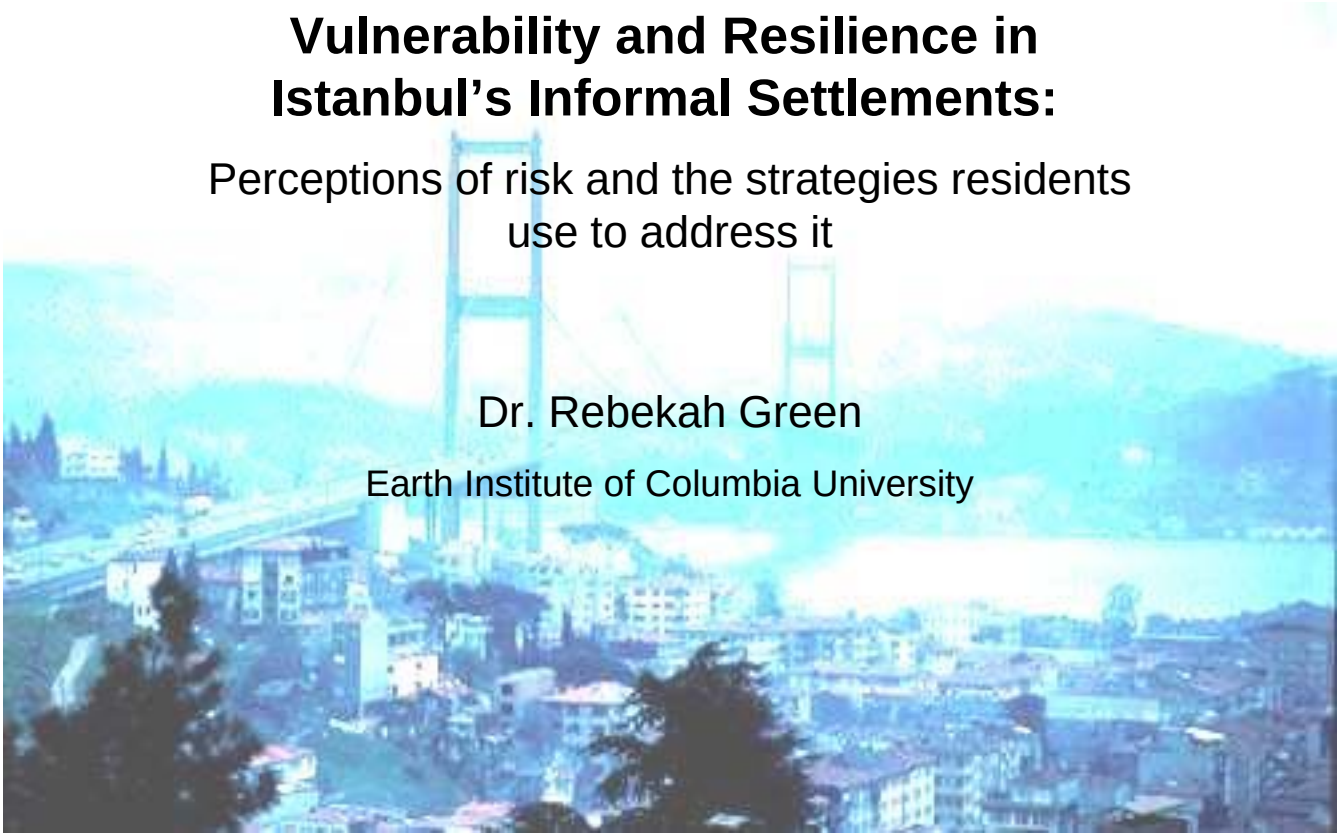
Vulnerability and Resilience in Istanbul's Informal Settlements:

Perceptions of risk and the strategies residents use to address it



Dr. Rebekah Green

Earth Institute of Columbia University

Agenda

I. Informal Settlements in Istanbul, Turkey

   a) Urban Growth Patterns

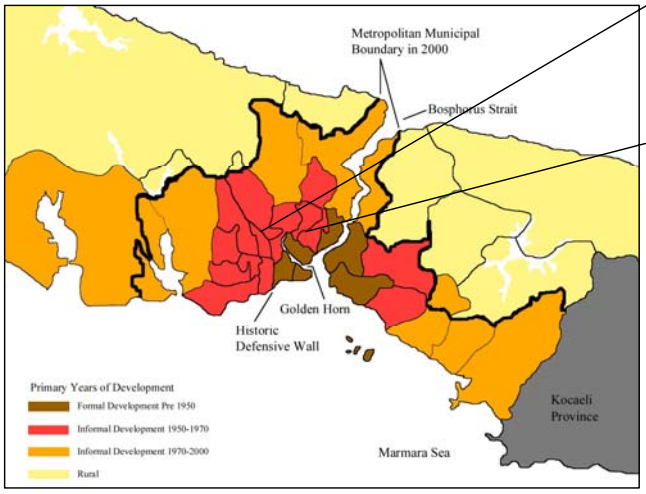
   b) Hazards

   c) Risk Perception and Coping Strategies

II. Vulnerability and Resiliency in Context

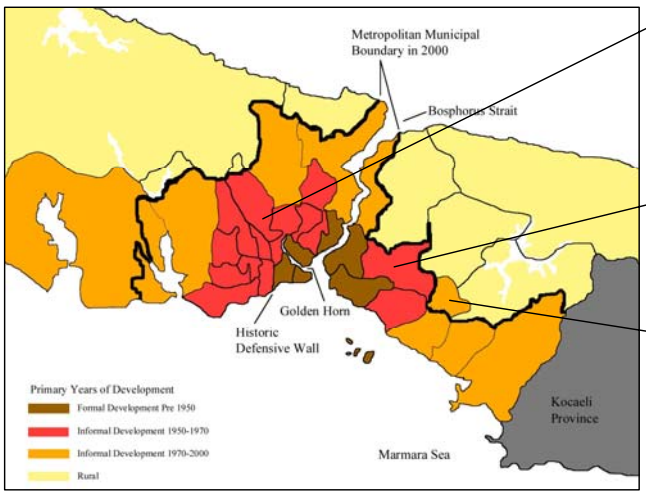
I. Informal Settlements in Istanbul, Turkey
a) Rapid Urbanization

- Istanbul's Rapid Urbanization
  - Rise in Temporary Squatter Settlements
  - Replacement of Low Density Housing



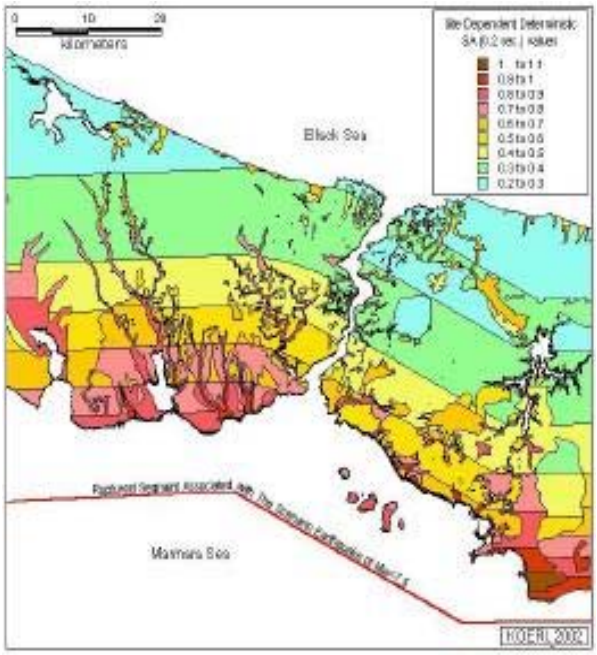
I. Informal Settlements in Istanbul, Turkey
a) Rapid Urbanization

- Istanbul's Rapid Urbanization
  - Rise in Temporary Squatter Settlements
  - Replacement of Low Density Housing



I. Informal Settlements in Istanbul, Turkey
b) Seismic Hazard and Vulnerability

- Istanbul's Seismic Vulnerability
  - Estimated Seismicity
    - -70% probability of an Mw=7.5 earthquake in the next 30 years
  - -Estimated Damages
    - - 40,000-50,000 deaths
    - - 40,000 buildings damaged beyond repair
    - - Monetary losses of 11+ billion USD



Site Specific Deterministic Spectral Acceleration for Tn=0.2 sec. from a *MW*= 7.5 Scenario Earthquake

Source: Erdik, M., *et. al* (2003) Earthquake Risk Assessment for the İstanbul Metropolitan Area - Final Report. Boğaziçi University Press, İstanbul.

