Water Resources Climate Change Adaptation Based on Best Available Science

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US Army Corps of Engineers

USACE CLIMATE PREPAREDNESS AND RESILIENCE

High-level Experts and Leaders Panel on Water and Disasters

17 October 2014

Topics

- Introduction to US Army Corps of Engineers (USACE)
- Climate change exacerbates water disasters
- Use of best available science can help improve climate resilience and reduce risk due to water hazards

United Nations Secretary-Generals'
Advisory Board on Water & Sanitation (UNSGAB)

Home | Who We Are | Our work | Hashimoto Action Plan | Meeting History | Documents

- Our mandate
- Post-2015 Water Goal
  - Support for Water Goal
- Sanitation
- Wastewater
- Financing
- IWRM/Nexus
- Water and Disaster

Focus action on Water and Disasters

UNSGAB stresses the importance of further action on the issue of disaster risk reduction, in line with the outcomes of the UN Special Thematic Session on Water and Disasters and the High-level Expert Panel on Water and Disaster (HLEP/ UNSGAB) both held in March 2013. During the next phase, UNSGAB members and secretariat will undertake the following actions in close collaboration and coordination with the newly formed High-level Experts and Leaders' Panel on Water and Disasters (HELP/UNSGAB). Board Members will actively respond to occasions to advocate for national, regional and local policies and cooperation measures which can reduce disaster risks. UNSGAB supports the principles and approach to priority action, developed and summarized in six urgent imperatives formulated in "Water and disaster: High-Level Expert Panel on Water and Disaster/UNSGAB, May 2009"

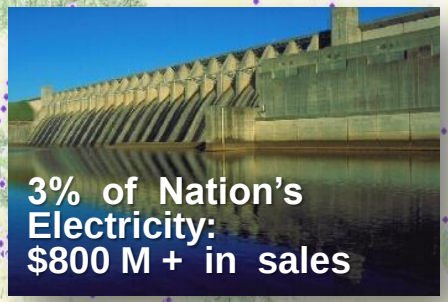
- Galvanize and mobilize before disaster strikes
- Actions and systems to inform, protect, warn and evacuate are of paramount importance
- Risk reduction measures to be incorporated in national development planning
- Create and support occasions to share lessons of disaster response
- Arrangements to provide safe drinking water and sanitation are a key element to effective disaster response
- Data creation and collection on response measures are imperative

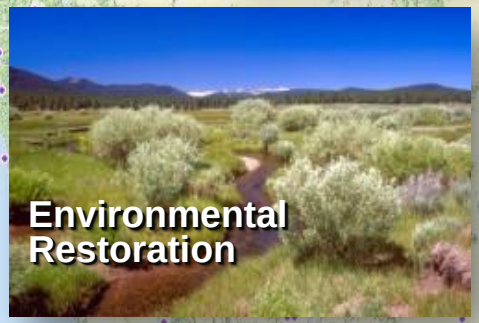
UNSGAB commits to:

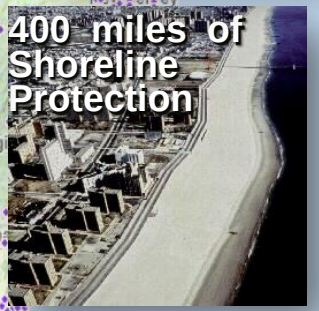
- Create an occasion for a dialogue focusing on water and disasters in the South Asian area in the eventuality that a Board meeting can be organized in the region.
- Encourage the cooperation between UNSGAB and UN Office for Disaster Risk Reduction (ISDR) with support of HELP/UNSGAB to ensure the mainstreaming of the HLEP/UNSGAB goals, objectives, lessons learned and best practices from the 2009 report into the mission of the UN system.
- Encourage the creation of specific dialogues on lessons learned and best practices in response to water related disasters.
  - At UN (GA and ECOSOC)
  - At the 7th World Water Forum in Korea in 2015
  - At relevant ISDR, World Meteorological Organization (WMO), FAO, UN-Habitat meetings
  - At the Milan 2015 exhibition (ExpoMilano)
- Within the existing resource constraints, assist HELP/UNSGAB to strengthen its functions to implement its Action Plan which will include continued advocacy toward tangible, numerical targets for disaster risk reduction as part of the post-MDG and SDG

The success and impact of these efforts will also depend on actions by others:

- National and local governments, civil society, private sector and other stakeholders meet their objectives under the Hyogo Framework.
- ISDR and WMO step up their disaster preparedness efforts.
- Partners participating in the Special Thematic Session on Water and Disasters act on the commitments made.
- All levels of governments strengthen public education and increase response capacity on disaster prevention and reduction.
- All countries pay attention to capacity building in formulating national disaster reduction planning and strategies including with a focus on training staff and reducing health and safety risks while training staff to qualify for disaster prevention.



