Concepts, Perspectives and Practice of Resilient City Financing with Case Studies and Prospects

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Outline

• Resilience Concepts
• Resilience Perspectives
• Practice of Resilient City Financing
• Case Studies
• Prospects
Resilience Concepts

ENGINEERING Resilience emphasizes the ability and speed a system to bounce back to its original condition after a disturbance. A single equilibrium point to which a system is returned.

Resilience Concepts

**ECOLOGICAL Resilience** recognizes that systems can have multiple stable states that evolve and change—assuming the system remains functional—and values both persistence and adaptability.

**Multiple equilibria** to which a system returns or even evolves into new equilibria.

Adapted from United Nations Human Settlements Programme (UN-Habitat), *Trends in Urban Resilience 2017.*

Resilience Concepts

**SOCIAL-ECOLOGICAL Resilience** “incorporates the idea of adaptation, learning and self-organization in addition to the general ability to persist disturbance” thereby capturing the ability of people transform their surroundings.

No true equilibrium as systems adapt and evolve through human intervention.


Social-Ecological Resilience Features

Social-ecological resilience can be measured by:

The *amount of disturbance* a system can absorb and still remain within the same state;
The degree to which the system is capable of *self (re)organization*, and;
The ability to build and increase the capacity for *learning and adapting*.

Adapted from United Nations Human Settlements Programme (UN-Habitat), *Trends in Urban Resilience 2017*.
# Resilience Concepts Compared

<table>
<thead>
<tr>
<th>NUMBER OF EQUILIBRIUMS</th>
<th>MEASURE FOR RESILIENCE</th>
<th>NATURE OF DISTURBANCES</th>
<th>EMPHASIS</th>
</tr>
</thead>
</table>
| Engineering resilience | one                    | speed of return to the single equilibrium | - predictable  
- external  
- shocks | - resistance and recovery  
- efficiency, predictability |
| Ecological resilience  | multiple               | magnitude of shocks that can be absorbed, before the threshold to enter a new equilibrium is crossed, as well as degree of self-organisation and capacity for learning | - predictable and unpredictable  
- external  
- shocks | - persistence  
- adaptability, flexibility  
- resourcefulness, efficiency, diversity |
| Social-ecological resilience | none, continuously changing | magnitude of shocks and stresses that are continuously absorbed, as well as advanced degree of self-organisation and capacity for learning by social-ecological systems | - predictable and unpredictable  
- internal and external  
- shocks and stresses | - persistence  
- adaptability, flexibility  
- human potential to transform its surroundings (human agency) |

Cities Must Finance Resilience

Cities are key to:

- alleviating poverty
- creating wealth
- fueling growth

55% of the global population lives in cities...

...but those cities are responsible for more than 80% of global GDP

Source: Global Facility for Disaster Reduction and Recovery https://www.gfdrr.org/sites/default/files/publication/Cities%20small.png
Resilience Investment Tradeoff

*Assuming there are investors willing to take the risk.

Value Capture as Low Risk, High Return

**Innovation required**

- **in professional performance**
  Non-investment finance, supports the below performance areas

- **in measures performance**
  The cost of capital and ROI is most directly linked to the risk, pro forma and “track record” of the specific type of measure

- **in area or system performance**
  The cost of capital and ROI is most directly linked to the overall risk and performance of the area/system

- **in institutional performance**
  The cost of capital and ROI (Return on Investment) is most directly linked to institutional risk, balance sheet, business plan and “track record”

**Financial instruments**

- Grants
- Catastrophe and social impact bonds
- Insurance and re-insurance
- Securitization/structured finance
- Performance contracts (Asset/system cost reductions)
- Custom debt instruments (Project-specific municipal, community, utility bonds)
- Equity
- Guarantees
- Loans (Banks, revolving funds)

**Project deliverables**

- Technical/planning assistance
  - Training
  - Other institutional support
- Risk reduction
  - Emergency management measures
- Specific asset or system performance enhancements
- Place-specific assets (real estate, infrastructure, utilities, amenities)
- Institutional operations capacity (utilities or special development corporations)

What is Value Capture?*

Profit; also “consumers’ surplus” when benefits exceed all costs.

Impact fees, tax increment financing, special district financing.

Increases in land value due to population growth and economic development

The government, on behalf of the general public, should keep this portion of the land value.

