ADVANCING THE DESIGN OF PUBLIC POLICIES TO REDUCE VULNERABILITY TO DISASTERS IN MEXICO

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Disasters in Mexico

Disasters in Mexico, 1983-2012

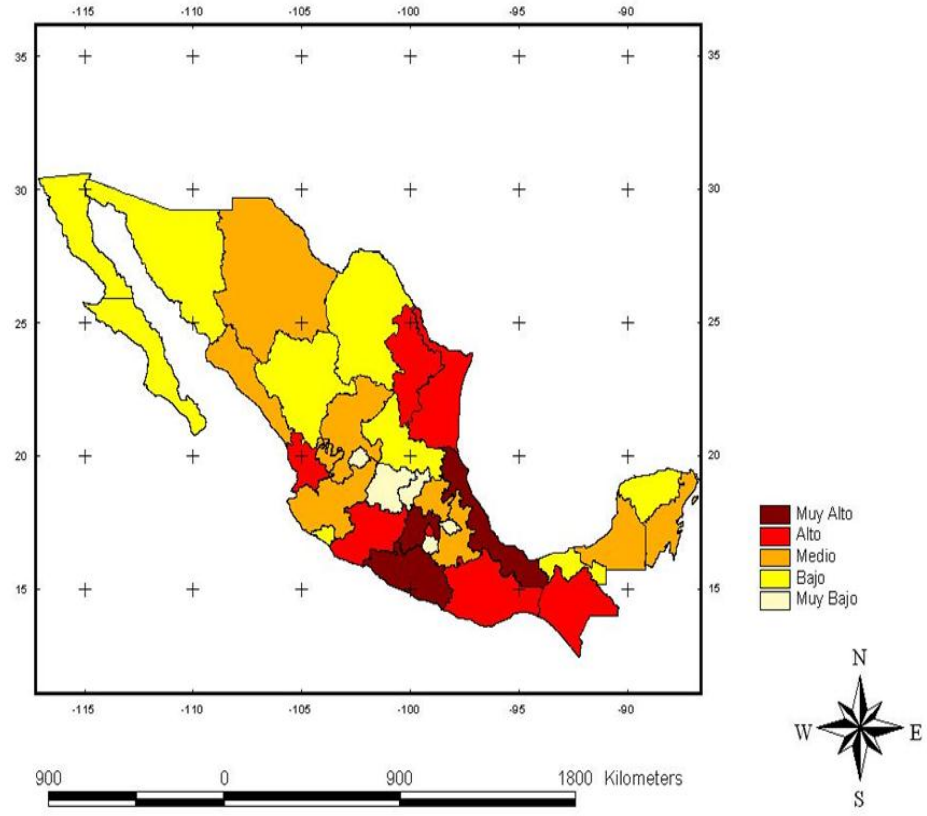
	Number of events	Dead	Affectation (thousand)	Damage (billion USD))
Drought	6	-	2,565	1,610
Average per event			428	268
Earthquake	17	9,651	2,656	5,783
Average per event		568	156	340
Cold Wave	14	718	136	583
Average per event		51	10	42
Heat Wave	1	380	-	-
Average per event		380	-	-
Flood	45	1,782	4,397	4,215
Averae per event				
Hurricane/Storm	67	1,601	7,131	20,933
Average per event		111	209	399
Landslide	10	214	320	-
Average per event		22	32	-
Volcano Eruption	7	20	118	-
Average per event		3	17	-
Forest Fire	2	50	-	91
Average per event		25	-	46

Source: "EM-DAT: OFDA/CRED International Disaster Database, www.em-dat.net - Université Catholique de Louvain, Belgium. The events of the table correspond to those reported in CRED EM-DAT. First event in May 1983, last event in May 2012.

- Disaster are declared when at least 10 people due to an event, at least 100 people are affected, there is a requesting international assistance, or a declaration of emergency is issued.
- Hurricanes and storms are by far the most damaging disasters according to the total damage measured in dollars, followed by earthquakes, floods and droughts.
- The most damaging disasters in terms of average per event, not including earthquakes, are related to meteorological events.
- Earthquakes, floods and storms kill more people than other events, total and in average.

Events and their aftermath: Floods

Occurrence of events



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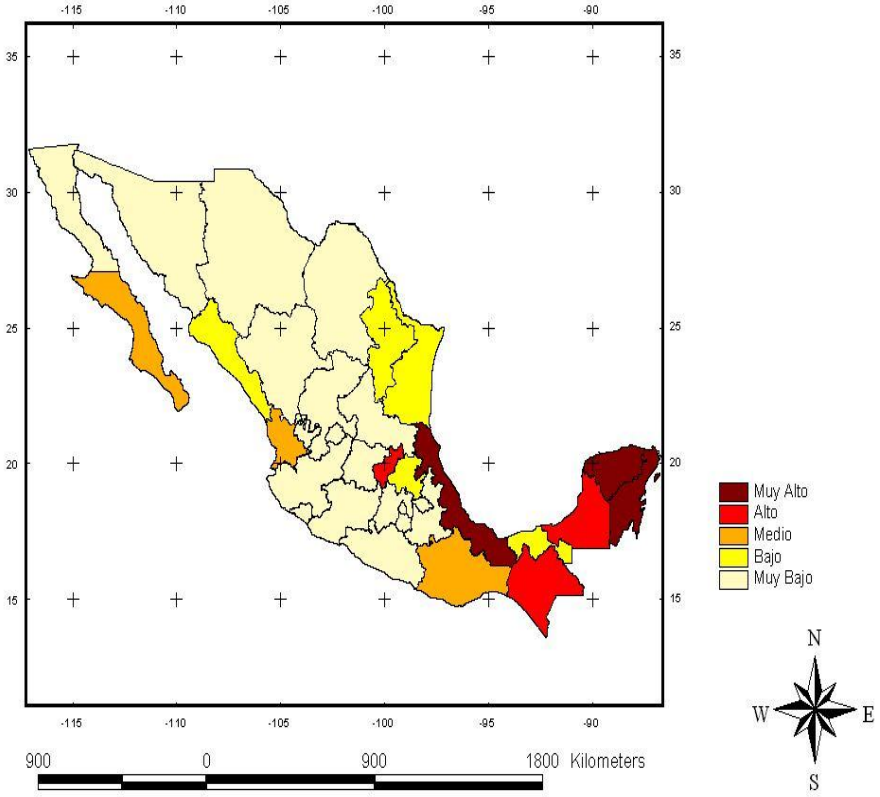
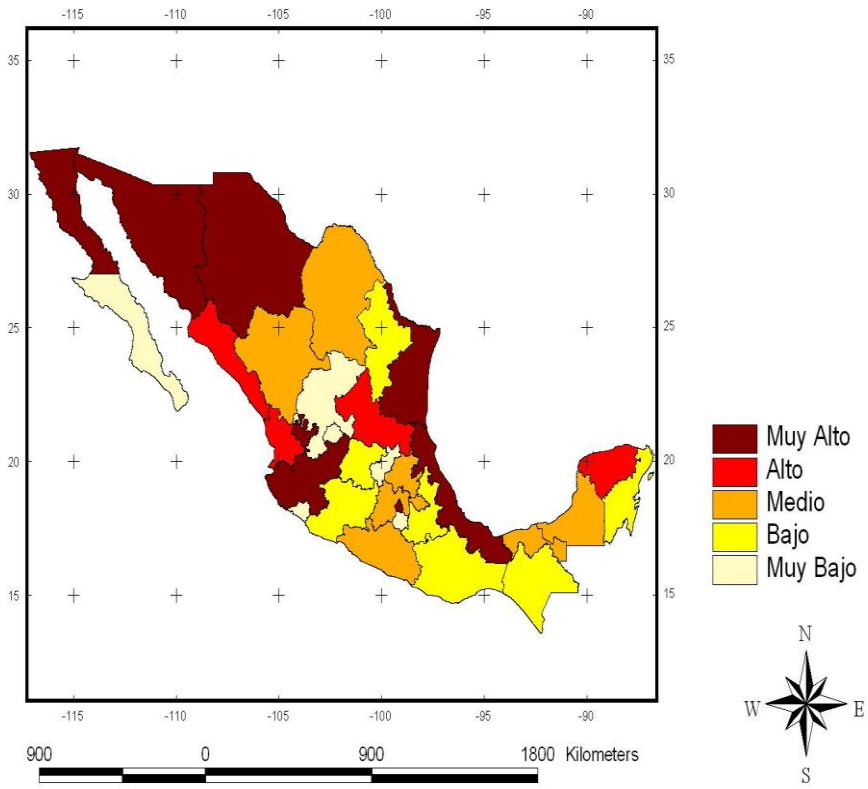
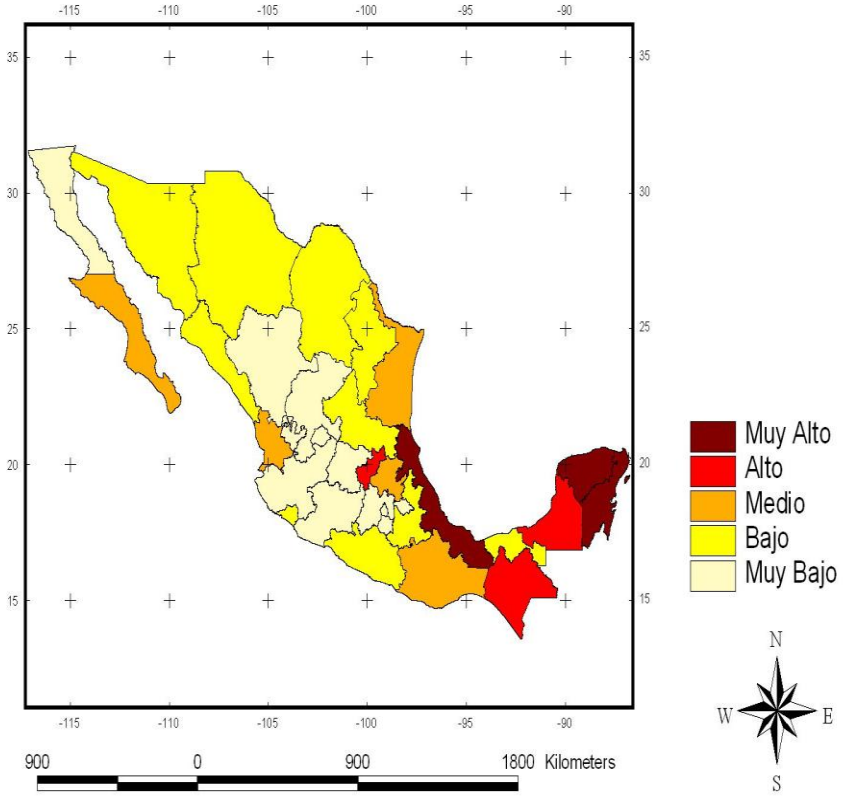


