Lecture 2: Commercial vs. Humanitarian Supply Chains

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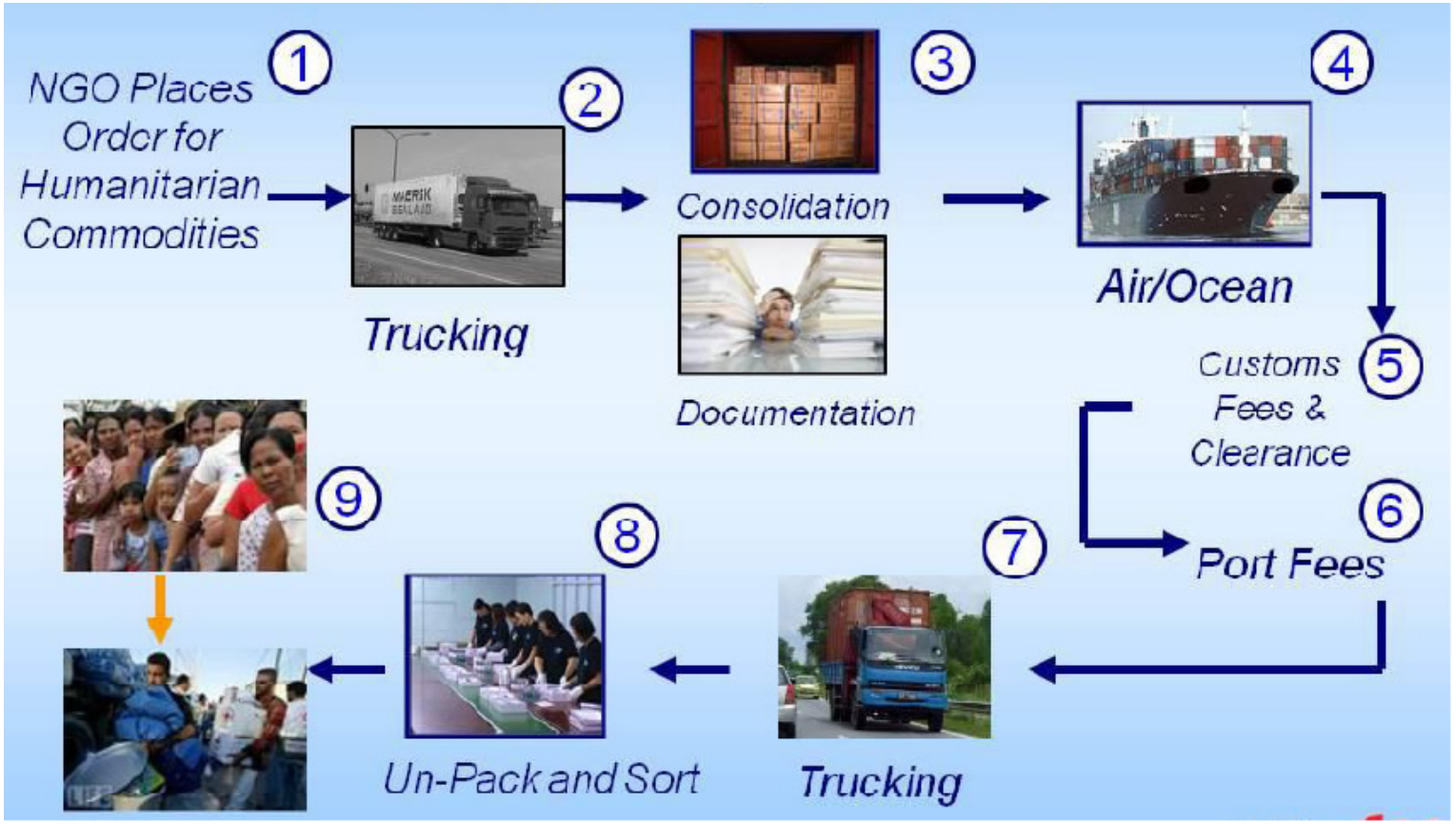
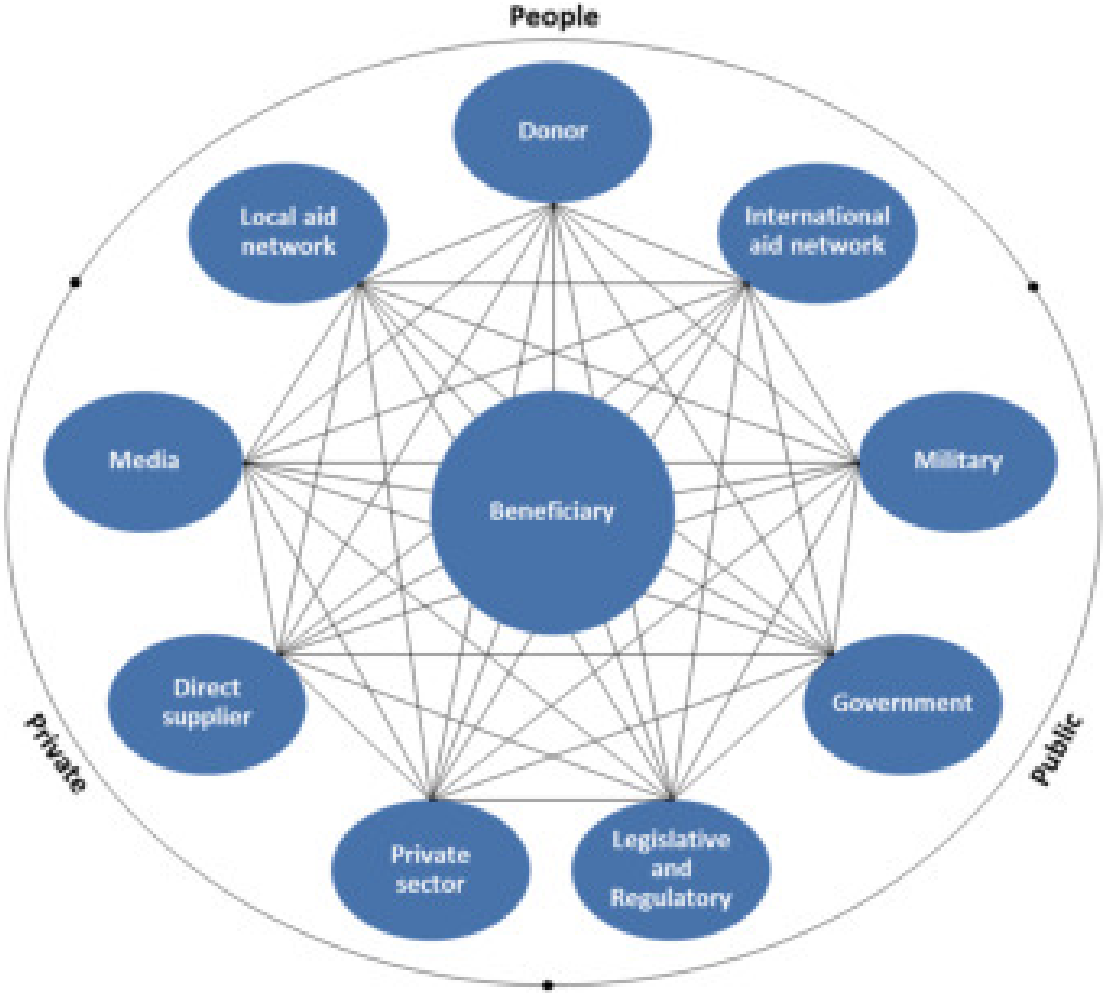
A Graphic of a Humanitarian Supply Chain



