EPA Sustainable Materials Management Web Academy

After Disaster: Deconstruction, Rebuilding and Resilience Lessons from Hurricanes Katrina and Irma

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Deconstruction and Reuse: Before and After

5 March 2020
Brad Guy,
Architect, AIA
Material Reuse
Disaster debris

It’s not waste until you throw it away!

- A lot of good materials to be extracted, before the event and before demolition
- Waste and contamination: environmental and human health impacts need to be managed
Sustainable materials management

• Using materials management ‘hierarchy’ to achieve resource conservation

• Includes all or any combination in cascading sequence - reduce, reuse, recycling, composting, energy recovery, disposal to landfills
Deconstruction / reuse

• Manage all materials
  – Remove hazards
  – Avoid hazardous dust generated by demolition
  – Generate local resources for local re-building

• Avoid new materials and embodied energy of manufacturing

• Mitigate import of rebuilding materials

• Planning and recovery is the time for deconstruction
Deconstruction defined

- The selective dismantlement of buildings materials primarily for reuse, secondarily and/or recycling/composting

- Last on, first off (LOFO)

- To generally follow the reverse of assembly or construction

- Opposite of demolition to reduce materials for disposal
Reuse

Storage / redistribute – existing / new / pop-up

1. Simultaneous projects
   - Homes / repairs
   - Storage buildings
   - Outdoor structures

2. Home
   - Sales off site

3. Move to storage

Storage / redistribute – existing / new / pop-up
Alachua County, FL

- 1970’s home, modern materials, graded lumber
- Community Rating: Flood plain buy-out
- “Mitigation” by deconstruction
- Early use of efficient “panelization”
- Safety – working less at height, more on the ground
“Reclaimed” housing

- New Section 8 home designed and built using the reclaimed lumber
- Design predicated on reclaimed materials
- Current building code allows reuse under alternative materials and methods
- OR & WA building codes explicit use of undamaged reclaimed lumber for structural purposes
- Lumber stayed in the community not in the landfill
Hurricane Katrina

- Deconstruction in MS and NOLA
- Range of house types and materials - historic to contemporary
- Demolition was difficult if not impossible because of site conditions
- Some sites very amenable to deconstruction materials processing
Community “triage”

Addressing traumatic context without “making it worse”

- Avoid spreading hazardous pollutants from demolition
- Triage to preserve in selective manner, not wholesale destruction and waste
- Involve community perspective in recovery & rebuilding
Deconstruction manages hazardous materials better than demolition

- Asbestos-containing materials
- Lead-based paint (LBP)
- Biological / chemical
- Gulf Coast Formosan termite quarantine zone
  - Must keep local
  - Treat for biological: bleach, borates, kiln-drying
- Many materials are not LBP
De-raising

It was a process of developing people and infrastructure -- the “reuse community.”
Supply chain

• Materials “supply” into rebuild logistics

• Can replace new materials if stored and made available

• Conserves natural resources and embodied energy
Integration

- Assessment
- Designing the deconstruction
- Experts and training
- Logistics for materials
- Job processes
- Tools
- MATERIALS FLOW
Working with partners

- People needed places for their stuff -- SHEDS
- Building Goodness on the ground in Pearlington, MS
- Architects and contractors performing community service
Pearl River sheds

- Everything is reclaimed except the metal roofs

- Remember green and white porch decking from Ocean Springs, MS, deconstruction?
Building reuse infrastructure

- Needed in proximity to highest risk areas
- Leverage existing infrastructure
  - Vacant strip malls, warehouses, manufacturing plants, anywhere with a roof
  - Tools / racks, etc.
It's about people

Reuse create a connection between before and after
Using what we have

- Making whole by reuse
- Need framework to support

Thank you!
Brad Guy
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After (and Before) Disaster: Deconstruction and Reuse as a Foundation for Rebuilding Social and Ecological Integrity in Coastal/Flood Plains

US-EPA Webinar

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• Case Study: Deconstruction and Reuse Benefits
  
  • Voluntary Buyouts and the Effect on Remaining Neighborhoods
    
    • Vacant Lots and Land
  
  • Sea Level Rise, Intense Storms and Day-to-Day Stormwater Management
    
    • Redesigning or Blending the Gradient from Remaining Neighborhoods to Redesigned Floodplain
Case Study: Hurricane Irene  
8/27-30/2011

Buyout House:  
53 Lakeshore Dr.  
Lake Hiawatha  
(Parsippany) NJ

Vacancy:  
6 Years  
(Time for deconstruction & adaptive design)

Project:  
Rutgers Landscape Architecture Design/Build Studio

Date:  
Spring, 2017

Praxis Design/Build Studio:  
Transforming Blighted Housing into Valued Community Environmental Amenities

Spring 2017

With economic, demographic and environmental changes, many neighborhoods are seeing an increase in abandonment of housing. Blight in a neighborhood is often considered solely from the economic standpoint of property value impact and cost of demolition. But value can be defined across categories of understanding, from the economic to the social and environmental. Alternative landscape practices can form the connections across categories to change negative value (or costs) into social, environmental and economic value. Deconstruction and reuse in green infrastructure are such practices – they transform abandoned structures and lots into productive and beautiful community assets. The cost of demolition is reinvested in workforce training and in green infrastructure building that are realized as assets to the community in the socio-environmental benefits of skill-building, cleaner water, reduced flooding, and vegetated gathering space.

