

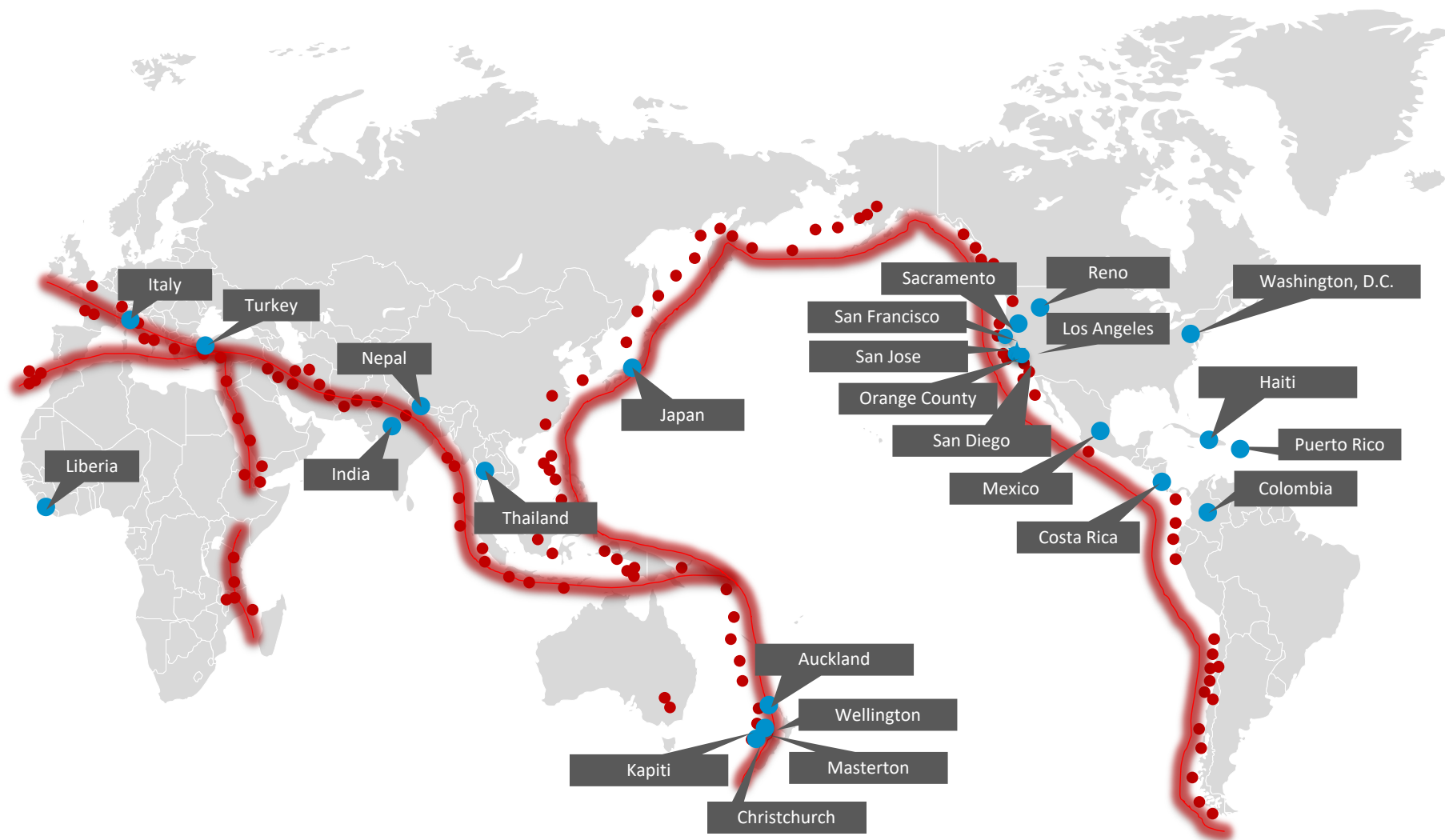
Solutions for Earthquake Recovery in Puerto Rico