A Graphic of a Humanitarian Supply Chain

Source: Emergency Relief Logistics (ERL), A.-J. Morrison, B. Forbes, and R. McPherson

Stakeholders



The Stakeholders in Humanitarian Logistics and Disaster Relief

Snapshot of Select Humanitarian Organizations

Name of Organization	Total Contributions 2000 (US$)[1]	Total Contributions[2] 2001 (US$)	Countries of Operation[3]
American Red Cross[4]	$ 738.0	$ 763.0	38
CARE USA	446.3	421.0	60
Catholic Relief Services	373.2	334.4	92
International Committee of the Red Cross	557.5	553.1	80
International Federation of Red Cross and Red Crescent Societies	223.7	189.7	178
International Rescue Committee	148.4	147.7	28
Medecins San Frontiers - Belgium	313.8	322.0	42
Oxfam UK	294.6	298.1	75
Save the Children	140.3	171.8	45
UNICEF	1139.0	1225.0	126
World Food Programme[5]	1490.0	1873.1	82
World Vision International[6]	964.2	1036.0	96
	$ **6829.0**	$ **7334.9**	

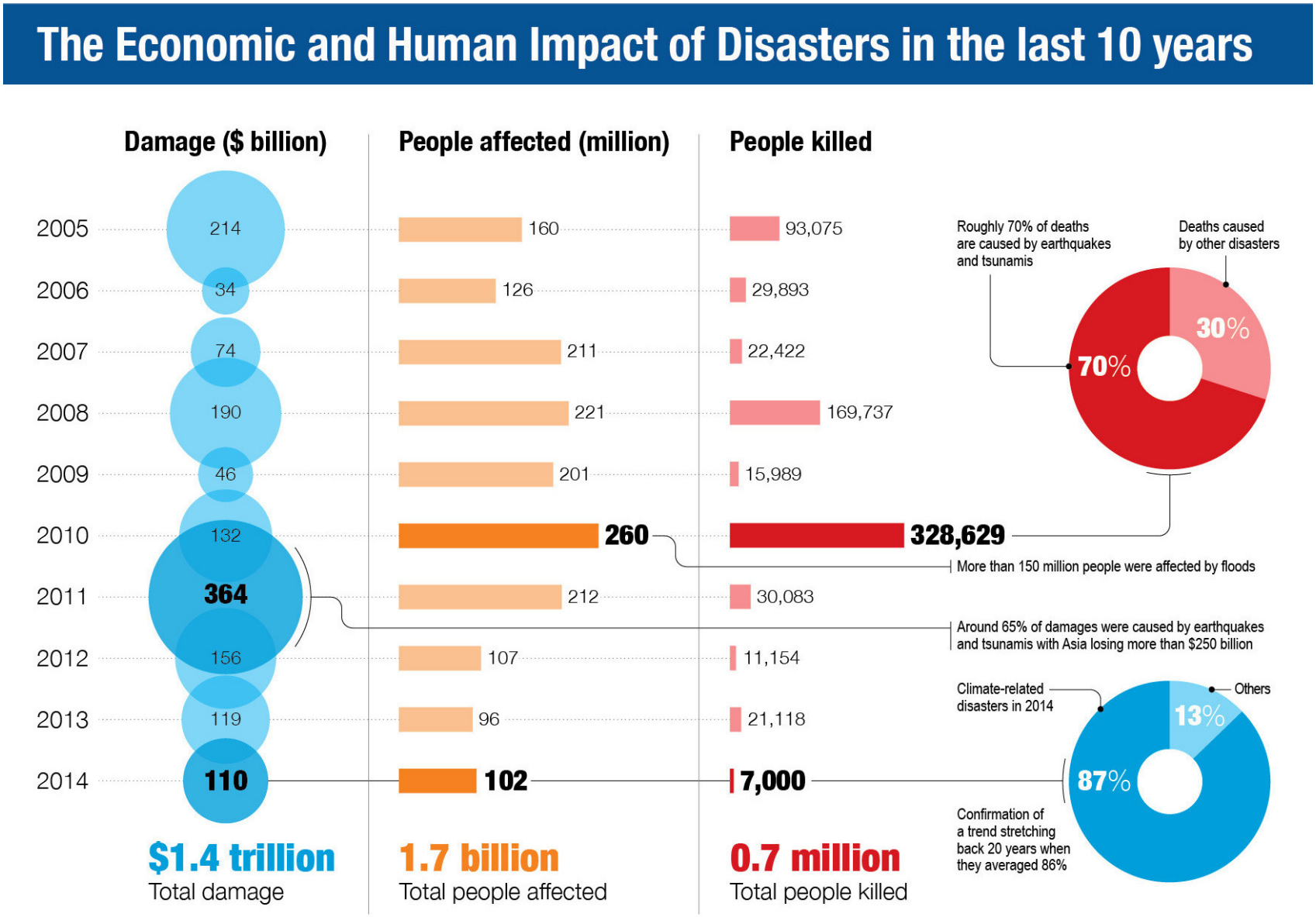
Source: A. Thomas, 2003. Humanitarian logistics: Enabling disaster response, Fritz Institute.

Notes:

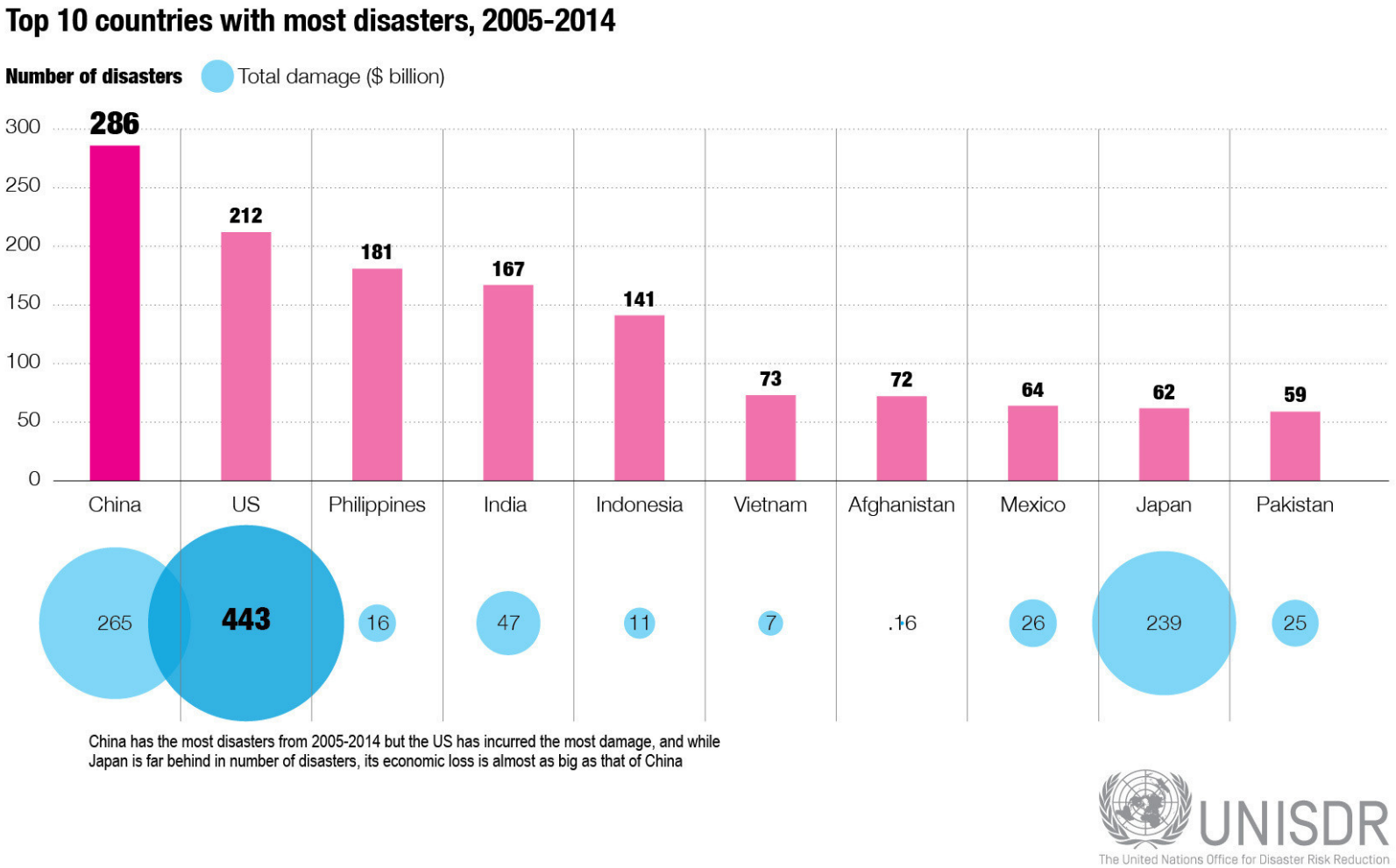
(1) Shown in U.S. dollars. Exchange rates from US$ to Euros as of year-end for 2000 is $1 = 1.0747 Euros, and for 2001 is $1 = 1.1047 Euros. Source: IMF
(2) Contributions refers to donations to humanitarian organizations by governments, foundations, other humanitarian organizations, individuals, and the private sector
(3) As per most recent annual report
(4) American Red Cross total contributions exclude revenue from products and services
(5) World Food Programme receives 54% of food contributions in the form of GIK

(6) World Vision International's 2000 financial statements are not available online. WV USA's contributions for 2000 totaled $469.1M

Impact of Disasters from 2005-2014



Top Countries Affected by Disasters



China has the most disasters from 2005-2014 but the US has incurred the most damage, and while Japan is far behind in number of disasters, its economic loss is almost as big as that of China

UNISDR
The United Nations Office for Disaster Risk Reduction

Commercial versus Humanitarian Supply Chains

Table: Characteristics of Commercial versus Humanitarian Supply Chains

	Commercial Supply Chain	Humanitarian Supply Chain
What is "Demand?"	Products	Supplies and People
Demand Pattern	Relatively stable, predictable. Demands occur at fixed locations in set quantities.	Demand generated from random events that are unpredictable in terms of timing, type, and size. Demands estimated after they are needed, based on assessment of disaster characteristics.
Inventory Control	Uses well-defined methods for determining inventory levels based on lead time, demand and target customer service levels.	Inventory control is challenging due to high variations in lead times, demands, and demand locations.
Lead Time	Lead time determined by the Supplier-Manufacturer-DC-Retailer-chain.	Zero time between the occurrence of the demand and the need for it.

Commercial versus Humanitarian Supply Chains

Table: Characteristics of Commercial versus Humanitarian Supply Chains

	Commercial Supply Chain	Humanitarian Supply Chain
Network Configuration	There exist methods for supply chain network design.	Challenging due to the nature of unknowns (locations, type and size of events, politics, culture) and "last mile" considerations.
Information Systems	Typically, well-defined, making use of advanced technology	Information is often unreliable, incomplete, or non-existent.
Performance Measurement System	Historically, focused on resource performance measures, such as maximizing profit or minimizing costs.	Primary focus on output performance measures, such as the time required to respond to a disaster or ability to meet the needs of the disaster victins.

