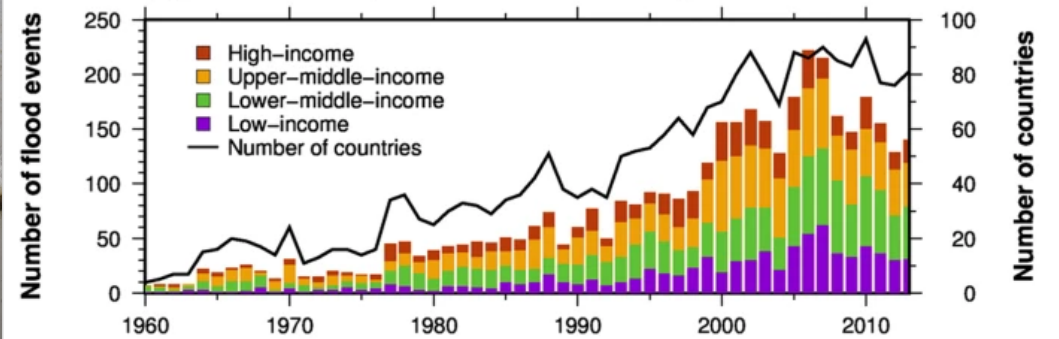
Map indicates community-based programs, post-event analysis (PERC), research studies and public policy advocacy.

The challenge



Figure 1

(a) Number of reported flood events by EM-DAT





Why Measure?



Why do we need to measure flood resilience?

Measurement enables us to assess and demonstrate the on-the-ground impact of improvements



Why do we need to develop our own framework?

Currently, there is no empirically verified measurement framework for disaster resilience. So, we want to address this gap.



How will the framework help us?

We will be able to contribute to the knowledge base on flood resilience, which will, in turn, help to increase social, political, and financial investment in building it.

So what do we need to do?

The first measure of resilience to be applied on a large scale, the **flood resilience measurement for communities:**

- ✓ Is fully integrated into community programming
- ✓ Helps analyze problems first before solutions
- ✓ Supports impact measurement
- ✓ Is generating data for empirical evidence on flood resilience

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Natural Hazards
and Earth System
Sciences 



Development and testing of a community flood resilience measurement tool

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Abstract. Given the increased attention on resilience strengthening in international humanitarian and development work, there is a growing need to invest in its measurement and the overall accountability of “resilience strengthening” initiatives. The purpose of this article is to present our framework and tool for measuring community-level resilience to flooding and generating empirical evidence and to share our experience in the application of the resilience concept. At the time of writing the tool is being tested in 75 communities across eight countries. Currently 88 potential sources of resilience are measured at the baseline (initial state) and end line (final state) approximately 2 years later. If a flood occurs in the community during the study period, resilience outcome measures are recorded. By comparing pre-flood characteristics to post-flood outcomes, we aim to empirically verify sources of resilience, something which has never been done in this field. There is an urgent need for the continued development of theoretically anchored, empirically verified, and practically applicable disaster resilience measurement frameworks and tools so that the field may (a) deepen understanding of the key components of “disaster resilience” in order to better target resilience-enhancing initiatives, and (b) enhance our ability to benchmark and measure disaster resilience over time, and (c) compare how resilience changes as a result of different capacities, actions and hazards.

1 Introduction

The Hyogo Framework for Action, established 10 years ago, set out an ambitious framework for addressing disaster risk. While the platform was successful in reducing disaster mortality globally, there has not been similar success in tackling the underlying factors driving increasing exposure of people and assets to hazards (UNISDR, 2013, 2015). This is a goal of the subsequent Sendai Framework (2015–2030) and arguably requires a collaboration and integration between the disaster risk management (DRM) field and wider investment and development planning, in particular within the international development sector (Schipper and Pelling, 2006). At the same time, the cost effectiveness of ex ante risk reduction over ex post response is increasingly recognized (Mechler, 2016) and is increasingly relevant under conditions of funding scarcity (Frankenberger et al., 2014). Disaster resilience has come to the fore as an integrating concept by assisting in identifying novel ex ante strategies for integrated approaches to disaster risk reduction and response, as well as sustainable development. Disaster resilience definitions, frameworks, and approaches are being developed and promoted prolifically (Frankenberger et al., 2014; Winderl, 2014; Mitchell, 2013).