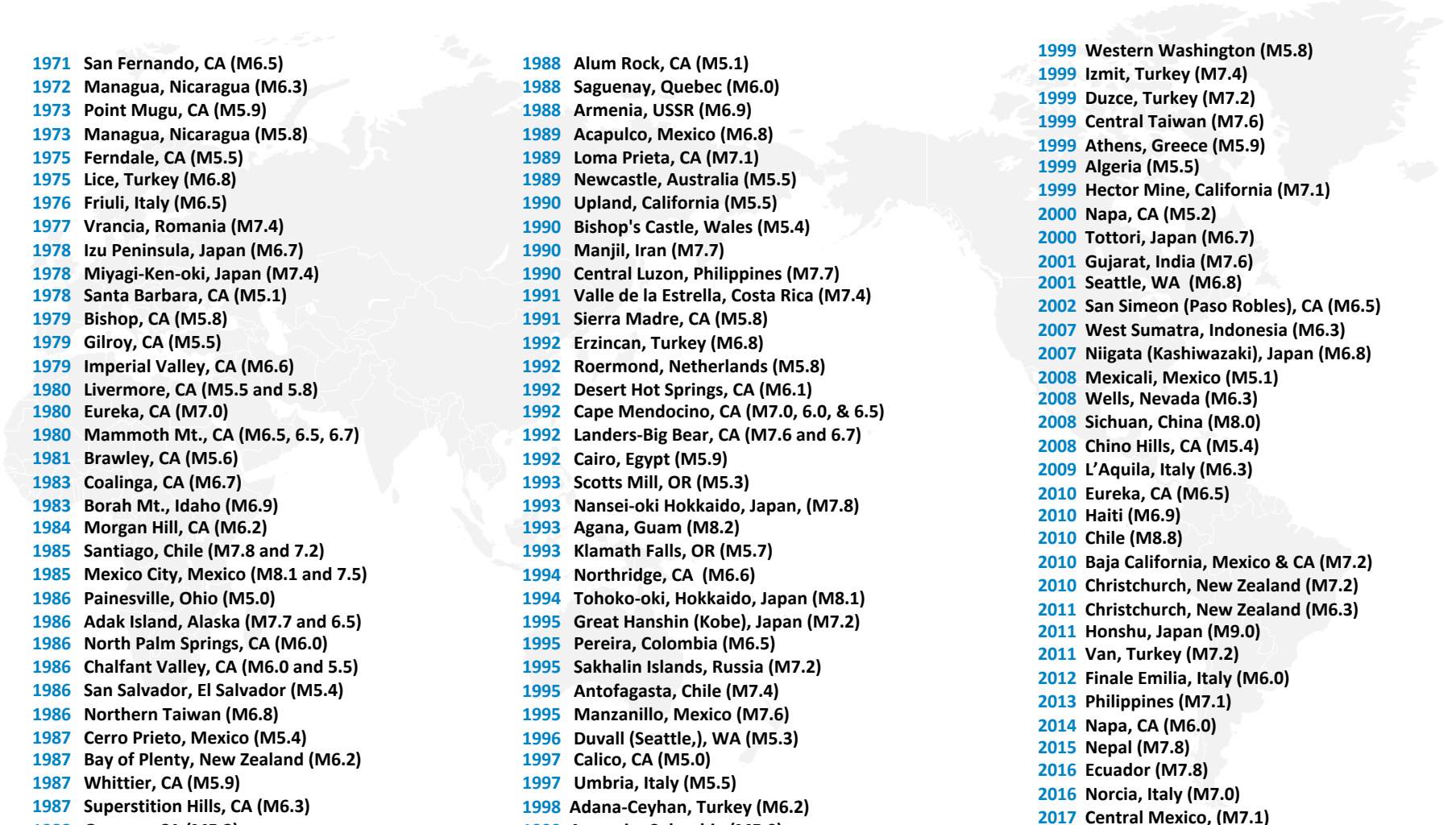
Dr Kit Miyamoto, S.E.

