

Mississippi River Commission

General Duke DeLuca

President, Mississippi River Commission

Commander, Mississippi Valley Division

U.S. Army Corps of Engineers

**Tulsa-Catoosa-Muskogee, OK – Ft. Smith-Fayetteville-Russellville-Little Rock, AR
Rosedale, MS - Caruthersville, MO – Memphis, TN – Houma, LA**

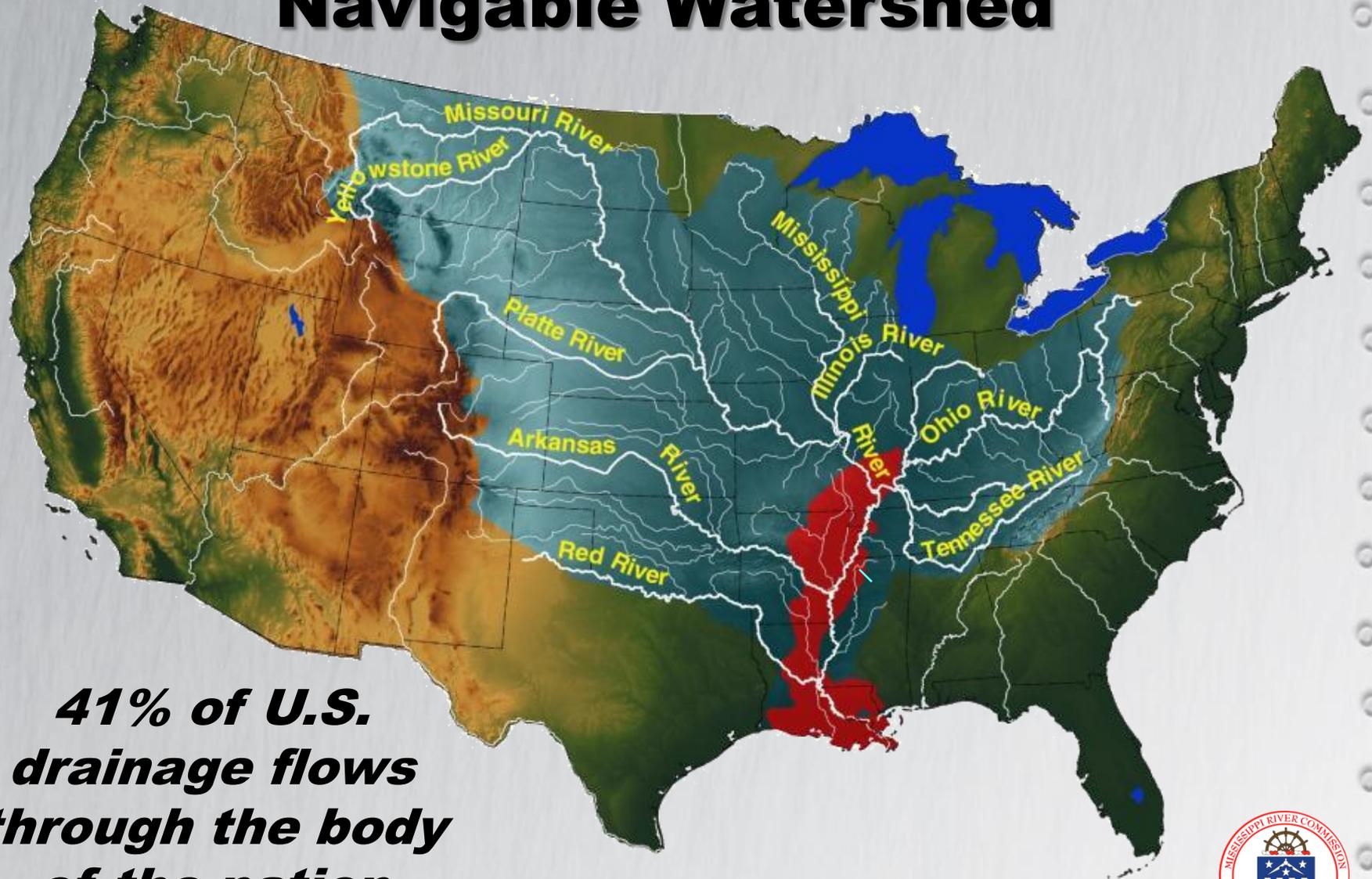
August 10-22, 2014

U.S. Army Corps of Engineers



Civil Works Funding Supports our Diverse Missions/Workforce

World's Largest Naturally Navigable Watershed



***41% of U.S.
drainage flows
through the body
of the nation***

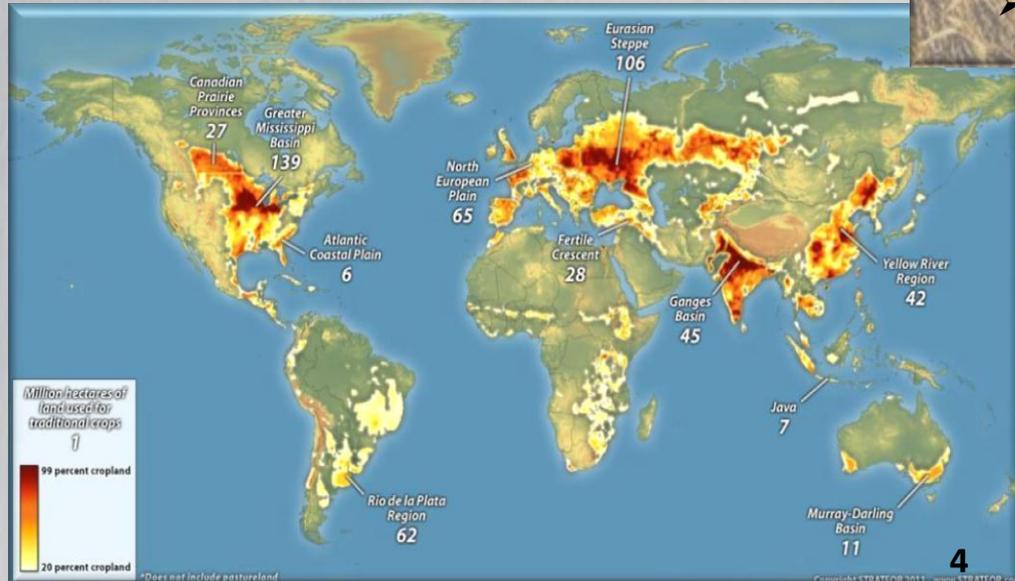
Listening, Inspecting, Partnering and Engineering since 1879



Revolution #1: Explosive Growth in US Agricultural Productivity



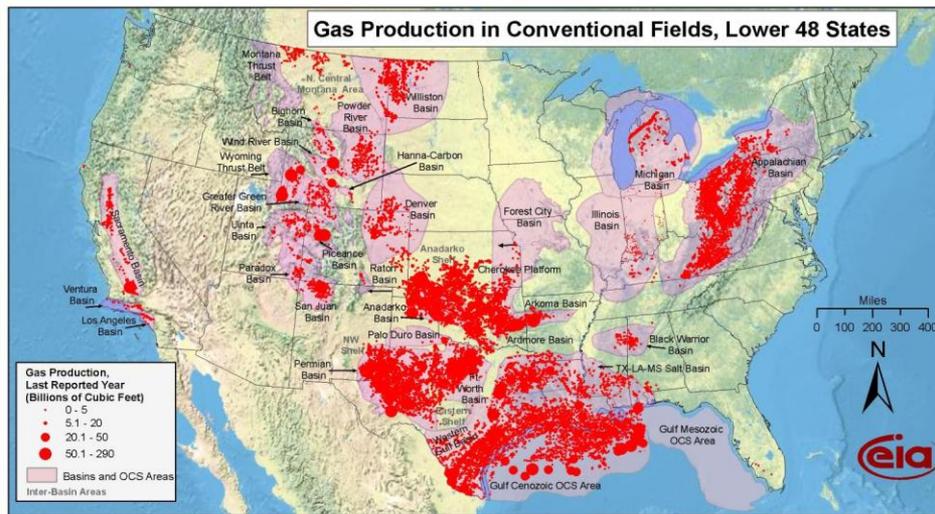
- 15-25 bushels per acre growing to 100 bushels per acre
 - Wheat, rice, soybeans, cotton
- Growing to 200 bushel per acre – corn
 - Some cases 300 bushels per acre
- Second “Green Revolution” now
 - First – 1970s “Borlaug”



Revolution #2: Hydrocarbon Production Revolution

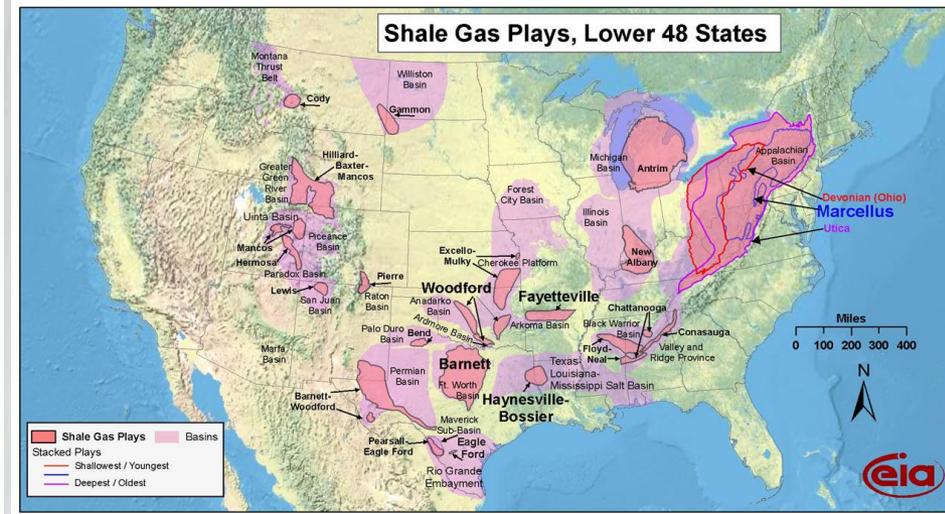
- United States oil production:
 - Grew 18% in last year alone
 - ~~US will be world #1 producer in 2015 (more than KSA)~~ **US is #1 producer July 2014**
- United States natural gas production:
 - United States is world's #1 producer as of 2013 (more than Russia)
- Affects many other industries including chemical, plastics and all manufacturing

Gas Production in Conventional Fields, Lower 48 States



Source: Energy Information Administration based on data from HPDI, IN Geological Survey, USGS
Updated: April 8, 2009