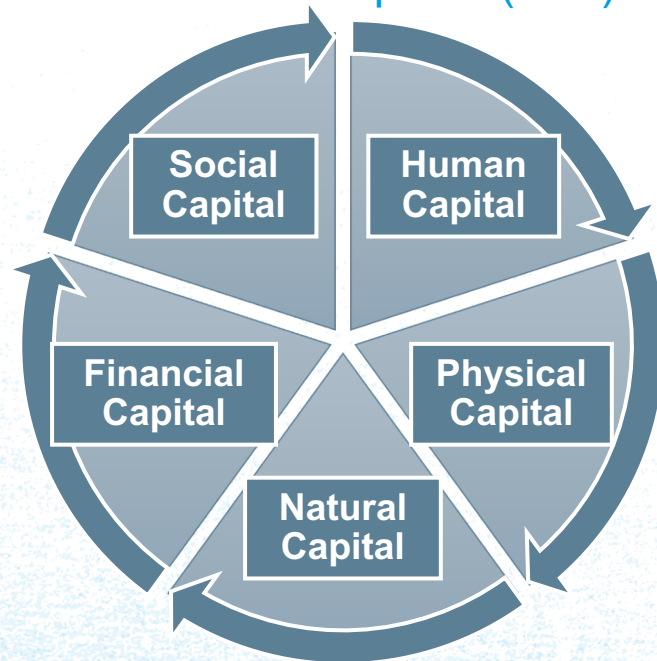
While resilience theories have informed wide-ranging disciplines for quite some time, an effort to identify operational indicators has gained some traction only in the last decade (Carpenter et al., 2005). Given the increased attention on enhancing disaster resilience, there has been growing investment in its measurement and the overall account-

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We have developed a robust measurement approach: Our 5C-4R FRMC

Our 5C-4R framework is using established models and Zurich's Risk Engineering expertise

Sustainable livelihoods framework: The 5 capitals (5Cs)



44 SOURCES OF RESILIENCE

Each mapped to 5C, 4R, 10 themes, ...

Each Source graded from

A (best in class) to D (very weak or not present)

The four properties of a resilient system (4Rs)

ROBUSTNESS (ability to withstand a shock)
for example, housing and bridges built to withstand flood waters

REDUNDANCY (functional diversity)
for example, having many evacuation routes

RESOURCEFULNESS (ability to mobilize when threatened)
for example, a community group who can quickly turn a community centre into a flood shelter

RAPIDITY (ability to contain losses and recover in a timely manner)
for example, access to quick finance for recovery

Developed originally by the Multidisciplinary Center for Earthquake Engineering Research at the University of Buffalo in the US (MCEER)

How to overcome technical limitations, and navigate complexity?



Flood Resilience Measurement for Communities (FRMC) Tool

1 COMMUNITY DATA COLLECTION

1/25
EDUCATION COMMITMENT DURING FLOODS
 Q: What are some reasons why the school students in this household might not attend school or classes due to flooding?
 Children help look after younger siblings or other family