Commercial versus Humanitarian Supply Chains

Table: Characteristics of Commercial versus Humanitarian Supply Chains

	Commercial Supply Chain	Humanitarian Supply Chain
Strategic Goals	Usually, to produce high quality products at low cost in order to maximize profitability and achieve customer satisfaction.	Minimize the loss of life and alleviate suffering.

B. M. Beamon, 2004. Humanitarian relief chains, issues and challenges, *Proceedings of the 34th International Conference on Computers & Industrial Engineering*, pp. 77-82.

The Disaster Management Cycle Phases

Disaster management can be depicted as a cycle with several phases:

- Pre-disaster, we concentrate on **mitigation and preparedness**.
- During the Disaster phase we are concerned with the **response**.
- During the Post-disaster phase we focus on the **recovery**.

Pre-Disaster Phase: Mitigation and Preparedness

Assessment:

- Identify risk factors.
- Assess vulnerabilities.

Planning:

- Evaluate infrastructure.
- Pre-position resources.
- Conduct capacity building.
- Engage policy makers.

Training and Education:

- Make sure that those who need to know – know.

Disaster Phase: Response

Relief Operations:

- **First Phase:** medicines, water, food, shelter
- **Second Phase:** housing, restoring food supply chains, construction

Stages of Logistics Operations:

- Mobilization and procurement
- Long haul
- The last mile

Hurricanes in 2017 and Disaster Response to Hurricane Maria Hitting Puerto Rico

The below link (in boldface) shows NASA footage of the major hurricanes in 2017, including Harvey, Irma, and Maria.

NASA video of major 2017 hurricanes

Click on the underlined text for the next video.
Response to Hurricane Maria in Puerto Rico

Post-Disaster Phase: Recovery

Reconstruction:

- Cleaning up of debris
- Rebuilding of infrastructure
- Re-establishing communities

Evaluation:

- Measuring the effects of disaster on:
- • planning, response, and infrastructure

Identifying lessons learned:

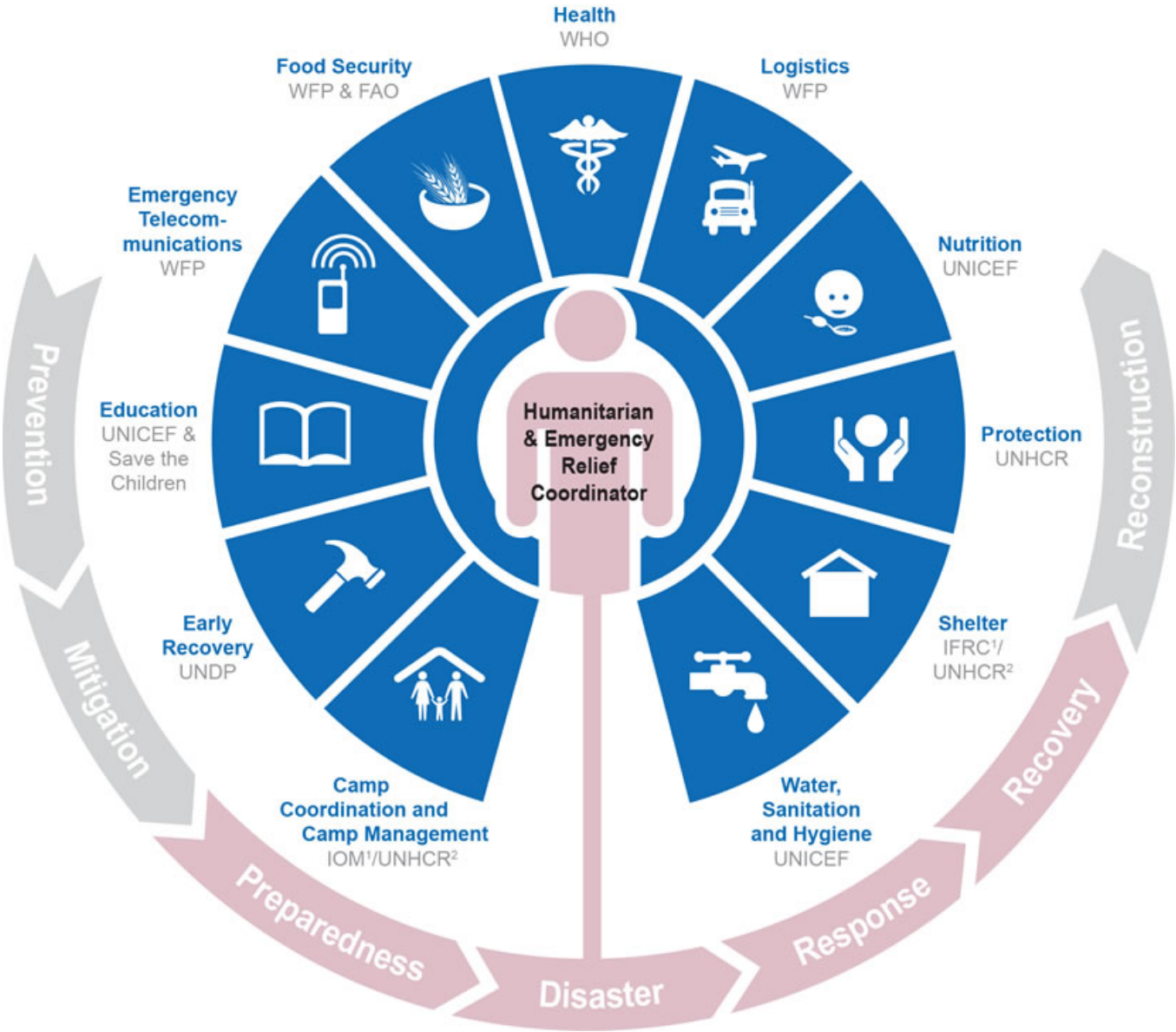
- Providing feedback to planning and response authorities.