Shale Gas Plays, Lower 48 States

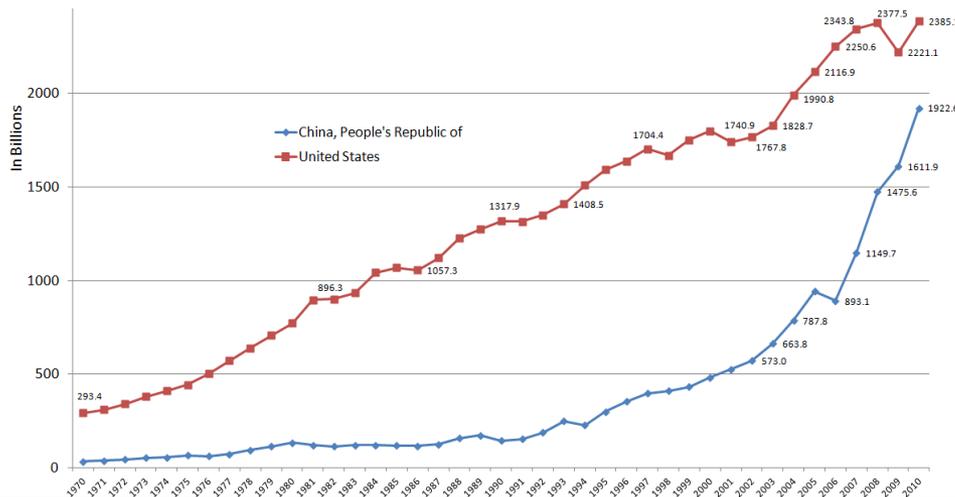


Source: Energy Information Administration based on data from various published studies.
Updated: March 10, 2010

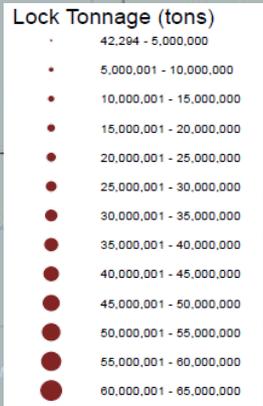


Revolution #3: Return of Manufacturing to the US and the Mississippi Valley

US Manufacturing Output vs China Manufacturing Output 1970 - 2009

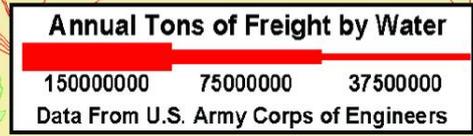


Waterway Tonnage



12,000 miles of inland waterways

- Over 600 million tons moved annually (20 million truck loads)
- 18% of the nation's domestic freight (at a cost of 2/3 that of rail and 1/10 of truck)
- 60% of nation's grain exports
- 22% of coal for electricity generation (10% of all electricity used in the U.S.)
- 22% of domestic petroleum and petroleum products



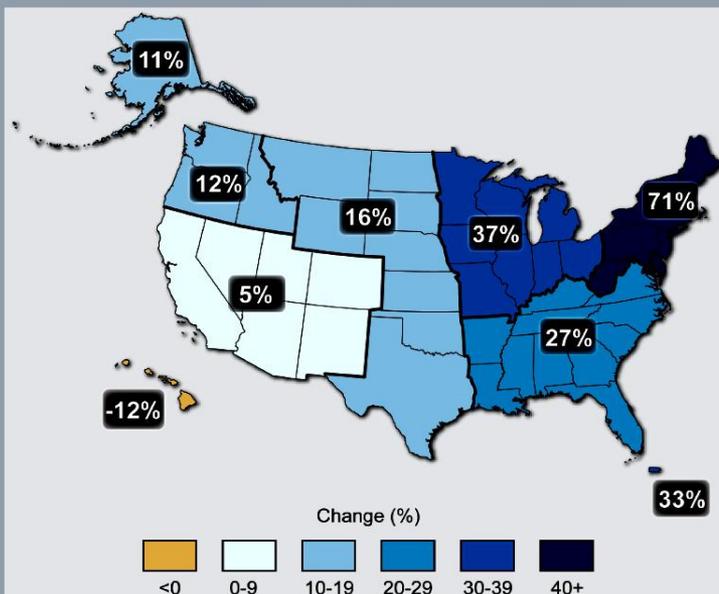
es) by 4-digit
ent volumes (tonnages,
broken down by 4-digit

Revolution #4: Accelerating Impacts of Climate Change

■ Changes to weather

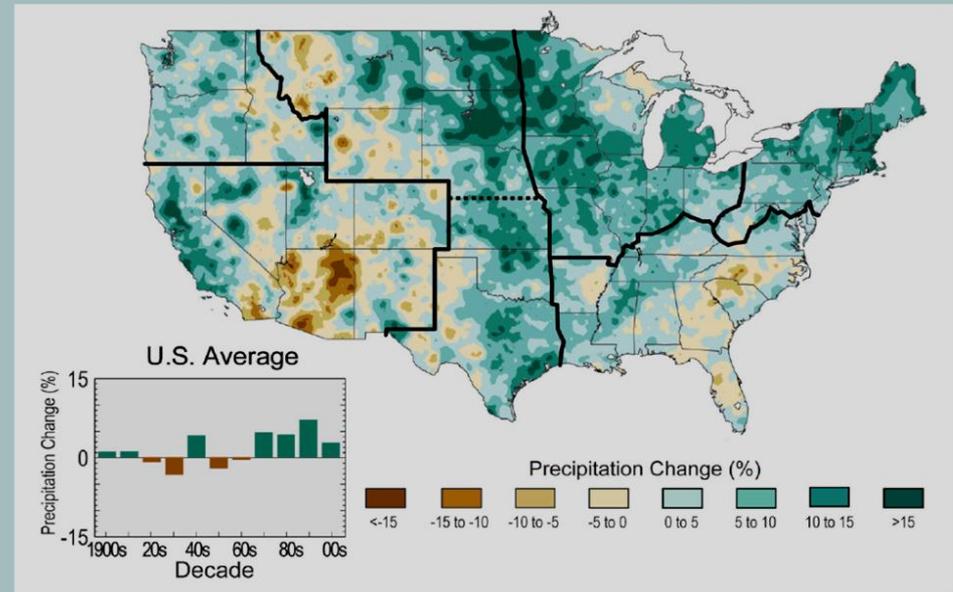
- Precipitation more intense – more volume in less time
- Increased runoff from this and development
- Significant storm events of high intensity
 - Record number of > \$1 billion events in 2013 (41 - 7 in United States)
 - Increasing high damage weather events - 151 since 1980

Observed Change in Very Heavy Precipitation



Percent changes in the amount of precipitation falling in very heavy events (the heaviest 1%) from 1958 to 2012 for each region. There is a clear national trend toward a greater amount of precipitation being concentrated in very heavy events, particularly in the Northeast and Midwest. (Figure source: updated from Karl et al. 2009⁹).

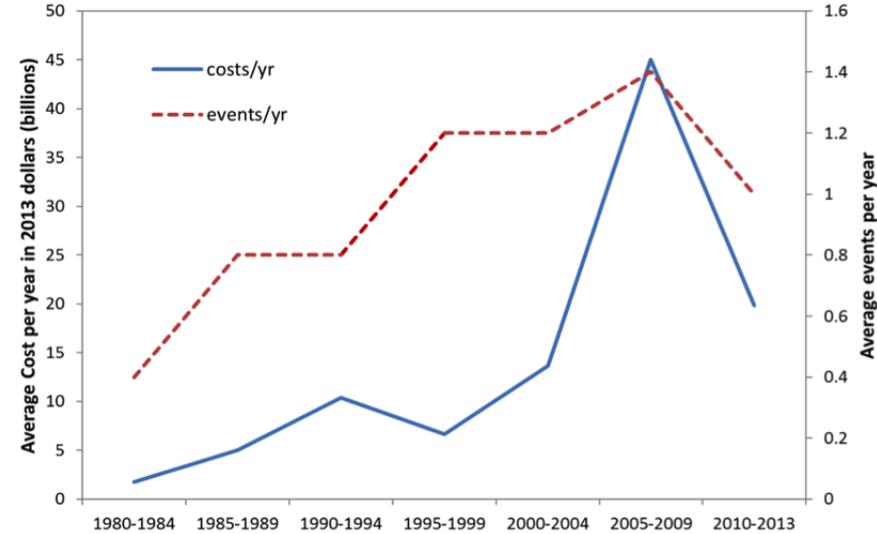
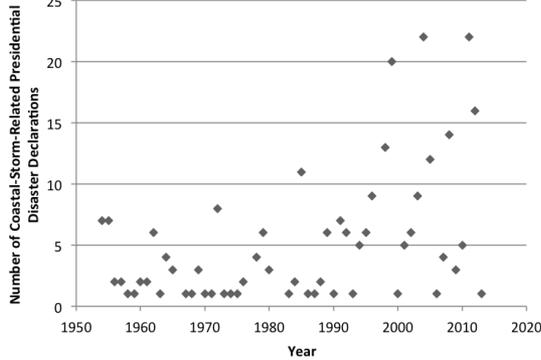
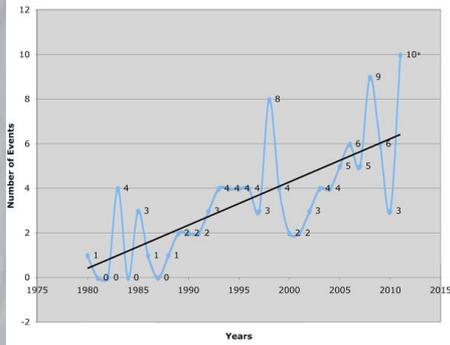
Observed U.S. Precipitation Change



The colors on the map show annual total precipitation changes for 1991-2012 compared to the 1901-1960 average, and show wetter conditions in most areas. The bars on the graph show average precipitation differences by decade for 1901-2012 (relative to the 1901-1960 average). The far right bar is for 2001-2012. (Figure source: NOAA NCDC / CICS-NC).