Increases in land value due to public investment in infrastructure and changes in land use regulations

Public service providers should capture this portion of the increment to cover the costs of public infrastructure and local service provision.

Increases in land value due to landowner’s investments

Private land owners should profit from this portion of the increment.

Increases in land value due to landowner’s investments

Land buyers (or lessees) pay sellers (lessors) to obtain the property rights of land.

Source: Adapted from Hong and Brubaker 2010.

*If you don’t know you need to attend more RMLUI conferences.
What is Value Capture?*


*If you don’t know you need to attend more RMLUI conferences.
Resilience Value Capture

Applications

• Transfer of Development **Rights**
• Innovative **Bonds** that Capitalize savings and indirectly capture value by protecting it.
• Impacts **fees**
• Special **assessments**
Transfer of Development Rights

Money ($$) From Sale of Rights

TDR Applications

Preserve open space
Protect Wildlife habitat
Maintain Rural Character
Maintain Agriculture/Forest
Environmentally Sensitive Lands
Infrastructure Capacity
Historic Preservation
Low Income Housing
Recreation
Renewable energy

New Jersey Pinelands
Regional Approaches

Transfer of development rights
Onsite density transfer/clustering
Land banking
Purchase of development rights
Acquisition through impact fees
Wetland protection/mitigation
Land donation acceptance

https://www.nj.gov/pinelands/home/maps/

Limitations of TDRs in Practice

• Unnecessarily **bureaucratic** and complex
• Not **regional** → mostly within jurisdictions
• Does not lead to **public ownership** of important land though land donation possible
• Few (no?) regional **resilience strategies** using TDRs.
• Groundwork is laid for the **next generation**.
Federal Role → FEMA

$14 billion and counting → Up to 75% matching grants for:

- Acquisition, demolition, relocation, reconstruction, or elevation of homes;
- Wind, wildfire, or earthquake-related structural retrofits of residences;
- Local mitigation of flood and drought via projects include flood storage, green infrastructure, floodplain restoration, related.

- Local hazard mitigation plan required.
- Charlotte NC case study.
  https://charlottenc.gov/StormWater/Flooding/Pages/FloodplainBuyoutProgram.aspx

Up to $10 million/project & up to 75% federal match for “resilient infrastructure.” Funds capital infrastructure projects that

“reduce risks, prevent loss of life, and lead to significant savings by reducing damage from natural disasters and lowering NFIP [National Flood Insurance Program] premiums”.

Local hazard mitigation plan required.

Funding for projects and planning that mitigate/eliminate long-term flood risk to NFIP-insured structures.

$300 million and counting. Funding for mitigation of flood risk for structures as well as “projects addressing flooding on a community level”

Local hazard mitigation plan required.

Adapted from Joseph DeAngelis, Haley Briel, Michael Lauer (2019), Planning for Infrastructure Resilience, APA.
Bonds for Resilience

- **Green** Bonds
- **Climate** Adaptation Bonds
- Environmental **Impact** Bonds

Local governments issue bonds, investors provide the capital, and taxpayers/ratepayers repay the investors over time with interest which can be **tax exempt**.
Green Bonds

• Green bonds use the *private market* to finance projects and infrastructure such as →
  - *Renewable* energy, *pollution* reduction, transportation *innovations*

• Financed through *standard bond* underwriting.

• Local governments *capitalize the savings* to local budgets between standard and green projects to help pay for often more expensive “green” projects.

• San Francisco >$1 billion.
Climate Adaptation Bonds

- Use **standard bond** underwriting to use capitalized savings or new revenue streams for →
- **Water-efficient** technology.
- Wind-, flood-, and heat-resilient building **materials** for both new and retrofitting.
- Infrastructure **upgrades**.
- Development **relocation**.
- European Bank of Reconstruction & Development.
Environmental Impact Bonds

- EIBs finance water, green and natural infrastructure connected to flood resilience, climate adaptation, or water quality.
- Performance targets are established.
- If metrics meet or exceed targets, investors get a higher bonus return derived as a share of local government savings.
- If targets are not met, investors receive standard return because local government is not saving.
- Atlanta, DC, Baltimore examples.
Bond Financing Options

• Long term infrastructure cost savings can be capitalized into higher bond issues.
• Property value protection can lead essentially to inelastic market response.
• Protecting communities from adverse outcomes can unlock new development.
• New development can pay impact fees used to help finance the bonds.
Impact Fees

To the extent that public investments in resilience have metrics allowing for level of service, service areas, and attribution of costs to new development with corresponding benefits to new development, impact fees can help.
Special Assessments

Special assessment districts can internalize the cost of **property value preservation** through a variety of formulas.

