METCALF INSTITUTE FOR MARINE & ENVIRONMENTAL REPORTING

Metcalf Institute Peter B. Lord Seminars on the Environment

Predicting and Responding to Extreme Weather Events
September 20, 2013
The Providence Journal, Providence, RI
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Science Resources

All links retrieved on 09/19/2013 unless otherwise noted.

Hurricane Science and Impacts (Note: this is a very small sampling of relevant information on hurricane science. Please visit hurricanescience.org and the National Hurricane Center for many additional resources on this topic.)

Emanuel, K.A. 2010, Global Warming Effects on US Hurricane Damage. Weather, Climate, & Society, 3:261-268. doi: 10.1175/WCAS-D-11-00007.1
ftp://texmex.mit.edu/pub/emanuel/PAPERS/wcas_2011.pdf

Emanuel, K.A., 2013, Downscaling CMIP5 climate models shows increased tropical cyclone activity over the 21st century. *Proc. Nat. Acad. Sci.*, **110**, doi/10.1073/pnas.1301293110.
ftp://texmex.mit.edu/pub/emanuel/PAPERS/Emanuel_PNAS_2013.pdf

Freedman, A. July 8, 2013. Hurricanes likely to get stronger and more frequent: Study. Climate Central. http://www.climatecentral.org/news/study-projects-more-frequent-and-stronger-hurricanes-worldwide-16204

Hurricanes: Science and Society. http://www.hurricanescience.org
This website is a great resource for details on hurricane formation, observation, and forecasting, as well as related hazards and impacts. There is also a comprehensive glossary of hurricane terms here.

Institute for Business & Home Safety. http://www.disastersafety.org/

Kossin, J.P., et al. 2007. A globally consistent reanalysis of hurricane variability and trends. Geophysical Research Letters, 34(4): L04815. doi:*10.1029/2006GL028836*.

National Hurricane Center. http://www.nhc.noaa.gov/
- Saffir-Simpson Hurricane Wind Scale - http://www.nhc.noaa.gov/aboutsshws.php

National Weather Service Forecast Office, New England Hurricane Climatology.
http://www.erh.noaa.gov/box/hurricane/NewEnglandClimatology.shtml

Pielke, R.A., and C.W. Landsea. 1998. Normalized hurricane damage in the United States: 1925-95. *Bulletin of the American Meteorological Society*, 13:621-631.
http://journals.ametsoc.org/doi/pdf/10.1175/1520-0434%281998%29013%3C0621%3ANHDITU%3E2.0.CO%3B2

Vallee, David. Hurricane Sandy from a Meteorological Perspective, *Environmental Business Council New England*, http://www.ebcne.org/fileadmin/pres/2_February_2013/2-26-2013_MASTER_David_Vallee.pdf

Storm Surge Mapping & Hurricane Evacuation Studies

ASCE. Hurricane Storm Surge and Infrastructure.
http://ascelibrary.org/page/jwped5/hurricanestormsurgeandinfrastructure
A compilation of publications by the American Society of Civil Engineers (ASCE) on hurricane storm surge, effects on infrastructure, modeling and research, and lessons learned from previous storms in relation to the effects of Hurricane Sandy.

Cottrill, Jody (June 05, 2013) Hurricane Evacuation Studies Briefed to State Partners, *Fedral Emergency Management Agency*, http://www.fema.gov/about-fema/employee-news-and-announcements/hurricane-evacuation-studies-briefed-state-partners

FEMA, Information on Proposed Changes to FEMA's FIRM Maps.
http://town.scituate.ma.us/flood/fema-map-info.html

FEMA. FEMA Map Service Center. http://msc.fema.gov/
A comprehensive website of FEMA Flood Maps, Flood Studies, and other useful tools.

FEMA. (2012, November 16). Hurricane Sandy Impact Analysis [Map], Retrieved November 19, 2012 from
http://fema.maps.arcgis.com/home/webmap/viewer.html?webmap=307dd522499d4a44a33d7296a5da5ea0

Masters. J. Storm Surge Basics. Wunderground.
http://www.wunderground.com/hurricane/surge.asp

NOAA. Primer on Storm Surge and Coastal Flooding.
http://www.noaawatch.gov/themes/coastal_inundation.php

NOAA. Storm Surge Overview. http://www.nhc.noaa.gov/surge/

U.S. Army Corps of Engineers. New England Hurricane Evacuation Studies.
http://www.nae.usace.army.mil/Missions/ProjectsTopics/HurricaneStudies.aspx

Precipitation Trends

Douglas, E. M. and C. A. Fairbank (2011, March) Is Precipitation in Northern New England Becoming More Extreme? Statistical Analysis of Extreme Rainfall in Massachusetts, New Hampshire, and Maine and Updated Estimates of the 100-Year Storm. *Journal of Hydrologic Engineering 16* (3). http://ascelibrary.org/doi/abs/10.1061/(ASCE)HE.1943-5584.0000303