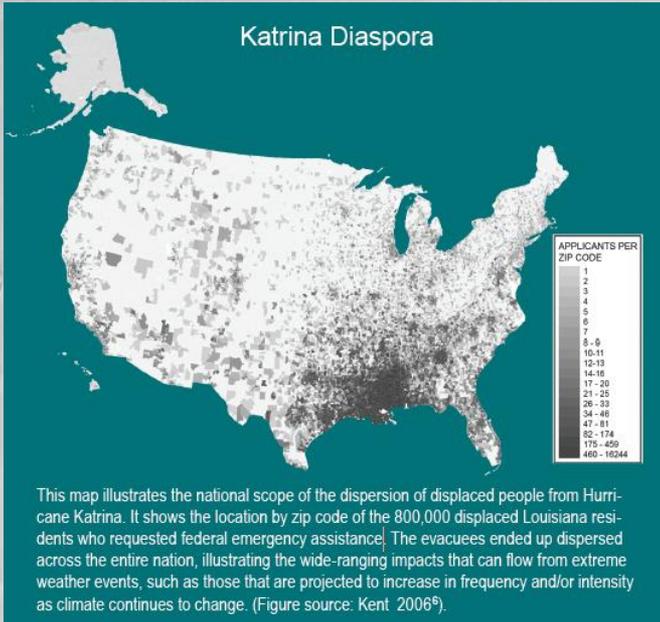
Accelerating Impacts from Climate Change - Damage Trends

US Billion Dollar Weather Events 1980-2010

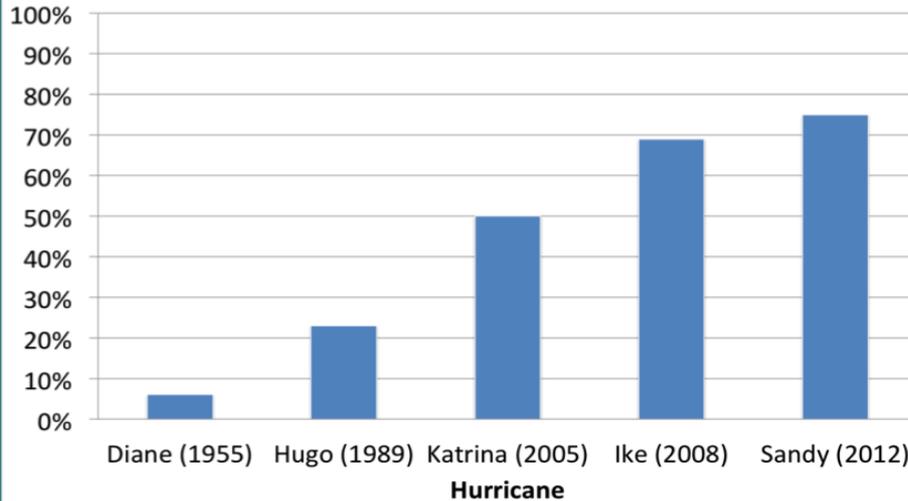


* Including Hurricane Irene, the US has experienced 10 billion-dollar weather events in 2011, as of September 1
Data Source: NOAA's National Climatic Data Center <http://www.ncdc.noaa.gov/imp/reports/billion-disasters2010.pdf>

Climate Change Impacts in the United States: Highlights, U.S. Global Change Research Program, p. 32, <http://nca2014.globalchange.gov/highlights>

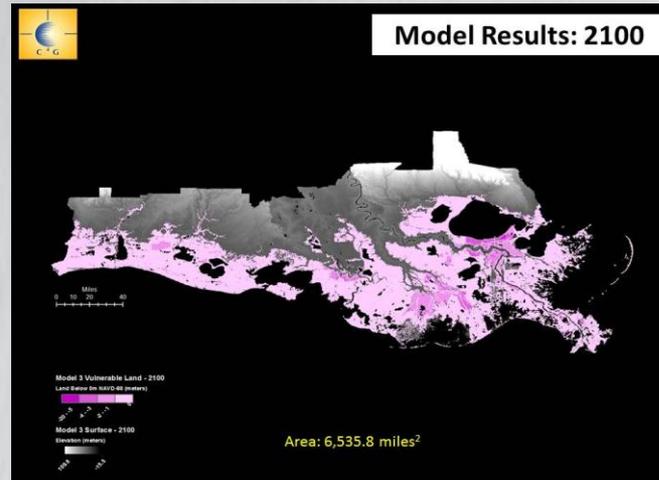
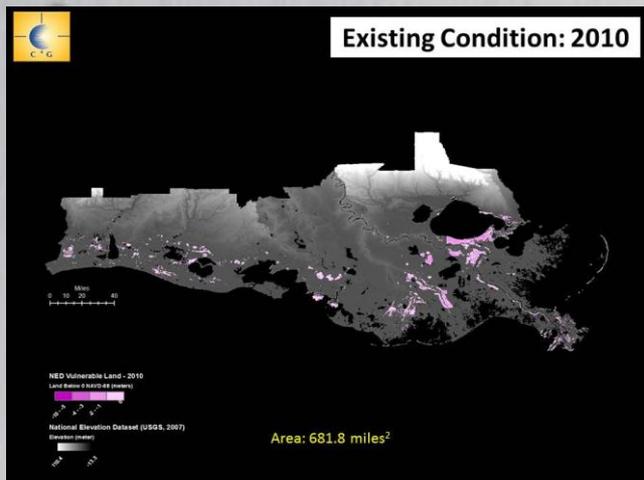
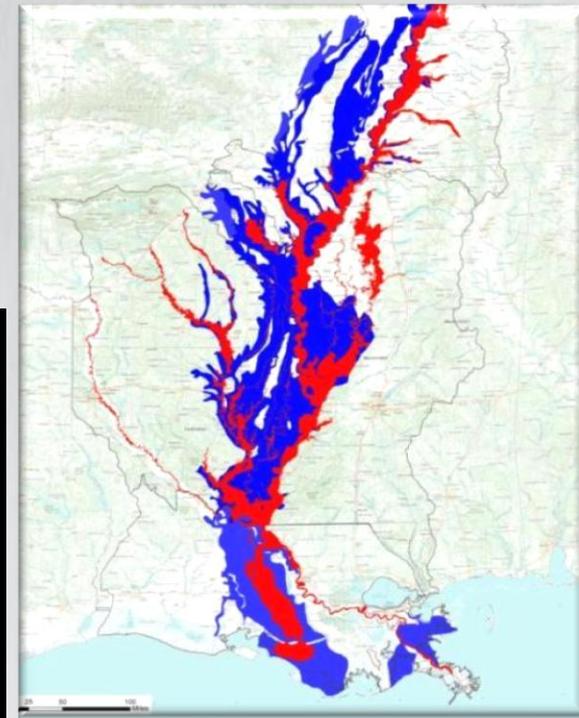


Federal aid as a percentage of total damage



Revolution #4: Accelerating Impacts of Climate Change

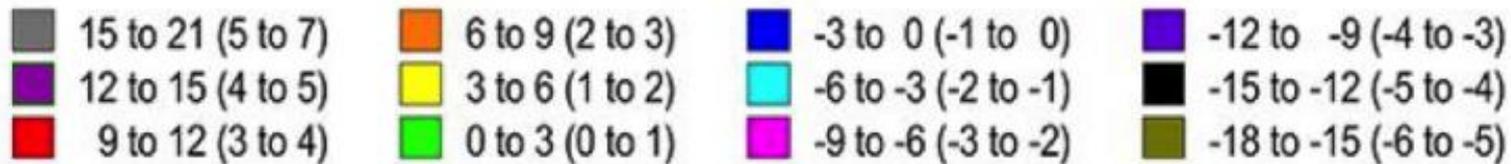
- Changes to watershed functioning – part climate change
 - Higher stages with same or less flow as in the past (need new flow line for Mississippi River – underway)
 - Bottom changes (geomorphology study underway)
 - Accelerating sea level rise
 - Louisiana coastal land loss is relative SLR



Impacts of Climate Change – Coastal Risk

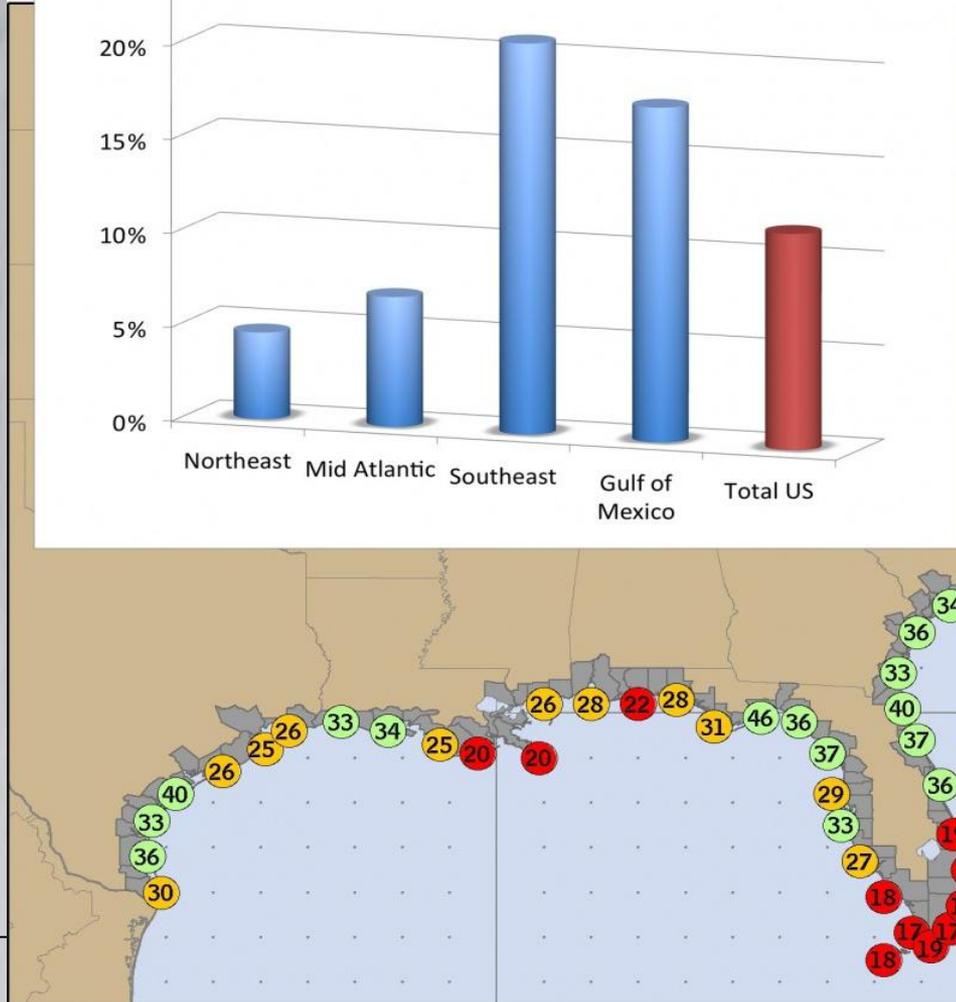
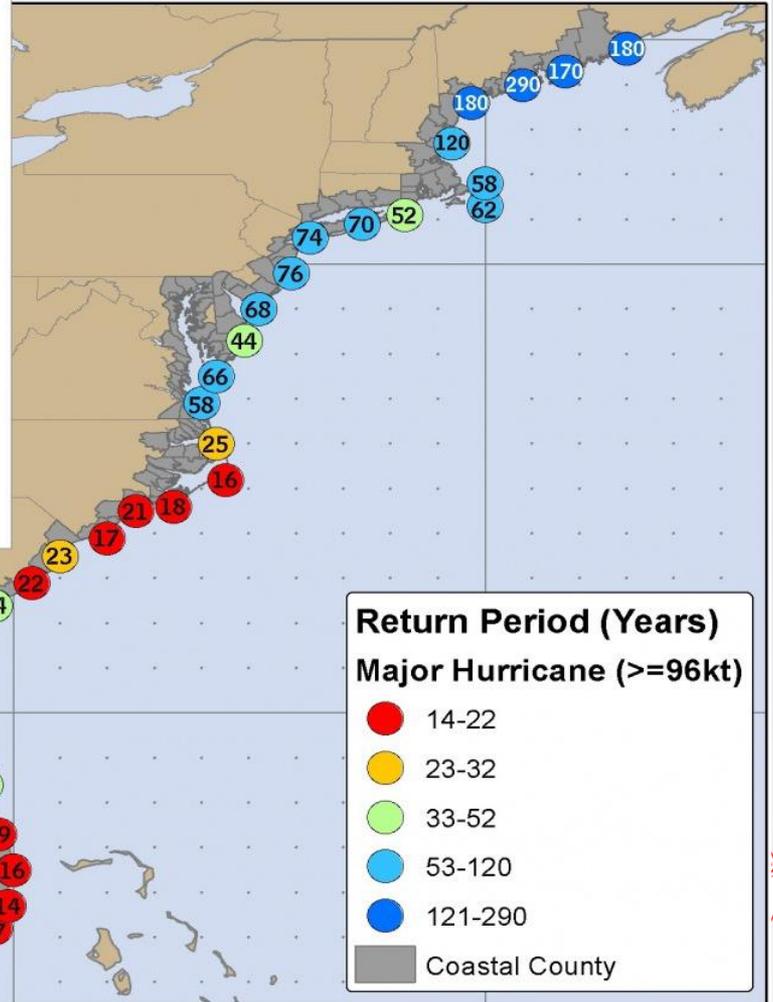
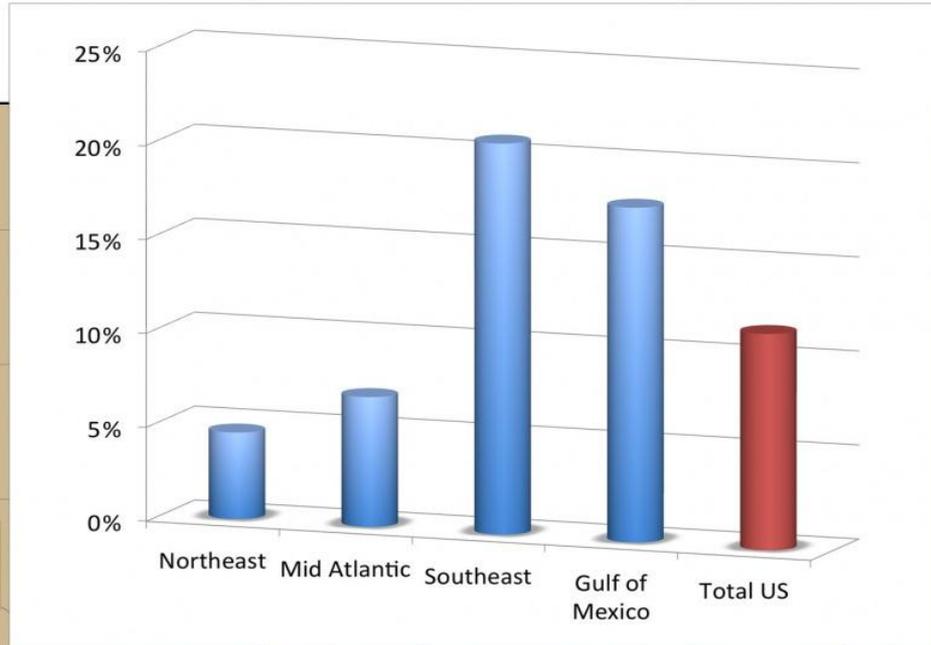