Events and their aftermath: Drought

Occurrence of events

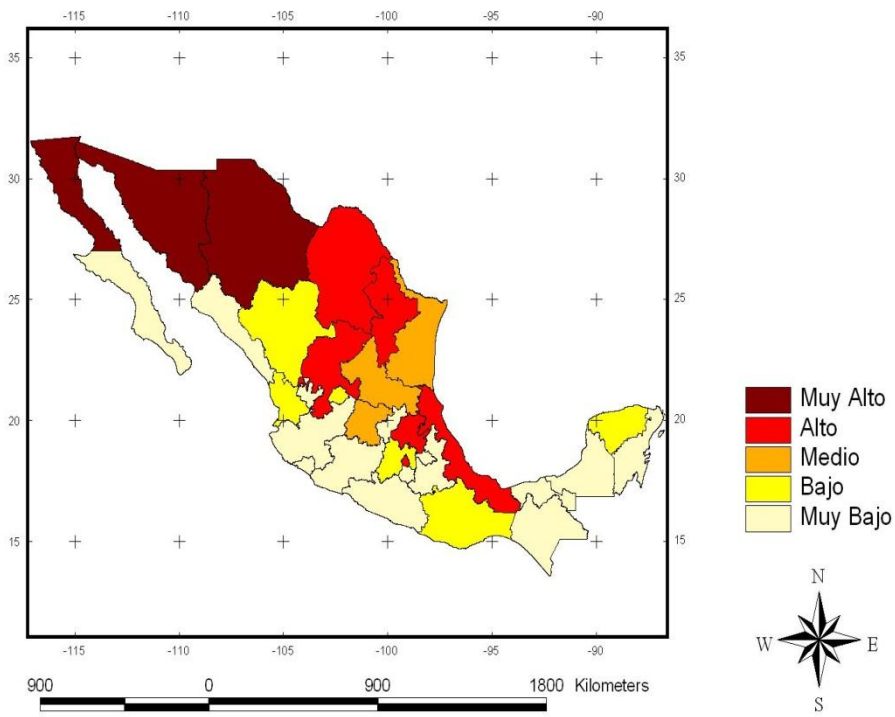


Damage



Events and their aftermath: Frost

Occurrence de events



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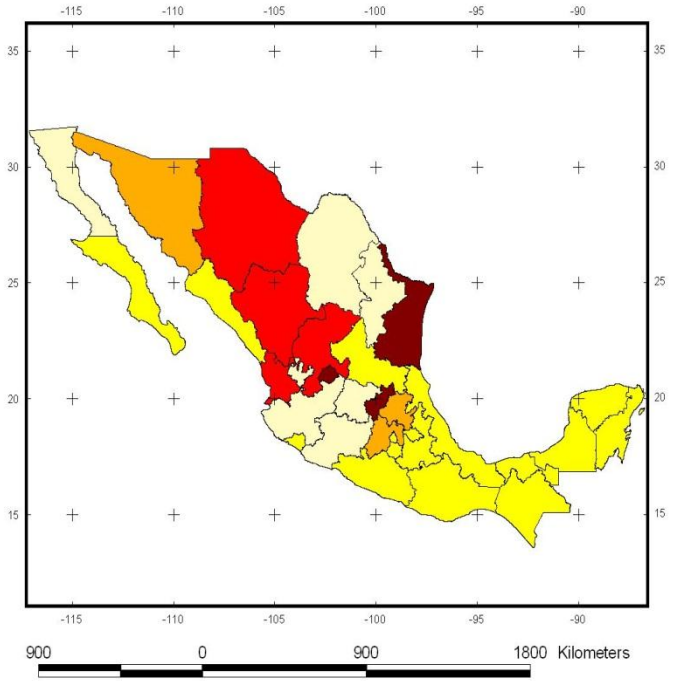
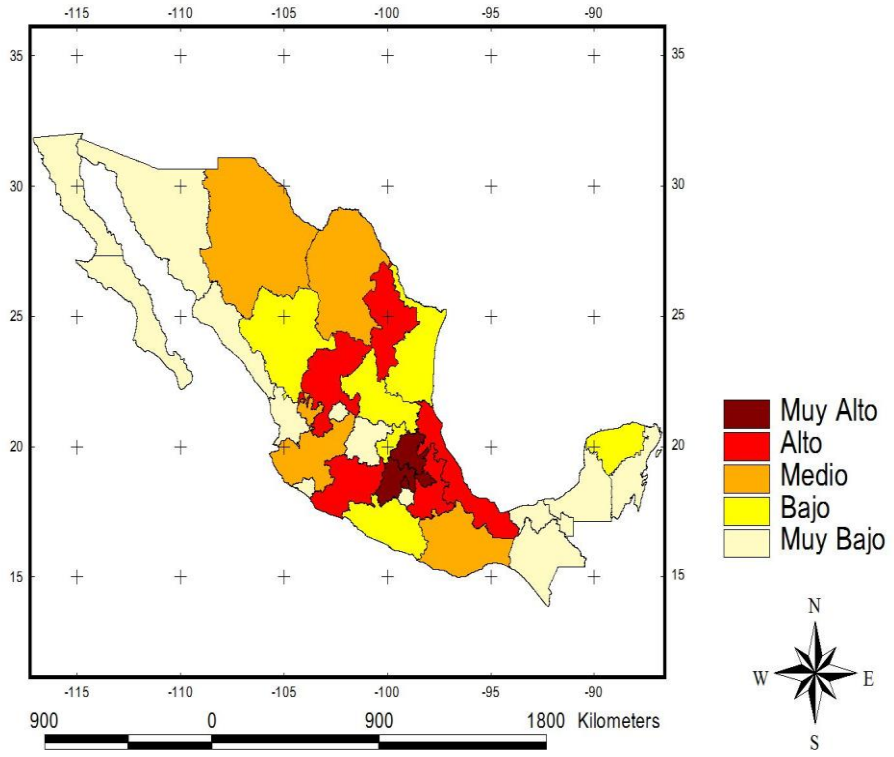