Hodgkins, G.A., R.W. Dudley and T.G. Huntington (2003, July 25) Changes in the timing of high river flows in New England over the 20th Century. Journal of Hydrology 274 (1-4) 244-252.
http://www.sciencedirect.com/science/article/pii/S0022169403001550

National Hydrologic Warning Council. http://www.hydrologicwarning.org/
"The National Hydrologic Warning Council (*NHWC*), with membership across the United States and around the world, is a non-profit organization dedicated to assisting emergency and

environmental management officials by providing expert advice on the use of real-time, high quality hydrologic information from automated remote data systems, with the goals of protecting lives, property, and the environment."

National Weather Services. National Snow Analyses. http://www.nohrsc.noaa.gov/nsa/

National Flood Insurance Program

AECOM, FEMA Climate Change Report,
http://www.aecom.com/News/Sustainability/FEMA+Climate+Change+Report

Burnett, M. Demystifying the Demons of Floodplain Management. http://rifloods.wordpress.com/ Effective summary of the National Flood Insurance Program (NFIP) process, from the Floodplain Management Program and the RI Emergency Management Agency.

Faulkner, Tim (July 11, 2013) More Flood Insurance Ahead for Rhode Islanders, *ecoRI news*.
http://www.ecori.org/climate-change/2013/7/11/more-flood-insurance-ahead-for-rhode-islanders.html

FEMA, The National Flood Insurance Program, http://www.fema.gov/national-flood-insurance-program

King, R. (February 6, 2013) the National Flood Insurance Program: Status of Remaining Issues for Congress, Congressional Research Service. http://www.fas.org/sgp/crs/misc/R42850.pdf

National Flood Insurance Program, Community Rating System,
http://www.floodsmart.gov/floodsmart/pages/crs/community_rating_system.jsp

National Flood Insurance Program, Flooding and Flood Risks: Flood Map Update Schedule,
http://www.floodsmart.gov/floodsmart/pages/flooding_flood_risks/map_update_schedule.jsp

National Research Council (2013) Levees and the National Flood Insurance Program: Improving Policies and Practices, Washington, DC: The National Academies Press.
http://www.nap.edu/catalog.php?record_id=18309

Immediate Impacts: Emergency Management

Federal Emergency Management Agency, Region I (New England) http://www.fema.gov/region-i-ct-me-ma-nh-ri-vt

FEMA. Flood Risk Resources
http://www.fema.gov/coastal-flood-risk-resources

FEMA. Map Service Center.
https://msc.fema.gov/webapp/wcs/stores/servlet/FemaWelcomeView?storeId=10001&catalogId=10001&langId=-1&userType=G

FEMA Region 1 Mitigation Office Directory
http://www.fema.gov/region-i-mitigation-contact

Providence Emergency Management Agency | City of Providence
https://www.providenceri.com/PEMA

RI Emergency Management Agency http://www.riema.ri.gov/

Rhode Island Emergency Agency. RI Hurricane Evacuation Maps and Information. http://www.riema.ri.gov/preparedness/evacuation/hurricane_evac.php

Lasting Impacts: Building Resilient Communities

Balbo, A., Dowding-Smith, E., and L. Kavanaugh. (2013, May 31-June 2) CLEI, 2013, Resilient Cities 2013: Congress Report. http://resilient-cities.iclei.org/fileadmin/sites/resilient-cities/files/Resilient_Cities_2013/RC2013__congressreport_singlepage.pdf

Bowen, Sarah, Jerolleman, Alessandra, Punchard, Darrin, Thomas, Edward, and Turner, Terri (June 8, 2011) Planning and Building Livable, Safe & Sustainable Communities, Natural Hazard Mitigation Association, http://stormsmart.org/uploads/patchwork-quilt/patchwork_quilt.pdf

Brewer, J. (2008) New Directions in Climate Change: Vulnerability, Impacts, and Adaptation Assessment. National Research Council. http://books.nap.edu/openbook.php?record_id=12545&page=R1

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Center for Climate and Energy Solutions (2013, July) Weathering the storm: building business resilience to climate change. http://www.c2es.org/docUploads/business-resilience-report-07-2013-final.pdf

Changon, S. D. (2003) Measures of Economic Impacts of Weather Extremes. *Bulletin of American Meteorological Society* (84) 1231-1235. http://journals.ametsoc.org/doi/abs/10.1175/BAMS-84-9-1231

