



# **Resilience: Is It the New Sustainability?**

**Everything Will (Must) Change!**

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Planning  
*for*  
Coastal Resilience

BEST PRACTICES FOR CALAMITOUS TIMES



TIMOTHY BEATLEY

**RESILIENT CITIES**

Responding to Peak Oil  
and Climate Change

Peter Newman, Timothy Beatley, and Heather Boyer



# A Perfect Storm?

## Eight Cost Shocks to 2012

1. **Peak Oil** and the Price of Petrol and Polycarbonates.
2. Increase in **Food Prices**.
3. The **Credit Crunch**, a Broken Financial System, and the Real Cost of Superficial Value.
4. The Immediate Cost of **Sea Level Rise**.
5. An Increase in **Extreme Weather Events (e.g. Drought, Storms, Heat)**.
6. Withering **Water**.
7. Preparing for **Carbon Pricing** and Carbon Capture.
8. Budgeting for 21<sup>st</sup> Century **Infrastructure**.

From Larry Quick, Resilient Futures Network

# What Is Community Resilience?

“The capacity of a system to absorb and utilize and even benefit from perturbations and changes ...and so persist without a qualitative change in the system’s structure” --C.S. Holling

From the Latin *Resiliere* meaning “to jump back” or “rebound”

Common meanings:

Durability, Flexibility, Adaptability, To bend not break...

# Qualities of a Resilient World?

(From Walker and Salt, 2006)

Diversity

Ecological Variability

Modularity

Slow Variables

Tight Feedbacks

Social Capital

Innovation

Overlap in Governance

Ecosystem Services

# THE

Orrin H. Pilkey & Robert Young

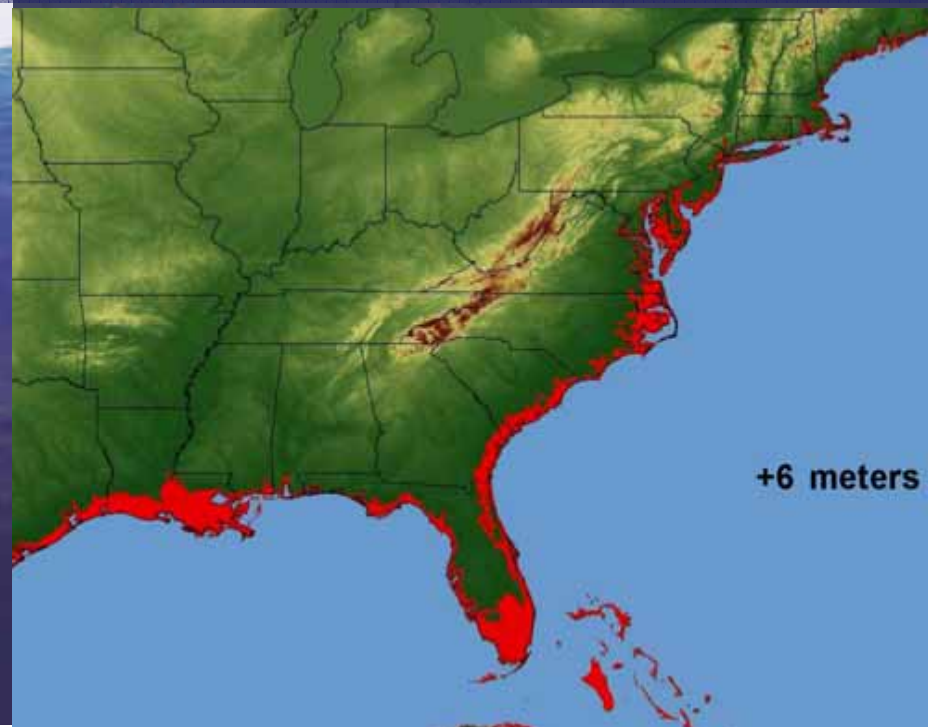
# RISING

# SEA



“For planning purposes, we think that a 7-foot (2 m) sea level rise by the year 2100 should be assumed. It is thus our belief that coastal management and planning should be carried out assuming that the ice sheet disintegration will continue and accelerate. This is a cautious and conservative approach.”

--Pilkey and Young, 2010





# Some Big Coastal Resilience Questions

Can We Protect (All of) Our Coast? What Shall We Protect and How?

Must We Look for Ways to Retreat?



New York City, NY - 3.0-meter sea level rise.