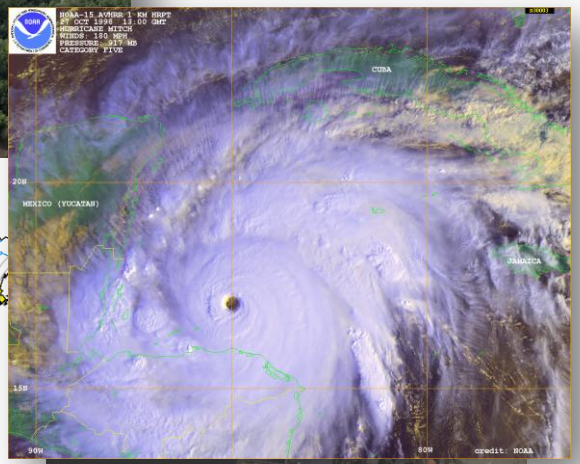


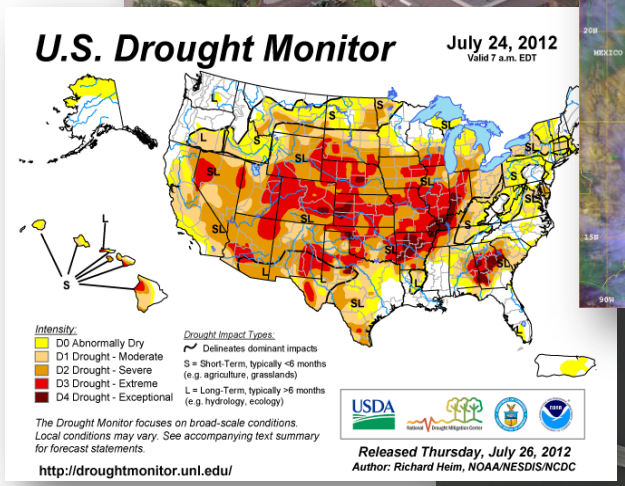


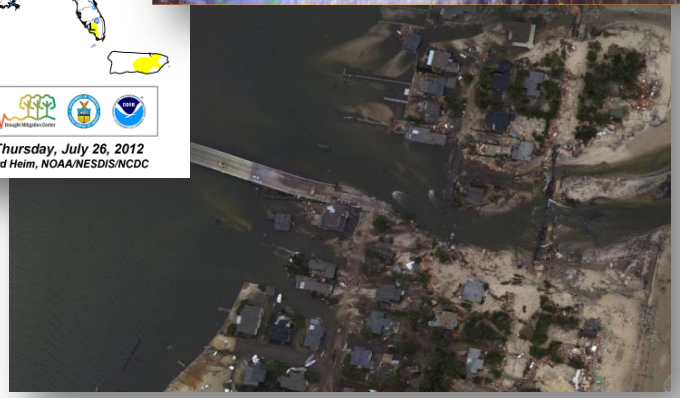
- US Ports and Waterways convey >2B Tons of Commerce, ~$1.7T
- Foreign Trade alone creates >$160 B in Tax Revenues