Events and their aftermath: Hailstorms

Occurrence of events



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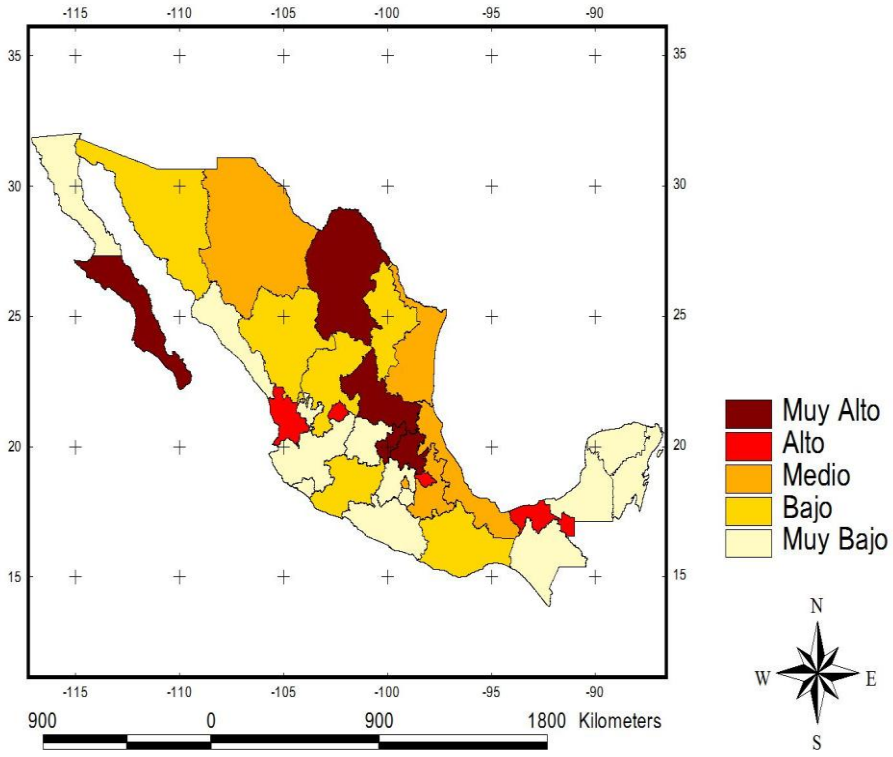
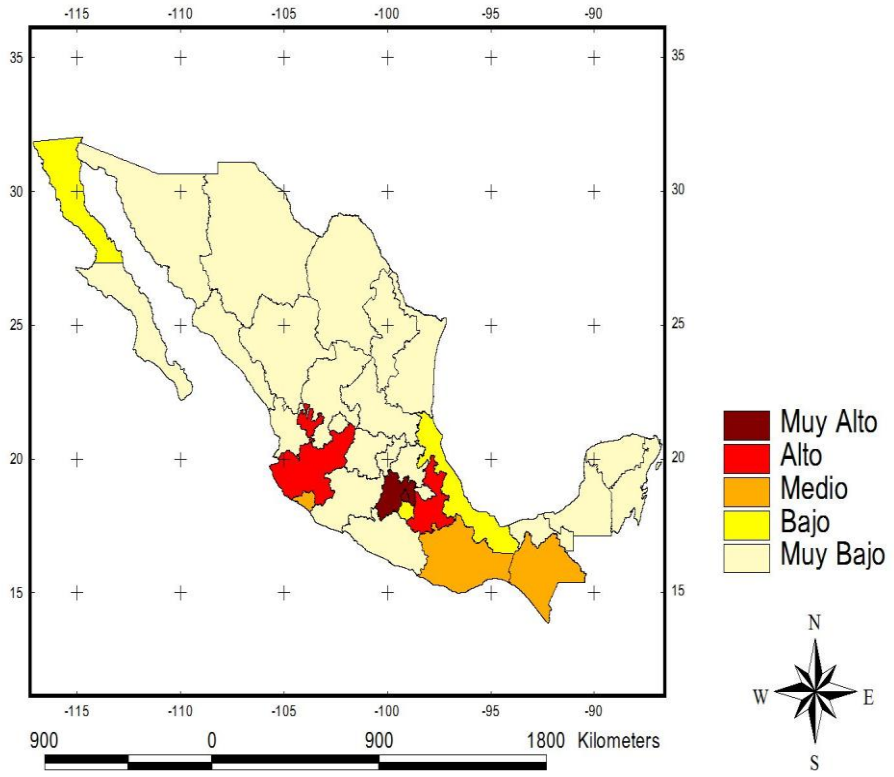


Events and their aftermath: Earthquakes

Occurrence of events



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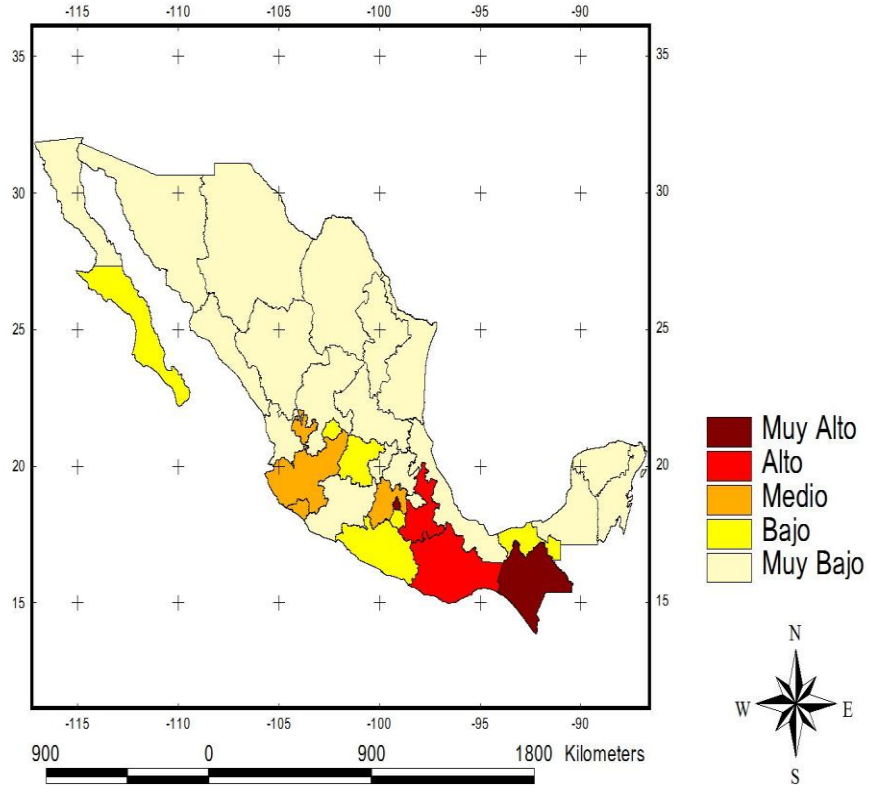


Identified Federal Programs

Agency	Goal
SEDESOL (12)	Contribute to risk prevention, through actions that reduce vulnerability of the population to the impact of natural phenomena; contribute to the social protection of the population affected by low demand for labor or an emergency; conditional transfers to promote human capital formation; multiply the efforts of Mexican migrants living abroad
SAGARPA (10)	Strengthen agribusiness production, giving certainty to the products, support to natural disaster affectations of farming, aquaculture and fisheries; induce funding for investment in equipment and infrastructure
SEGOB (2)	Address the effects of natural disasters that exceed the financial capacity of response of the local governments; integrate actions across sectors and agencies
SEMARNAT (2)	Protect, conserve, restore, and sustainably exploit the resources in forests and arid zones of Mexico; strengthen response
SEDENA, SCT, CONAGUA (2)	Complement response between programs and agencies

Diagnostic

- The effects of disasters are differentiated by event type and by region
  - Occurrence of events
  - Damage measured in mortality, displacement, economic losses, etc.
- There are programs, especially at the Federal level, for:
  - Disaster prevention
  - Infrastructure
  - Strengthening income
  - Increasing productivity
  - Attending disasters

Research Questions

- Why do disasters occur in different regions and have differentiated impacts?

- To what extent do federal programs attend the needs of the population in terms of prevention, care and strengthening the response to different types of disasters?

- Given the affectations of each type of disaster, what combination of public policy programs can enhance adaptation to climate change by reducing the vulnerability of the population?