Sea Level Trends
mm/yr (feet/century)

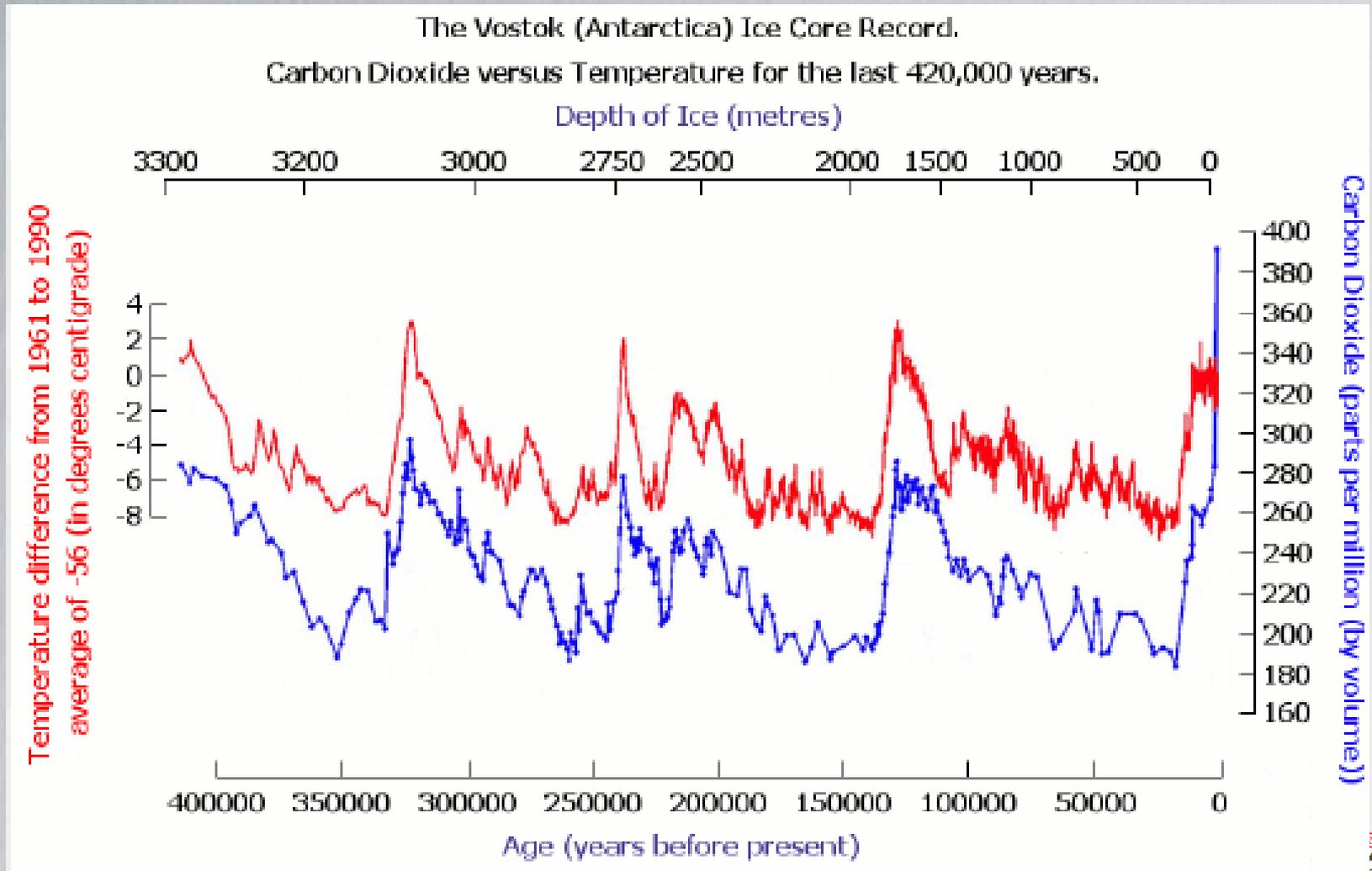


Impacts of Climate Change - Coastal Risk Exposure Trend

Percentage of Coastal Population Growth, 2000-2011



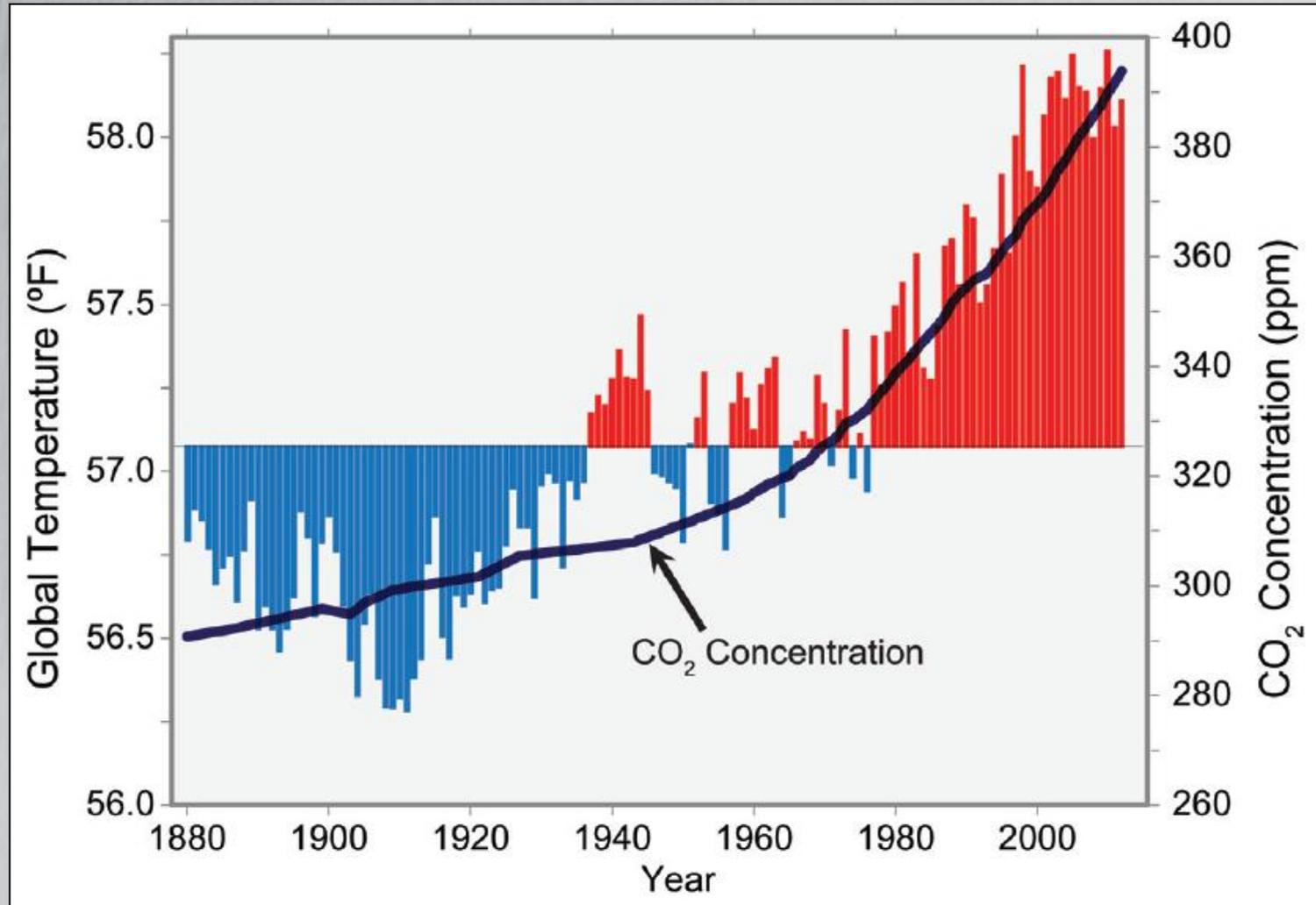
CO₂ Concentrations and Proxy Temperatures from the 400,000+ Vostok Ice Core Data Set