Ivan Hernandez, SE

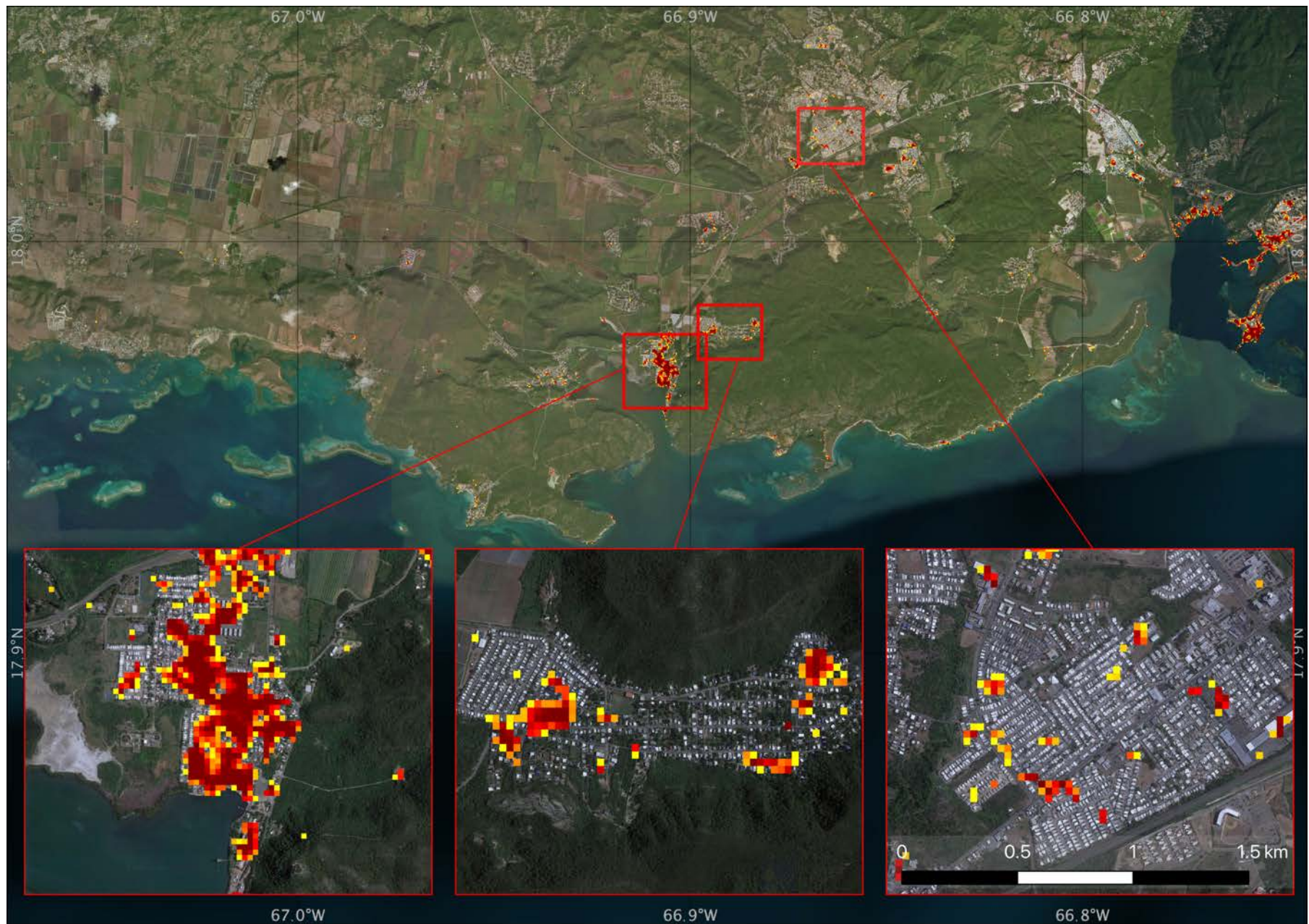
miyamoto.