Structure of Indexes

Characteristics	Subindex
1. Events and Damage	Probability of events
	Damage (mortality, displaced, losses, etc.)
2. Geographic	Plains, mountains, detlas, etc.
3. Natural	Temperature and precipitation anomalies
	Land use
	Land degradation
4. Socioculturales	Economic and social capacity
5. Capacidad Institucional	Institutional capacity
6. Cambio Climático	Expected exposure to climate change

Vulnerability Index to specific disasters

1. Standarizing
   - Compatibility (units)
   - Relative Indicator (values 0 to 1)
   - Value increases with increasing vulnerability

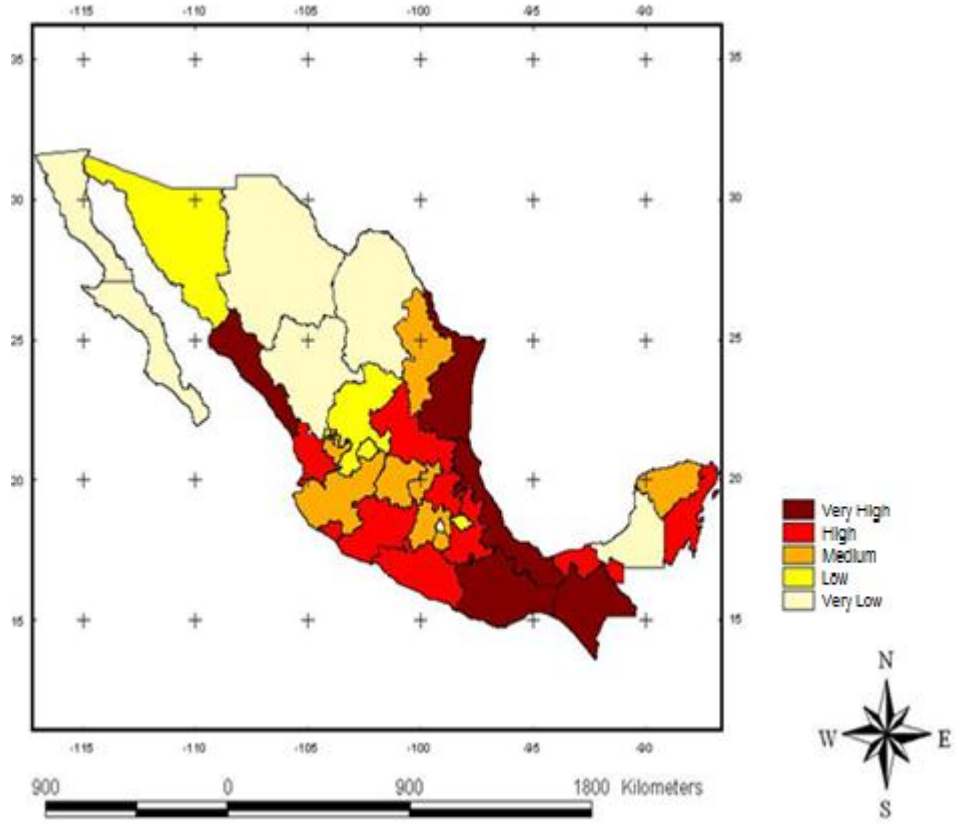
2. Geometric Mean: Vulnerability Index
   - Eliminate outliers
   - Aggregation of variables and sub-indexes

3. Relative weights of components
   - Participation of the component in the sum of the sub-index

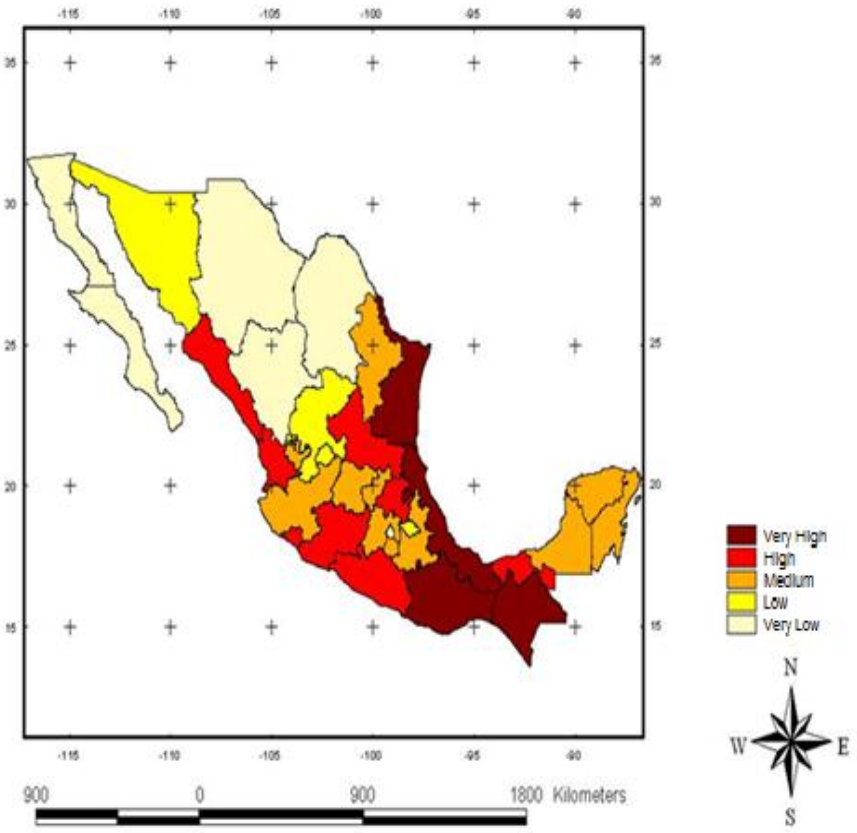
4. Simulation
   - Impact of improvements or deterioration of individual components in the total index