*Graphic courtesy of NOAA Paleoclimatology, National Climatic Data Center



Global Temperature and Carbon Dioxide

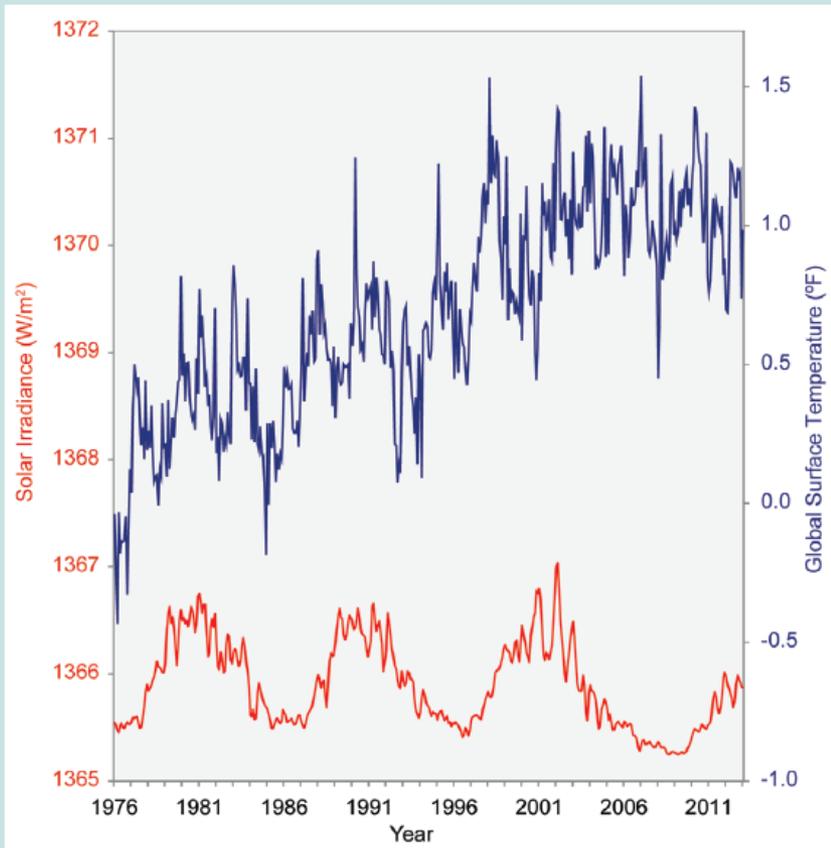


Climate Change Impacts in the United States: Highlights, U.S. Global Change Research Program, p. 18, <http://nca2014.globalchange.gov/highlights>

Listening, Inspecting, Partnering and Engineering since 1879



Measurements of Surface Temperature and Sun's Energy



The full record of satellite measurements of the sun's energy received at the top of the Earth's atmosphere is shown in red, following its natural 11-year cycle of small ups and downs, without any net increase. Over the same period, global temperature relative to 1961-1990 average (shown in blue) has risen markedly. This is a clear indication that changes in the sun are not responsible for the observed warming over recent decades. (Figure source: NOAA NCDC / CICS-NC).

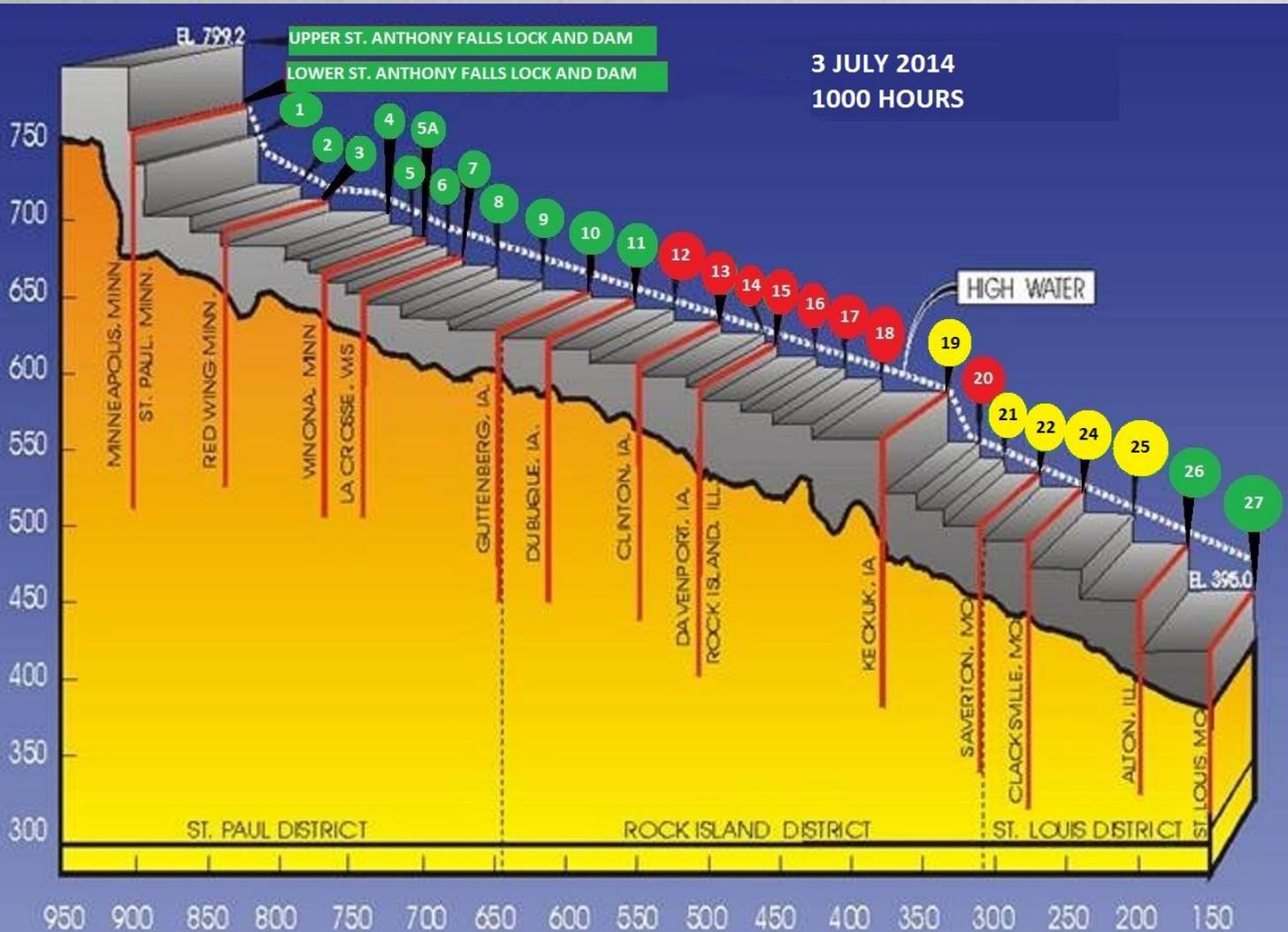
Climate Change Impacts in the United States: Highlights, U.S. Global Change Research Program, p. 23

<http://nca2014.globalchange.gov/highlights>



Locks and Dams Have Many Benefits - Not Just Navigation

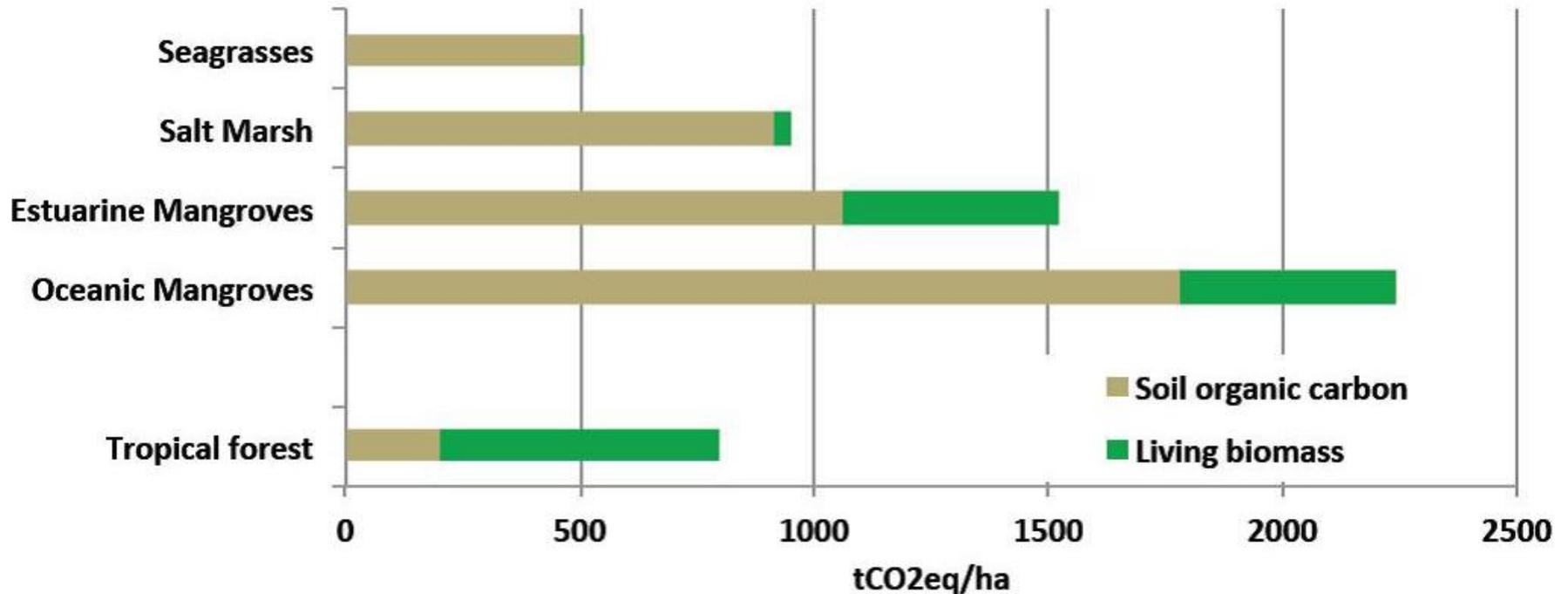
■ Aquifer Recharge -- Hydropower -- Conservation



- Flood risk reduction
- Recreation
- Eco-systems restoration and eco-system services
- Water supply
- Real estate



Coastal restoration and ecosystem restoration are not just about conservation and physical protection - natural habitats that absorb CO₂