Hydrologic Variability is Already a Challenge

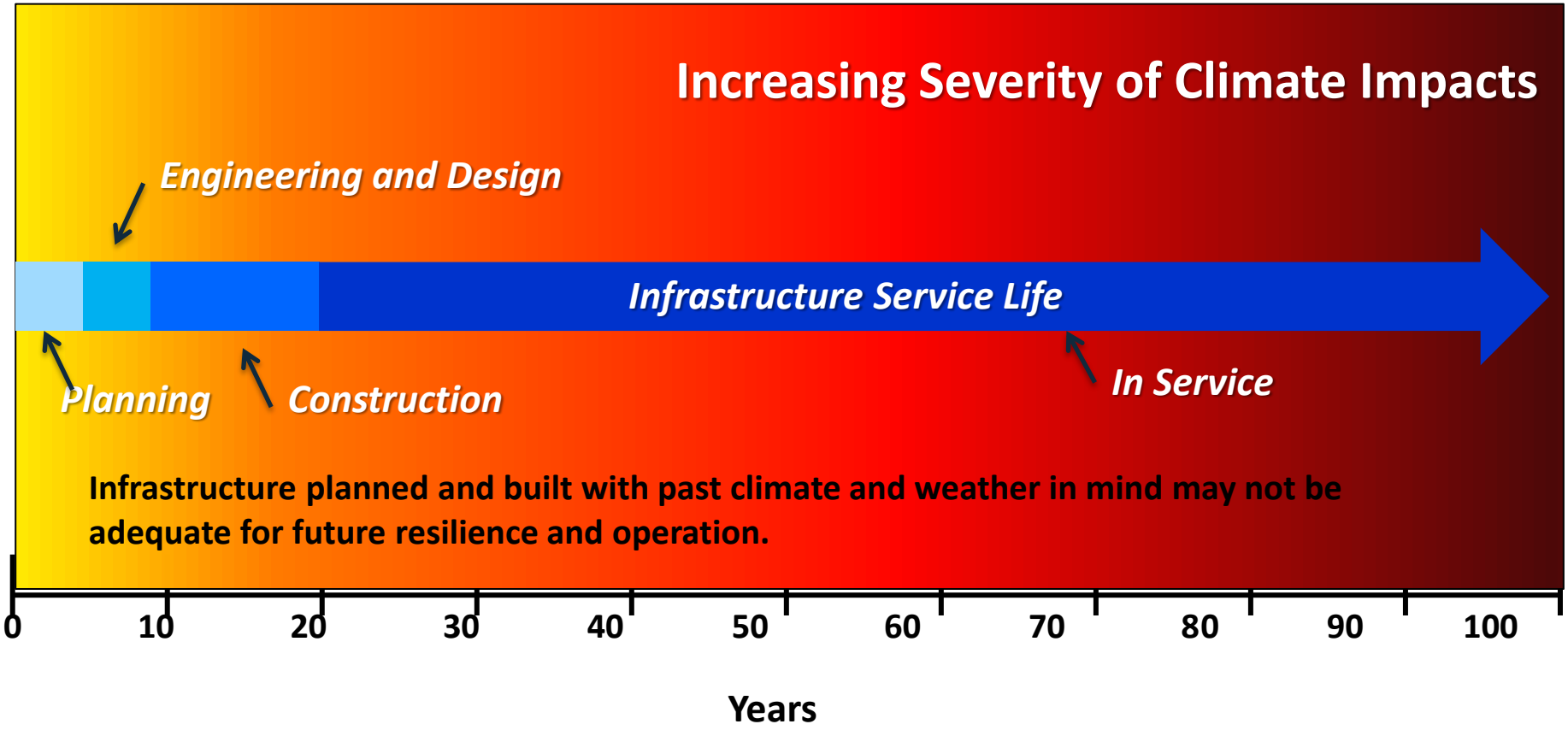
- Hydrologic variability is already a challenge to water managers
  - Floods
  - Drought
  - Sea Level
  - Storms
- Impacts are being experienced across a diverse array of geographic regions and economic sectors of the US







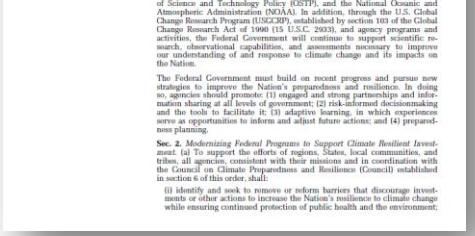
Must Consider Long Lead Time and Long Service Life



After United States Ports: Addressing the Adaptation Challenge, Mr. Mike Savonis

Executive Order 13653
"Preparing the US for the Impacts of Climate Change"

- USACE is one of 30 named agencies in new **Council on Climate Preparedness and Resilience,** which replaces existing Interagency Climate Change Adaptation Task Force
- EO 13653 requires agencies to build on recent progress and pursue new strategies to improve the Nation's climate preparedness and resilience, promoting:
  - Engaged and strong partnerships and information sharing at all levels of government
  - Risk-informed decision-making and supporting tools
  - Adaptive learning, in which experiences serve as opportunities to inform and adjust future actions
  - Preparedness planning