Experience: More than 100 Earthquakes, 1971 - 2018



1971	San Fernando, CA (M6.5)	1988	Alum Rock, CA (M5.1)	1999	Western Washington (M5.8)
1972	Managua, Nicaragua (M6.3)	1988	Saguenay, Quebec (M6.0)	1999	Izmit, Turkey (M7.4)
1973	Point Mugu, CA (M5.9)	1988	Armenia, USSR (M6.9)	1999	Duzce, Turkey (M7.2)
1973	Managua, Nicaragua (M5.8)	1989	Acapulco, Mexico (M6.8)	1999	Central Taiwan (M7.6)
1975	Ferndale, CA (M5.5)	1989	Loma Prieta, CA (M7.1)	1999	Athens, Greece (M5.9)
1975	Lice, Turkey (M6.8)	1989	Newcastle, Australia (M5.5)	1999	Algeria (M5.5)
1976	Friuli, Italy (M6.5)	1990	Upland, California (M5.5)	1999	Hector Mine, California (M7.1)
1977	Vrancia, Romania (M7.4)	1990	Bishop's Castle, Wales (M5.4)	2000	Napa, CA (M5.2)
1978	Izu Peninsula, Japan (M6.7)	1990	Manjil, Iran (M7.7)	2000	Tottori, Japan (M6.7)
1978	Miyagi-Ken-oki, Japan (M7.4)	1990	Central Luzon, Philippines (M7.7)	2001	Gujarat, India (M7.6)
1978	Santa Barbara, CA (M5.1)	1991	Valle de la Estrella, Costa Rica (M7.4)	2001	Seattle, WA (M6.8)
1979	Bishop, CA (M5.8)	1991	Sierra Madre, CA (M5.8)	2002	San Simeon (Paso Robles), CA (M6.5)
1979	Gilroy, CA (M5.5)	1992	Erzincan, Turkey (M6.8)	2007	West Sumatra, Indonesia (M6.3)
1979	Imperial Valley, CA (M6.6)	1992	Roermond, Netherlands (M5.8)	2007	Niigata (Kashiwazaki), Japan (M6.8)
1980	Livermore, CA (M5.5 and 5.8)	1992	Desert Hot Springs, CA (M6.1)	2008	Mexicali, Mexico (M5.1)
1980	Eureka, CA (M7.0)	1992	Cape Mendocino, CA (M7.0, 6.0, & 6.5)	2008	Wells, Nevada (M6.3)
1980	Mammoth Mt., CA (M6.5, 6.5, 6.7)	1992	Landers-Big Bear, CA (M7.6 and 6.7)	2008	Sichuan, China (M8.0)
1981	Brawley, CA (M5.6)	1992	Cairo, Egypt (M5.9)	2008	Chino Hills, CA (M5.4)
1983	Coalinga, CA (M6.7)	1993	Scotts Mill, OR (M5.3)	2009	L'Aquila, Italy (M6.3)
1983	Borah Mt., Idaho (M6.9)	1993	Nansei-oki Hokkaido, Japan, (M7.8)	2010	Eureka, CA (M6.5)
1984	Morgan Hill, CA (M6.2)	1993	Agana, Guam (M8.2)	2010	Haiti (M6.9)
1985	Santiago, Chile (M7.8 and 7.2)	1993	Klamath Falls, OR (M5.7)	2010	Chile (M8.8)
1985	Mexico City, Mexico (M8.1 and 7.5)	1994	Northridge, CA (M6.6)	2010	Baja California, Mexico & CA (M7.2)
1986	Painesville, Ohio (M5.0)	1994	Tohoko-oki, Hokkaido, Japan (M8.1)	2010	Christchurch, New Zealand (M7.2)
1986	Adak Island, Alaska (M7.7 and 6.5)	1995	Great Hanshin (Kobe), Japan (M7.2)	2011	Christchurch, New Zealand (M6.3)
1986	North Palm Springs, CA (M6.0)	1995	Pereira, Colombia (M6.5)	2011	Honshu, Japan (M9.0)
1986	Chalfant Valley, CA (M6.0 and 5.5)	1995	Sakhalin Islands, Russia (M7.2)	2011	Van, Turkey (M7.2)
1986	San Salvador, El Salvador (M5.4)	1995	Antofagasta, Chile (M7.4)	2012	Finale Emilia, Italy (M6.0)
1986	Northern Taiwan (M6.8)	1995	Manzanillo, Mexico (M7.6)	2013	Philippines (M7.1)
1987	Cerro Prieto, Mexico (M5.4)	1996	Duvall (Seattle.), WA (M5.3)	2014	Napa, CA (M6.0)
1987	Bay of Plenty, New Zealand (M6.2)	1997	Calico, CA (M5.0)	2015	Nepal (M7.8)
1987	Whittier, CA (M5.9)	1997	Umbria, Italy (M5.5)	2016	Ecuador (M7.8)
1987	Superstition Hills, CA (M6.3)	1998	Adana-Ceyhan, Turkey (M6.2)	2016	Norcia, Italy (M7.0)
1988	Gorman, CA (M5.2)	1999	Armenia, Colombia (M5.0)	2017	Central Mexico, (M7.1)
		1999	Puerto Escondido, Mexico (M7.5)		













miyamoto.



miyamoto.