©2007-2010 2030, Inc. / Architecture 2030. Data Source: USGS 10M DEM.3



# MoMA's *Rising Currents* Exhibition

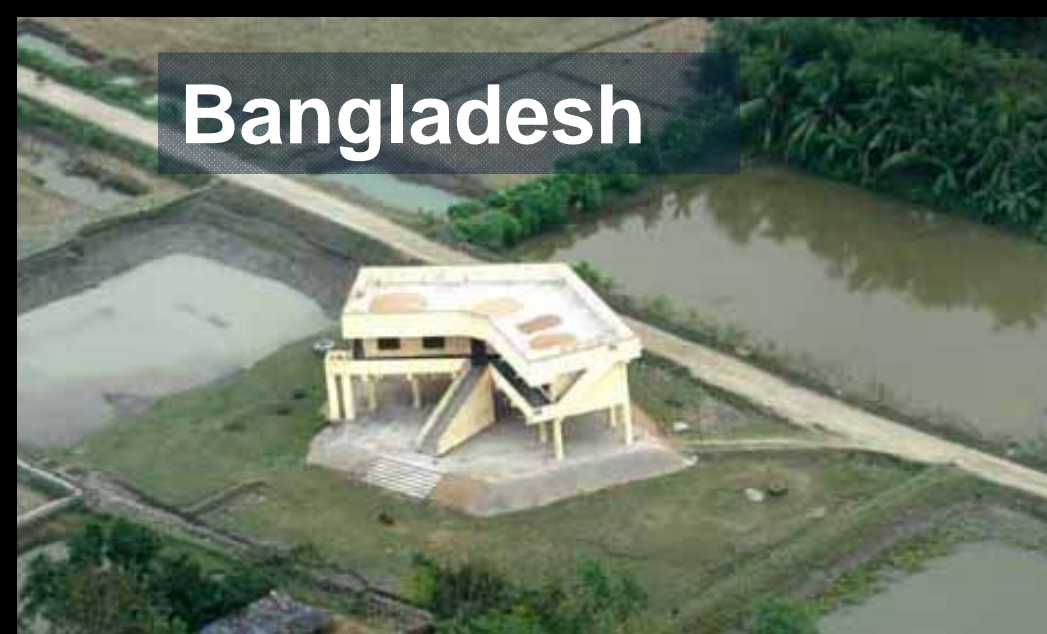
(Shown: design by Architecture Research Office (ARO) and dlandstudio)



