Disaster Resilient Caracas: Urban Planning Student Studio

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Lamont-Doherty Earth Observatory
UTC Workshop, Nov 2019

Definitions

- Sustainability: Promoting intergenerational social (time) and geographic (space) equity.

- Disaster Resiliency: The ability to absorb natural hazard shocks and preserve sustainable growth through mitigation and adaptation.

Premise: Disaster Resilience is a characteristic of sustainable societies.

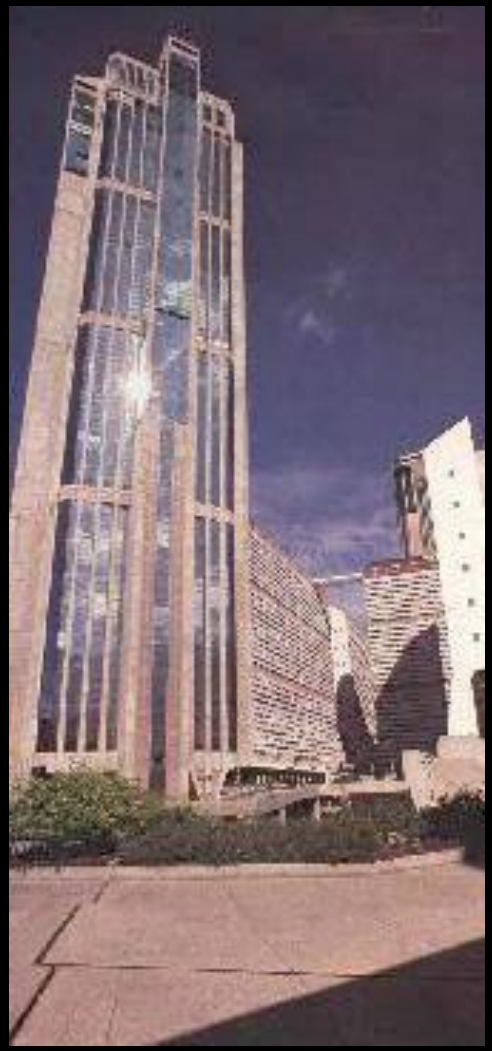
- Disaster Resilience will enhance social development.
- Disasters highlight social and economic inequities, and affect the poor disproportionately.
- Therefore, Disaster Resilience is an agent of poverty reduction and social stability.
- Disaster Resilience provides an additional metric for investment.

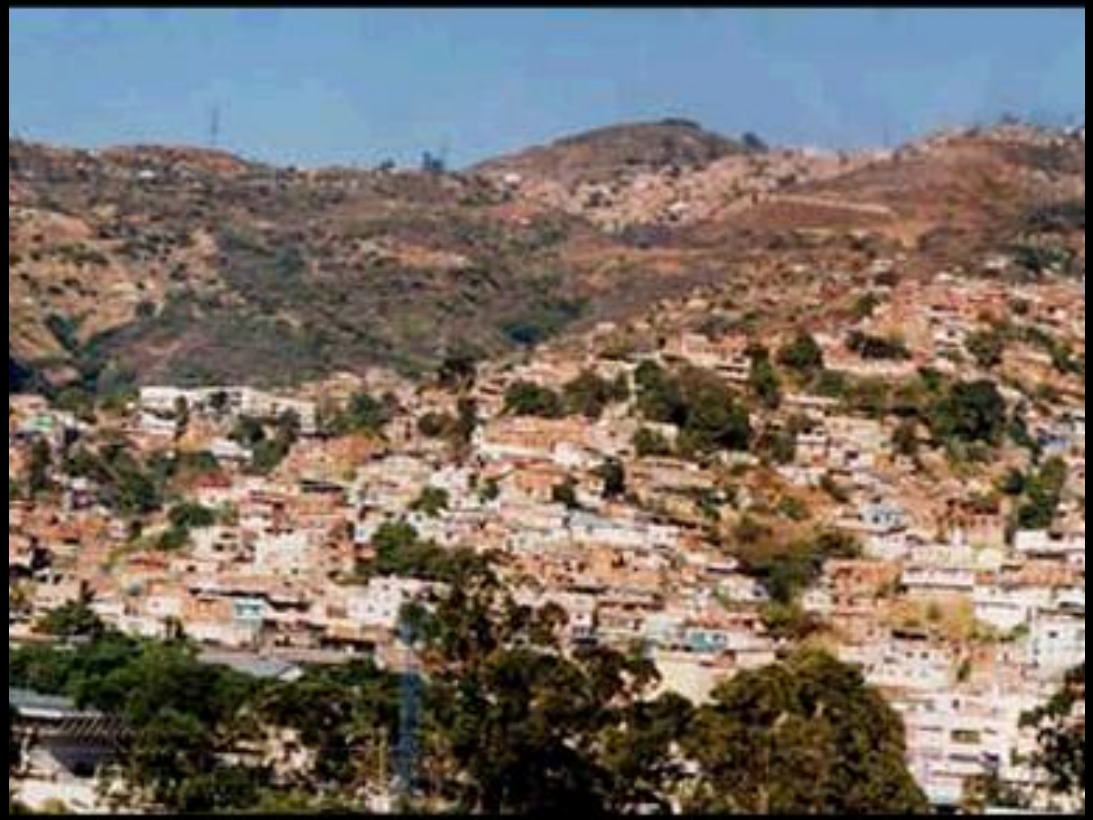
Context

- Building disaster resilient metropolitan areas accomplishes the dual goal of achieving social development and protecting the people and their built environment.
- Integrated urban areas will be centers for the application of sustainable development strategies based on science and rational planning.