I. Informal Settlements in Istanbul, Turkey
c) Risk Perception and Coping Strategies
i) Methods

- Housing and Risk Perception in Four Municipalities
  - - Risk perception of homes
  - ↓
  - - Strategies used to reduce vulnerability to seismic hazard
  - ↓
  - - Effects on physical vulnerability of housing

Istanbul Municipal and Provincial Boundaries, 2000

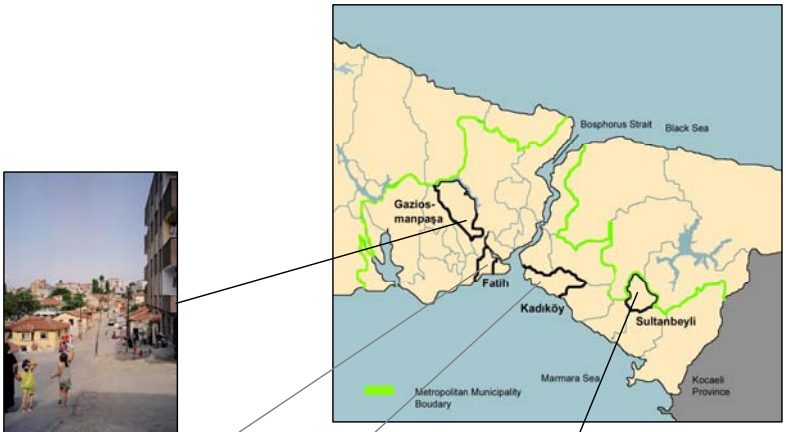

Gaziosmanpaşa


Fatih


Kadıköy


Sultanbeyli

- Mixed Methods
  - Two years of field ethnography
  - 45 in-depth interviews
  - Engineering rapid visual assessment
  - Quantitative survey



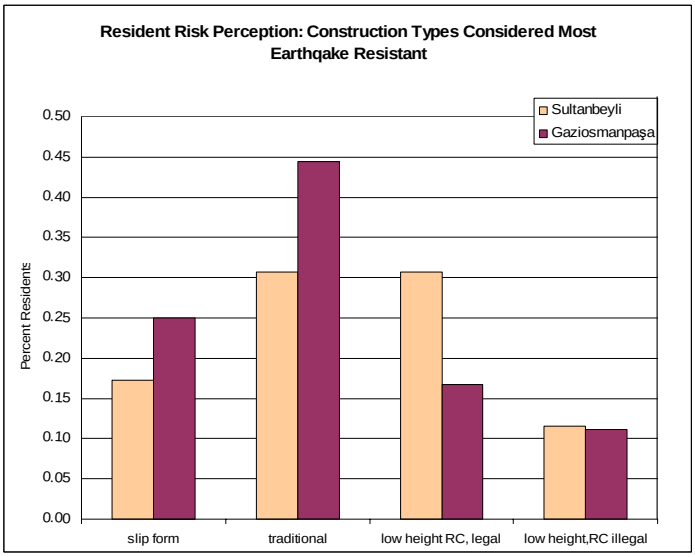
Gaziosmanpaşa


Fatih


Kadıköy


Sultanbeyli

- Pictorial survey used to assess risk perception
  - Distrust in unauthorized construction despite prevalence
  - -Distrust of predominant structural type



• Generalized Distrust of Neighborhood vs. Trust of Own Home

		Trust in earthquake resistance of own home compared to neighborhood housing (%)			
	N	Own home more EQ resistant	Own home about the same	Own home less EQ resistant	Don't Know
Gaziosmanpaşa	36	50	33	17	0
Sultanbeyli	50	50	33	13	4

• Involvement in Construction Significant Factor in Prediction of Trust

Trust in Homes of Residents in Informal Housing Districts

Least-Squares Regression, N=81

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	1.628005	0.544529	2.989749	0.003747
Inspection	-0.14612	0.19125	-0.76403	0.447184
Retrofit	0.301839	0.259231	1.164361	0.247873
Relationship to residents	**0.367811**	**0.186248**	**1.97485**	**0.05087***