Street  
Deconstruction  
Salvage
House
Rebuilding
Lot
Green Infrastructure
Edge
Restoration
Wetland
Water

images top to bottom:  
1: Deconstruction  
2: Design Build Parks  
3. apartmenttherapy.com  
4. Grijzen International  
5. Bichabits  
7. The_Steel_Yard-Klopfers_Martin_Design_Group  
8. Willow Patch Restoration Planting, Cazenovia, NY  
10. Massachusetts Bays Program
During storm

24 hours after storm
House vacant 6 years after storm:
- Illicit use during vacancy troubled neighbors
- Visual blight detracted from neighborhood
- Maintenance and legal burden for township
Stormwater management potential:
- Site is lower than roadways
- Bypass inlet possible
Safe work environment:
- Standard protective gear
- Training by OSHA, Reuse Consulting, Inc., Professors
Sorting and grading materials:

- ¼ donated to local NGOs
- ¼ used on site to build park amenities
- ½ used at Rutgers for student projects
Processing materials:
- Student training
- Denailing – there is a denailing gun for that! e.g. “Nail-Kicker”
- Enhanced recycling
Fieldwork experience and fun
Description

To achieve full potential of the site with the lowest possible maintenance for the township we used the method of creating an urban meadow on the site. Through the use of environmentally friendly rainwater retention infrastructure the site will help lessen the load on the neighboring rivers. Swales would lead runoff water, coming in from curb cutouts, from the streets around the site to allow for maximum time for infiltration. This ecological design will create a habitat for animals that are threatened by ongoing land development and new infectious diseases. By installing a meadow small mammals and insects will have a habitat to survive. Then by also installing bat and bird houses the insect population will be kept under control and will also provide bats and birds a safe place to nest and thrive. This design requires minimal maintenance, only mowing along edges and pathways to keep the site neat and tidy.

Rutgers Landscape Architecture Studio Design
Field design:
- Synthesizing multiple designs into one
- Collaboration, compromise and role definition
- Working with real conditions
- Understanding opportunities and constraints:
  Reuse: budgets, materials and physical possibilities
Porous gabions from chain-link fence
Stormwater and flood landscape
- Floodable park
- Experience of wetland type vegetation
- 95% reused materials
- Ecological linkage to adjacent riparian corridor
Growth over time

- Dynamic ecology available to experience for neighborhood
- Minimized mowing, other types of maintenance for township workers to learn
- Maintains neat and clean edge with street
Current Standard:
- Crowned lawn: less than ¼” infiltration typical
- Lawn maintenance burden
- Flood mitigation: only area of removed house and structures
- Flood storage: minimal
- No habitat value
- No use value
- No integration with remaining neighborhood
- Remnant residential vegetation: reminds of abandonment
Potential Standard:
- Network of pocket parks
- Stormwater storage and infiltration (Quantity and quality improvements)
- Flood storage
- Improved habitat: connection and integration with riparian area
- Integration with neighborhood, use and appearance
- Reduced appearance of abandonment
- Potentially reduced maintenance (mowing), but other types of maintenance needed
Riparian Forest Restoration

As settlement becomes sparser in the area, opportunities arise to restore the native flood plain ecology to the neighborhood. Small pockets of woods may never completely mimic a fully functioning forest, but they can provide a richness of species diversity, habitats for wildlife, and places for children to explore and experience nature. We propose the construction of small playhouses in these wooded pockets to encourage their use and ownership by neighborhood kids.

Opportunities for Reuse:

Play Houses, Stepping "Stones"
Floodplain restoration plans and projects:

- Could integrate deconstruction and reuse to mitigate psycho-social impacts of neighborhood change
- Diverse landscape types could enable understanding of emerging human/ecological interfaces
More flexibility needed:

- Floodable area reuse – open space but with more flexibility
- Dynamic human-ecological systems could emerge
- Deconstruction and reuse are adaptive techniques that reveal ‘on the ground’ strategies for resource-efficient removal and abandoned land reuse
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Mitigation and recovery efforts and funding prioritize deconstruction over demolition

Incentivize / explicitly allow / communicate opportunities for post-disaster deconstruction

Pre-disaster deconstruction and reuse infrastructure – investments and policies

- Strategically locate building materials reuse warehouses / storage areas and de-nailing yards
- State and local government deconstruction policies / facilities (Portland, Seattle)
- Deconstruction industry
- Deconstruction job training
- Deconstruction and reuse education

Develop model designs for post-disaster storage sheds, floodplain parks and simple structures
Resilience Opportunities (2)

- Include deconstruction and material recovery in disaster assessment, training, planning and recovery
  - NGOs, faith-based and environmental justice community
  - Deconstruction industry
  - Planning – Community, adaptation and managed retreat
  - Disaster recovery systems
  - Disaster debris management
  - Architecture, construction, materials sources

- Update building codes to explicitly allow safe use of reclaimed materials (OR, WA examples)

- Integrate with pre- and post-disaster support services for community members

- Engage professional societies, e.g., AIA, APA, ASCE, ASLA, NTHP (Good Samaritan Laws)

- Add lifecycle cost-benefit of deconstruction into FEMA Benefit-Cost Analysis Toolkit

- Add building materials reuse emissions factors (embodied energy and GHG) to U.S. EPA WARM and ReCON models

- Design Challenges / Innovation Grants