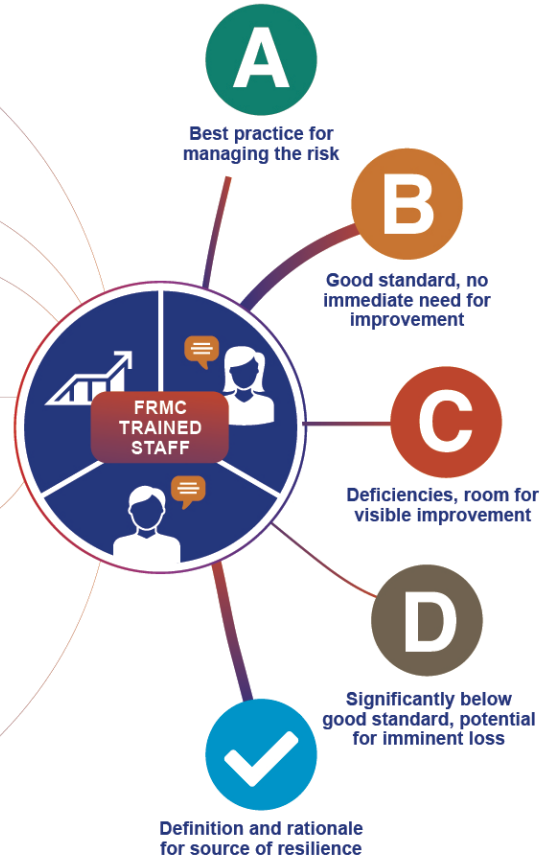
MIXED DATA COLLECTION METHODS

- HOUSEHOLD SURVEYS
- FOCUS GROUP DISCUSSIONS
- KEY INFORMANT INTERVIEWS
- SECOND SOURCE DATA

2 44 SOURCES OF RESILIENCE

- Education during flood time
- Asset protection knowledge
- Governance awareness
- Access to well-planned flood services
- Community safety
- Flood exposure awareness
- Flood emergency infrastructure
- Continuity of education
- Flood emergency food supply
- Priority natural land units
- Household asset recovery
- Disaster response budget

3 EXPERTS ASSIGN GRADES TO EACH SOURCE



4 DATA ANALYSIS AND INTERPRETATION

5 CAPITALS

4Rs

7 THEMES

DRM CYCLE

SYSTEM LEVEL VIEWS

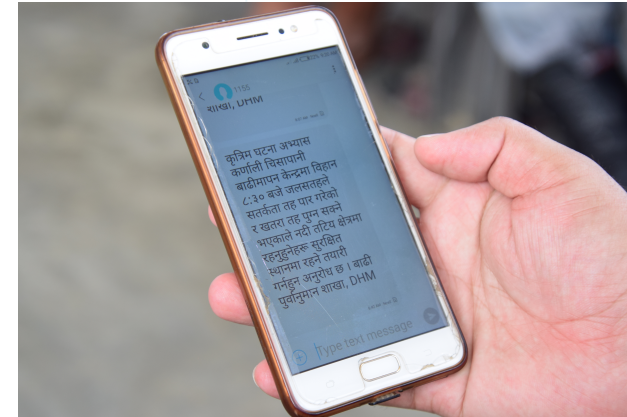
Overall community score

Study score

Financial Human Natural Physical Social



How to overcome technical limitations, and navigate complexity?