Vulnerability Index: Floods

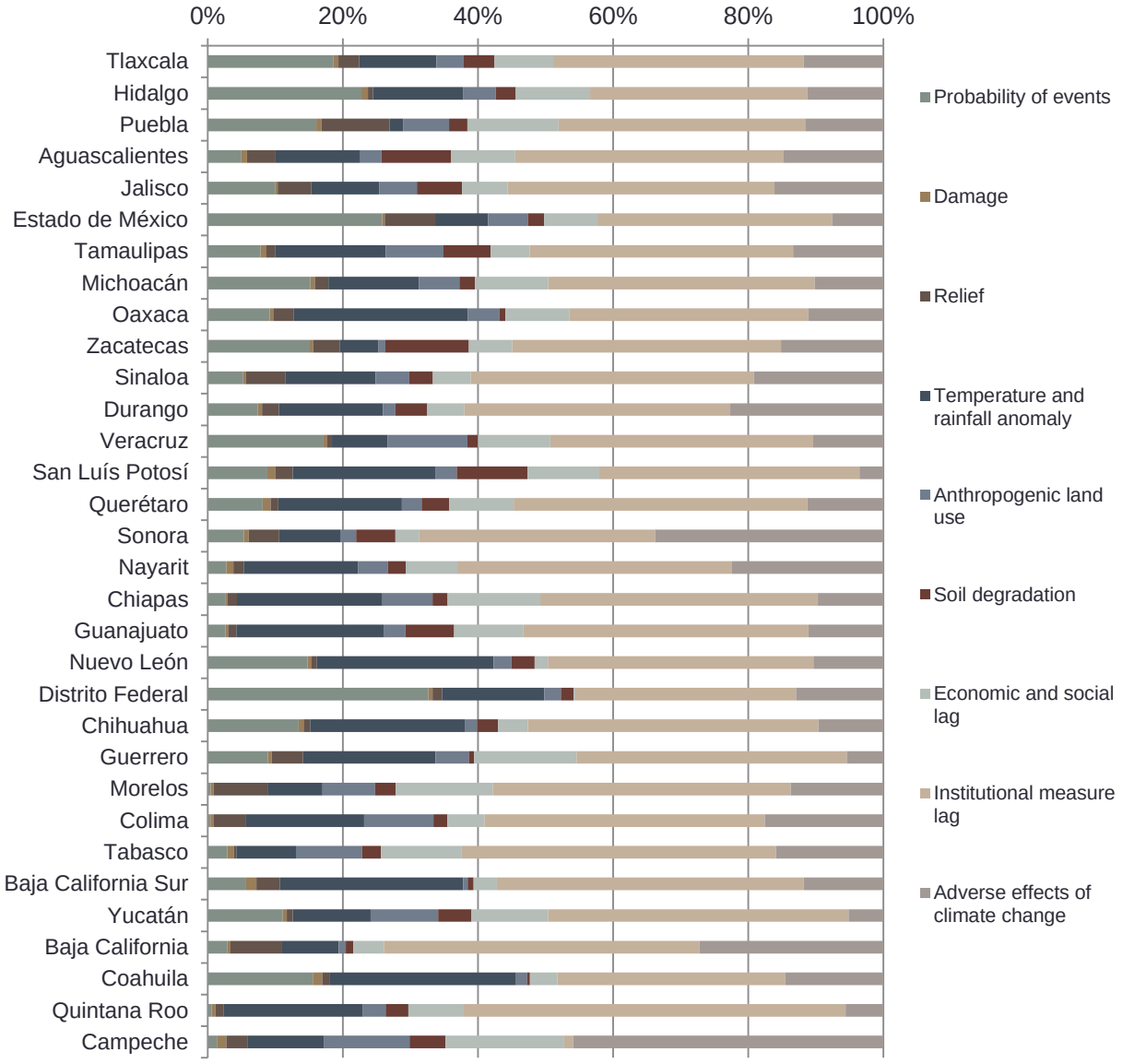
With institutional capacity



Without institutional capacity

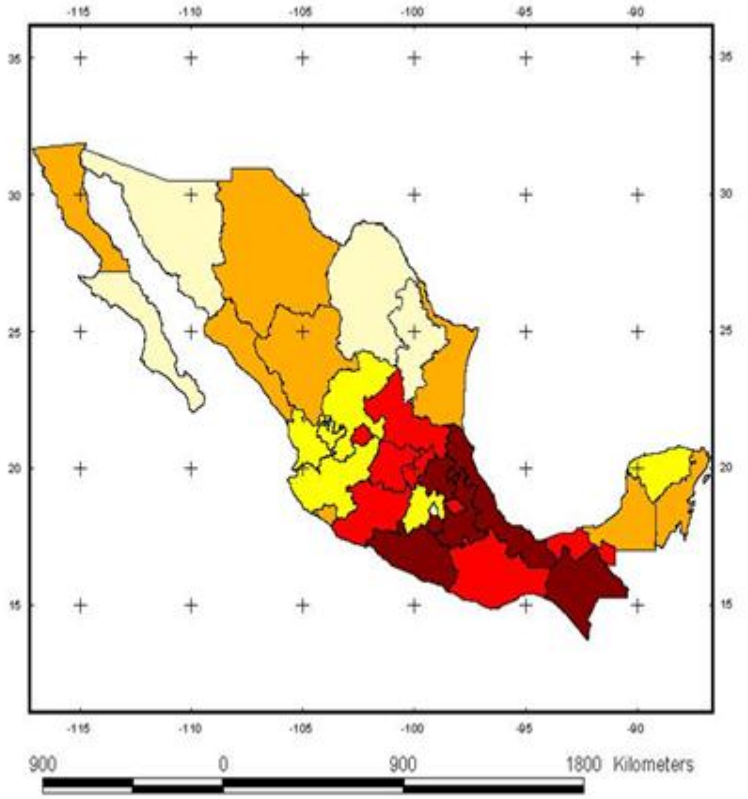


Relative weight of components in floods

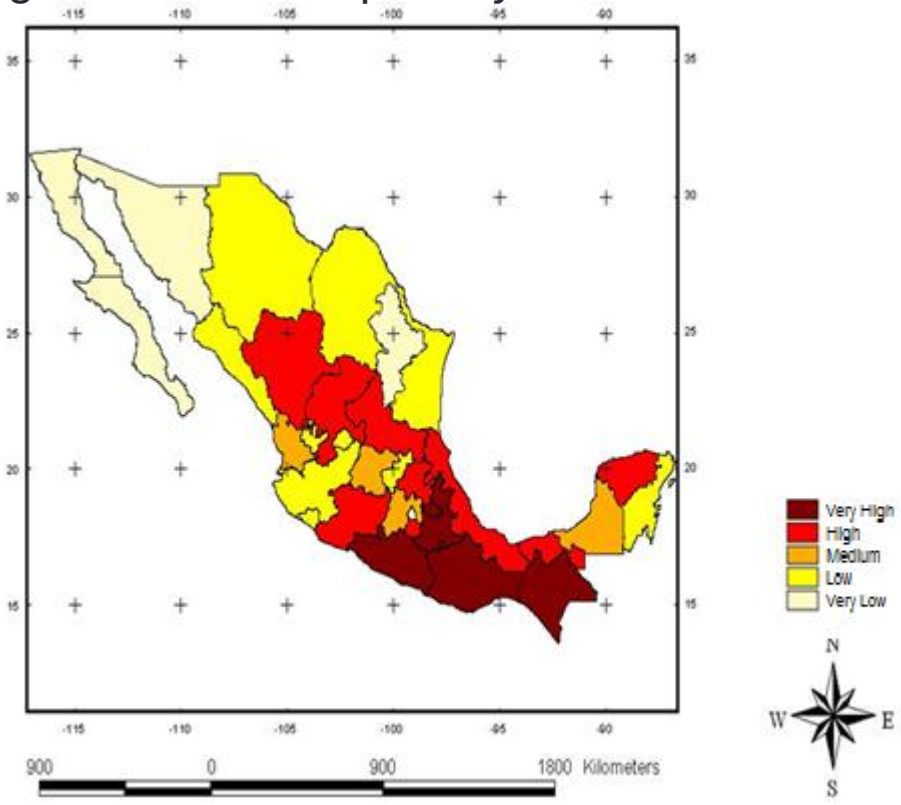


Relative weights of flood components

Lag in economic and social capacity

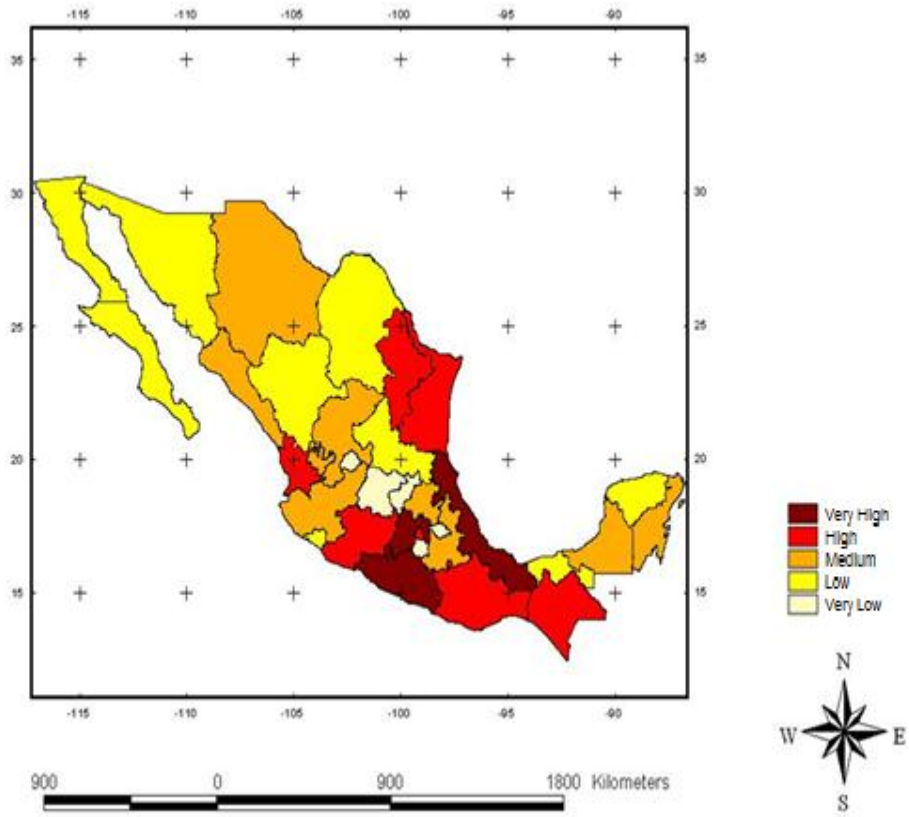


Lag in income and poverty levels

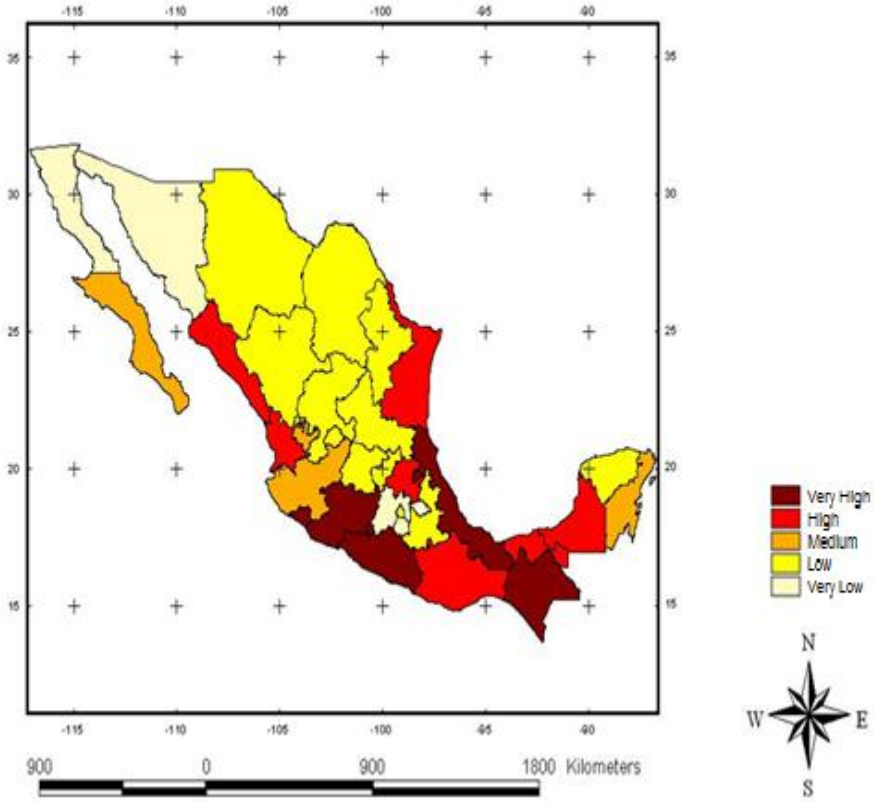


Relative weights of flood components