Four Components of Urban Disaster Resilience

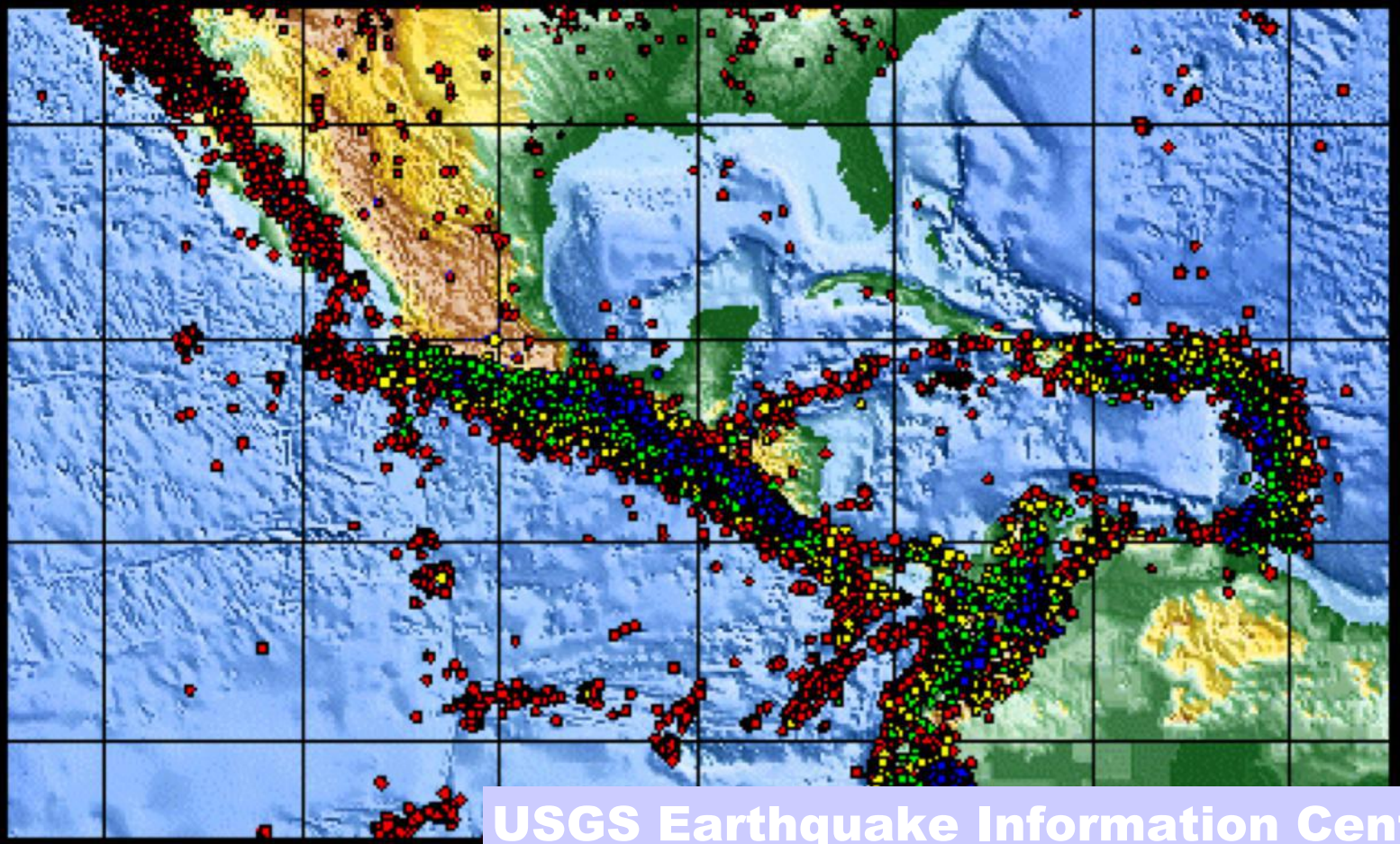
1) Rational planning process that includes multi-hazard risk assessment.
2) Risk management strategies, including financial, regulatory, and market incentives.
3) Building knowledge, institutional and social capital for disaster response, mitigation and adaptation.
4) Real-time environmental and state-of-health monitoring.






Matthew C. Larsen, USGS

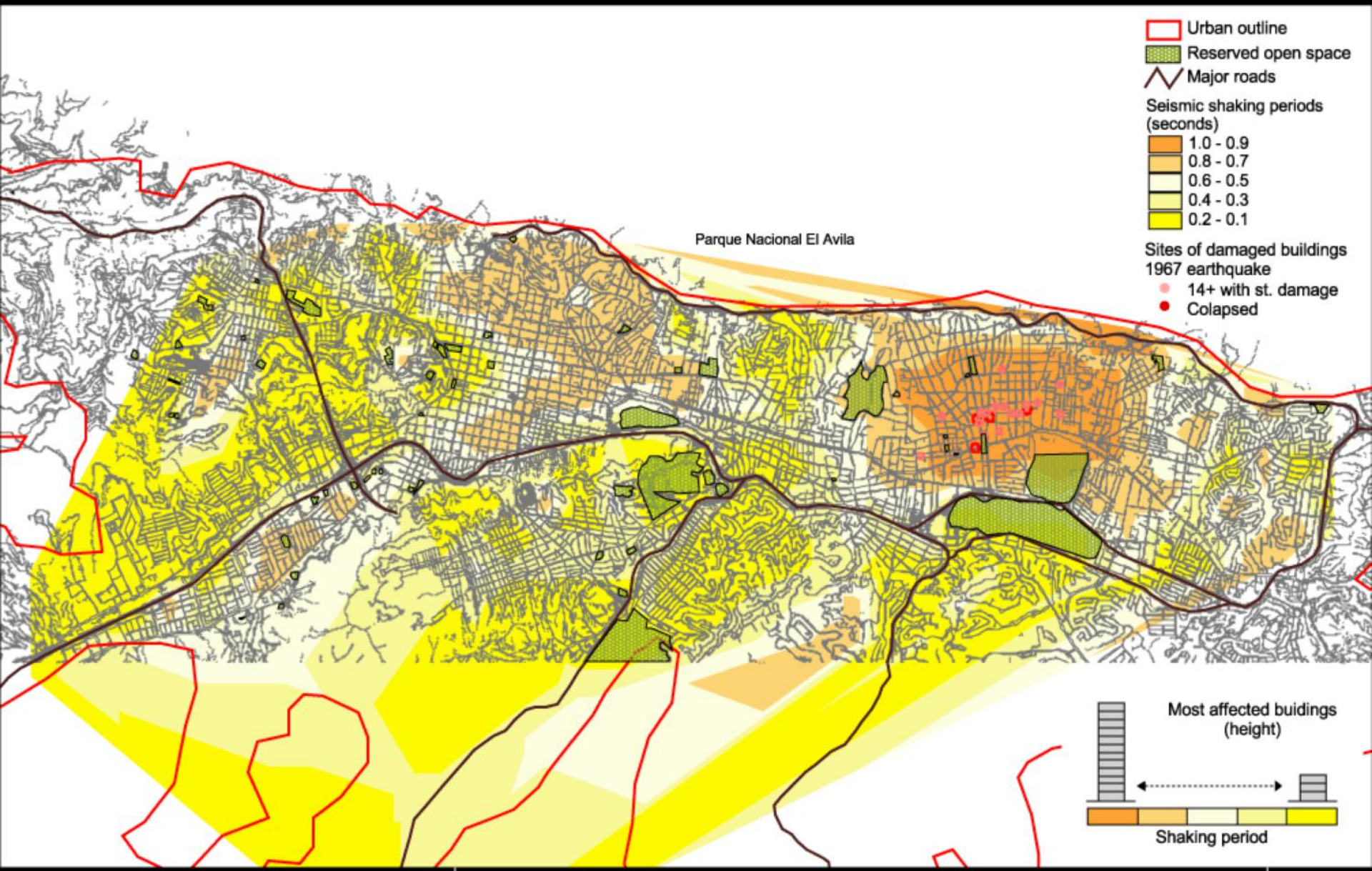
Earthquakes from 1977-1997



USGS Earthquake Information Center

Normal December Rainfall:	100 mm
December 15-17, 1999:	912 mm
December 1999 Total:	1207 mm

