

Devastation (1)



Chronology (4)

- Aug 25: moves into Gulf of Mexico
- Massive damage
 - ❑ 80K dwellings destroyed or badly damaged
 - ❑ 250,000 people homeless
 - ❑ 1M people without clean drinking water
 - ❑ Power outages for 1.5M people

10

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Chronology (5)

- Aug 26: 140 mph winds reach LA coast
 - ❑ Major damage along US 90
 - ❑ Destroyed much of sugarcane crop
- Aug 27-28
 - ❑ Generated tornados throughout LA, AL, GA, TN
 - ❑ LA: 10K dwellings destroyed & 30-50K homeless

11

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Recovery Slow, Disorganized

- Basic services absent
 - ❑ "...electricity, telephones, water supply, sewage disposal, banks, gasoline stations, and grocery stores...."
 - ❑ Days & weeks of disruption
- Social breakdown
 - ❑ Looters
 - ❑ National Guard & Army deployed
 - ❑ Pres George Bush & Gov Lawton Chiles blamed each other for delays
 - ❑ Increasing levels of domestic abuse & family breakdowns

12

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Lessons Learned (1)

- Aug 13, 2004: Hurricane Charley hit FL
 - ❑ But FEMA & state, local officials generally praised
- Immediate (day 1) distribution of ice, water, food door to door
- Emergency communications up and running
- Immediate search-and-rescue operations
- 1st 24 hours: emergency toilets, A/C, tents, showers, medical emergency rooms in place

AP (2004). "FEMA learned from Hurricane Andrew in 1992." *USTODAY* (2004-08-26). <http://tinyurl.com/5db7ef>

Lessons Learned (2)

- Recovery affected by insurance policies
 - ❑ Institutions & individuals unfamiliar with terms
 - ❑ Scope of coverage critical
 - ❑ Many exclusions of critical equipment
 - ✓ Electrical fixtures
 - ✓ Appliances
 - ✓ Air conditioning & heating
 - ✓ Water heaters
 - ✓ Built-in cabinets

Poliakoff, G. A. (2004). "Lessons from Hurricane Andrew." See http://www.becker-poliakoff.com/practice_areas/areas_disasterrecovery.html

Lessons Learned (3)

- Buildings were poorly built – codes ignored by contractors & FL government officials
- Many insurance companies went bankrupt, leaving policy holders unprotected
- Insurance rates climbed so steeply that thousands of homeowners could not afford insurance
- 1M homes lost all insurance coverage

See US Natl Weather Service (1993). *Hurricane Andrew: South Florida and Louisiana: August 23-26, 1992*. Available as e-book and on paper. <http://tinyurl.com/6lq3nmc>

Hurricane Preparedness Checklist

- Disaster Plan
- Evacuation Routes
- Emergency Generators & Supplies
- Backup Computer Files
- Secure the Premises
- List of Owners & Employees
- Photograph or Video Premises
- Building and Facilities Plans
- Insurance Policies & Agent Details
- Bank Account Details & Signatories
- Mitigation of Damages
- Debris Removal

Poliakoff, G. A. (2004). "Lessons from Hurricane Andrew." See <http://tinyurl.com/6g4qmch>

BC511 Continuity of Government Operations

- Organizational analysis
- Risk and threat analysis
- Mitigation and control strategy development
- Implementing organizational structure
 - ❑ Sustain program

Organizational Analysis

- Map people to functions
- Discover & establish
 - ❑ How people will collaborate
 - ❑ On priority issues
 - ❑ Regardless of organizational status

Risk & Threat Analysis (1)

- Identify critical infrastructure, equipment and services
 - ❑ Agriculture & Food
 - ❑ Banking & Finance
 - ❑ Chemical Industry
 - ❑ Communications
 - ❑ Critical Manufacturing
 - ❑ Dams
 - ❑ Defense Industrial Base
 - ❑ Emergency Services
 - ❑ Energy
 - ❑ Government Facilities
 - ❑ Healthcare & Public Health
 - ❑ Information Technology
 - ❑ National Monuments & Icons
 - ❑ Nuclear Reactors, Materials & Waste
 - ❑ Postal & Shipping Services
 - ❑ Transportation Systems
 - ❑ Water

See http://www.dhs.gov/files/programs/gc_1189168948944.shtm

Risk & Threat Analysis (2)

- Compile types of threats to continued functioning
 - ❑ E.g., hurricane, tornado, flood, earthquake, insurrection, terrorism
- Identify types of failure
 - ❑ E.g., electrical-grid failure, road blockage, rail blockage, communications failures
- Establish approximate probability of specific types of threat
 - ❑ Historical records, best-guess estimates

Risk & Threat Analysis (3)

- Compute Annualized Loss Expectancies (ALE)
 - ❑ for each component and threat
- $ALE(\text{failure}) = pc$
- $ALE(\text{prevention}) = (1-p)c'$
- where
 - ✓ p = probability of failing
 - ✓ c = cost of failure
 - ✓ $(1 - p)$ = probability of not failing
 - ✓ c' = cost of prevention

Mitigation & Control Strategy Development

Use ALEs as heuristic for discussing strategies; e.g., suppose (illustration only)

- Cost of failure of communications infrastructure ~\$100M
- Probability(failure)/year = 0.01
- So $ALE(\text{failure}) = \$100M \cdot 0.01 = \$1M$
- But probability of not failing in 1 year = 0.999
- Then what is the breakeven point where we spend enough to balance out possible loss?
- $ALE(\text{prevention}) = 0.999c'$ and so for breakeven,
- $c' = \$1M / 0.999 = \$1.001M$
- In other words, spending around \$1,001,000 a year gives us a breakeven point IFF the probabilities and costs are correct