NO
ENTRE

miyamoto.









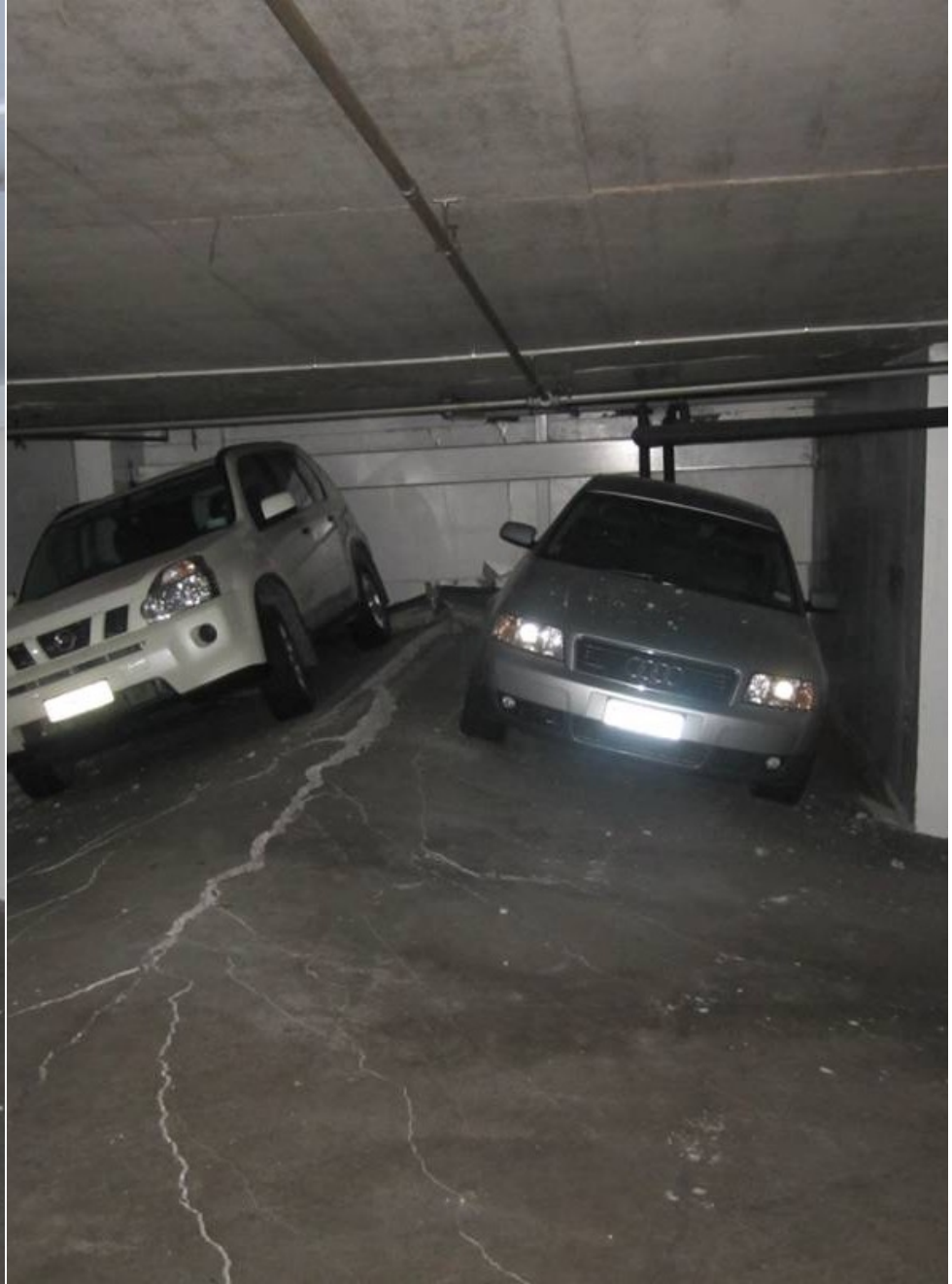


New Zealand 2011