shaking periods



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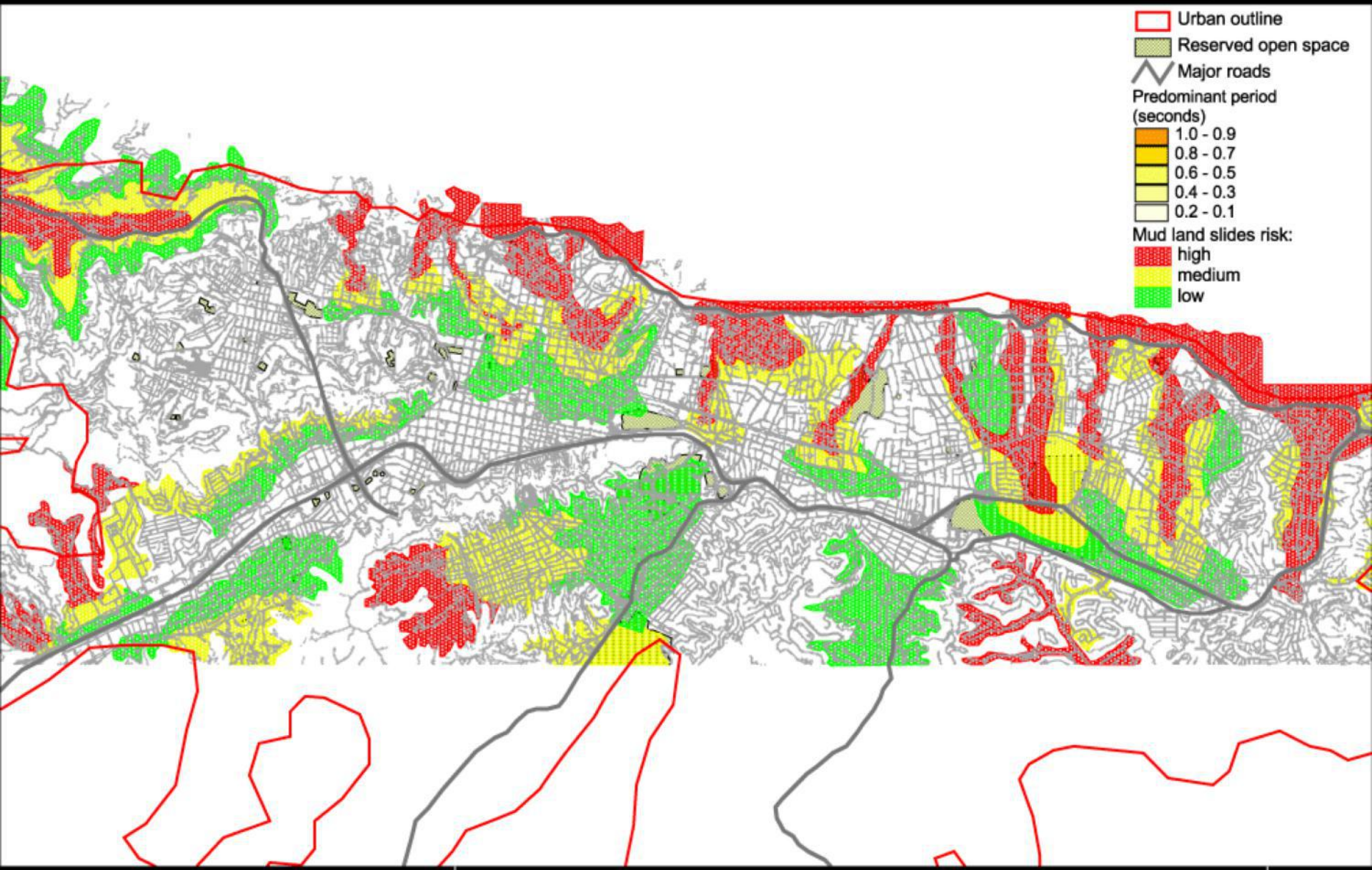
Disaster Resistant Caracas

HAZARDS

debris flows / landslides

1:75,000
1 0 1 Kilometers



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Disaster Resistant Caracas

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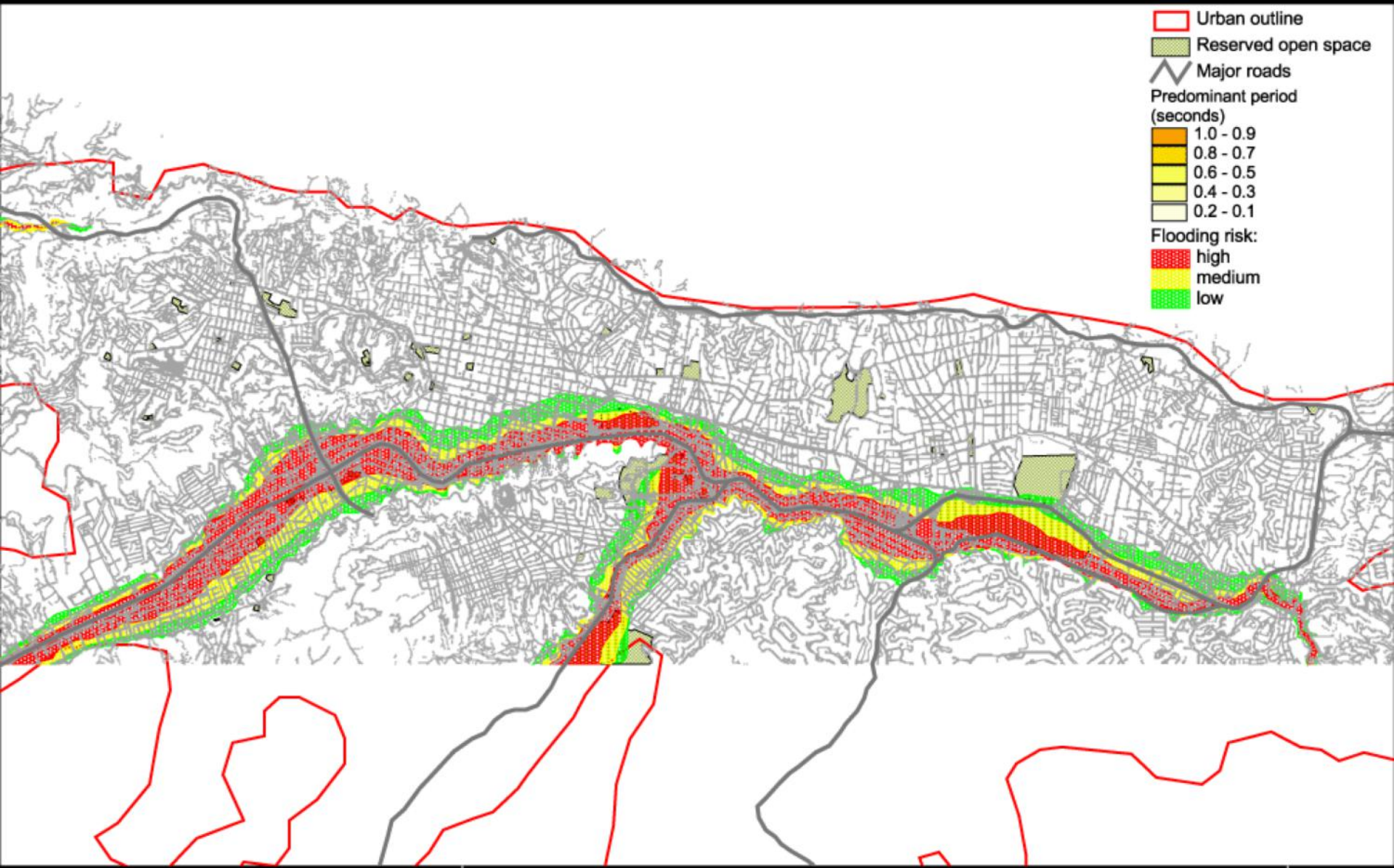
studio 2001