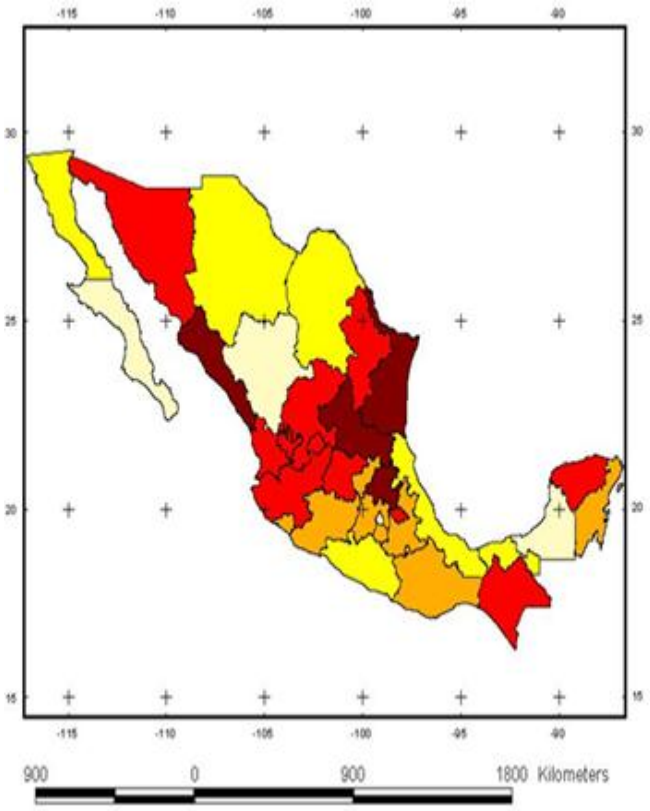
Occurrence of events



Expected exposure to climate change



Drought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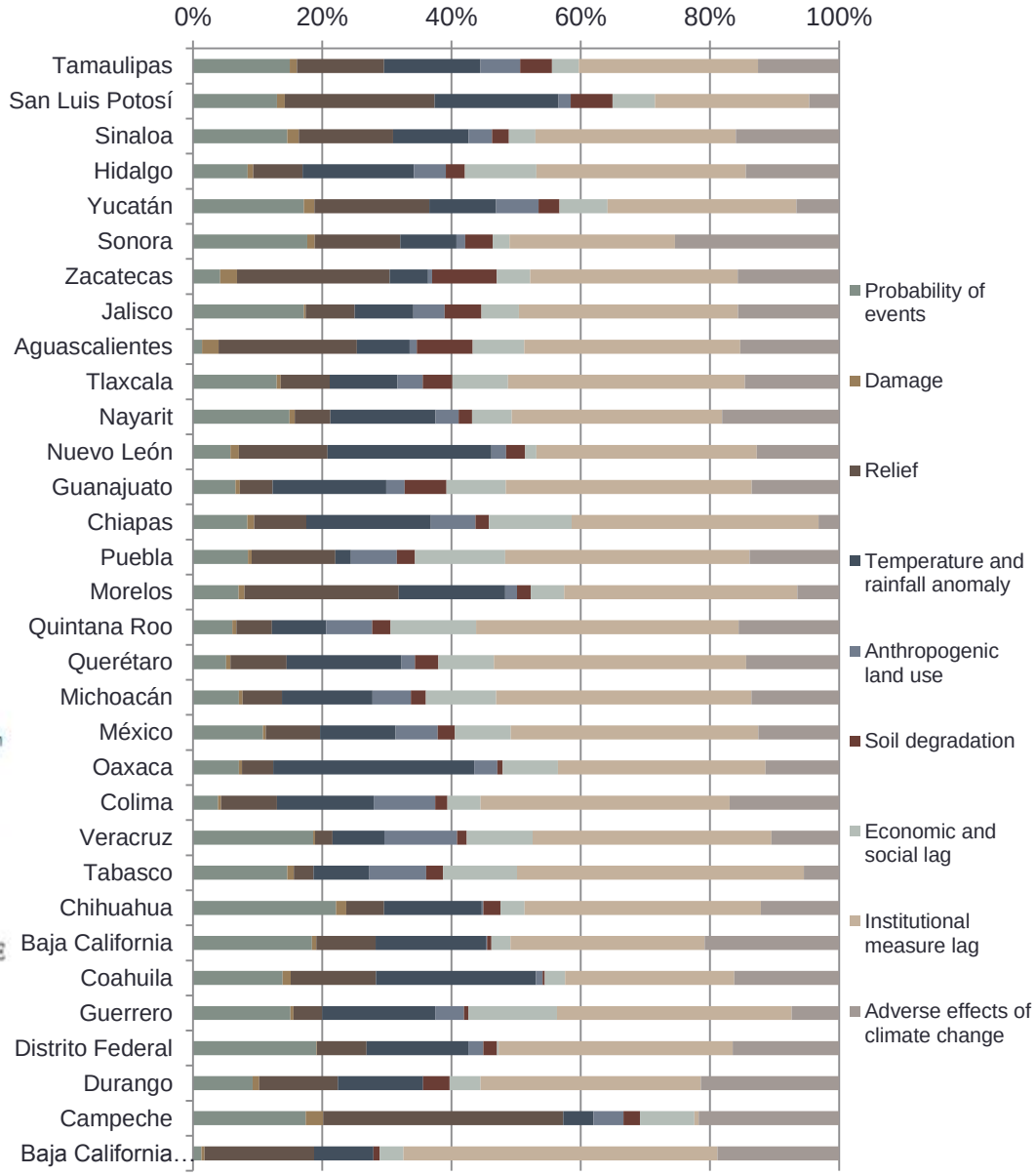
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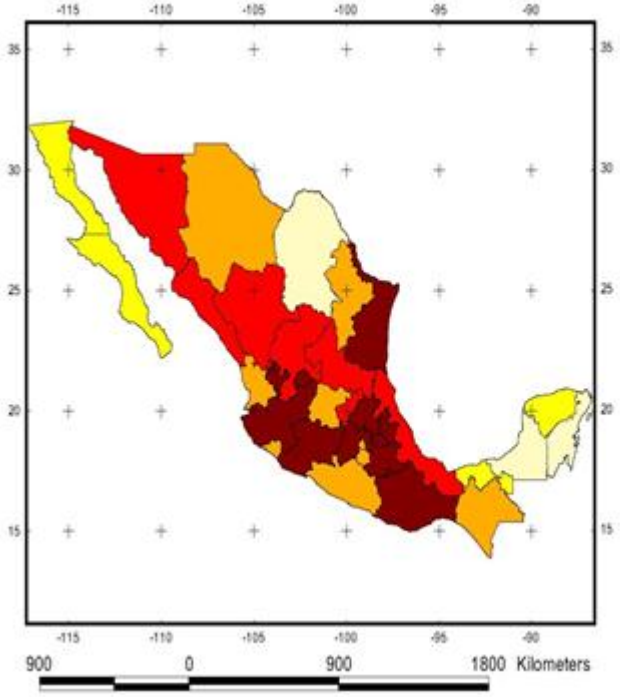
Relief
Temperature and rainfall anomaly
Anthropogenic land use
Soil degradation
Economic and social lag
Institutional measure lag
Adverse effects of climate change