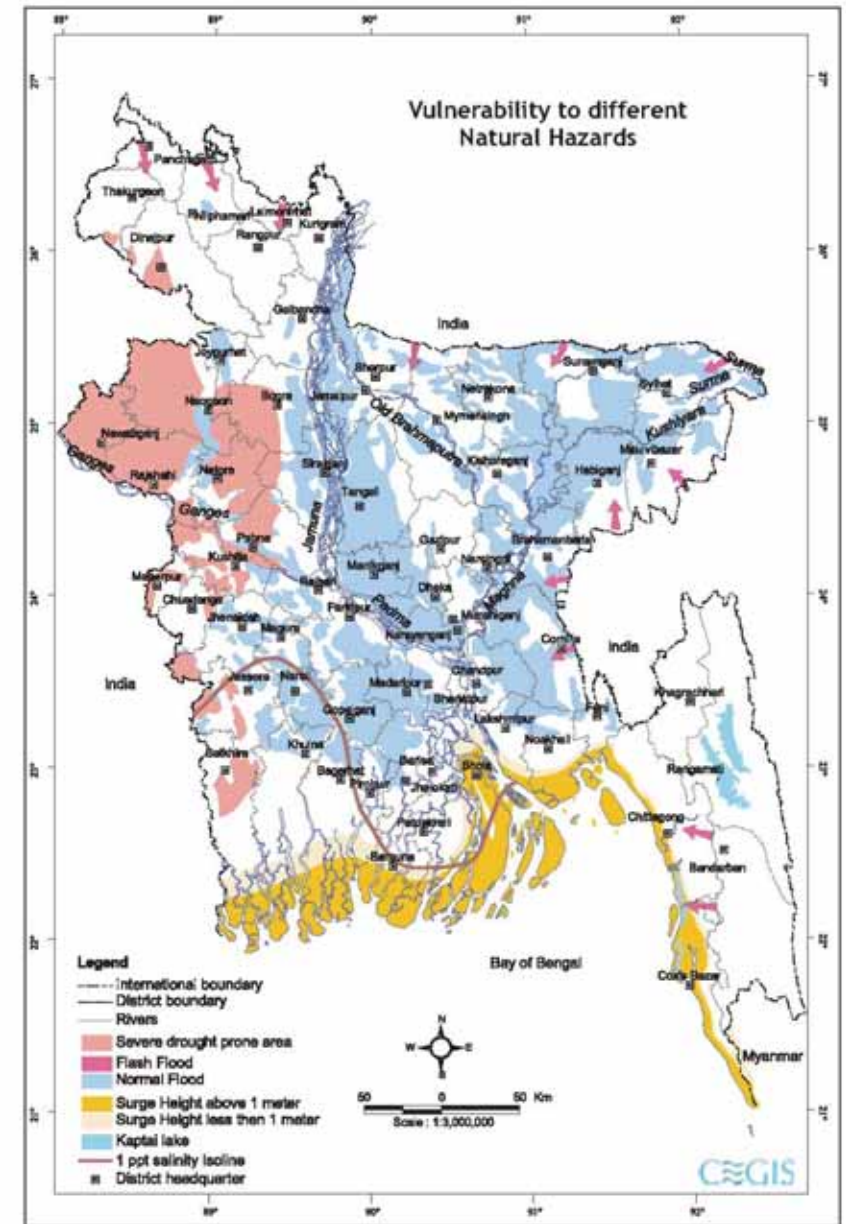


Venice Aqua Alta

# Bangladesh



Map1. Areas affected by different types of climate-related disaster



# Climate Tolerant Rice



# nature

£10.00

www.nature.com/nature

## Feeling the heat

Biodiversity losses due to global warming

### Supernova close-up

The red giant was not alone

### Embryonic stem cells

New route to fertile sperm

### Earth's atmosphere

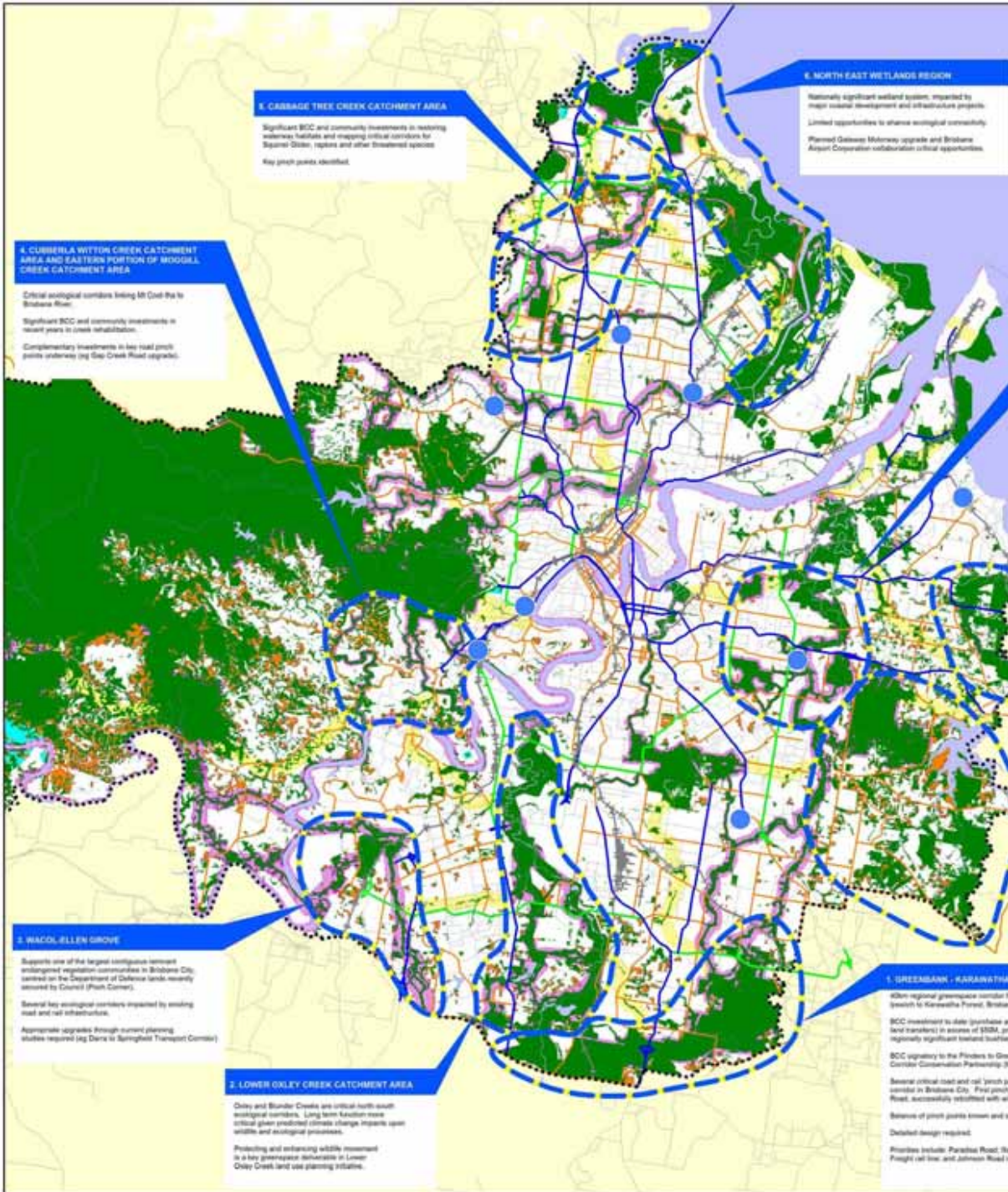
Then there was oxygen



“Using projections of species’ distributions for future climate scenarios, we assess extinction rates for sample regions that cover some 20% of the Earth’s terrestrial surface...We predict on the basis of mid-range climate-warming scenarios for 2050, that 15-37% of species in our sample of regions and taxa will be ‘committed to extinction.’”

--Thomas et al, *Nature*, 2004

Left: Boyd's forest dragon  
(*Hypsilurus boydii*)



Original Production Scale 1:120,000 1 centimetre equals 1.2 kilometres

Publisher: Spatial Information Services  
 Publication Date: 22 May 2009  
 Reference: 88072858  
 File Name: N:\Request\2009\_08\88072858\_1.mxd  
 Projection: May Grid of Australia, Zone 56  
 Horizontal Datum: Geocentric Datum of Australia 1984

**Natural Environment and Sustainability  
 City-wide Priorities:  
 Wildlife Movement Solutions  
 NOT COUNCIL POLICY**

*Dedicated to a better Brisbane*

# Building Resilience and Passive Survivability

BR 6

## Analyze Strategies to Maintain Habitability During Power Outages

**Issue:** Research on climate change indicates that there will be an increase in the frequency and severity of events that can disrupt the city's power, water, sewer and transportation infrastructure. In the event that city services are not usable, passive and dual-mode functions will be critical.

**Recommendation:** Undertake a comprehensive study of passive survivability and dual-mode functionality, then propose code changes to incorporate these concepts into the city's building codes. Also include a study on refuge areas in sealed buildings.

Benefits	Costs
N/A Savings <ul style="list-style-type: none"> <li><span style="color: yellow;">●</span> Health &amp; Safety</li> <li><span style="color: green;">●</span> Environment</li> </ul>	N/A Cost



BR 8: Rooftop water towers have long been a fixture of the New York City skyline and, unlike pump driven systems, can help ensure access to potable water during a crisis.

