Panel 2:
Resilient and sustainable urban and rural society in the face of climate change

Dr. Pati Romero Lankao, National Center for Atmospheric Research (NCAR), Urban Futures, CSAP-RAL, Senior Scientist, Lead of Urban Futures Initiative

2:15 p.m. – 3:45 p.m. (90 minutes)
<table>
<thead>
<tr>
<th>Name</th>
<th>Institution/Position</th>
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<tbody>
<tr>
<td>Dr. Patricia Romero-Lankao</td>
<td>National Center for Atmospheric Research (NCAR)</td>
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<td>Urban Futures, CSAP-RAL</td>
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<td>Senior Scientist, Lead of Urban Futures Initiative</td>
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<td>Dr. Dr. Gian Carlo Delgado</td>
<td>National Autonomous University of Mexico (UNAM)</td>
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<td>Interdisciplinary Research Centre on Sciences and Humanities</td>
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<td>Senior Researcher</td>
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<td>Dr. Katya Wowk</td>
<td>Texas A&amp;M University-Corpus Christi</td>
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<td>Harte Research Institute for Gulf of Mexico Studies</td>
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<td></td>
<td>Senior Associate for Strategic Planning and Policy</td>
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<tr>
<td>Dr. Steve Bergman</td>
<td>Shell (retired)</td>
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<td>Global Geology Upstream Exploration Research</td>
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<td>Principal Regional Geologist</td>
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Consolidated Panel 2 Presentations

Dr. Patricia Romero-Lankao
Moderator
Binational Perspectives on Gulf of Mexico Sustainability

Panel 2: Resilient Urban and Rural Society in the Face of Climate Change
Panel 2: Resilient Urban and Rural Society in the Face of Climate Change
Questions to Panelists

1. What does it mean to have rural/urban societies that are climate-resilient?
2. How has (or can) resilience be achieved in the sectors/communities your work with?
3. How can a US-Mexico partnership contribute to enhance resilience in the sectors/communities you work with?
Climate & Environmental Change: Resilience (and Sustainability)

- Offer reasons for concern
- Open opportunities for economic, social and institutional reform
  - Environment, economy and equity
  - Capacity
Many Definitions of Resilience

<table>
<thead>
<tr>
<th>Authors</th>
<th>Definition</th>
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<tr>
<td>Brown et al. (2012) [20]</td>
<td>“The capacity of an individual, community or institution to dynamically and effectively respond to shifting climate circumstances while continuing to function at an acceptable level. (p. 534)</td>
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<td>Henstra (2012) [21]</td>
<td>“A capacity to withstand climate change stresses, to respond effectively to climate-related hazards, and to recover quickly from residual negative impacts” (p. 178).</td>
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<td>Leichenko (2011) [9]</td>
<td>“The ability of a city or urban system to withstand a wide array of shocks and stresses” (p. 164)</td>
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<td>Lu and Stead (2013) [22]</td>
<td>“the ability of a city to absorb disturbance while maintaining its functions and structures” (p. 200).</td>
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<td>Thornbush et al. (2013) [23]</td>
<td>“a general quality of the city’s social, economic, and natural systems to be sufficiently future-proof” (p. 2).</td>
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<td>Tyler and Moench (2012) [6]</td>
<td>“A resilience approach encourages practitioners to consider innovation and change to aid recovery from stresses and shocks that may or may not be predictable...three of urban resilience: systems, agents and institutions.” (p. 312)</td>
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<td>Wardekker et al., (2010) [24]</td>
<td>“A resilience approach makes the system less prone to disturbances, enables quick and flexible responses, and is better capable of dealing with surprises than traditional predictive approaches ... [it] aims to promote a system’s capability of coping with disturbances and surprises” (p. 988)</td>
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• Mechanistic, linear and deterministic world (bounce back)

• Dynamic, complex, multifaceted (bounce forward)
Operationalization Challenges

• Uncritical application to social domains

• Equity and environment issues take the back seat to economic growth

• Capacity is key to operationalization still it is unequally distributed
Extreme Events Time Series
Tropical Storms, Floods, Drought, Wildfires and more...

Billion-Dollar Disaster Event Types by Year (CPI-Adjusted)

- Winter Storm
- Wildfire
- Trop Cycl
- Severe Storm
- Freeze
- Flooding
- Drought

Cost w/ 95% CI
5-Year Mean


Number of Events

Cost in Billions of Dollars

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240
Coast-to-Inland Economic Connections
Today’s Most Vulnerable Populations
Urbanization and Mobilization

A civilization of accelerated movement has emerged from the culture of immobility.

The global urban pop. may increase from just under 4 billion today to 6.5 billion by 2050 – and urban infrastructure will grow with it.

Need a paradigm shift away from incrementalism toward transformative changes with a strategic, long-term view:
  • accounts for humanity’s natural life-support systems
  • creates urbanity that promotes human quality of life
Resilient Infrastructure

Salt Marsh

Coral

Mangrove

Oyster

Dunes

Sea Wall

Sea Wall and Riprap

Levee

Dike
Examples of benefits:

- Fisheries (recreational and commercial)
- Recreation & tourism
- Water filtration
- Cultural services
- Habitat for other species
- Carbon sequestration & storage

Additional Coastal Ecosystem Services
Innovation in Coastal Protection

- Build resilience for infrastructure and for community and social networks
- ‘Double duty’ in terms of providing protection in times of need but also providing other benefits and uses such as recreational opportunities

The Big U, City of New York 2014

NOLA Water Storage, Waggoner & Ball 2014
Participatory governance for holistic resilience assessment to evaluate the robustness and inter-relationships of not only civic infrastructure, facilities and transportation but also health, environmental justice and socio-ecological factors.
The light blue areas are land that is at or less than one foot of elevation. Half of New Orleans is below sea level, with some areas as much as 10 feet below sea level. All of this land would be flooded if there were no levees (NOAA and LSU 2016).