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Federal Register
Vol. 78, No. 215
Wednesday, November 6, 2013

Presidential Documents

Title 3—
The President

Executive Order 13653 of November 1, 2013

Preparing the United States for the Impacts of Climate Change

By the authority vested in me as President by the Constitution and the laws of the United States of America, and in order to prepare the Nation for the impacts of climate change by undertaking actions to enhance climate preparedness and resilience, it is hereby ordered as follows:

Section 1. *Policy.* The impacts of climate change—including an increase in prolonged periods of excessively high temperatures, more heavy downpours, an increase in wildfires, more severe droughts, permafrost thawing, ocean acidification, and sea-level rise—are already affecting communities, natural resources, ecosystems, economies, and public health across the Nation. These impacts are often most significant for communities that already face economic or health-related challenges, and for species and habitats that are already facing other pressures. Managing these risks requires deliberate preparation, close cooperation, and coordinated planning by the Federal Government, as well as by stakeholders, to facilitate Federal, State, local, tribal, private-sector, and nonprofit-sector efforts to improve climate preparedness and resilience; help safeguard our economy, infrastructure, environment, and natural resources; and provide for the continuity of executive department and agency (agency) operations, services, and programs.

A foundation for coordinated action on climate change preparedness and resilience across the Federal Government was established by Executive Order 13514 of October 5, 2009 (Federal Leadership in Environmental, Energy, and Economic Performance), and the Interagency Climate Change Adaptation Task Force led by the Council on Environmental Quality (CEQ), the Office of Science and Technology Policy (OSTP), and the National Oceanic and Atmospheric Administration (NOAA). In addition, through the U.S. Global Change Research Program (USGCRP), established by section 103 of the Global Change Research Act of 1990 (15 U.S.C. 2933), and agency programs and activities, the Federal Government will continue to support scientific research, observational capabilities, and assessments necessary to improve our understanding of and response to climate change and its impacts on the Nation.

The Federal Government must build on recent progress and pursue new strategies to improve the Nation's preparedness and resilience. In doing so, agencies should promote: (1) engaged and strong partnerships and information sharing at all levels of government; (2) risk-informed decisionmaking and the tools to facilitate it; (3) adaptive learning, in which experiences serve as opportunities to inform and adjust future actions; and (4) preparedness planning.

Sec. 2. *Modernizing Federal Programs to Support Climate Resilient Investment.* (a) To support the efforts of regions, States, local communities, and tribes, all agencies, consistent with their missions and in coordination with the Council on Climate Preparedness and Resilience (Council) established in section 6 of this order, shall:

(i) identify and seek to remove or reform barriers that discourage investments or other actions to increase the Nation's resilience to climate change while ensuring continued protection of public health and the environment;

USACE Climate Adaptation Policy: June 2011 Updated June 2014 To Reflect EO 13653

- ***Integrate*** climate change adaptation planning and actions into USACE missions, operations, programs, and projects
- Use the ***best available and actionable climate science*** and climate change information at appropriate level of analysis
- Consider climate change impacts when undertaking ***long-term planning, setting priorities, and making decisions***

http://www.corpsclimate.us/adaptationpolicy.cfm

USACE Approach

- USACE climate change adaptation planning and implementation for new and existing, built and natural infrastructure relies on
  - Policy and guidance based on consistent approaches due to collaboration with aligned agencies and partners
  - Science translation to inform decision-makers, based on best available and actionable science
  - Tools and methods for use at working staff level
  - Screening level assessments of vulnerability to climate change that will be refined over time
  - Training and capacity building
  - Geospatial tools support knowledge transfer