Community & Regional Resilience Institute. http://www.resilientus.org/

Cooke, Kieran (July 8, 2013) Insurance Companies Given Sever Weather Warning, *Climate Central*, http://www.climatecentral.org/news/insurance-companies-given-severe-weather-warning-16193

Doherty, Thomas and Clayton, Susan (May-June, 2011) The Psychological Impacts of Global Climate Change, *American Psychologist* 66: 265-276. http://www.apa.org/pubs/journals/releases/amp-66-4-265.pdf

Farhat Kassab, S. (2013, March 7) Is the U.S. Insurance Industry Prepared for Climate Change? Analysis of first-ever industry-wide survey finds that only 23 of 184 companies have comprehensive climate change strategies, yet some leaders are emerging. Skoll Foundation. http://www.skollfoundation.org/is-the-u-s-insurance-industry-prepared-for-climate-change-analysis-

of-first-ever-industry-wide-survey-finds-that-only-23-of-184-companies-have-comprehensive-climate-change-strategies-yet-some-leade/

Federal Highway Association. Regional Climate Change Effects: Useful Information for Transportation Agencies. Climate Change Adaption. http://www.fhwa.dot.gov/environment/climate_change/adaptation/resources_and_publications/climate_effects/effects03.cfm

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National Sea Grant College Program. Focus Team: Hazard Resilient Coastal Communities. *NOAA*. http://www.seagrant.noaa.gov/focus/hrcc_page.html

North American Electric Reliability Corporation. (2011). NERC Examines Power System Impacts from Recent Extreme Weather Conditions [Press Release]. http://www.nerc.com/news/Pages/NERC-Examines-Power-System-Impacts-from-Recent-Extreme-Weather-Conditions.aspx

Pilgrim, Joanne (November 15, 2012) Need Seen for Post-Storm Recovery Plan, *The East Hampton Star*, http://easthamptonstar.com/?q=News/20121115/Need-Seen-Post-Storm-Recovery-Plan

Rhode Island Climate Change Commission. (2012, November). Adapting to Climate Change in the Ocean State: A Starting Point. *2012 Progress Report*. http://www.rilin.state.ri.us/Reports/Climate%20Change%20Commission%20Prog%20Report%20Final%2011%2015%2012%20final%202.pdf

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Climate Change, General

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U.S. EPA. Climate Change: Glossary of Climate Change Terms. http://www.epa.gov/climatechange/glossary.html

U.S. Global Change Research Program. National Climate Assessment. (The next National Climate Assessment is scheduled to be completed in early 2014.) Information about the current assessment: http://www.globalchange.gov/what-we-do/assessment/draft-report-information

Relevant Conferences/Events

CUNY Annual NOAA Crest Symposium. (2013, Jun 5-6) Climate and extreme weather impacts on urban coastal communities. CUNY http://crest.ccny.cuny.edu/symposium2013/#symposium

CUNY. (2013, May 29) Superstorm Sandy: Are We Ready for the Next One? The Institute for Sustainable Cities. http://www.cunysustainablecities.org/superstorm-sandy-ready-one-may-29-2013-cuny-graduate-center/

Wuebbles, D. et al. (2013. Feb 15) U.S. Climate and Weather Extremes: Past, Present, and Future. Connie Woodhouse (Organizer). American Association for the Advancement of Science. http://aaas.confex.com/aaas/2013/webprogram/Session5652.html

Relevant Organizations/Corporations/Agencies

ASFPM. Association of State Floodplain Managers http://www.floods.org/

The Climate Corporation - http://climate.com/products/total-weather-insurance

Jeff Masters' Wunderblog at Weather Underground -
http://www.wunderground.com/blog/JeffMasters/show.html

Massachusetts Institute of Technology

- Kerry Emanuel - http://eaps4.mit.edu/faculty/Emanuel/

National Ocean Economics Program. Established in 1999, the National Ocean Economics Program (NOEP) provides a full range of the most current policy-relevant economic and demographic information available on changes and trends along the U.S. coast, Great Lakes, and coastal waters. The NOEP delivers its information through searchable databases available on this site, as well as through published articles and
reports. http://www.oceaneconomics.org/default.aspx?AspxAutoDetectCookieSupport=1

NOAA. State of the Coast. This site compiles data, maps, and other resources about a variety of coastal issues, including climate change, ecosystems, economy, and communities.
http://stateofthecoast.noaa.gov/

New England Water Environment Association. (2012). Officer & Committee Directory.
http://www.newea.org/LinkClick.aspx?fileticket=jK80WTorcas%3D&tabid=244&mid=805

Risk Management and Decision Processing Center, The Wharton School, University of Pennsylvania
http://www.wharton.upenn.edu/riskcenter/insmitig.cfm

State Coastal Zone Management Agencies:
Connecticut -- http://www.ct.gov/deep/cwp/view.asp?A=2705&Q=323536