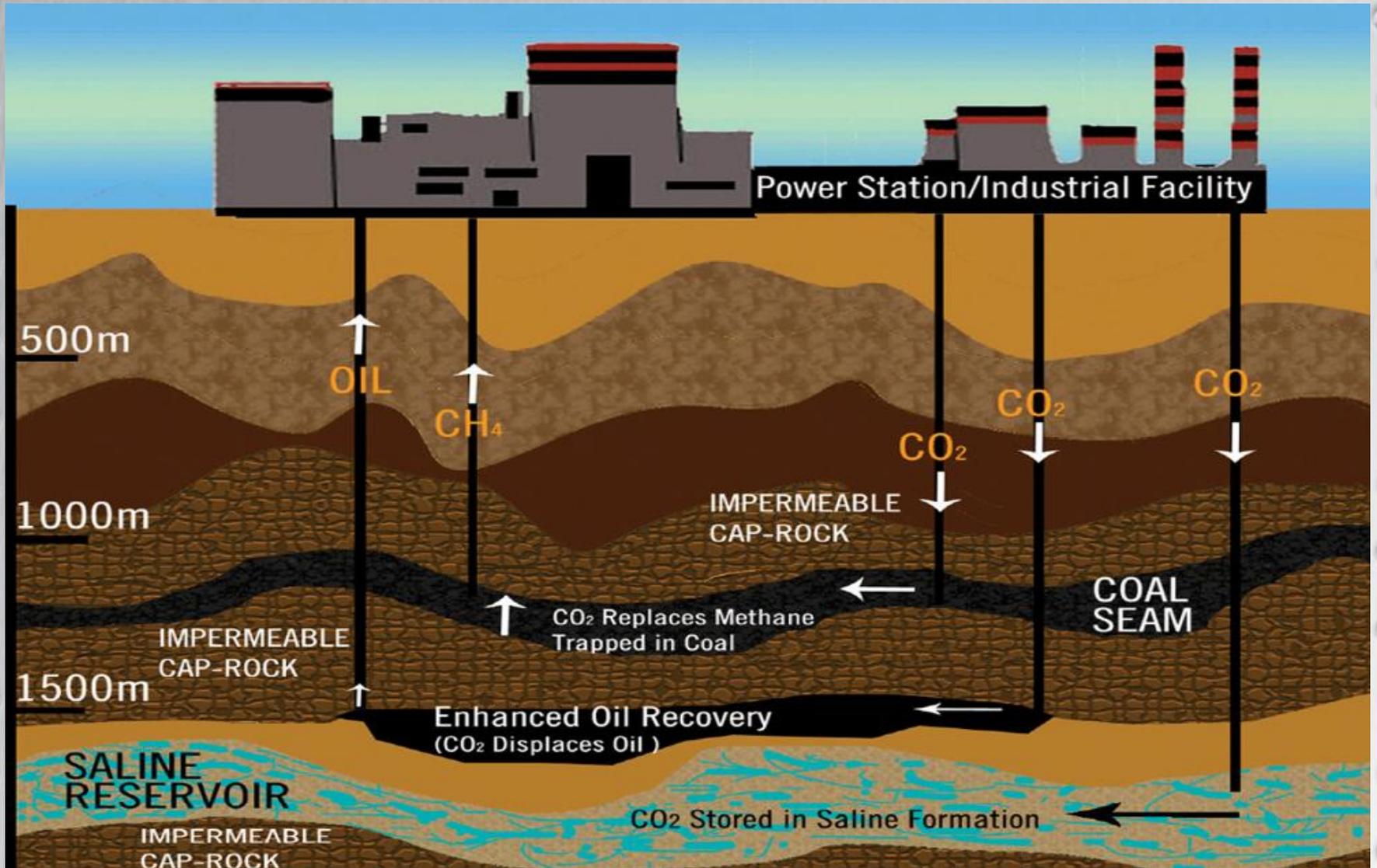


*Data is per unit area, where tCO₂eq/ha is tons of carbon dioxide equivalents per hectare.

Source: Murray, Brian, Linwood Pendleton, W. Aaron Jenkins, and Samantha Sifleet. 2011. Green Payments for Blue Carbon: Economic Incentives for Protecting Threatened Coastal Habitats. Nicholas Institute Report. NI R 11-04

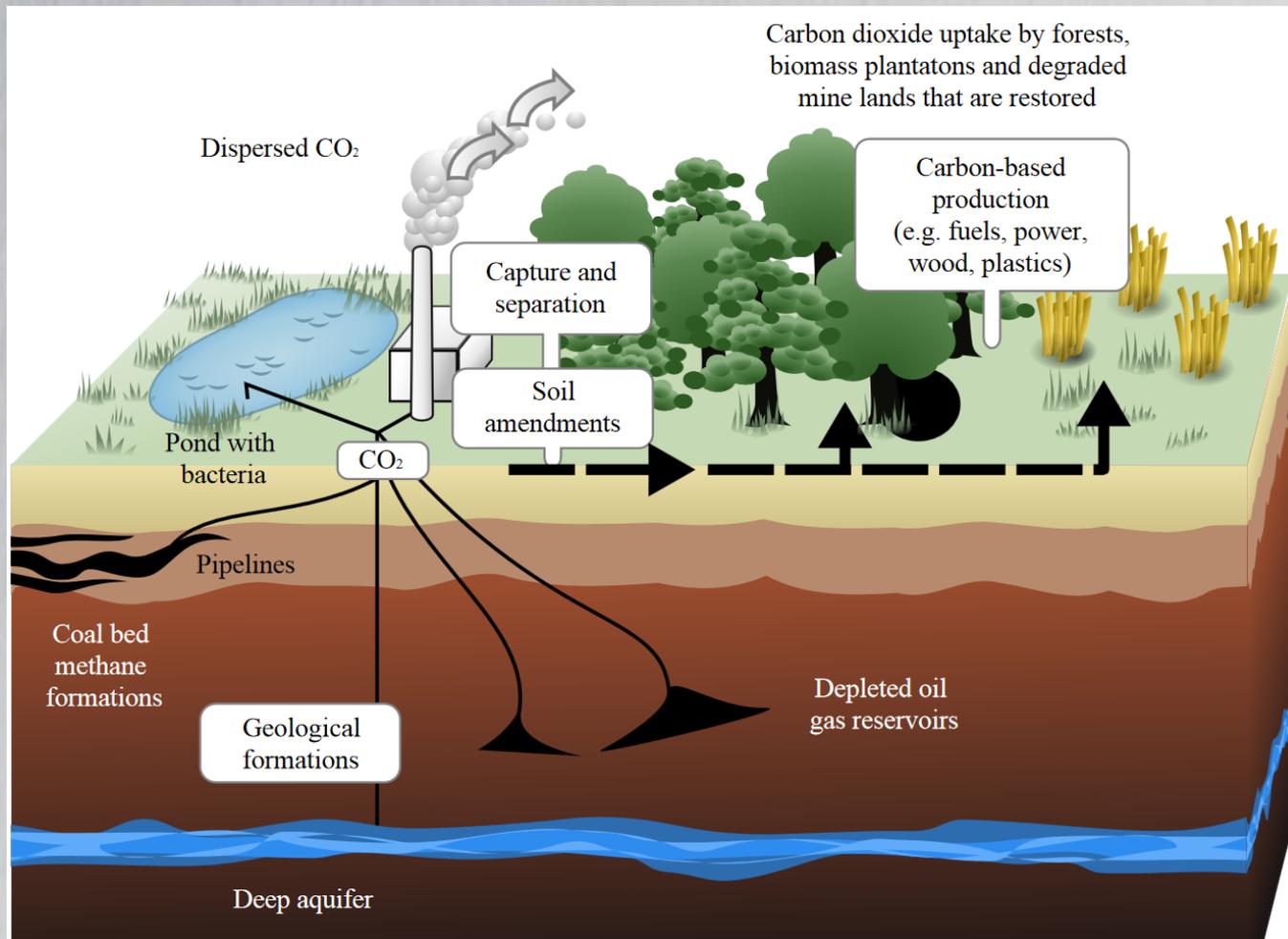


Carbon Capture & Sequestration

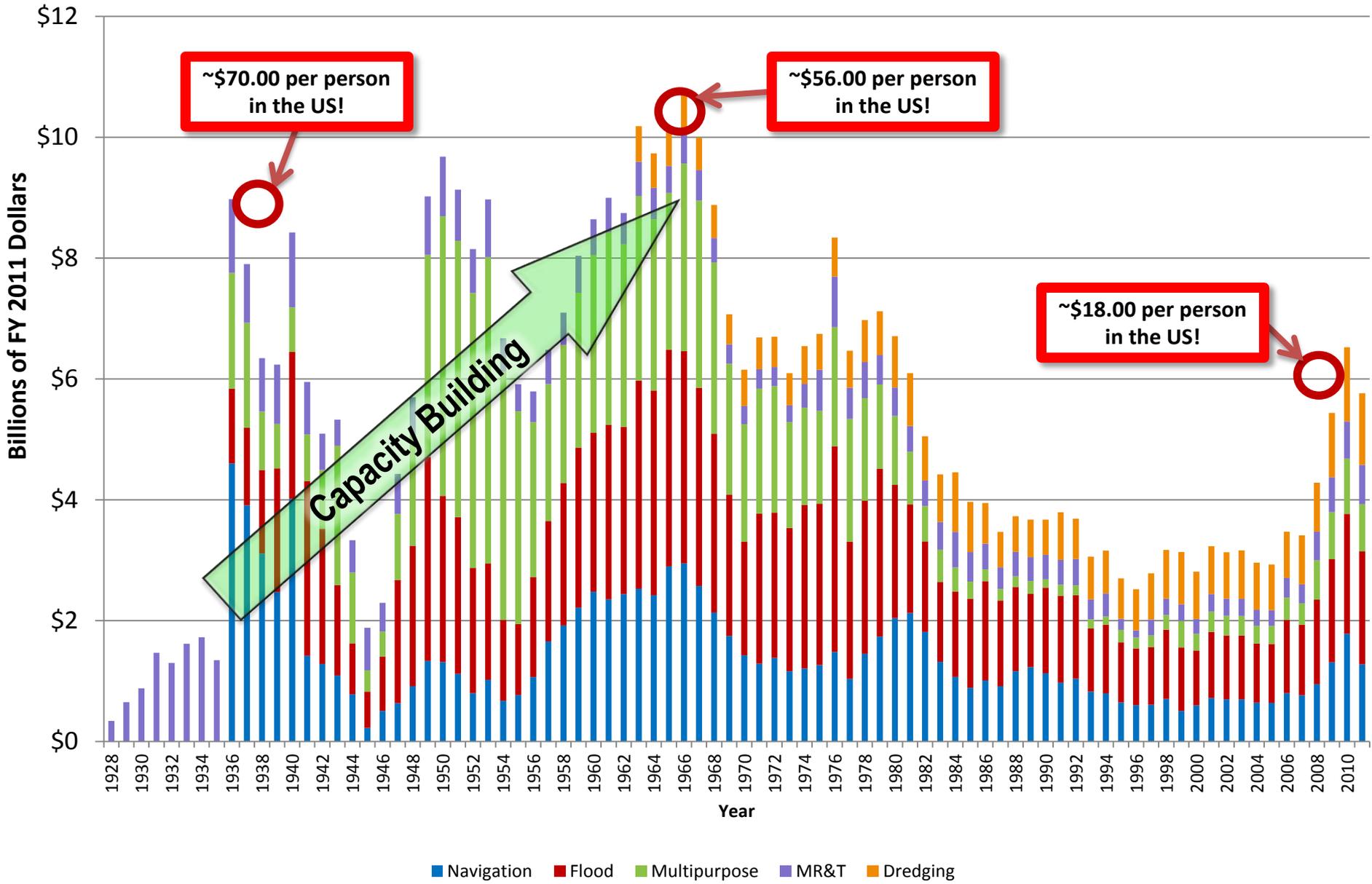


“Carbon Capture & Sequestration Flow Chart”, World Resources Institute,
<http://www.wri.org/resources/charts-graphs/carbon-capture-sequestration-flow-chart>