HAZARDS

river flooding

1:75,000
1 0 1 Kilometers



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Disaster Resistant Caracas

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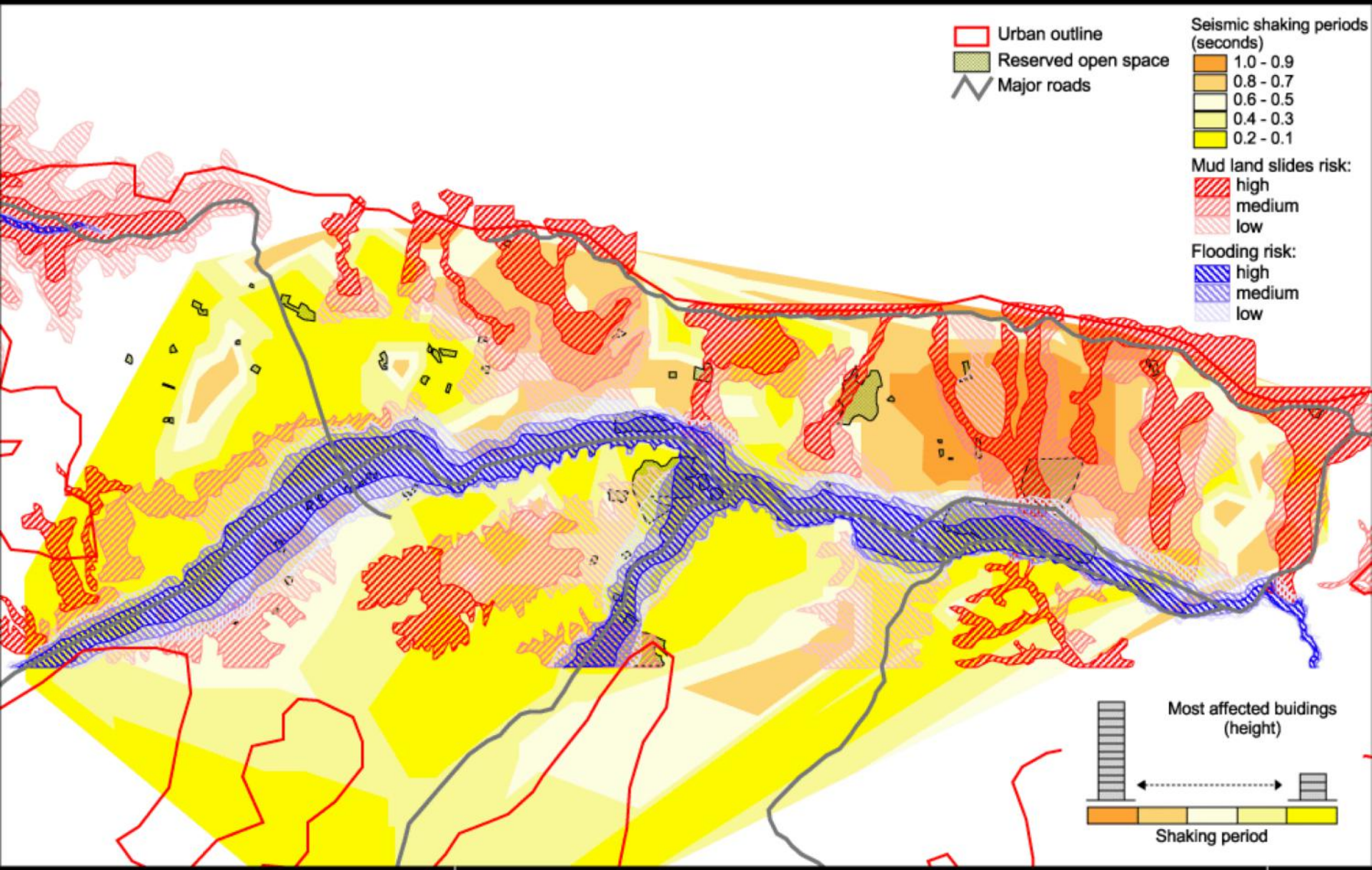
HAZARDS seismic + debris flows/landslides + floods