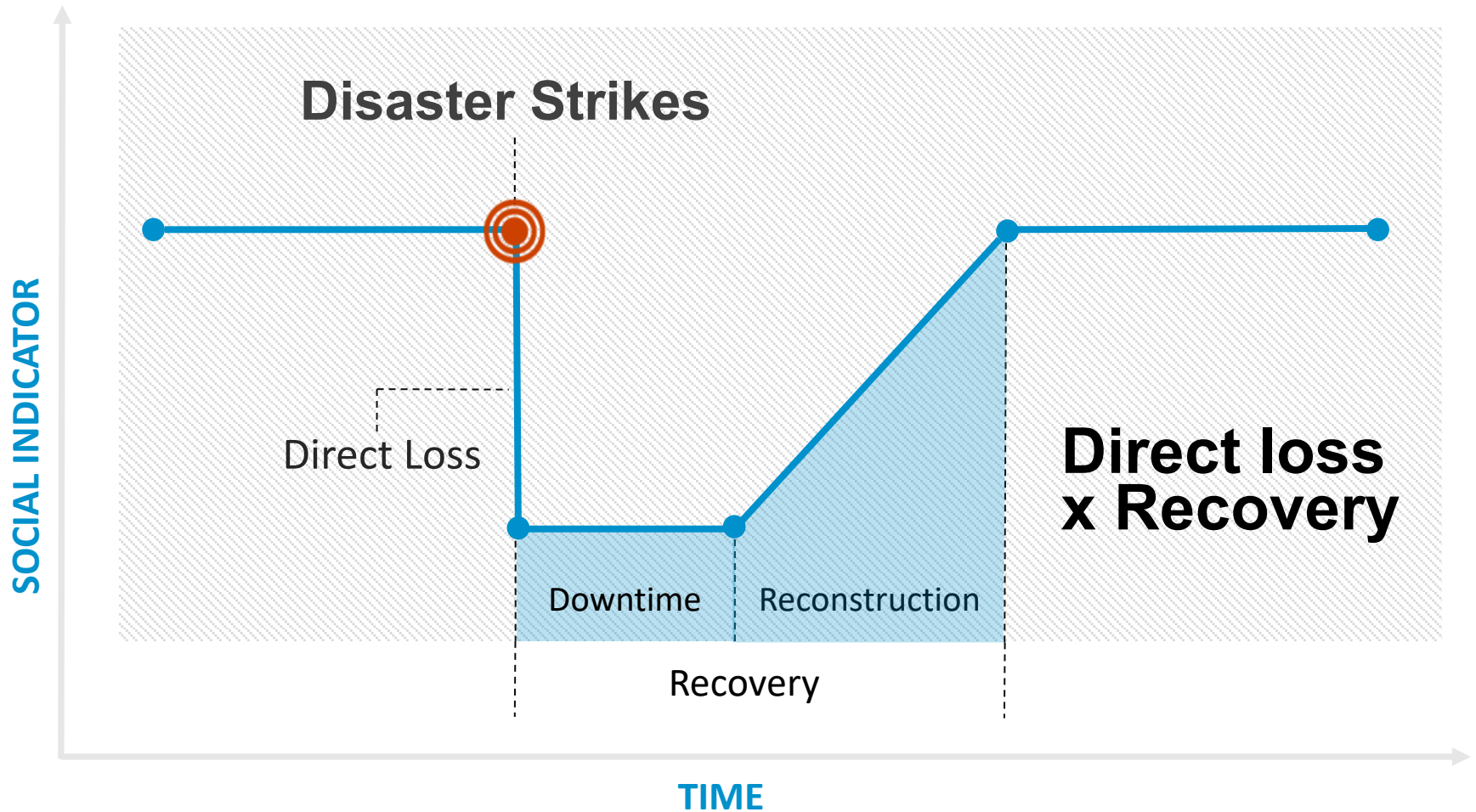








What RESILIENCE Means?