Terrestrial and Geological Sequestration of CO₂ Emissions from a Coal-Fired Plant

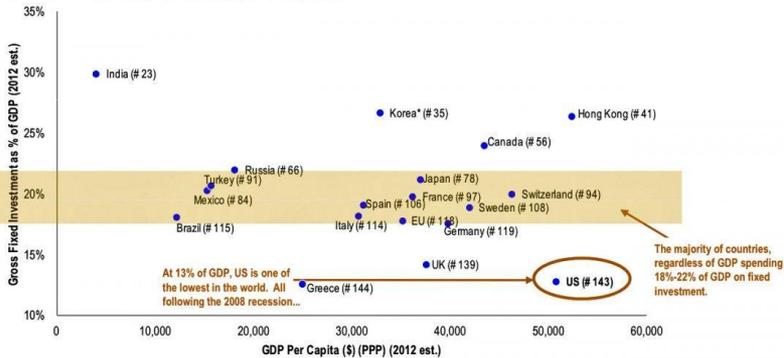


Historical Investments by USACE Functional Category 1928 to 2011



United States relative to other nations

Figure: GDP Per Capita versus Gross Fixed Investment as a % of GDP: Underinvestment in the US
Estimates for 2012. The rank of Gross fixed investment as % of GDP is in the parenthesis.



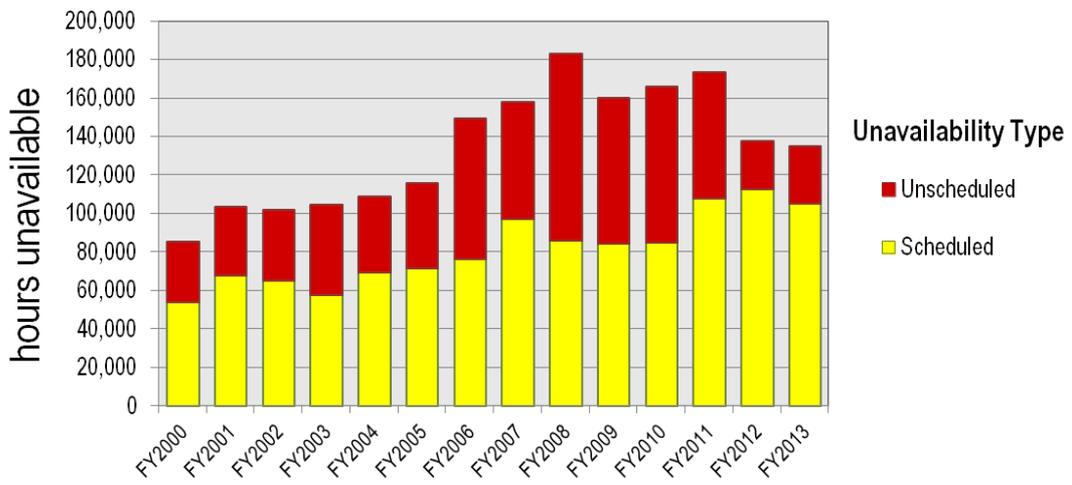
Low investment in infrastructure!
(equivalent to Greece #143 in world)

Since 2000: more than a doubling in delays!

These are actual delays experienced by vessels!

Effects of decreased investment

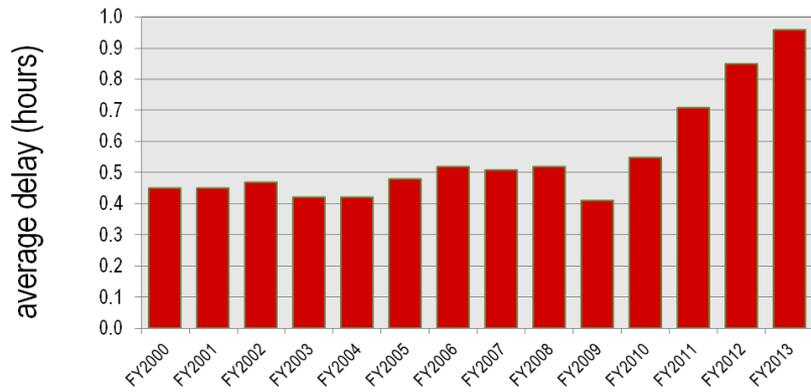
US Army Corps of Engineers: Navigation Lock Unavailability



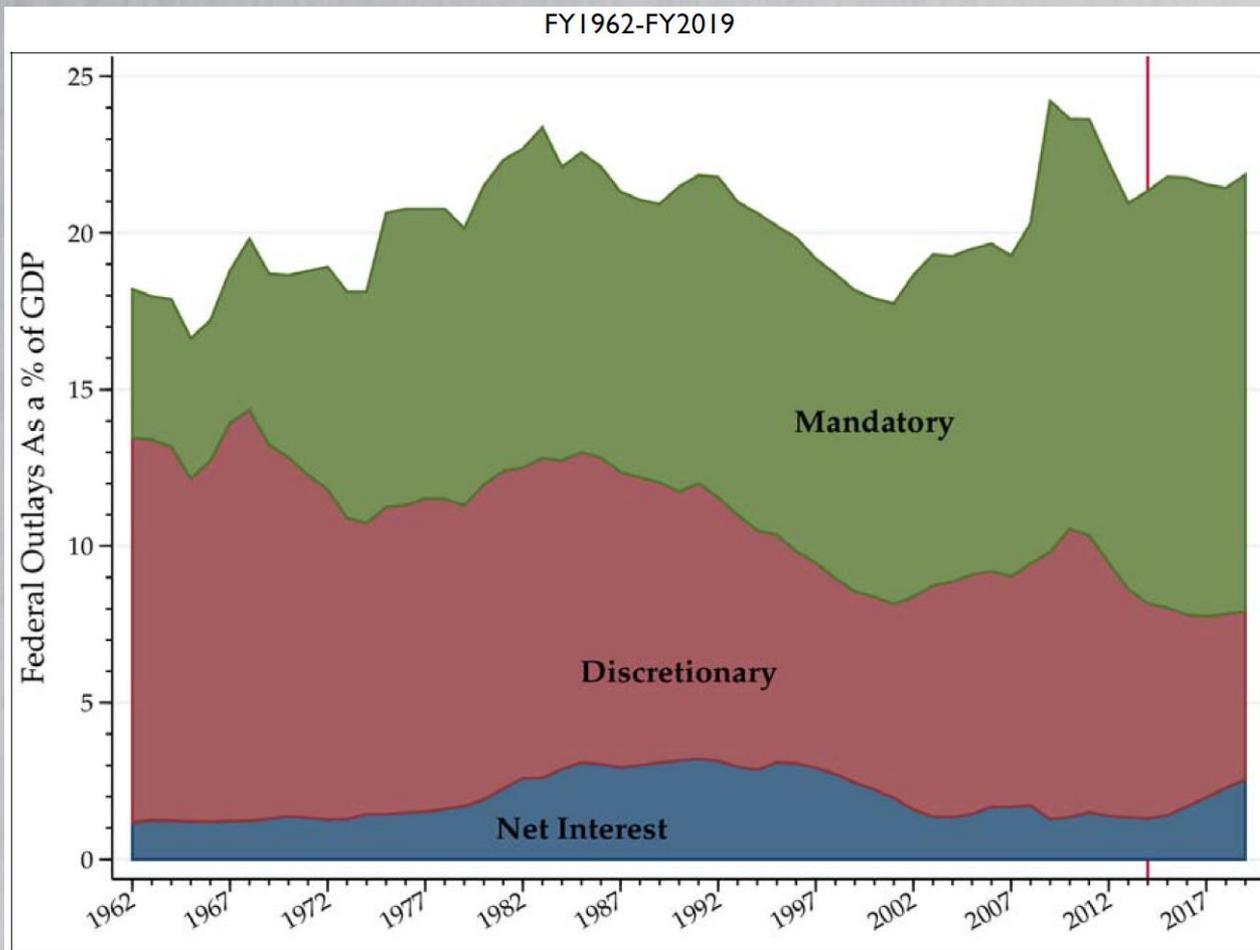
Since 2000:

- **~50% decrease in availability**
- **Twofold increase in scheduled outages!**

US Army Corps of Engineers: Vessel Delays at Locks



Components of Federal Spending: FY1962-FY2019

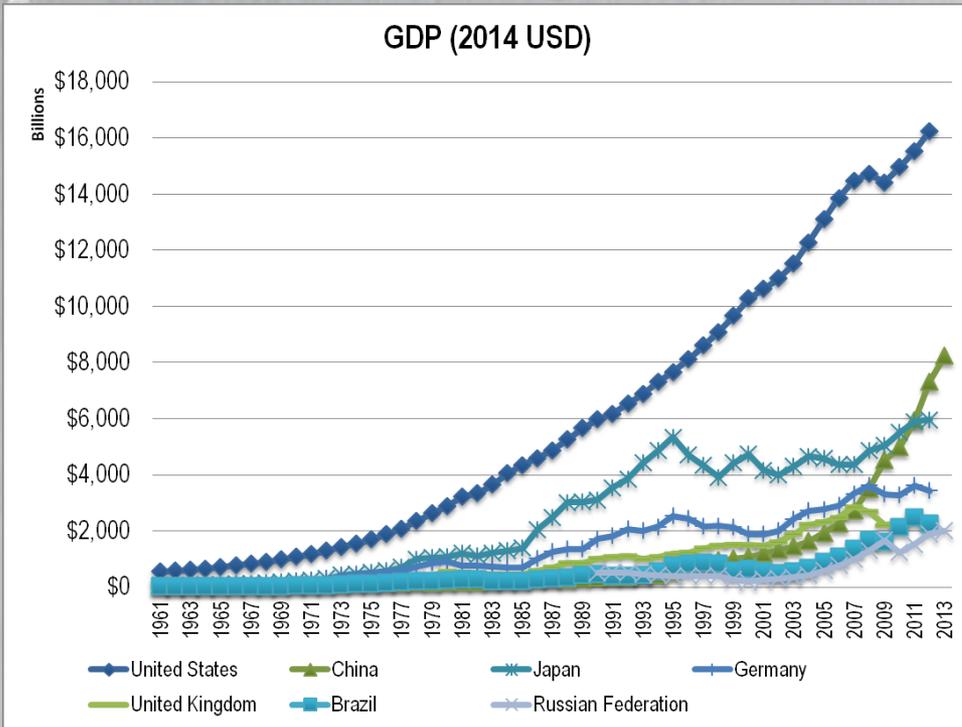


As published in “The Budget Control Act and Trends in Discretionary Spending,”
D. Andrew Austin,
Congressional
Research Service,
2 April 2014, p. 20.