1:75,000
1 0 1 Kilometers



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Disaster Resistant Caracas

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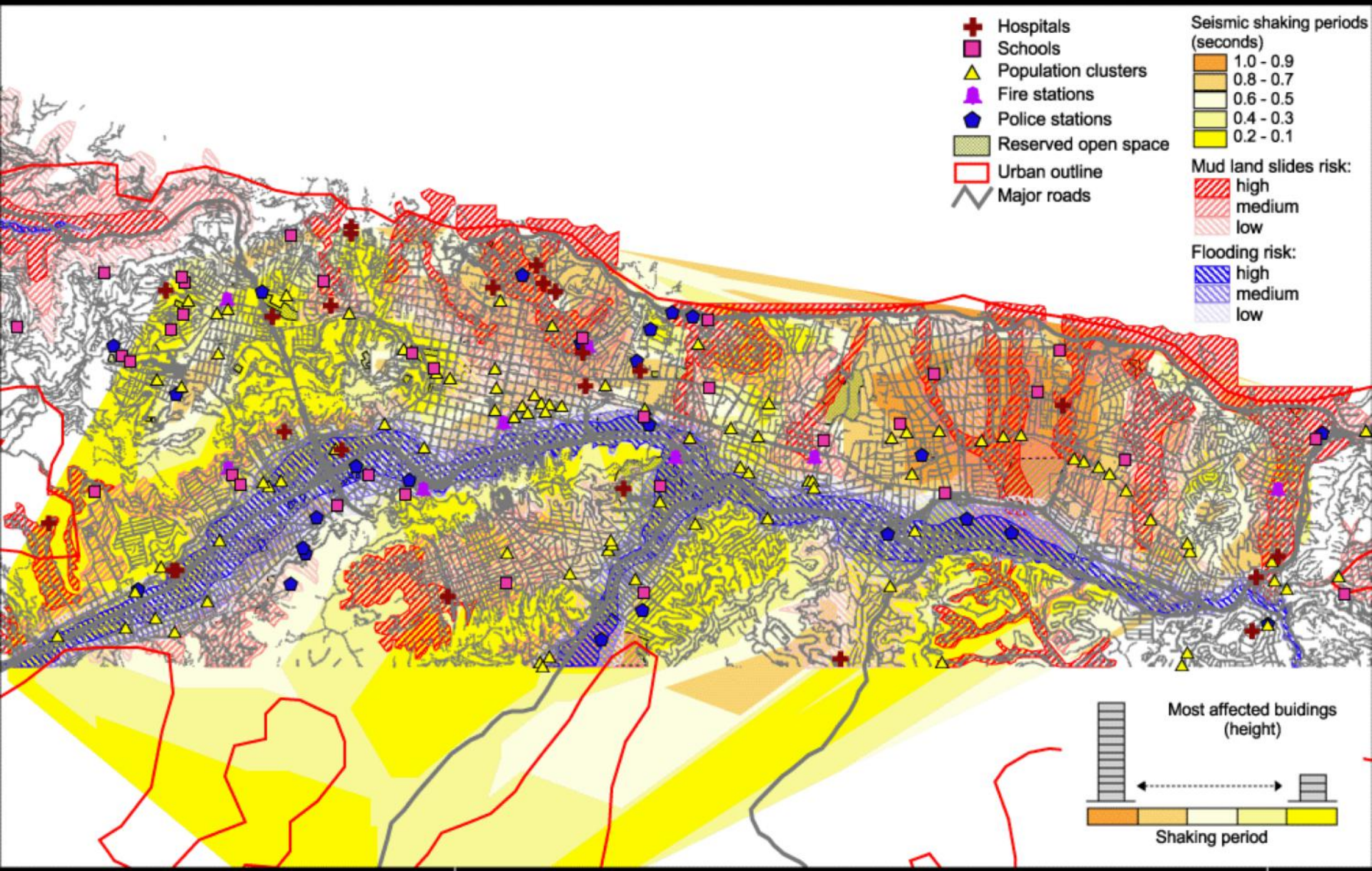
HAZARDS critical facilities & hazards



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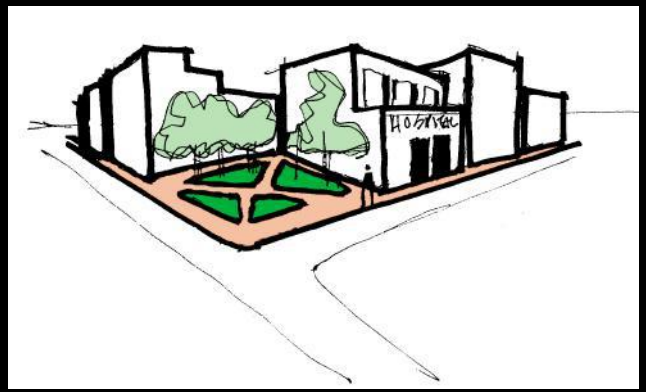
Reserved Spaces – Parroquias

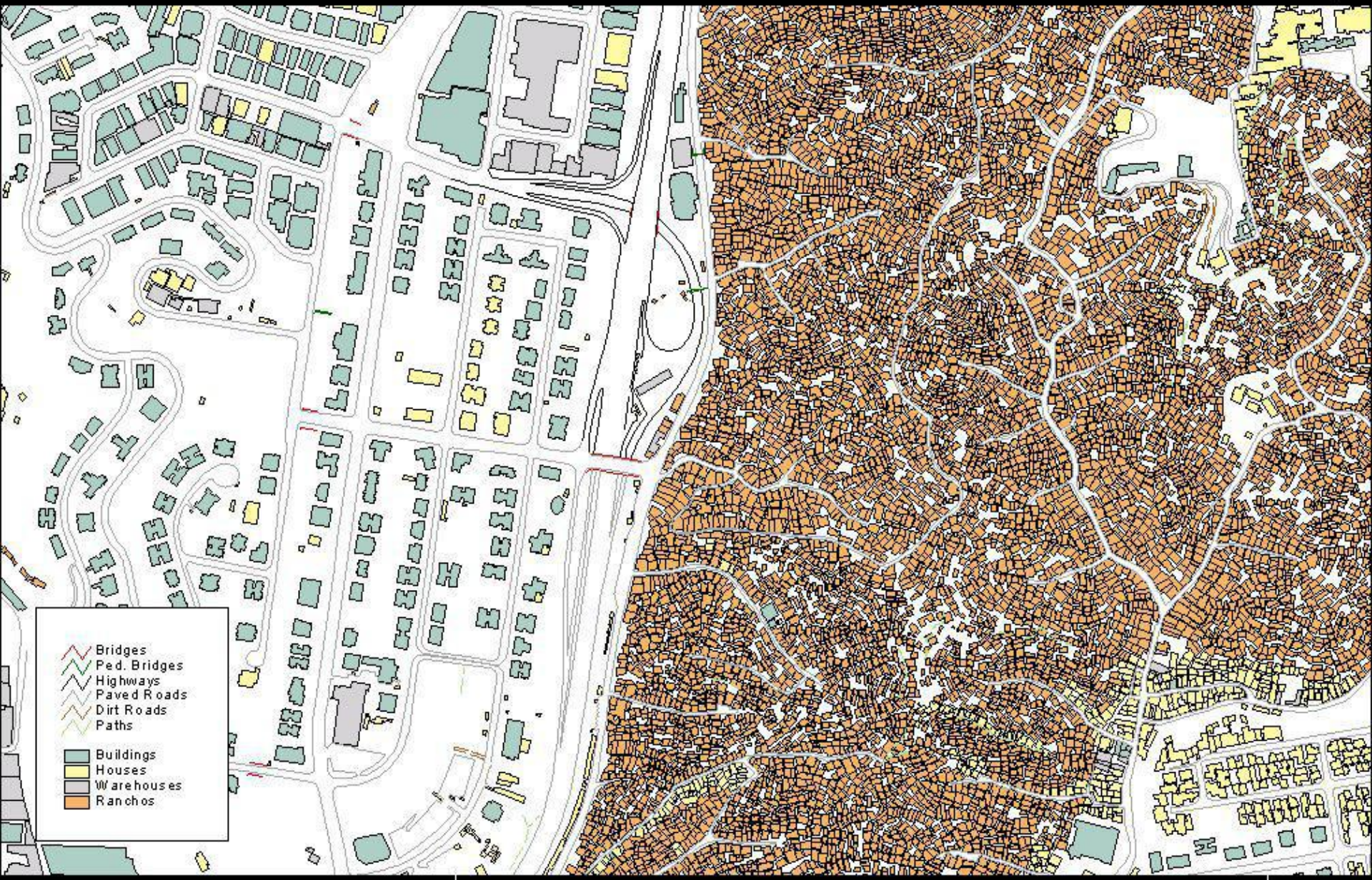
- Normal Function
  - Parks and Plazas
  - Recreation Fields
  - Community Centers
  - Open-air markets
  - Preserve historic areas