**Pricing Risk**

U.S. counties facing the greatest risk from earthquakes, hurricanes, and other catastrophes have the highest and quickest rising home values.

<table>
<thead>
<tr>
<th>Risk Level</th>
<th>Homes</th>
<th>Average home value</th>
<th>Appreciation since 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very high risk</td>
<td>19,674,094</td>
<td>$325,187</td>
<td>55%</td>
</tr>
<tr>
<td>High risk</td>
<td>14,126,981</td>
<td>237,228</td>
<td>43</td>
</tr>
<tr>
<td>Moderate risk</td>
<td>13,201,595</td>
<td>219,985</td>
<td>40</td>
</tr>
<tr>
<td>Low risk</td>
<td>11,856,646</td>
<td>247,222</td>
<td>35</td>
</tr>
<tr>
<td>Very low risk</td>
<td>12,422,535</td>
<td>223,375</td>
<td>30</td>
</tr>
</tbody>
</table>

Source: Attom Data Solutions

Source: https://www.greenbiz.com/article/next-year-resilience-will-become-new-normal
Property Assessed Clean Energy (PACE) Financing

- Innovative method to finance energy efficiency and renewable energy on private property.
- **Special district** created and issues bonds to fund PACE improvements for enrolled properties.
- Property owners repay over 10-20 years through special assessments secured by the property and paid as part of the property tax.
- By 2019, **200,000 homeowners**, $5 billion invested in California, Florida, Missouri.

*Source: https://www.energy.gov/eere/slsc/property-assessed-clean-energy-programs*
Prospects

- If resilience investments create value → **Recapture** it or leverage it.
- In NYC, properties that overlook green roofs pay higher rents → **Increase supply** by capturing the incremental value and using it to subsidize new green roofs.
- We should create a resilience value capture **bounty** for scalable ideas.
Prospects → Expand PACE

- PACE works but it is **limited** to energy efficiency.
- PACE could be **expanded** to resilient infrastructure investments in hazardous areas.
- Financing would be similar, through special assessments on **benefiting property**.
- However, unlike the current PACE, **all property** in the assessment district would need to be assessed.
Expanded PACE on Steroids

- PACE regular and expanded imposes assessments on benefiting property.
- It may be in states’ interest to encourage PACE and PACE+ through →
  - State loan guarantees
  - At tax exempt/double tax-exempt rates
- The Federal government could create mechanisms to encourage state support of PACE and PACE+ but leaving implementation to the states.
May you live long ... 
... and be Resilient
Exploring Local Disaster Resilience Funding Options

(abridged version)

John Travis Marshall
Associate Professor
Georgia State University College of Law

(with thanks to Arthur C. Nelson, Julian Juergensmeyer, and Donovan Finn)

Rocky Mountain Land Use Institute
March 5, 2020
Funding and financing local climate resilience initiatives looms as major challenge

• 21st Conference of Parties (COP21), which yielded the 2015 Paris Climate Accord, participating countries highlight funding for climate resilience projects as a major challenges for national and subnational gov’ts (Banahan)
• U.S. climate adaptation initiatives are slow-paced and insufficient (Milne)
• Few adaption plans set forth the necessary funding strategies to complete adaptation projects (Rosenbloom, 2013)
• Common local gov’t ‘playbook’ for financing projects not adequate to address climate change challenges (Rosenbloom, 2013)
Disasters Have *Also* Taught That Local Recovery Is Slow and Greatly Underfunded

- Federal recovery funds arrive slowly . . . .
- A fraction of the community’s “bill” for long-term recovery is covered by private insurance, flood insurance, federal grant funds, and philanthropic dollars.
- Who suffers most?