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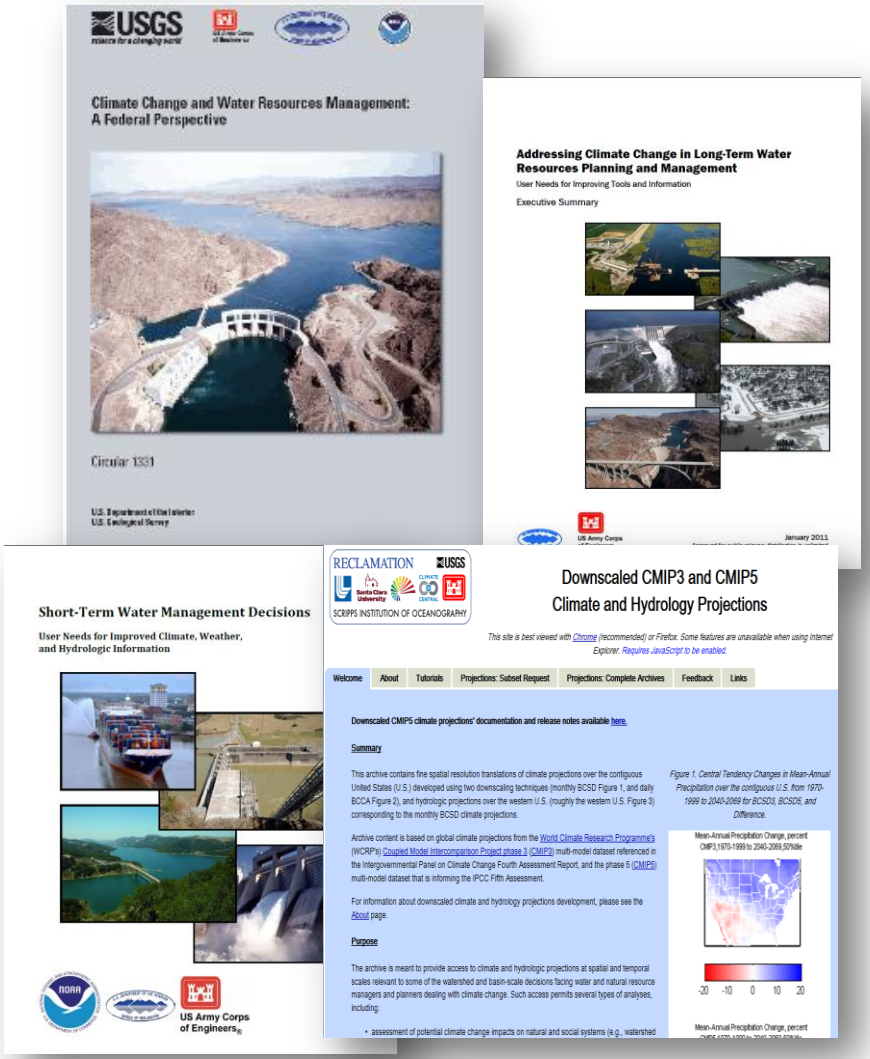
Collaboration is Key: National Level

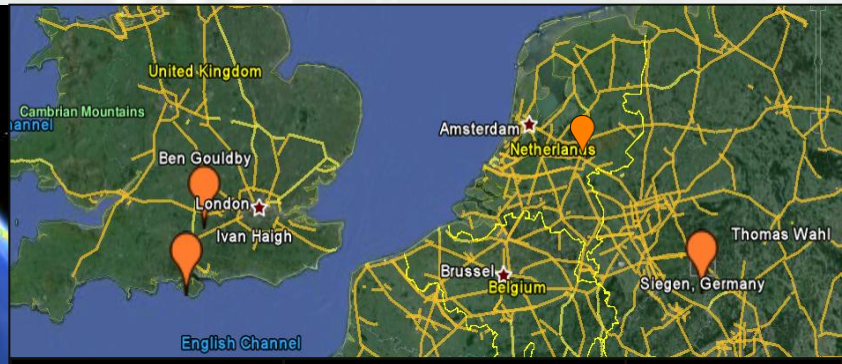
- Examples of national-level collaboration:
  - US Global Change Research Program:
    - National Climate Assessment (May 2014)
    - Supporting technical reports, (e.g., NOAA 2012)
  - White House Council on Climate Preparedness and Resilience:
    - Priority Agenda - Enhancing the Climate Resilience of America's Natural Resources (Oct 2014)
    - State, Local, and Tribal Leaders Task Force
    - Climate Data and Tools Initiative

Collaboration is Key: Hydrology

- Examples of specific work to translate climate science into actionable information for decision makers
  - Overview report, 2009
  - User needs reports
    - Long-term (>5 yrs) 2011
    - Short-term (Weather to climate, < 5 yrs) 2013
  - Consistent set of statistically downscaled climate hydrology for Continental US mid-size watersheds March 2013, updated Feb 2014