Salvation Army and Recovery Post and Reconstruction 2010 Haiti Earthquake

Click on underlined text to see video.

Salvation Army in Recovery and Reconstruction of Haiti Post 2010 Earthquake

United Nations Cluster Approach



The United Nations Cluster Approach

The UN Cluster Approach organizes humanitarian relief into a number of specialist clusters with a predefined leadership to strengthen overall response capacity and to improve the overall effectiveness of the response by (United Nations OCHA, 2005):

1. **Ensuring sufficient global capacity is built up and maintained in all the main sectors/areas of response**, with a view to ensuring timely and effective responses in new crises.
2. Providing **predictable leadership** in all the main sectors/areas of response.
3. **Developing/designing approaches around the concept of partnerships/clusters between UN agencies, international organizations and NGOs**.
4. **Strengthening accountability** by making cluster leads answerable at the global level for building up a more predictable and effective response capacity and at the field level, for fulfilling agreed roles/responsibilities.
5. **Improve strategic field-level coordination and prioritization** in specific sectors/areas of response by placing responsibility for leadership and coordination with the competent operational agency.

The Cluster Concept

The cluster concept is designed to apply to all humanitarian UN bodies, as well as national and international NGOs involved in the provision of disaster relief. Essentially, any humanitarian organization which has the capacity can lead a cluster and organizations working in the field may find themselves contributing to a number of clusters.

The InterAgency Standing Committee (IASC), which is designated as the primary mechanism for interagency coordination of humanitarian assistance, has defined global clusters in eleven functional areas of humanitarian activity, with associated lead organizations.