(Photos from left: AFP/Getty Images (9.2.05); Colo. Springs Gazette (5.18.19); Huffington Post (8.28.17))

Superstorm Sandy Unmet Needs: New York City

• $9.2 billion in unmet needs, including:
  – repair & mitigation for affordable housing units
  – enhanced coastal protection for neighborhoods
  – stormwater management & green infrastructure

<table>
<thead>
<tr>
<th>Category</th>
<th>Unmet Need Before CDBG-DR</th>
<th>Of which, associated with Resiliency</th>
<th>% of Total</th>
<th>CDBG-DR Funding*</th>
<th>Need Covered by CDBG-DR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing</td>
<td>5,300,000,000</td>
<td>1,000,000,000</td>
<td>39%</td>
<td>2,968,056,000</td>
<td>56%</td>
</tr>
<tr>
<td>Business</td>
<td>2,400,000,000</td>
<td>200,000,000</td>
<td>18%</td>
<td>91,000,000</td>
<td>4%</td>
</tr>
<tr>
<td>Infrastructure*</td>
<td>4,900,000,000</td>
<td>3,600,000,000</td>
<td>36%</td>
<td>515,420,000</td>
<td>11%</td>
</tr>
<tr>
<td>Other City Services</td>
<td>900,000,000</td>
<td>50,000,000</td>
<td>7%</td>
<td>336,580,000</td>
<td>37%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$ 13,500,000,000</strong></td>
<td><strong>$ 4,850,000,000</strong></td>
<td><strong>39%</strong></td>
<td><strong>$ 3,911,056,000</strong></td>
<td><strong>56%</strong></td>
</tr>
</tbody>
</table>

Planning/Ad   287,820,000

4,198,876,000
Superstorm Sandy Unmet Needs: New York State

- $15.2 billion in unmet needs, including:
  - Repairs to rental and homeownership units
  - Mitigation initiatives including home elevation, critical systems (e.g., HVAC) elevation
  - Small business and seasonal business assistance

Table 2: Estimate of Unmet Needs for Hurricane Irene, Tropical Storm Lee and Superstorm Sandy in Millions (excluding New York City)

<table>
<thead>
<tr>
<th></th>
<th>APA15</th>
<th>APA15 (w/ HUD Construction Cost Multiplier)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing</td>
<td>$1,294</td>
<td>$1,294</td>
</tr>
<tr>
<td>Economic Development</td>
<td>$476</td>
<td>$476</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>$1,719</td>
<td>$1,719</td>
</tr>
<tr>
<td>Total</td>
<td>$3,489</td>
<td>$14,442</td>
</tr>
</tbody>
</table>

Source: GOSR Programmatic Data (November 2015). HUD high construction cost multiplier of 1.44 applied after state interventions for housing and economic development.

Hurricane Harvey Unmet Needs: Harris County

- $12.9 billion in unmet needs, including:
  - Rental and homeownership repairs
  - Residential and commercial property buyouts
  - Neighborhood drainage systems

Table 13: Harris County Summary of Total Unmet Need

<table>
<thead>
<tr>
<th>Category</th>
<th>Losses/Gap</th>
<th>CDBG-DR Investments*</th>
<th>Other Known Investments</th>
<th>Remaining Unmet Need</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing</td>
<td>$7,458,498,829</td>
<td>$837,097,816</td>
<td>$3,671,644,866</td>
<td>$2,949,756,147</td>
</tr>
<tr>
<td>Owner-Occupied Housing</td>
<td>$1,729,324,745</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residential Property Insurance/TX Windstorm</td>
<td>1,644,337,050</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>National Flood Insurance Program</td>
<td>$1,894,715,877</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Housing and Disaster Related Expenses</td>
<td>$760,850,000</td>
<td></td>
<td></td>
<td>$65,000,000</td>
</tr>
<tr>
<td>Rental-occupied Housing</td>
<td>$628,237,775</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public Housing Authority Housing</td>
<td>$933,384</td>
<td></td>
<td></td>
<td>$714,904</td>
</tr>
<tr>
<td>Harris County Buyout Program (Pub L. 113-31)</td>
<td>$800,000,000</td>
<td></td>
<td></td>
<td>$500,000,000</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>$10,868,369,302</td>
<td>$222,519,672</td>
<td>$698,910,323</td>
<td>$9,947,539,307</td>
</tr>
<tr>
<td>FEMA Public Assistance</td>
<td>$868,774,302</td>
<td></td>
<td>$679,910,323</td>
<td></td>
</tr>
<tr>
<td>Rebuild Texas</td>
<td>$10,000,195,000</td>
<td></td>
<td></td>
<td>$19,000,000</td>
</tr>
<tr>
<td>Grand Total (Housing)</td>
<td>$10,337,369,421</td>
<td>$1,052,657,429</td>
<td>$4,370,555,149</td>
<td>$13,907,283,545</td>
</tr>
</tbody>
</table>
Thoughtful pre-disaster housing & community development programs pay post-disaster dividends – 6 examples
1. Neighborhood preservation & affordable housing initiatives jump start recoveries