BR 7

## Ensure Toilets & Sinks Can Operate During Blackouts

**Issue:** Some toilets and faucets can function only with utility power; this presents a sanitation risk in the event of a long-term power outage.

**Recommendation:** Require that toilets and faucets be capable of operating without building power for at least two weeks.

Benefits	Costs
N/A Savings <ul style="list-style-type: none"> <li><span style="color: yellow;">●</span> Health &amp; Safety</li> <li><span style="color: green;">●</span> Environment</li> </ul>	Cost <ul style="list-style-type: none"> <li><span style="color: red;">●</span> Cost</li> </ul>

BR 8

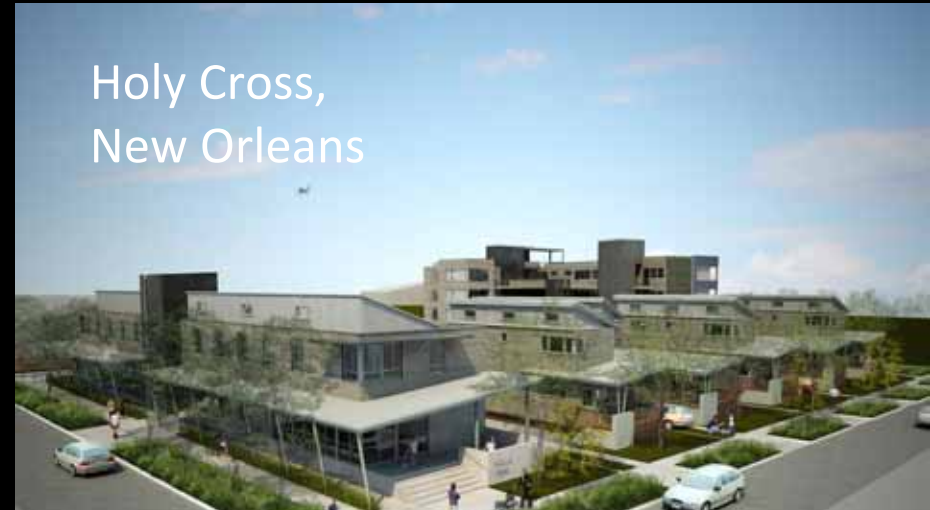
## Enhance Building Water Supply During Blackouts

**Issue:** Water towers are an energy-efficient way of providing water pressure and ensuring access to potable water during short power outages. The building codes do not require water towers for new construction, and they allow for their removal from existing buildings.

**Recommendation:** Prohibit the removal of existing water towers and require water towers in all new and renovated buildings.

Benefits	Costs
N/A Savings <ul style="list-style-type: none"> <li><span style="color: yellow;">●</span> Health &amp; Safety</li> <li><span style="color: green;">●</span> Environment</li> </ul>	Cost <ul style="list-style-type: none"> <li><span style="color: red;">●</span> Cost</li> </ul>

Holy Cross,  
New Orleans



**Resilience Features:** located in the high ground close to the river and levee (it is about 6 feet above sea level; pier foundation system to address weak soils and possible lifting from foundation from bouancy during flooding; first floor elevated another 3 feet above grade; rigid foam insulation that is less easily damaged by water and dries out more quickly; insulation placed on exterior (between sheathing and siding so it can be replaced if necessary without having to damage the interior; paperless drywall on the groundfloor to preclude or limit mold growth; mechanical equipment and electrical switch box on second floor to reduce risk of water damage; windows and solar panels rated for impact from hurricane force winds.

## PLANNING FOR COASTAL RESILIENCE

### Box 8.1 Hilltop at Walnut Hill Infill Neighborhood, Berlin, Worcester County, Maryland

#### LOCATION/SITE

- Infill neighborhood with 3- to 15-minute walk/bike to major grocery store chain, local farmers' market, drug stores, hospital, doctors' offices, medical facilities, dentist, barber shop, post office, banks, schools, restaurants, auto repair and parts store
- Compact community with urban-size lots, narrow tree-lined streets and sidewalks, common open space, cluster mail delivery
- All houses must meet Energy Star residential requirements for energy efficiency by deeded covenants and restrictions
- Home office/apartment above carriage house

#### STRUCTURE

- Modestly sized 2,100-square-foot (195-square-meter) home with unfinished basement
- Orientation to accept winter sun and summer breezes and facilitate passive heating and cooling
- Minimum north glazing, shaded east and west
- Precast basement walls using 70 percent less concrete than equivalent poured concrete walls
- Framing material of locally sourced yellow pine
- Water-resistant OSB (oriented strand board) sheathing throughout
- No/low-VOC (volatile organic compound) glues, paints, and finishes
- Cementous lap siding
- Reflective steel roof of 95 percent recycled content
- High-efficiency fiberglass windows and doors

- Soy-based spray foam insulation
- Soy-based interior
- Cabinets and built-ins of agricultural waste sheet goods
- Countertops of natural material
- Interior trim of recycled barn lumber and found/saved wood
- Limestone tile, cork, and wood floors

#### ENERGY/WATER CONSERVATION FEATURES

- Winter passive solar gains / summer sun shading
- Daylighting / natural thermo siphon air circulation
- Supplemental wood heat, mostly from construction waste
- High thermal mass house
- Soy-based spray foam insulation
- Groundwater heat pump with HRV (heat recovery ventilator)
- 80-gallon (0.3 cubic-meter) ambient air stand tank for hot water preheat
- Attic-mounted batch passive solar water heater
- Gas-fired tankless water heater
- Metlund on-demand hot-water circulator system
- Meets USDOE Building America specs (50 percent more efficient than standard home)
- Energy- and water-saving appliances and fixtures
- Dimmable lighting and fluorescents
- Plumbed for graywater and rainwater recovery with storage
- Separate plumbing supply lines to toilets/hose bibs for graywater/ rainwater