Humanitarian Logistics Specific Challenges Today

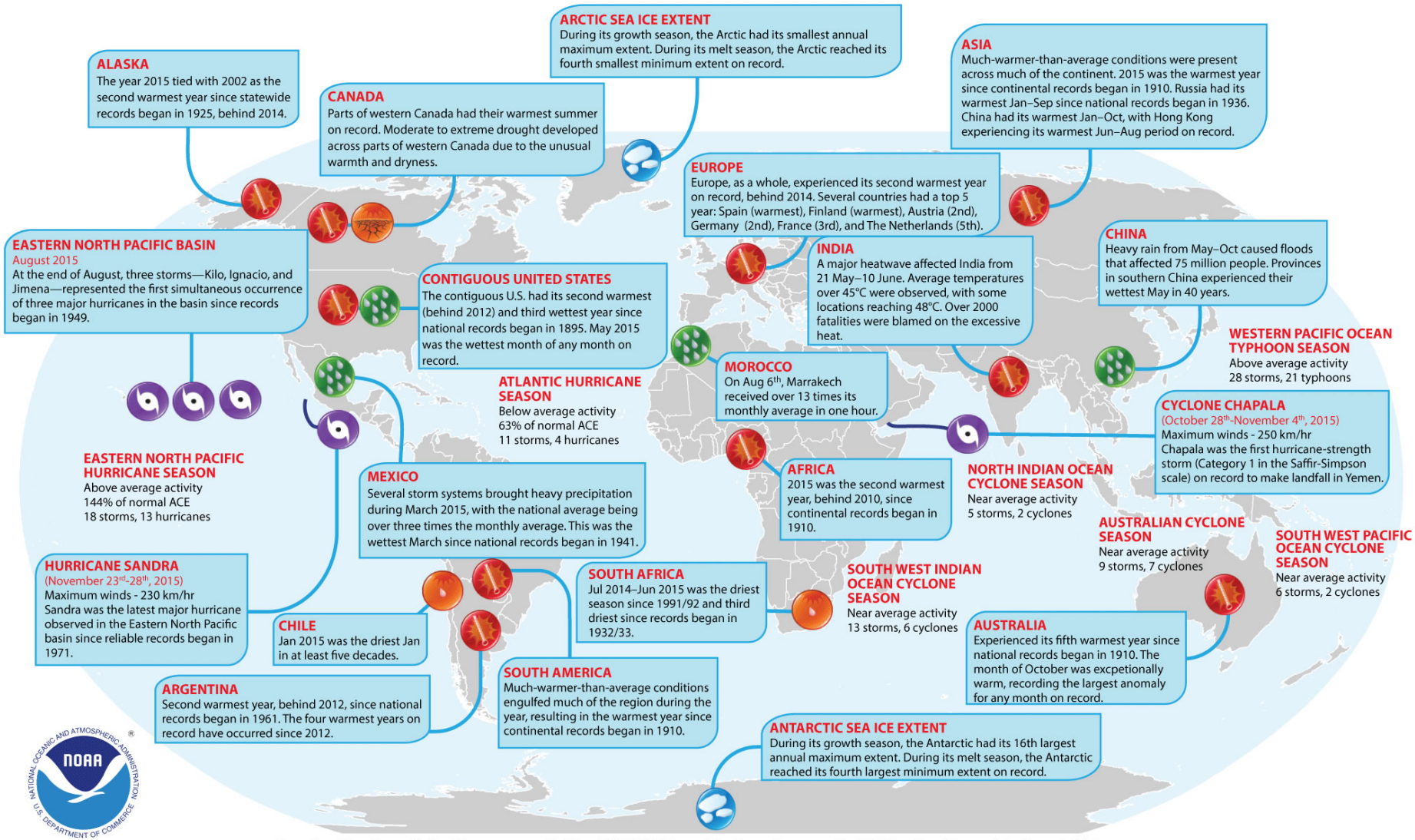
Specific Challenges:

- Climate change
- Urbanization trends – now more than half of the world's population lives in cities
- Diseases are spreading at increasing speeds because of global air travel and increased population densities