- Disaster Function
  - Evacuation Sites
  - Temporary Shelters
  - Field Hospitals
  - Information Posts
  - Supply Distribution Points



ACTION PLAN

petare



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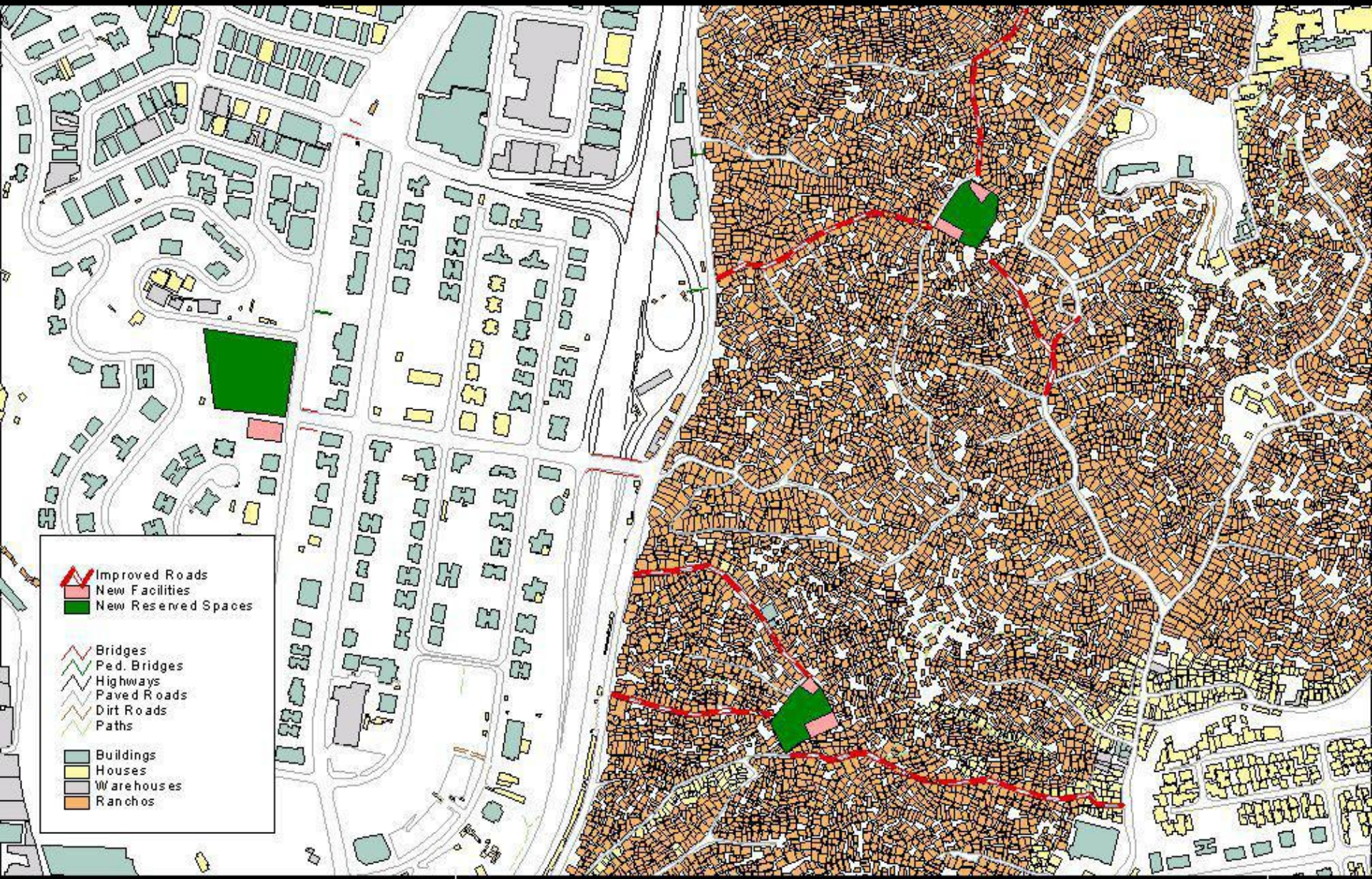
ACTION PLAN

new reserved spaces



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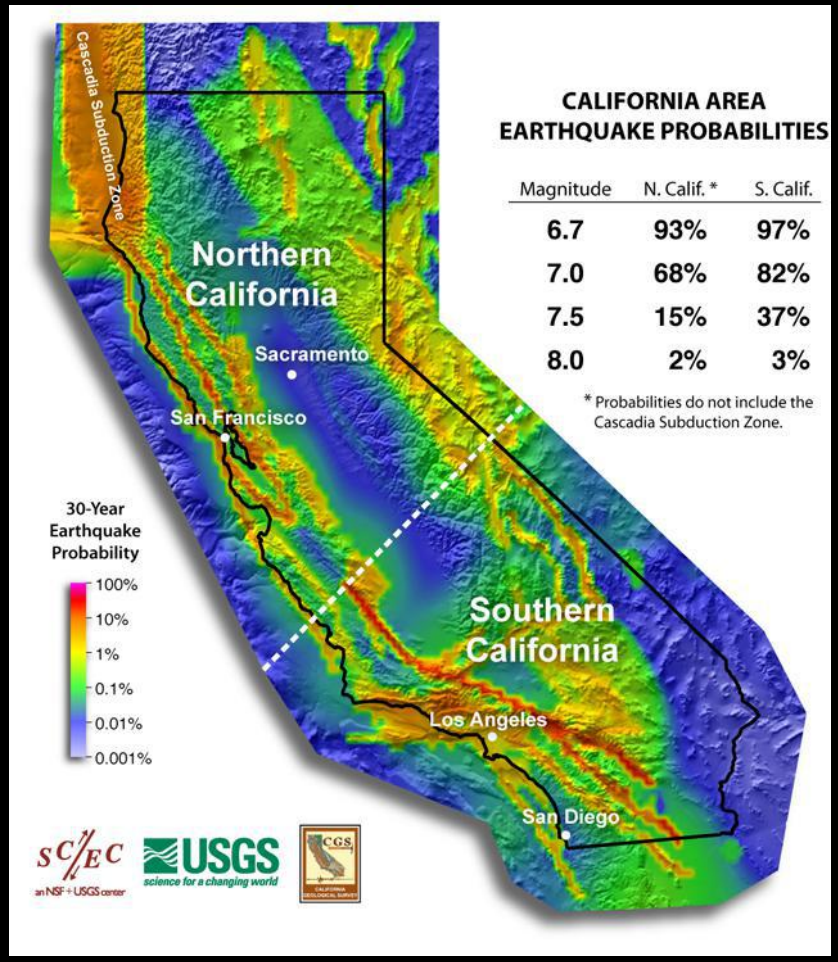
UCERF N-S Probabilities