Program examples – data collection



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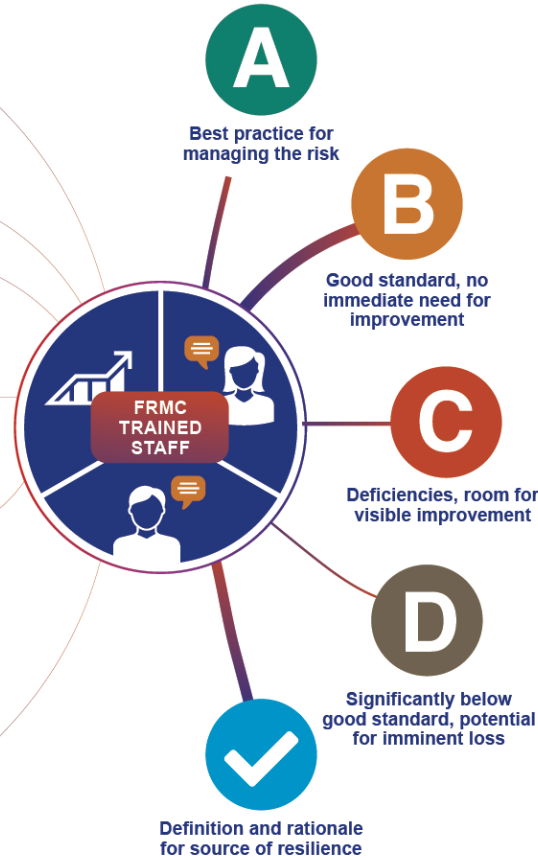
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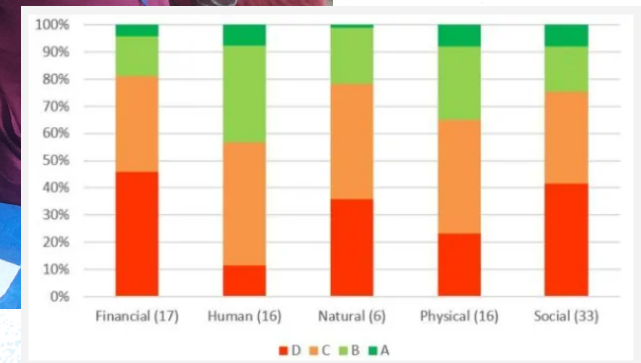
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So what's next?



Practical Action program example

Strengthening human capital through training and education



Practical Action program example

Strengthening social capital through interaction and community organization and networks of resilient communities



Overall program examples

Leveraging investment and influencing local and national policy: Several million USD in local currency invested more



Zurich Flood Resilience Alliance - FRMC – Global Flood Partnership



Evidence for changing practice...



Solutions the Alliance can offer

Our Post Event Review Capability (PERC):

- ✓ A unique forensic methodology
- ✓ Unbiased event-level learning
- ✓ Understanding why events become disasters
- ✓ We provide practical recommendations for the future



The PERC manual

Learning from disasters to build resilience:
a simple guide to conducting a post event review



Solutions the Alliance can offer

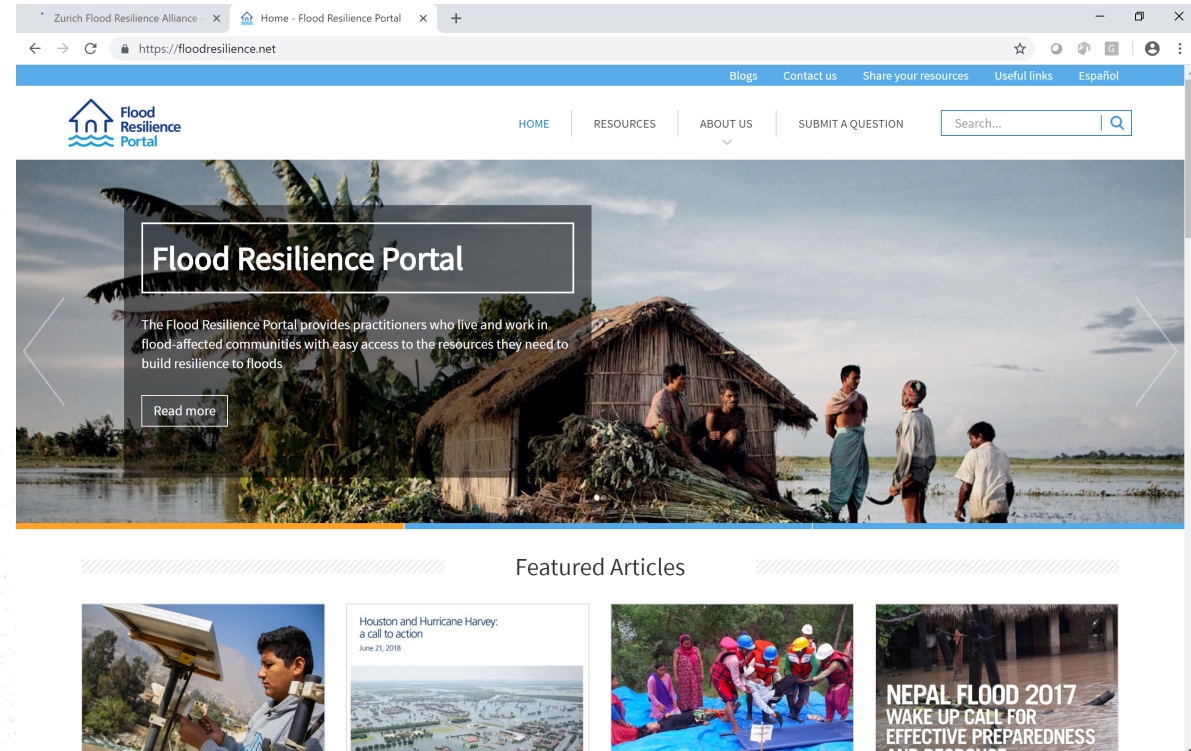
Flood Resilience Portals for cross-cutting knowledge sharing