Frost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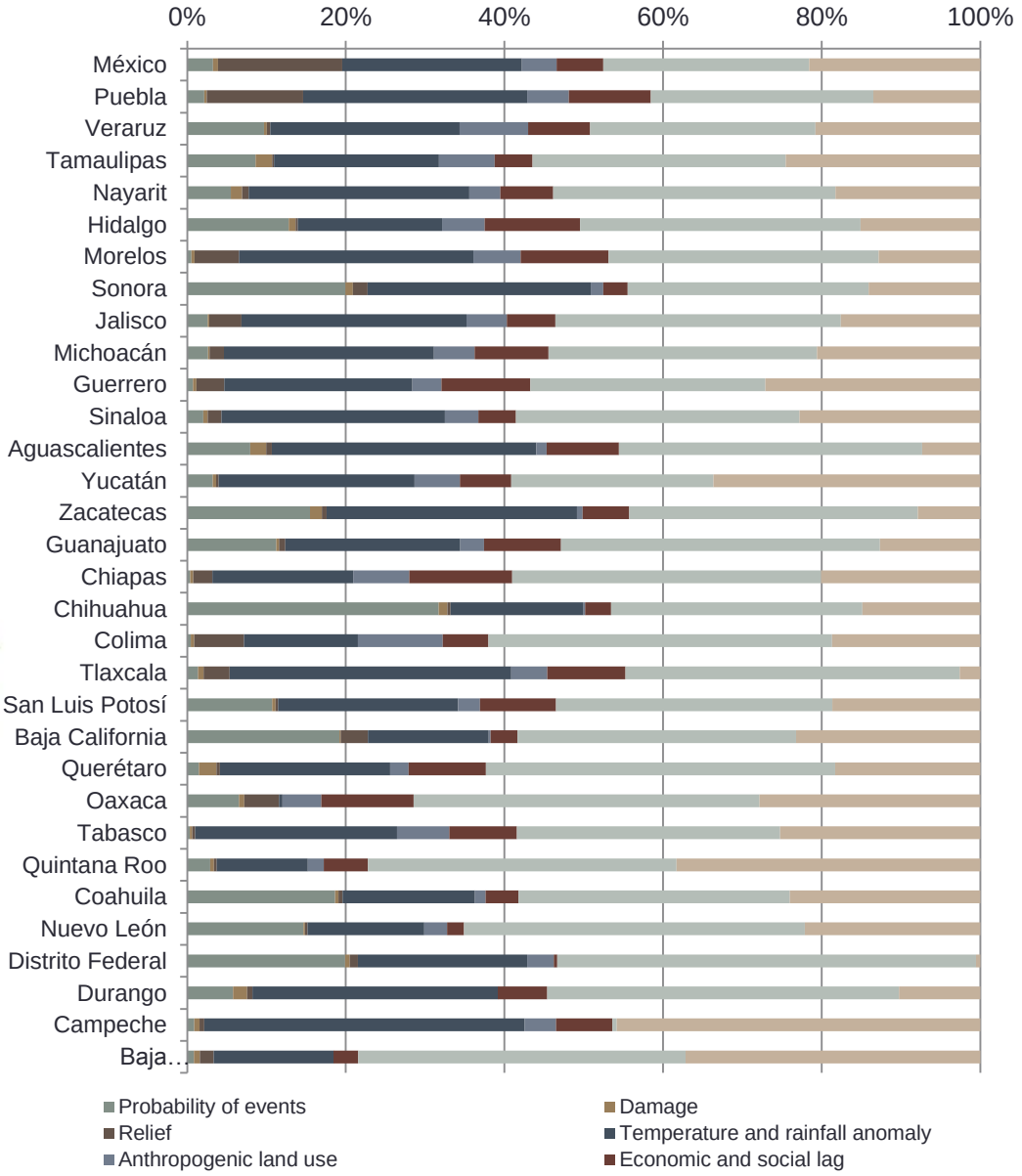
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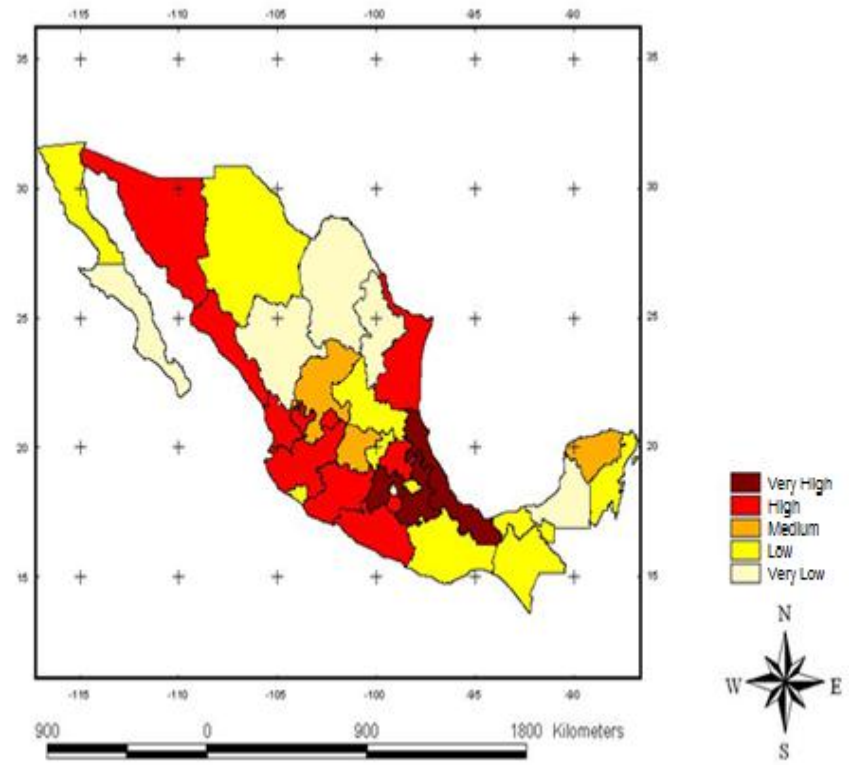
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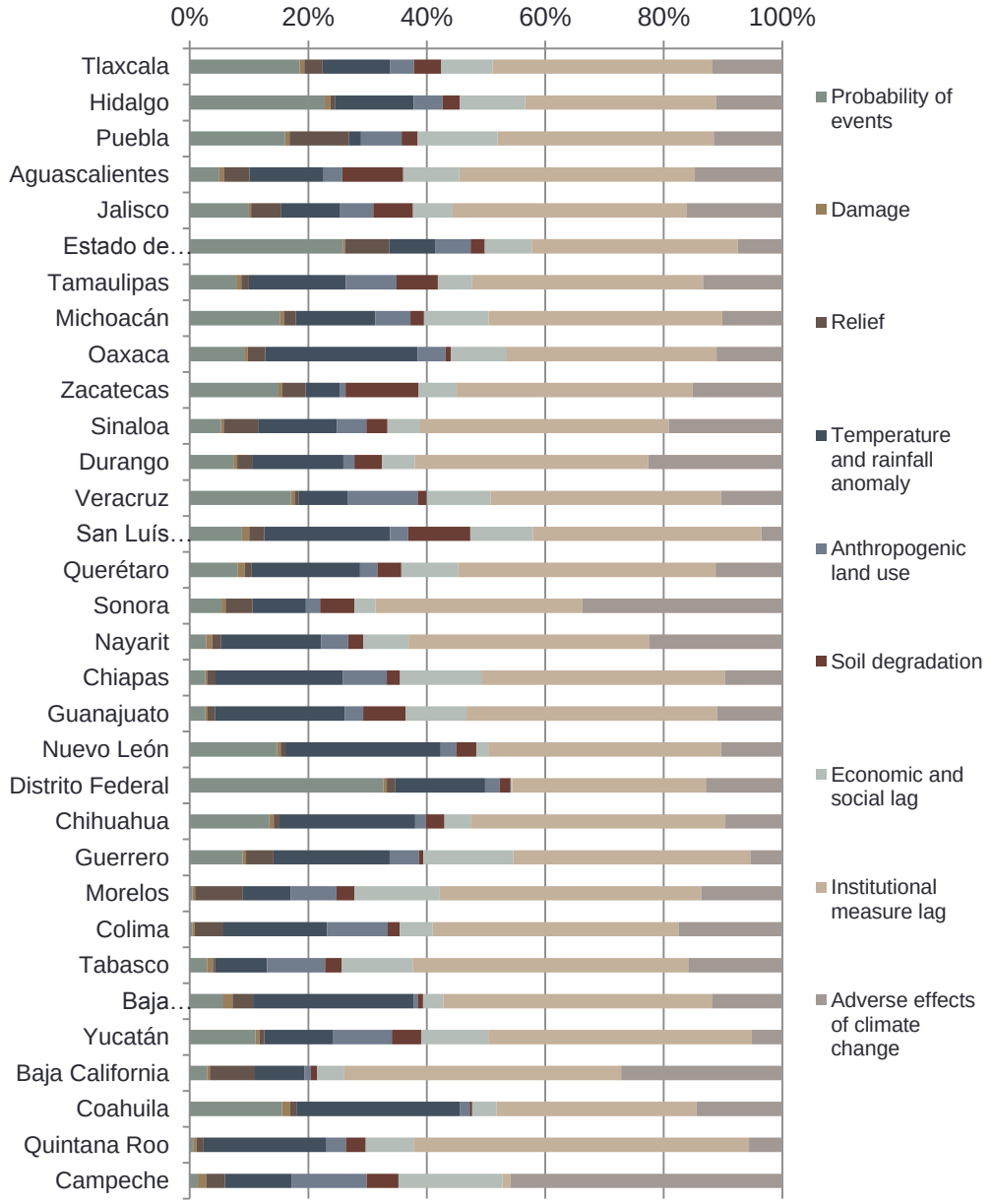
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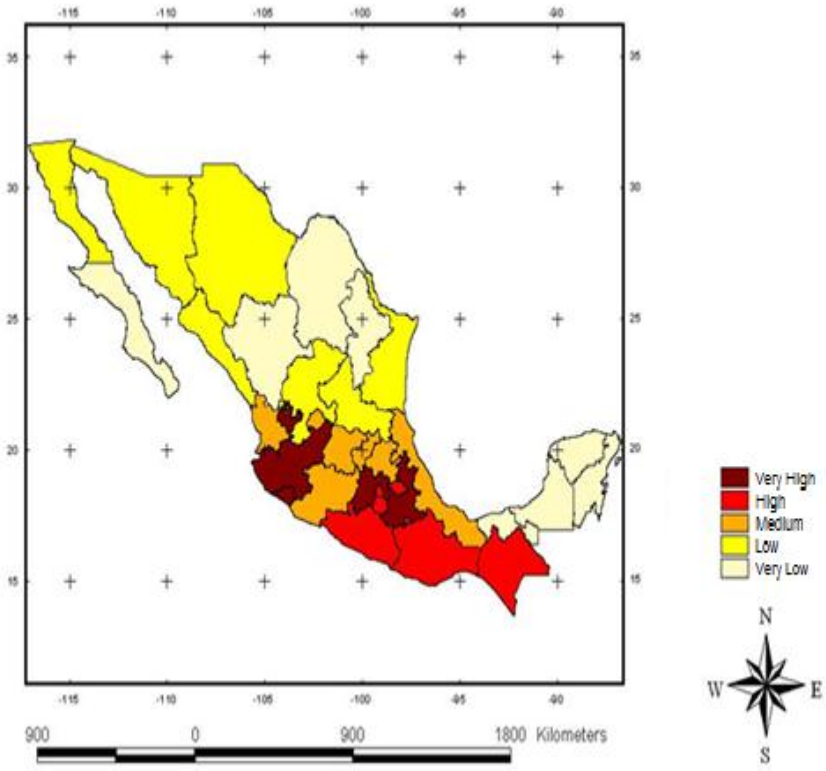