#### PREPAREDNESS

- Sheathing glued to frame
- Concrete safe room
- 2 months supply of food/water





# Strategic Shoreline Retreat?



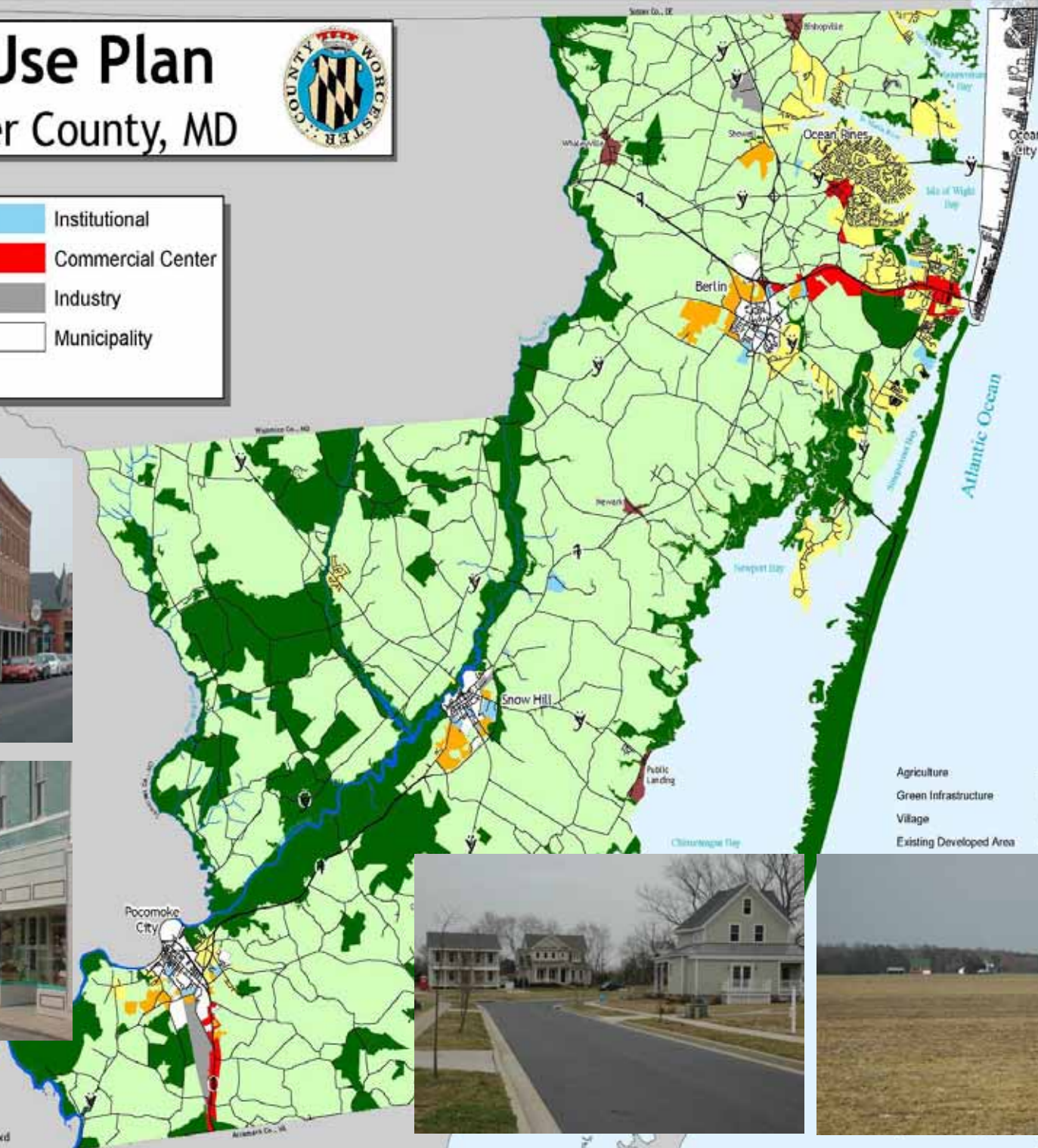
Showing the bodily removal of the Brighton Beach Hotel, Coney Island, New York, by the aid of six locomotives. The hotel is 170 yards long by 15 yards deep, and was moved about 175 yards inland from the sea, which had begun to sap the foundations.

# Land Use Plan

## Worcester County, MD



	Agriculture		Institutional
	Green Infrastructure		Commercial Center
	Village		Industry
	Existing Developed Area		Municipality
	Growth Area		



Agriculture Reserved for farming, forestry and related industries  
 Green Infrastructure Highly restricted conservation zones  
 Village Traditional villages that serve as rural centers  
 Existing Developed Area Maintains current development character

that are suitable  
 growths  
 uses  
 of business,  
 e uses  
 self-government  
 re Planning,  
 Comprehensive

10

# Resource Resilience



Solara



Positive Energy Buildings

*Example:* Cape Code Commission  
now requires minimum 10% onsite  
renewable energy generation

A photograph of a row of offshore wind turbines in the sea. The turbines are white and arranged in a line that recedes into the distance. The sky is overcast and grey, and the water is dark with some whitecaps. The text is overlaid on a blue textured background.