Knowledge from the Alliance and beyond on how to build community resilience published on the Alliance's online portals:

Global
<http://floodresilience.net/>

Latin America
<https://infoinundaciones.com/>

Nepal
<http://floodresilience.net.np/>



Are you interested?

- Document explaining the approach
- "Inviting Other"
- Including form to fill out for interested participants
- FRMC work stream to assess and grant access

Available on the portal: <https://floodresilience.net/frmc>

Direct link: <https://floodresilience.net/resources/item/the-flood-resilience-measurement-for-communities-frmc>

The theory behind the FRMC



The Flood Resilience Measurement for Communities (FRMC)

This document provides detail on the conceptual framework behind the Flood Resilience Measurement for Community (FRMC) and explains how it is applied practically, including the software used. Over 110 communities in nine...

(PDF: 1.14 MB) 

[READ MORE](#)

What are your thoughts?



Flood
Resilience
Alliance

Thank you

In partnership
with:



More resources to understand the alliance

Zurich Flood Resilience Program webpage: <http://zurich.com/flood-resilience>

Learning to support the SDGs: Post Event Review Capability (PERC):
<https://www.zurich.com/en/corporate-responsibility/flood-resilience/learning-from-post-flood-events>

Videos explaining the measurement approach in detail:
<https://www.zurich.com/en/corporate-responsibility/flood-resilience/measuring-flood-resilience>

Four-pager explaining the approach in text and illustrations:
https://www.zurich.com/_/media/dbe/corporate/docs/corporate-responsibility/zurich-flood-resilience-measurement-paper-feb-2016.pdf?la=en

The Alliance knowledge & learning webpage: <http://floodresilience.net/>

More resources to understand the alliance

Flood Resilience Measurement Framework (NHESS): <http://www.nat-hazards-earth-syst-sci.net/17/77/2017/>

Disaster forensics (PERC) cross-cutting lessons (NHESS): <http://www.nat-hazards-earth-syst-sci.net/16/1603/2016/>

Disaster resilience and how it helps change development policy (Wiley):
<http://onlinelibrary.wiley.com/doi/10.1111/dpr.12201/abstract>

Technologies to support community flood disaster risk reduction (IJDRS):
<http://link.springer.com/article/10.1007%2Fs13753-016-0086-5>

Economic efficiency of disaster risk management and cost-benefit (NH):
<http://link.springer.com/article/10.1007%2Fs11069-016-2170-y>

Building resilience into our communities (Nature): <http://www.nature.com/news/we-must-build-resilience-into-our-communities-1.18223>

What drives households to buy flood insurance (EE):
<http://www.sciencedirect.com/science/article/pii/S0921800915002876>