Implementing Organizational Structure

- Don't impose new structures without discussion
- Need to convince colleagues to collaborate
- Create open environment for free contributions of ideas, criticisms, suggestions
- Establish needs, benefits
- Listen carefully to objections and discuss in detail

BC521 Public Sector Incident Management & Emergency Response

- Developing response plan
- Emergency operations centers
- Emergency communications
- Working with first responders
- Best practices for
 - ❑ Developing off-site backups
 - ❑ Offsite work areas
 - ❑ People and equipment for continuing operations

Developing Response Plan

- Critical path analysis
 - ❑ What must be done first?
 - ❑ Establish priorities for functional recovery
- Continuous Process Improvement
 - ❑ Test and refine repeatedly
 - ❑ Use video recording throughout exercises
 - ❑ Analyze mistakes, reasons for errors, and fixes
 - ❑ Adopt non-punitive, collaborative culture

25

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Emergency Operations Centers

- EOCs critical element of response
 - ❑ AKA command centers, situation rooms, war rooms, crisis management centers
 - ❑ Coordination of all responses to ensure smooth, effective delivery
- Fixed-position EOCs:
 - ❑ Built to withstand appropriate level of stress
 - ❑ No good if destroyed during emergency!
 - ❑ Can serve multiple uses outside emergency
- Mobile EOCs – local command and control

26

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Emergency Communications

- Incident Command System
 - ❑ Software supported by hardware (radio above all; mobile phones & wireless networks if available)
 - ❑ Supports management of all operations
 - ❑ Coordinate daily operational activities
 - ❑ Communications with EOC & personnel on ground
- Event Information Tracking
 - ❑ Audit trail of all actions / events
 - ❑ Notifications, activations, tasks, resource allocation, performance, status reports

27

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Working with First Responders

- Official responders will be highly trained & equipped with communications tools
 - ❑ EMTs, fire-fighters, National Guard, Red Cross, police canine units, doctors, nurses, electrical power workers...
- BUT must plan for volunteers
 - ❑ Searchers for survivors
 - ❑ Builders, contractors, demolition experts,
 - ❑ Truckers bringing supplies
 - ❑ May be disorganized, without communications

28

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Developing Off-site Backups

- Data & software must be copied to remote storage
 - ❑ Daily, weekly, monthly – depends on needs
 - ❑ Adapt schedule to each application & site
- 3 types of operational backup site
 - ❑ Cold: all infrastructure but no computers, networks
 - ❑ Warm: cold + computers, networks
 - ❑ Hot: warm + all software & data
- Hot sites can be used for sharing normal load

29

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Offsite Work Areas

- Plan for critical operations to be completely ready for immediate occupancy & use
- Some older, little-used or unused sites may serve in emergency
- Immediate need for safety & acceptable working conditions, not luxury
- Some try able to share resources with other agencies
 - ❑ But where will THEY get their work done?
 - ❑ Generally does not work well

30

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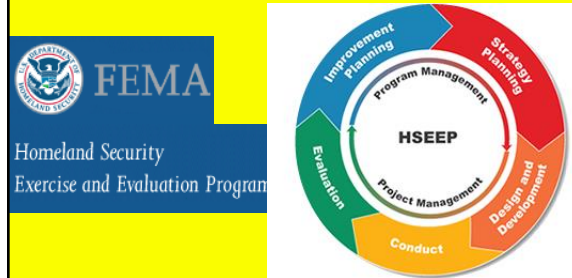
People & Equipment for Continuing Operations

- Budget for contingencies
- Use older but serviceable equipment where possible
- Provide safety for families / loved ones of employees
- Ensure time for communications with families
- Provide emergency sleep accommodations, food, water, washing facilities....

31

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Systems Approach: FEMA



https://hseep.dhs.gov/pages/1001_HSEEP7.aspx

32

Hurricane Irene: August 2011

- Aug 20: Lesser Antilles – organization of cyclonic circulation – Natl Hurricane Center issues advisories
- Aug 21: Virgin Islands
- Aug 22: severe damage in Puerto Rico
- Aug 23-26: severe damage in Bahamas
- Aug 27: veers past FL & hits NC Outer Banks
- Aug 28: 2nd landfall in NJ, moves NE through NY

33

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Irene Hits Vermont

- Aug 28-29: downgraded to tropical storm
- Moves through VT – worst flooding in century – 6 feet in main streets several towns
- Several towns completely isolated when roads washed out (e.g., Killington, Pittsfield)
- Many classic covered bridges washed away
- Damage to crops in low-lying areas

34

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Emergency Response Excellent

- Immediate shelter sites in several areas
- Vermont & Maine National Guard on scene at once
- Politicians, FEMA responded quickly
- Spontaneous coordination through radio, TV, Internet
- Strong community outpouring of financial support and goods (clothing, food)
- Norwich University students pitched in

See <http://vem.vermont.gov/>

35

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Some Resources for Further Study

- CDC "Emergency Preparedness & Response" <http://www.bt.cdc.gov/>
- DHS "Critical Infrastructure" http://www.dhs.gov/files/programs/gc_1189168948944.shtm
- FEMA "Are You Ready?" <http://www.fema.gov/areyouready/>
- FEMA "Emergency Management Guide for Business & Industry" <http://www.fema.gov/business/guide/index.shtm>
- FEMA "National Response Framework Resource Center" <http://www.fema.gov/emergency/nrf/>
- MIT WORLD "Emergency Response" topics <http://mitworld.mit.edu/searches?term=emergency+response>
- MIT WORLD "Disaster Recovery" topics <http://mitworld.mit.edu/searches?term=disaster+recovery>
- Ready.gov <http://www.ready.gov/>

36

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