*** Significant at the P<0.05 level**

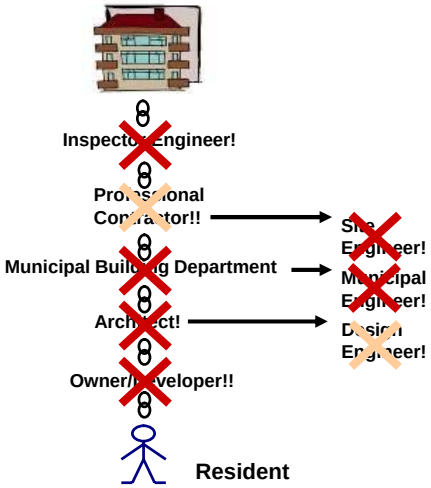
"My building is really strong because we built it for ourselves."
-Sultanbeyli resident

"My uncle fought with the contractor every day, but in the end he made sure the building will stand." - Kadıköy resident

• Distrust in Formal Construction Process – Clientelistic worldview*

"If I had been a contractor, I too would have stole a bit from the cement, from the sand, from the steel. [Their work is] a bunch of thievery.
-Fatih resident

"When engineers are no longer part of the process, the building becomes a bit stronger."
-Sultanbeyli resident



• Self-help Building within Social Networks

- Logical Solution to Distrust
- Economically beneficial too!

* e.g. Scott 1985, Gunes-Ayata 1994, Tekeli 1994, Linden 1997, White 1994

Unauthorized Construction . . .

- Addressed acute housing shortage
- Strengthened and reconstituted rural social ties in urban setting
- Allowed for incremental housing investment for urban poor

. . . . and . . . .

- Decreased perception of social vulnerability to untrustworthy professionals
- Decreased perception of physical vulnerability to earthquakes

. . . Resilient solution to social, economic and environmental problems with immediate and mid-range socio-cultural feedbacks (housing shortage, economic instability)

II. Vulnerability and Resiliency in Context
b) Context of Vulnerability

Unauthorized Construction and living in informal settlements . . .

-Increased physical vulnerability of housing

-Structural specifications inadequate

- Non-ductile detailing

- Incremental construction

- Self-help retrofitting

. . . Vulnerability-increasing solution to problems with extended environmental and social feedbacks (environmental degradation, earthquakes)

Selected further sources on building stock vulnerability in the Marmara Region of Turkey:
Erdik, M., N. Aydınoğlu, et al. (2003). Earthquake Risk Assessment for the İstanbul Metropolitan Area - Final Report. İstanbul, Boğaziçi University Press.
Gülkan, P. (2000). "Building Code Enforcement Prospects: The Failure of Public Policy." Earthquake Spectra **Supplement A to Volume 16**: 351-374.
Gülkan, P. and H. Sucuoğlu (1992). Earthquake vulnerability, loss and risk assessment in Turkey. Tenth World Conference on Earthquake Engineering, Madrid, Spain, A. A. Balkema.
Sengezer, B. and E. Koc (2005). "A critical analysis of earthquakes and urban planning in Turkey." Disasters **29**(2): 171-194.
Sezen, H., K. J. Elwood, et al. (December 2000). Structural Engineering Reconnaissance of the Kocaeli (Izmit) Turkey Earthquake of August 17, 1999. Berkeley, CA, Pacific Earthquake Engineering Research Center.

II. Vulnerability and Resiliency in Context
c) Strategies for Balance Resilience

Continued Questions:

* How can and should we be addressing short and long horizon vulnerabilities?

* How can these residents' coping strategies be used to address physical vulnerability to earthquakes?

* How will these coping strategies affect these residents' ability to recover as a community from a major hazard event?

Funding and Partnerships/Acknowledgements

National Science Foundation, GRF, HSD 0606606

Fulbright Program in Turkey

American Research in Turkey Institute

American Association of University Women

Sabancı University

Kandilli Observatory and Earthquake Research Institute

Disaster Preparedness Education Program of Istanbul

Cornell University,
Department of Civil and Environmental Engineering