Massachusetts -- http://www.mass.gov/eea/agencies/czm/

Rhode Island -- http://www.crmc.ri.gov/

State Emergency Management Agencies:
Connecticut -- http://www.ct.gov/demhs/site/default.asp

Massachusetts -- http://www.mass.gov/eopss/agencies/mema/

Rhode Island -- http://www.riema.ri.gov/prevention/floods/

State Floodplain Management Contacts:

Association of State Floodplain Managers Directory
http://www.floods.org/index.asp?menuID=274&firstlevelmenuID=185&siteID=1

Connecticut – https://hazards.fema.gov/contacts/statecontacts/contacts.asp?page=CT
Diane Ikfovic, diane.ifkovic@ct.gov, 860-424-3537

Massachusetts – https://hazards.fema.gov/contacts/statecontacts/contacts.asp?page=MA
Richard Zingarelli, richard.zingarelli@state.ma.us, 617-626-1406

Rhode Island – https://hazards.fema.gov/contacts/statecontacts/contacts.asp?page=RI
Michelle Burnett, michelle.f.burnett@us.army.mil, 401-462-7048

Storm Smart Coasts

- Massachusetts - http://ma.stormsmart.org/
- Rhode Island - http://ri.stormsmart.org/

University of Rhode Island

- The Coastal Institute - http://www.ci.uri.edu/
- Austin Becker - http://cels.uri.edu/maf/MAF_ProfileView.aspx?id=12
- Isaac Ginis - http://www.gso.uri.edu/users/iginis
- Arthur Gold - http://cels.uri.edu/nrs/NRS_ProfileView.aspx?id=7
- Lewis Rothstein - http://www.gso.uri.edu/users/lewisr
- Judith Swift - http://www.uri.edu/artsci/the/judith_swift.html
- Emi Uchida - http://cels.uri.edu/enre/FacultyDetail.aspx?FName=Emi&LName=Uchida

Additional Resources Retrieved from SEJ-TIPSHEET: SEJ WatchDog of 14 NOVEMBER 2012.
http://www.sej.org/publications/tipsheet/overview

"Superstorm Sandy was a wake-up call on many levels–especially as a lesson on the need to be prepared for disasters. SEJ's Reporting Tools library, http://www.sej.org/library/reporting-tools/overview, may help you prepare for covering environmental disasters. But here are a few more that may come in handy.

- EPA's National On-Scene Coordinator Phone Book is a listing of crisis responders within the agency -- often those focused on Superfund hazardous waste incidents -- in many cases including 24-hour numbers. Ignore EPA's press office, who are rarely helpful, and will tell you to go through them, and call the On-Scene Coordinator anyway. http://www.epaosc.org/main/oscdir.aspx

- WISER, the National Institutes of Health's Wireless Information System for Emergency Responders, is a mobile app you can run on your smart phone (iPhone, Android, or Blackberry). It is a quick entry to TOXNET's Hazardous Substances Data Bank, including support for radiological and biological agents. Starting point: http://1.usa.gov/TJqLnF

- Some of the biggest impacts of Sandy were on sewer and water infrastructure. The Water Environment Federation has published many guides related to disasters affecting public drinking water and sewage treatment plants http://bit.ly/QdS9NX

- EPA has collected Risk Management Plans for some major hazmat-handling facilities that could kill tens or hundreds of thousands of people in a catastrophe -- but makes it hard for reporters to access the information. To find one near you, start here http://www.epa.gov/oem/content/rmp/ It's a good thing OMB Watch's Right-To-Know Network has compiled the verboten information in easy-to-access form http://www.rtknet.org/db/rmp

- If you really want to prepare for chasing hazmat trucks, you may want to download and install CAMEO http://www.epa.gov/oem/content/cameo/index.htm on your 4G-tethered laptop or tablet. It's the same system most hazmat trucks carry onboard -- to tell them what chemical risks they face and what vulnerable sites (nursing homes? schools?) may be nearby.

- Another key resource is the Dart Center for Journalism & Trauma http://dartcenter.org/topic/disaster, which includes help on covering natural disasters in all their facets, including mental health. Further resources are available from the International News Safety Institute <http://www.newssafety.org/>.

- The International Center for Journalists also offers help. Check out "Disaster and Crisis Coverage," by Deborah Potter and Sherry Ricchiardi http://www.icfj.org/resources/disaster-and-crisis-coverage>; and "Journalism and Trauma," by Deborah Potter and Sherry Ricchiardi http://www.icfj.org/resources/journalism-and-trauma

- SEJ's Reporting Tools library http://www.sej.org/library/reporting-tools/overview> includes toolboxes on floods, tsunamis, earthquakes, oil spills, hurricanes, wildfires, and more."