Earthquake Early Warning Systems

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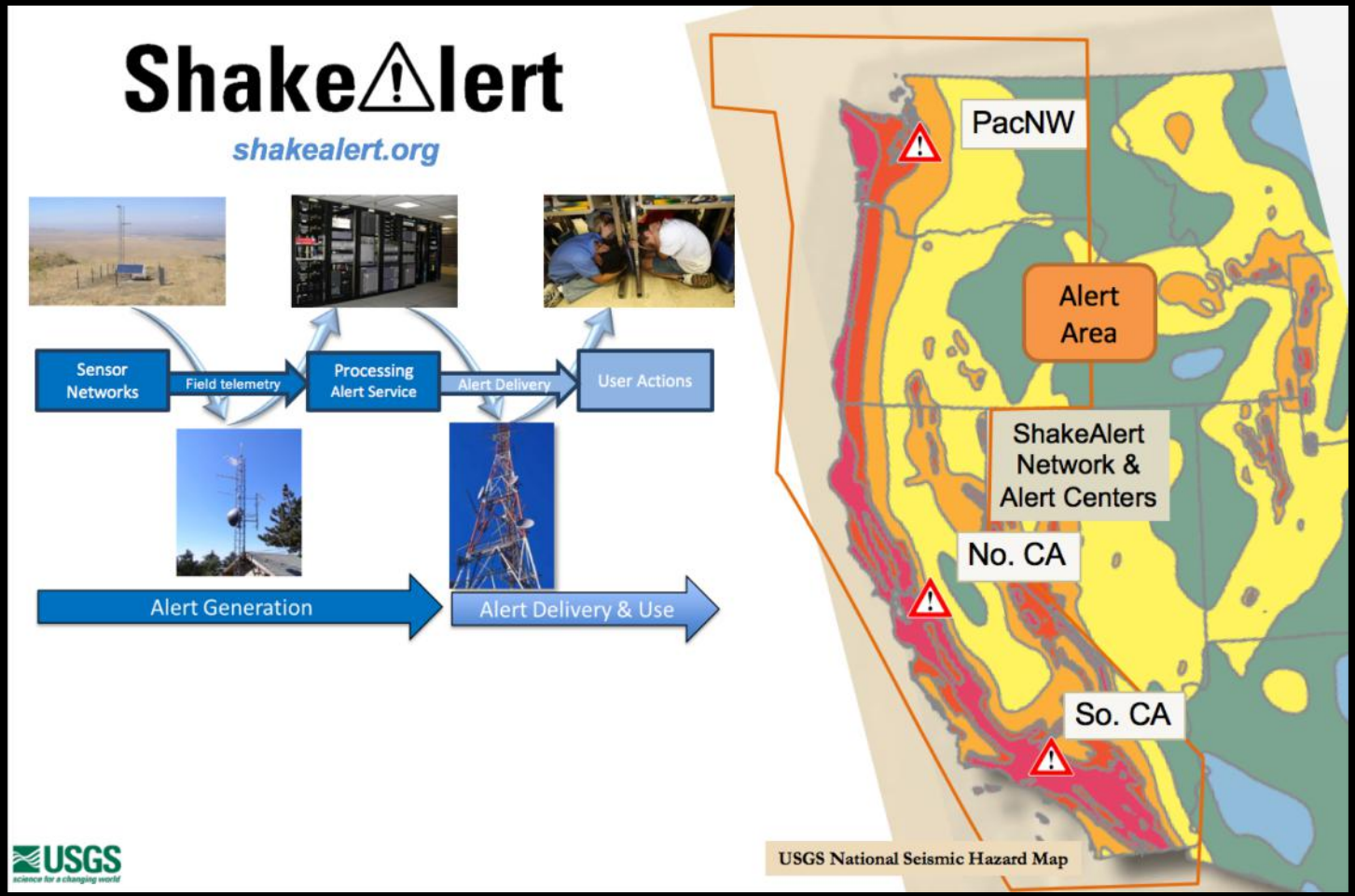

ShakeAlert (USGS+Partners)

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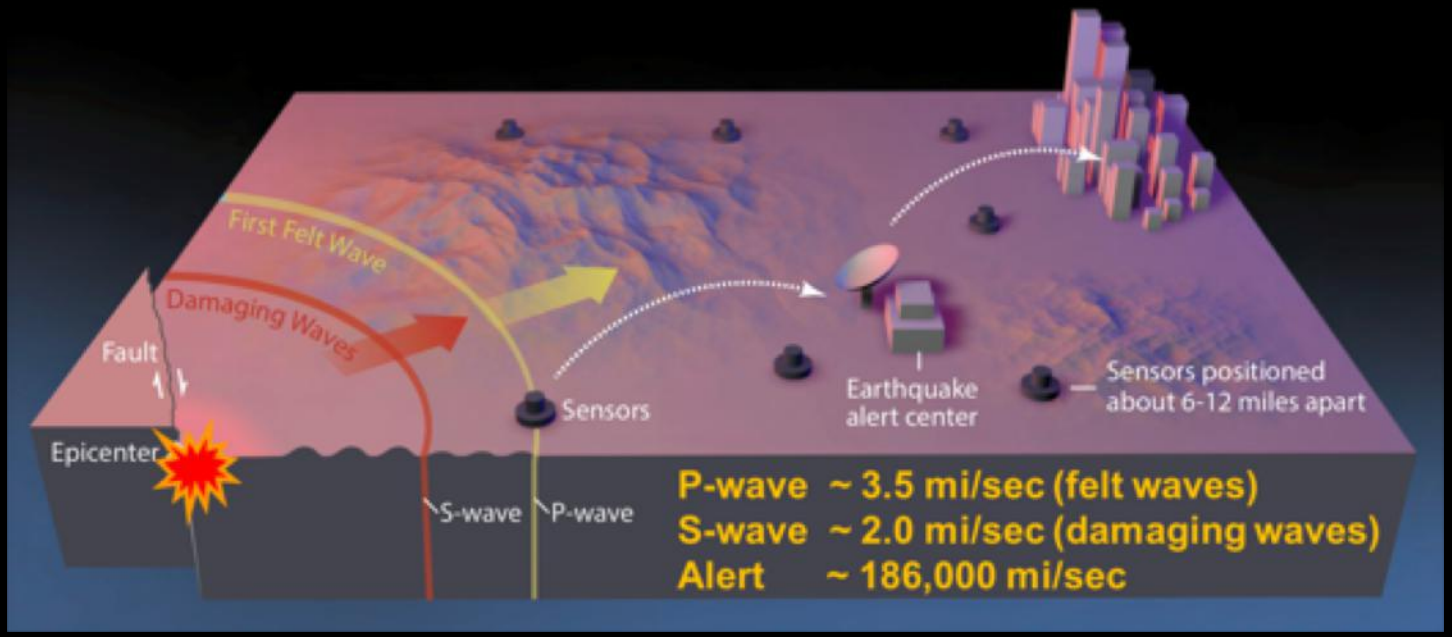