Collaboration is Key: Team for Incorporating Sea Level Change in Total Water Levels for Coastal Projects



Member	Agency	City
Billy Sweet	NOAA	Honolulu
Chris Zervas	NOAA	Silver Spring
Curt Storlazzi	USGS	Santa Cruz
Mark Crowell	FEMA	Washington
Dave Kriebel	USNA	Annapolis
Ben Gouldby	HR Wallingford	Wallingford
Ivan Haigh	University of Southhampton	Southhampton
Tom Smith	USACE District	Fort Shafter
Jessica Podoski	USACE District	Fort Shafter
Will Veatch	USACE District	NewOrleans
Hans Moritz	USACE District	Portland
Heidi Moritz	USACE District	Portland
Mark Gravens	USACE ERD	Vicksburg
Patrick O'Brien	USACE ERD	Hanover
Jeff Melby	USACE ERD	Vicksburg
Bob Jensen	USACE ERD	Vicksburg
Jesse McNinch	USACE FRF	Duck
Peter Ruggiero	Oregon StateUniversity	Corvallis
Mark Huber	USACE AGC	Morganton
Bill Pierson	University of New South Wales	Sydney
Kate White	USACE IWR	Hanover
Eddie Douglass	MCD-RIT planner	Washington
Thomas Wahl	University of Siegen	Siegen, Germany
Ferdinand Diermanse	Deltares	Netherlands
TBD	Department of Transportation	Washington

USACE Adaptation Policy, Guidance, and Tools

- Sea Level Change
  - Policy & Guidance
    - 2000, ER 1105-2-100 – sensitivity to historic and NRC high rate sea level
    - 2013, ER 1100-2-8162 (supersedes 2009 and 2011's EC 1165-2-211 and 1165-2-212) – Use 3 scenarios
    - 2014 ETL 1100-2-1, adaptation – uses tiered approach with level of effort commensurate with scale of decision and consequences
  - Tools
    - Sea level change calculator available to public, web accessible
    - Sea level calculator supporting Interagency Sandy Sea Level Rise Tool
    - Comparison tool for USACE and NOAA scenarios
    - Simplified method for extreme water levels (waves, tides, surges) in development

USACE Adaptation Policy, Guidance, and Tools

- Hydrology
  - Policy & Guidance
    - ECB published on use of qualitative methods for inland hydrology, USACE ECB 2014-10, March 2014
  - Tools
    - Regional literature syntheses in development, complete FY15
    - Developed consistent nationwide (unregulated) hydrology at HUC-4 watershed level for CONUS based on statistically downscaled climate data
    - Web tool to easily access this hydrology is in development
    - Screening-Level Climate Vulnerability Assessment Tool at Watershed-Scale

Summary

- Like other water resources managers, USACE experiences different types of water disasters ranging from floods to drought
- Climate is changing and will continue to change, increasing hydrologic variability
- Collaborative efforts allow us to translate best available science into information for decision-makers

- Background slides

Climate Change Impacts Water Resources Decisions

Increased **frequency and intensity** of heat waves, along with health and worker safety impacts, drought impacts, species disruptions, increased energy demand for cooling, altered material properties

Changing **precipitation** rates and duration, including increases in heavy precipitation in some locations and longer, more intense droughts in other locations