- Ample regional housing stock is a key to recovery.
- Consider whether there’s balance between homeowners and renters.
- Good rental housing options essential for first responders, teachers & service industry.
- Older homes, if suffering from deferred maintenance, can see post-disaster repair costs exceeding home values.
- Vigilant code enforcement helps prevent dilapidation AND [ideally] serves as possible lever to secure title to abandoned properties and redevelop neglected structures and lots as affordable housing.

From top: Springfield News-Sun (6.28.19); Jackson Free Press (6.25.19)
2. Temporary housing is critical to communities’ recovery

- Site control often biggest obstacle
- Allows displaced families to return home immediately.
- Frees hotels for housing contractors and other construction workers
- Post-disaster short-term housing options should be memorialized in local planning documents.
- Short-term housing can be re-purposed for community needs as residents move back home

From top: Congress for the New Urbanism (3.2.17); Curbed San Francisco (4.19.19)
Sources


J. Peter Byrne and Kathryn A. Zyla, Climate Exactions, 75 Maryland L. Rev. 758 (2016).


National Volunteer Organizations Active in Disaster (NVOAD), Hurricane Harvey Facts and Figures, https://www.nvoad.org/harveyfacts/
DEVELOPER MITIGATION OF IMPACT ON NEED FOR CLIMATE CHANGE INFRASTRUCTURE

LEGAL STANDARDS

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EXACTIONS

- I follow the practice of most lawyers and planners in using the term “exactions,” even though I lament the negative vibes that the term emits.

- A more appropriate label for developer funding of infrastructure requirements that are nexus based, proportionate, and used to internalize the costs of development rather than pass them on to local governments and their taxpayers would be something like” proportionate share mitigation requirements.” On the other hand, if the costs of providing new infrastructure is passed on to the local taxpayers, it is they who are being “exacted” from by being required to subsidize developer profits.
“Value capture refers to the recovery by the public of the land value increments (unearned income…) generated by the actions other than the landowner’s direct investments….Although all such increments are essentially unearned income, value capture policies focus primarily on the increment generated by public investments and administrative actions, such as granting the permission for the development of specific land uses and densities. The objective is to draw on publicly generated land value increments to enable local administrations to improve the performance of land use management and to fund urban infrastructure and service provisions. The notion is that benefits provided by governments to private landowners should be shared fairly among all residents.” Martim, Smolka

In the U.S. the concept is primarily implemented through impact fees and transferable developments rights although the former focus on infrastructure costs associated with new development rather than the value created by development permission for the developer
There is no reasonable distinction among in-lieu fees, mitigation fees, and impact fees. All are fees charged by government as a condition for land development approval (as distinguished from charges such as user fees and taxes, discussed below). All are embraced by the Court’s term “monetary exaction,” and thus all are now subject to the nexus and proportionality requirements of *Nollan* and *Dolan*.

Professor David Callies
The Nollan-Dolan Two Pronged Nexus Requirement

- **First**, an “essential nexus” must exist between the asserted legitimate state interest and the permit condition imposed by government. *Nollan v. California Coastal Comm’n.; Dolan v. City of Tigard.*

- **Second**, if the required nexus to a valid public purpose exists, the court must then analyze the “degree of connection” between the exaction and the “projected impact” of the proposed development. There must be “rough proportionality” between the two. *Dolan.*
DUAL RATIONAL NEXUS TEST

1. A rational nexus between the need for additional capital facilities and the growth in population generated by the development; and

2. A rational nexus between the funds collected and the benefits accruing to the development itself.
DUAL RATIONAL NEXUS TEST

1. Developer provisions may be no more than the government’s infrastructure costs that are reasonably attributable to the new development, and

2. The new development must benefit from the expenditure of the required developer provisions.
QUESTIONS

- Can Developer Mitigation Requirements Play a Role?
- If So, What About Existing Deficiencies?