Effects on Disasters

- Increasing severity
- Increasing frequency – It is estimated that over the next 50 years natural and man-made disasters will increase **five-fold** (Thomas and Kopczak (2007)).
- Complexity

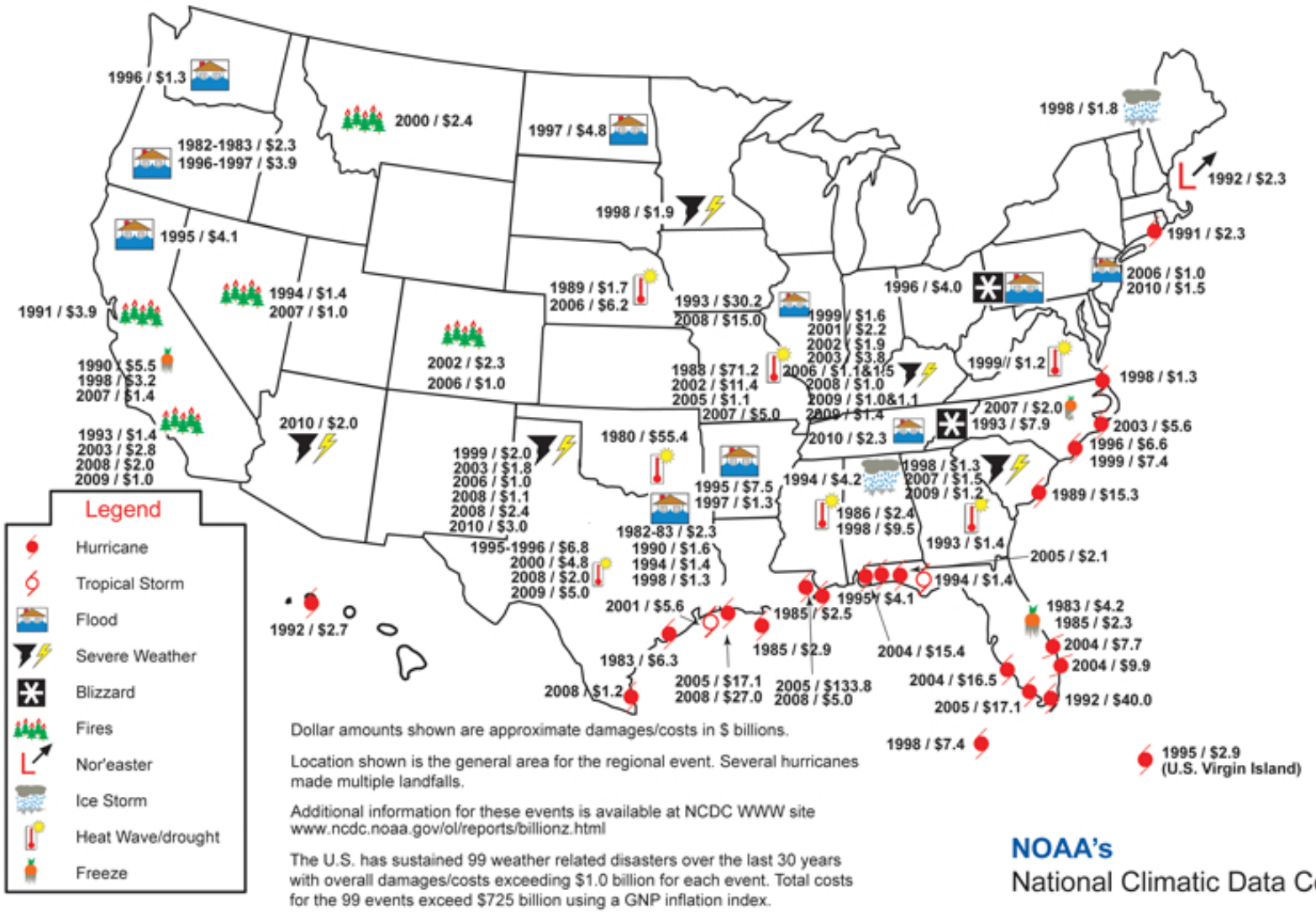
Selected Significant Climate Anomalies and Events in 2015