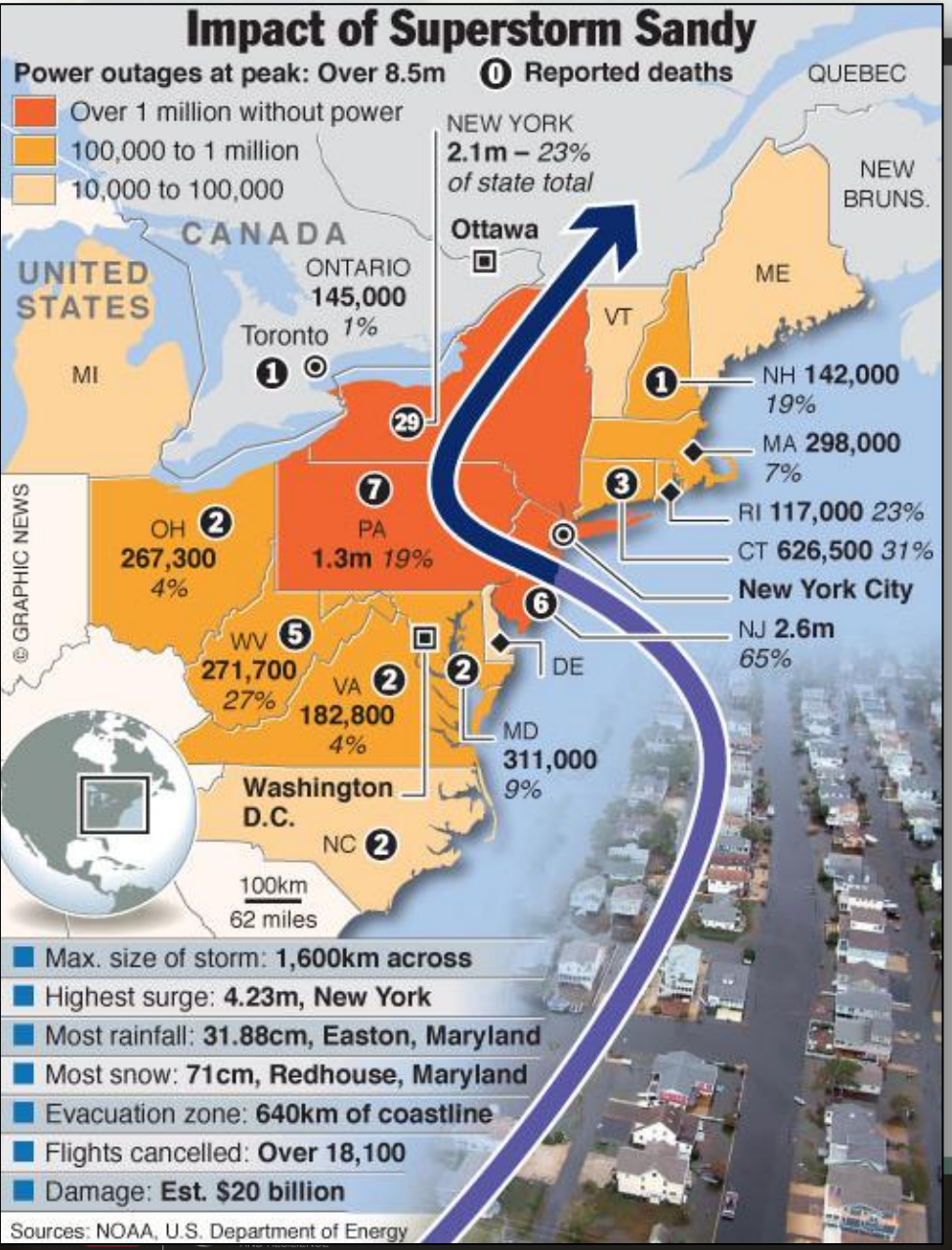
Rising **sea levels** and associated waves, tides, and surges from changing storms

Continued development in increasingly vulnerable areas

USACE Adaptation Policy, Guidance, and Tools

- Datums
  - Policy & Guidance
    - ER 1110-2-8160 Policies for Referencing Project Evaluation Grades to Nationwide Vertical Datums
    - EM 1110-2-6056 Standards and Procedures for Referencing Project Evaluation Grades to Nationwide Vertical Datums
  - Tools
    - USACE Survey Monument Archival and Retrieval Tool (U-SMART) Database
    - Datum Compliance Tracking Tool
- Post-Sandy Flood Risk Recovery Standard
  - Policy & Guidance
    - 2013 ECB 2013-33, Application of Flood Risk Reduction Standard for Sandy Rebuilding Projects
  - Tools
    - Sandy FRRS calculator supporting Interagency Sandy Sea Level Rise Tool

Hurricane Sandy - by the Numbers



- National Hurricane Center predicts storm surges up to 15 feet in the NY/NJ metropolitan area
- USACE aggressively prepositioned technical experts, Planning and Response Teams.
- Incident Support Bases established in PA, MA, NJ, and NY
- Hurricane Sandy makes landfall as a tropical storm.
- Flooding is observed at the NYC Battery, 13.8 fee
- Levee in Moonachie, NJ, is overtopped.
- Numerous coastline breaches