Delivery to Stakeholders

ShakeAlert: 3 Primary Messages

1) Event Message

- Earthquake Source
  - Point: location, magnitude & uncertainty
  - "Finite fault" (If M6.0+)

2) Contour Message

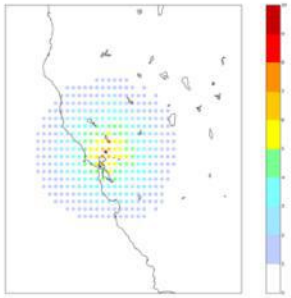
- **Event Message** + MMI contours
  - nested 8-pt polygons enclosing areas by MMI, PGA, PGV

3) Map Grid Message

- **Event Message** + MMI grid
  - grid map of MMI, PGA, PGV
  - ~20km spacing

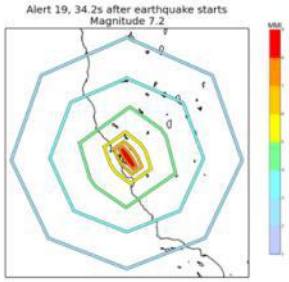
Also special messages like CAP for IPAWS/WEA

1) Event Info



3) Grid Map

Hayward M7.0 Simulation



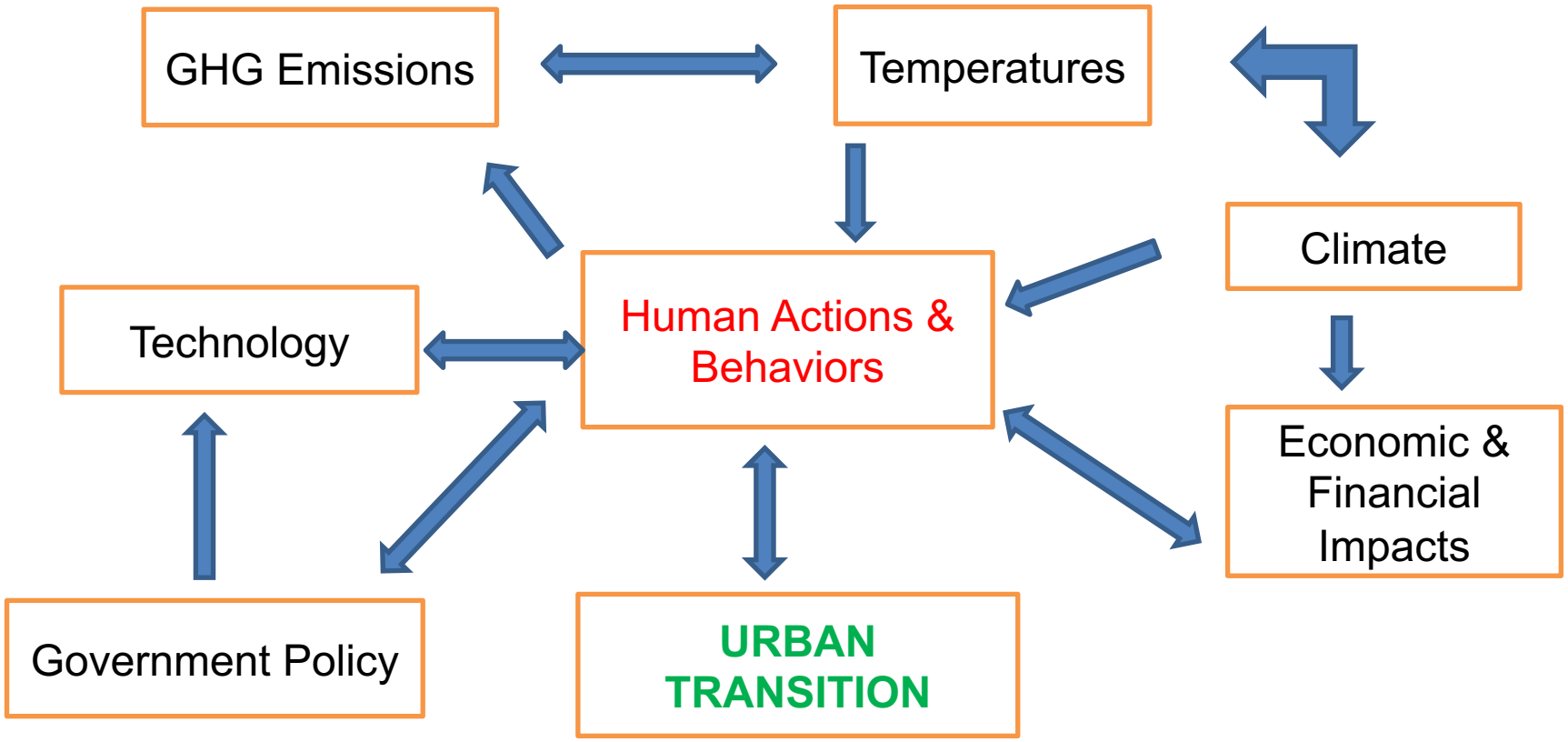
2) Contour Map

Alert updates as event grows

USGS science for a changing world

ShakeAlert

CLIMATE RISK RESPONSE



Lessons Learned

- Complexity demands multi-disciplinary integrated approach.
- Local institutional/community partnerships crucial for implementation and success.
- Existing local capacity in different disciplines must be integrated and reinforced to deal with complex systemic issues.

- Data issues are paramount.
- Community issues paramount to implementation.