Please Note: Material provided in this map was compiled from NOAA's NCEI State of the Climate Reports and the WMO Provisional Status of the Climate in 2015.
For more information please visit: http://www.ncdc.noaa.gov/sotc

Figure: Impacts of climate change on transportation infrastructure

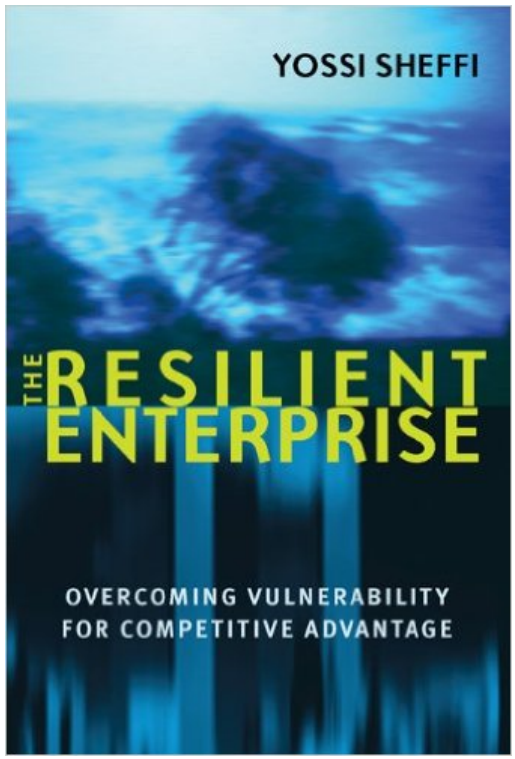
Recent Billion Dollar US Weather Disasters



Supply Chain Disruptions and Humanitarian Logistics

Video lecture by Dr. Yossi Sheffi and Dr. Jarrod Goenztel of MIT on the impact of the Fukushima triple disaster on commercial supply chains globally and also on the need for humanitarian relief.

Sheffi is the author of *The Resilient Enterprise*.



References

⇒ A. Bayer, 2017. New Ebola vaccine can't be used for prevention, World Health Organization warns. INQUISITR, January 6.

⇒ B. M. Beamon, 2004. Humanitarian relief chains, issues and challenges, *Proceedings of the 34th International Conference on Computers & Industrial Engineering*, pp. 77-82.

⇒ A. Thomas, 2003. Humanitarian logistics: Enabling disaster response, Fritz Institute.

⇒ A. S. Thomas and L. R. Kopczak, 2005. From logistics to supply chain management: The path forward in the humanitarian sector, Fritz Institute.

⇒ A. Nagurney and Q. Qiang, 2009. *Fragile Networks: Identifying Vulnerabilities and Synergies in an Uncertain World*, John Wiley & Sons, Hoboken, New Jersey.

⇒ G.P. Ramsden, 2014. *Managing the Humanitarian Supply Chain - A Collaborative Approach?* PhD thesis, University of Lincoln, England.