Each City and Region Will Have Its Own  
Unique Renewable Energy Resources

Middelgrunden, Copenhagen

# Community Supported Energy





MAYOR'S TASK FORCE REPORT:

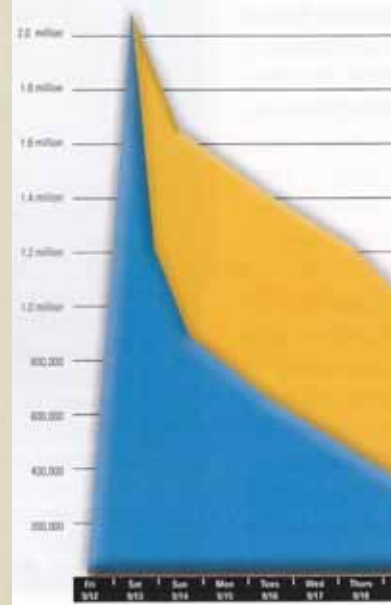
# Electric Service Reliability in the Houston Region

April 21, 2009



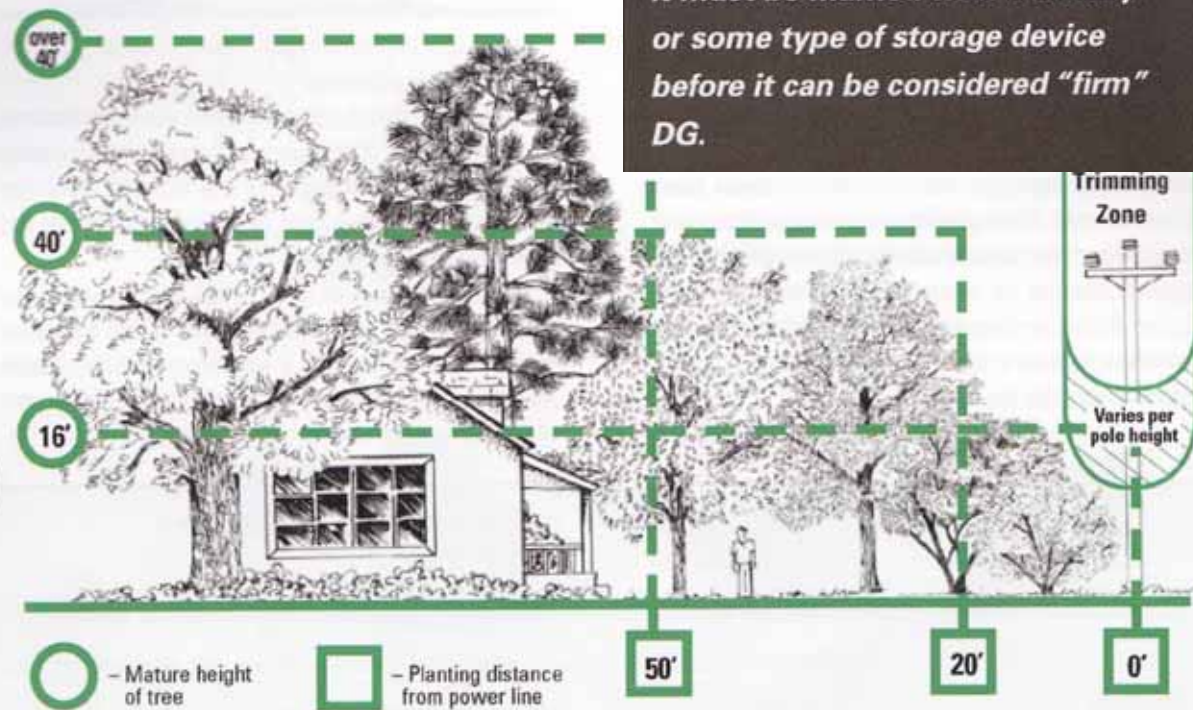
## Restoration Timeline

CenterPoint Energy - Smart Grid (SG) Estimate



*With respect to solar DG as a reliability resource it needs to be noted that solar is an intermittent resource by definition. If the sun is not shining on a solar panel it will obviously not provide power; it must be married with a battery or some type of storage device before it can be considered "firm" DG.*

### Safe planting distance for trees near distribution lines





Jennifer Wagner



**Emphasis on Local Materials:**

Onsite trees that had to be cut down here were milled and used for interior paneling and trim, shingles were sourced from a local cedar shingle mill, wood framing has come from small local mills and the structure uses so-called "non-straight" woods that would otherwise not be marketable . As well, cabinetry and interior partition wood has also been sourced locally.