Earthquake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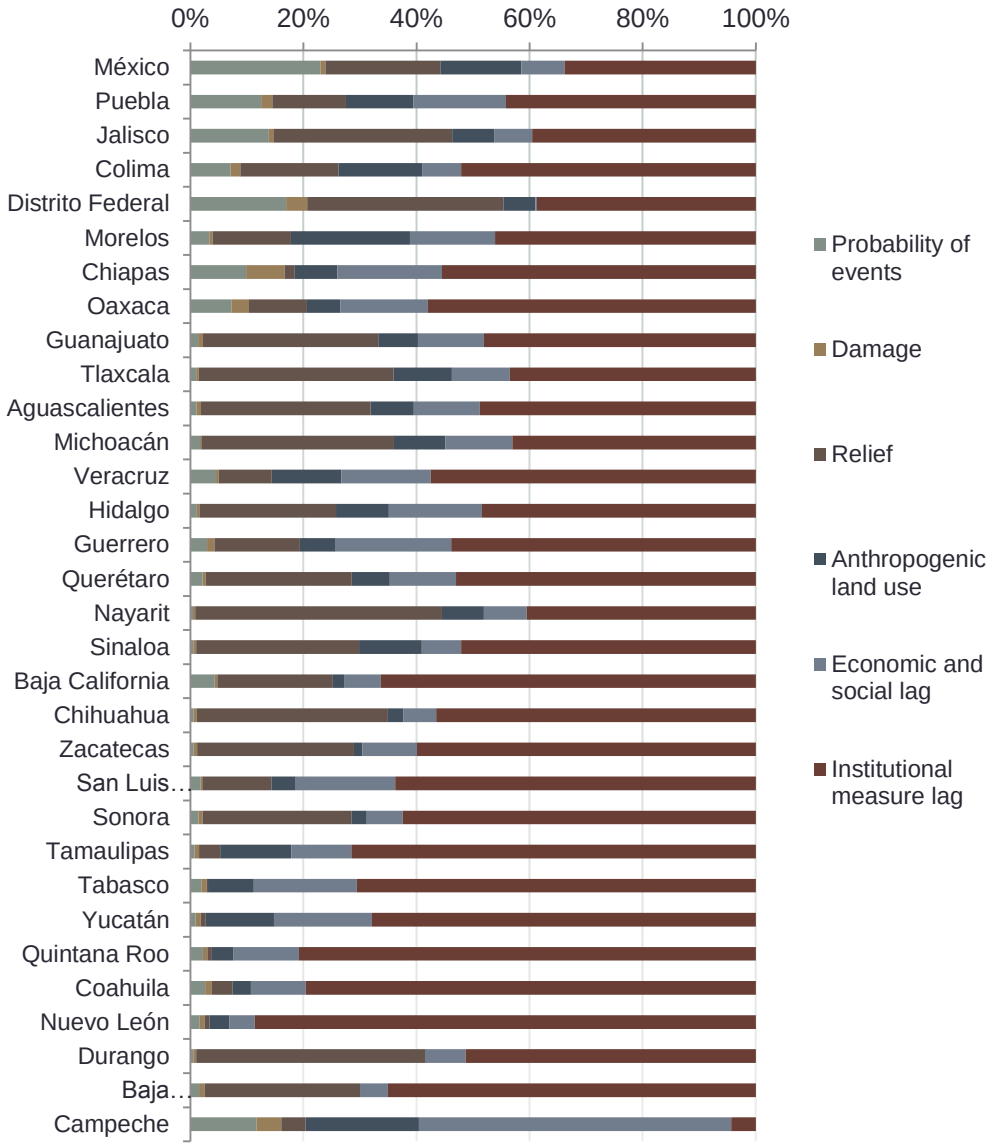
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Future Work

- Build decision trees to identify sets of federal programs to address main components
- Simulating the effects of adaptation policies on vulnerability