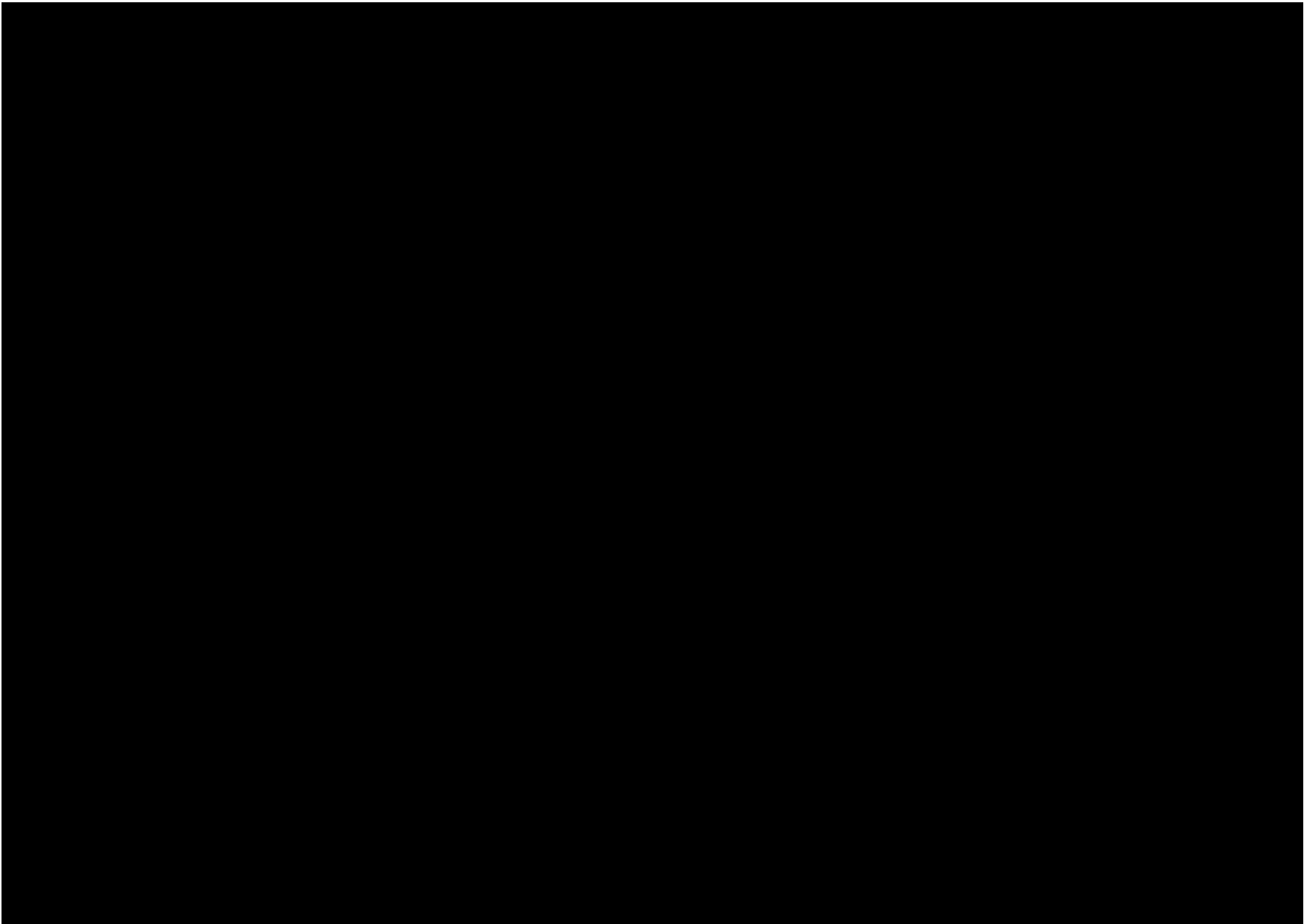
**How to Reduce
Direct Loss
economically?**

Resiliency Enhanced Fiber Mixed Concrete











Recovery Strategies

- Housing: Yellow and Red Tagged buildings
Repairability Quantification
- School Risk Identification and Strengthening
Programs in Affected Area
- Private Sector Needs to Enhance Resiliency of
Assets
- Private Sector Investment Facilitates Recovery in
Affected Area



make the world a better, safer place.