Butterworks Farm  
Organic Corn with  
Vermont Maple BBQ dip

Klingers Bakery  
Wheat Toast

Chapelle Farm  
Potatoes

Vermont Smoke and  
Cure Maple Sausage

Maple Meadow  
Farm eggs

# Year-Round Local Food Production?



Pete Johnson, Pete's Greens in Craftsbury Village



**Pete's Greens**  
Providing Fresh, Seasonal Organic Vegetables Since 1997

**Produce Availability List**

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Arugula, Baby 4/10-11/1												
Basil 4/20-10/1												
Beans 7/5-9/15												
Beets Year Round												
Braising Mix 4/10-11/15												
Broccoli 7/15-11/1												
Broccoli Raab 6/1-11/1												
Brussels Sprouts 9/1-12/15												
Cabbage 7/15-3/1												
Carrots Year Round												
Cauliflower 7/15-11/1												
Cauliflow. Romanesco 9/1-11/15												
Celery 7/1-10/15												
Chard (bu) 4/20-12/1												
Chinese Cabbage 5/1-11/15												
Collard (bu) 5/15-11/15												
Cucumber 5/15-10/1												
Dakota Radish 9/15-5/1												
Dandelion 5/15-11/15												
Eggplant 5/25-15/1												
Escarole 7/1-9/15												
Fennel bulb 6/15-12/15												
Head Lettuce 5/1-10/15												
Herb (german) 6/20-10/1												
Kale (bu) 5/15-12/15												
Kohlrabi 6/1-2/1												
Leek 5/20-2/1												
Melon & Watermelon 7/15-10/1												
Miscun 4/15-11/15												
Mizuna (bu.) 4/15-6/15 & 9/15 - 11/15												
Onion 5/15-3/15												
Parsley 4/25-11/15												
Parrot 9/15-4-15												
Peas 7/10-9/10												
Pepper 7/15-10/15												
Potato 7/10-5/1												
Pumpkin 9/10-12/10												
Radicchio 7/15-3/1												
Radish 5/1-10/15												
Radish, Storage 9/15-5/1												
Rutabaga 9/15-5/1												
Scallion 5/1-10/15												
Shallot 9/1-5/1												
Soybeans, Edamame 8/15-10/1												
Spinach, Baby 4/10-11/15												
Sprouts, Soil Grown 11/1-4/1												
Sweet corn 7/15-10/1												
Tomatillo 7/15-10/1												
Tomato, Beefsteak 6/10-10/15												
Tomato, Heirloom 7/1-10/15												
Turnip Year Round												
Winter Greens 11/1-4/1												
Winter Squash 9/15-2/1												
Yukon Gem (bu.) 5/1-7/1												
Zucchini 7/5-9/20												

This chart is only a representation of what we grow and not all varieties are listed. If you are looking for something specific or have a question about availability dates, please do not hesitate to contact Pete at Pete's Greens at 892-566-2882, mailbox 7 or email Pete@petesgreens.com.

# Community Resilience

A22 SUNDAY, SEPTEMBER 21, 2003 R DC MD VA

THE WASHINGTON POST

## IN ISABEL'S WAKE

# Power Cords Link Haves, Have-Nots

*Community Sharing Turns on Some Lights*

By LINDA PERLSTEIN  
and AMY ARGETSINGER  
*Washington Post Staff Writers*

The extension cord has become a symbol of community since Hurricane Isabel left the Washington region in a patchwork of power: one block with, one block without. One house with, one house without. Even, to residents' puzzlement, one apartment with, one apartment without.

Compelled by friendliness and a bit of survivors' guilt, many of the lucky ones willingly snaked a cord across the alley, yard or street, sharing their electricity with those whom Isabel did not spare.

Carol Osborne, a high school teacher from North Arlington, was happily recovering from her less-than-grueling one hour without power Thursday evening when she heard a knock on the door about 8:30. It was the pregnant woman from across the street, drawn like a moth to the Osbornes' lights.

For hours, the woman and her husband had been bailing water from their finished basement, their sump pump idled by a power out-

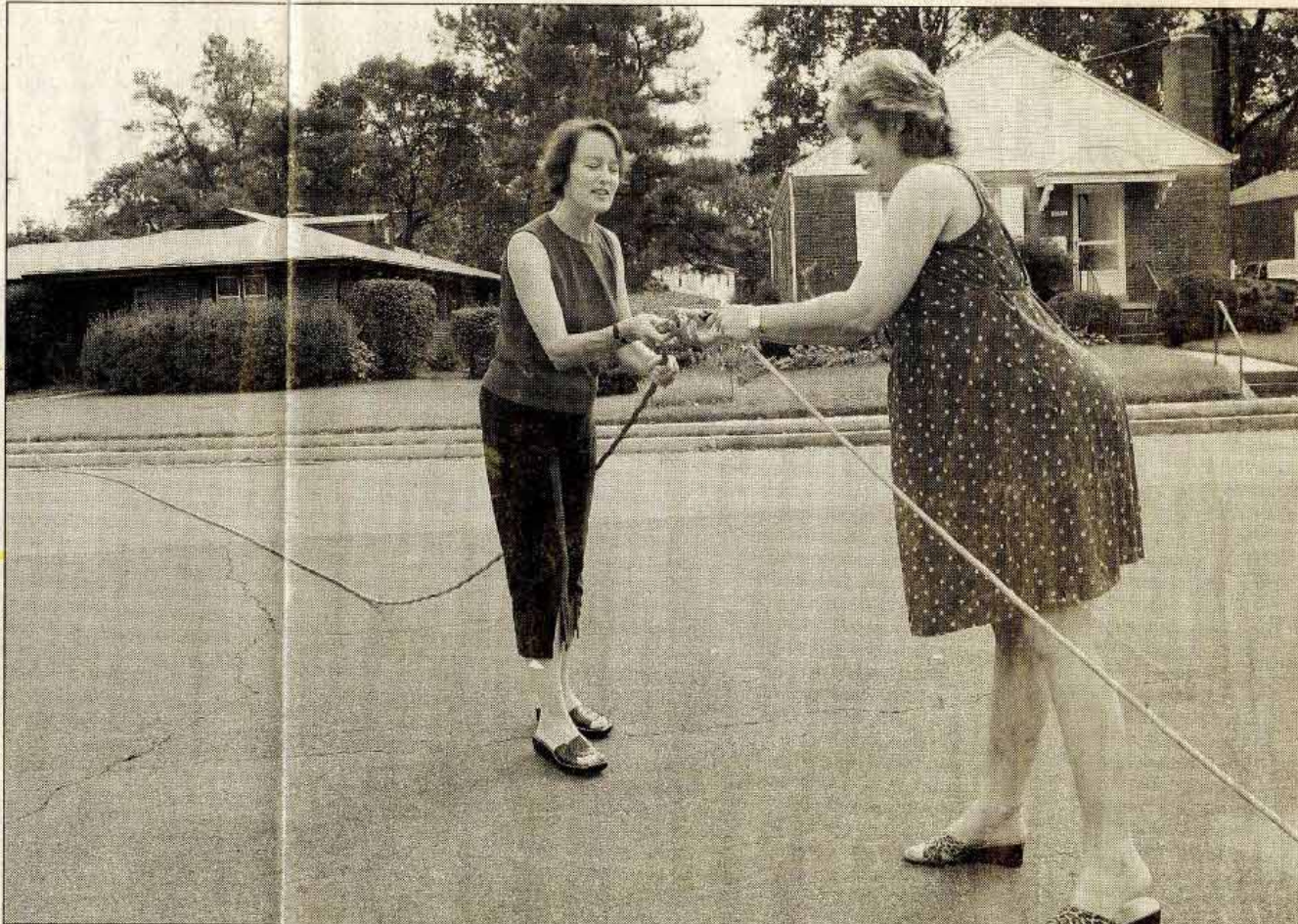
And thanks to the orange cord stretched across 22nd Street, the Vorsts had refrigeration and a more-or-less dry basement. Power came back to most of the neighborhood early yesterday.

Carol Osborne said the electrical lending hadn't drawn down her own power too much, though at one point a circuit breaker was tripped by too many appliances in use. The Osbornes figured that, to be safe, they would not turn on their air conditioning.

"I'm glad we can help them," Osborne said. She added that she is glad the couple asked for a power hookup to remedy the sump pump situation, or Osborne might have been contributing not her electrical sockets but her muscle, by helping bail.

It's not just power that's being shared. It's refrigerators, freezers and dinner.

Susan Barocas, a documentary filmmaker and publicist, was sitting in her Cleveland Park house Thursday when she saw her neighbors' homes go dark. Her family had planned for the worst—placing flashlights everywhere, forgoing a



Snaked across their Arlington County street, a power cord from the home of Carol Osborne, left, brings hopes for a dry basement to neighbor Gabrielle Vorst.

BY FRANK JOHNSTON—THE WASHINGTON POST



   
**HURRICANE  
EVACUATION  
BUS STOP**

**PARADA DE AUTOBUS  
PARA EVACUACION  
DE HURACANES**

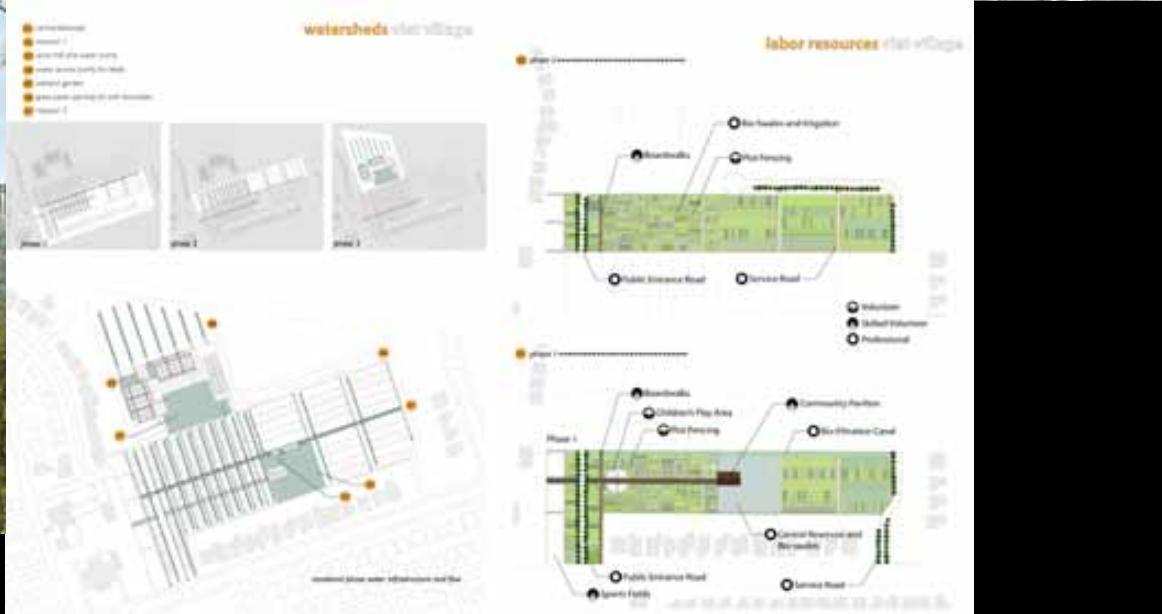


Store Will  
Be CLOSED  
Saturday  
February 3<sup>rd</sup>  
Anthony getting  
MARRIED.....

Karen Terranova



Father Vien Nguyen  
Mary Queen of Vietnam Church







# Is Resilience is the New Sustainability?

**Everything Will (Must) Change!**

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