Source: CRS calculations based on data from the FY2015 OMB budget submission.

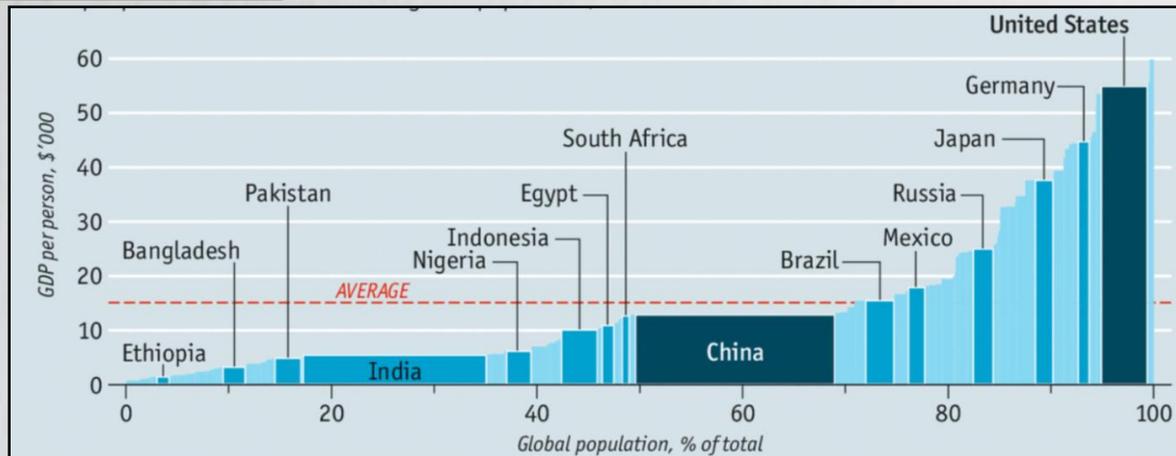


Comparison of gross domestic product



GDP per person at purchasing power parity and share of global population, 2014 forecast

As published in The Economist, "The Dragon takes wing", May 3, 2014, p. 65.



Sources: International Comparison Programme; IMF; The Economist

*Purchasing-power parity

Failure of Vision

- “Nothing has been proposed during my twenty-two years in the United States Senate that would do more to wreck our fiscal budget system. As we spend and borrow and borrow, the least we can do for future generations – our children and grandchildren, on whom we would place astronomical burdens – is to keep an honest set of books so we’ll know what debts we of this generation have incurred for them to pay.”

--Sen. Harry Byrd: VA commenting on the proposed Clay Plan for the Eisenhower Interstate Highway System, 1955

Success of Vision

- United States GDP has grown 5.7 times larger today than in 1955 – due in large part to investments in inland waterways and the interstate highway system.
 - \$ 2.78 trillion in 1955
 - \$ 15.95 trillion in 2014



And By the Way...

- **We are not adapting to the four revolutions across MVD and the nation**
- **We are not serious about “performance-based budgeting”**
 - **USACE generates \$15 billion in annual fees for Treasury vs \$5-6 billion appropriations**
 - **Payback period = 4 months**
 - **Annual payback ratio = 3:1**
 - **USACE generates > \$50 billion in annual direct NED benefits vs \$5-6 billion appropriations**
 - **Payback period \leq 2 months**
 - **Annual Payback ratio = 6:1**
- **Our infrastructure makes delivery of domestic stability, global stability and security possible.**



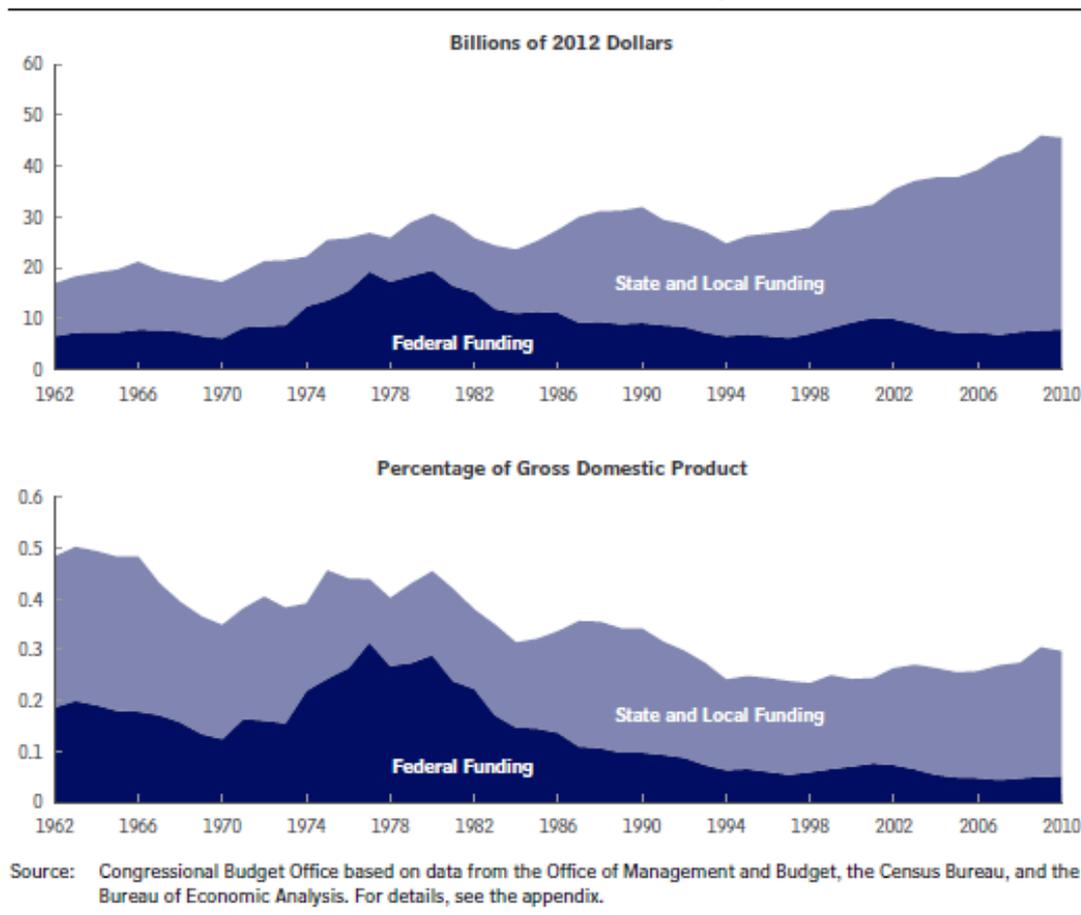
The Bottom Line:

- **Our infrastructure makes global STABILITY and American domestic SECURITY and ECONOMIC PROSPERITY possible!**
 - Our infrastructure is degrading and our infrastructure is underperforming
 - The United States is under-investing in its infrastructure and the United States significantly lags other developed nations in its maintenance of prior investments.
 - We stand to lose hard-fought ground earned by prior generations through their financial and personal sacrifices
 - Our economic prosperity, national security, standard of living and environmental quality are at risk
 - Our infrastructure is NOT disposable and should not be treated as such
- **The United States is on an unsustainable glide-path! Something MUST change!**
- **USACE / Federal approps model of the 20th Century UNLIKELY to be restored.**
 - Private, state and local capital MUST be brought to bear
 - USACE must incorporate standards and oversight model similar to FAA and airports; MUST consider grant-making model similar to DoT
 - USACE MUST include system-wide P3 options
 - Full privatization MUST be on the table and considered
 - Modified TVA Model for the entire inland waterway possible
 - Modified FAA Model for USACE oversight of WR investments



Water Infrastructure Spending

Water Infrastructure: Sources of Nondefense Investment, 1962 to 2010



Between 1962 to 2010:

- Total funding **increased**
- % GDP **decreased**
- Greater burden on state and local funding sources as infrastructure ages.



Is WRRDA 2014 The Beginning of a Federal Response?

- Developing implementing guidance – with **YOU!**
 - Needs your input to exploit full authorities to benefit public
 - Needs your active support to achieve in a relevant timeline
- Section 1001, 2, 4, 5 – SMART planning streamlining studies and reviews, Section 1005 **streamlined environmental review process**
- Section 1007 – Speeds 408 permission review process
- Section 1014 – Raised trigger for independent external peer review
- Section 1013 – Improve PPA templates
- Section 1014, 1015 – Allows non-federal entities to contribute funds to advance projects or to execute – studies, construction and receive credits



Is WRRDA 2014 The Beginning of a Federal Response?

- Section 1017 – Explore non-federal entities paying for expanded lock operations
- Section 1018, 1019, 2020-2022 – Clarifies credits for in-kind contributions flexibly applied with some transferable between projects
- Section 1043, 5014 – **Directs public-private partnership pilot program (up to 15 proposals)** Section 1044 - **revised IEPR triggers**
- Section 2002 – Refines inland navigation project management, enables ECI, D-B, continuing contracts and MILCON-type mechanisms, expands Inland Waterways User Board's roles and responsibilities, **requires a 20-year inland navigation and intercoastal navigation plan (within 5 years).**
- Section 2003-6, 2013 – Adjust rules on IWTF, Olmsted



Is WRRDA 2014 The Beginning of a Federal Response?

- Section 2010 – Closure for navigation of Upper St. Anthony Falls Lock & Dam
- Section 4002 – USACE and NOAA upgrade water level forecasting, special status of Upper Mississippi Basin and need for the NESP, USACE examine safety of navigation in extreme low water
- Section 1036 – Authorizes USACE to construct a locally preferred plan for a higher level of protection authorized in a WRDA, if feasible. NFS funds all costs above federally authorized level
- Section 3001 - Establishes national dam safety program for awareness and outreach to public
- Section 3011 – Allows NFS to remain eligible for PL 84-99 program if significant progress is being made on meeting federal requirements to improve the system



Is WRRDA 2014 The Beginning of a Federal Response?

- **Section 3023, 24, 25 – Directs USACE to evaluate strategies for managing comprehensive risks of extreme weather events using all tools, including ecosystem restoration and develop potential rehab or improvement to reduce risk**
- **Section 5023 – Directs USACE to study flood risk management and navigation infrastructure in the Mississippi Basin to improve the system in flood and drought**
- **Section 3016 – Establishes national levee safety program**
- **Section 1008 – Makes non-federal hydropower development on USACE civil works features a national priority with USACE report in two years**



Is WRRDA 2014 The Beginning of a Federal Response?

- **Section 3017 – Allows USACE to restore flood risk reduction projects to their authorized level of protection in response to settlement, subsidence and relative sea level rise**
- **Section 3027 – Directs USACE to establish an emergency communications network for notification and help when rain and runoff exceed lowest risk to life and property**
- **Section 5023 – Study flood risk and navigation in upper Mississippi basin**
- **Title V, Subsection C – Creates WIFIA \$175 million over 5 years; loans for projects worth more than \$20 million**
- **Over \$9.1 billion of new authorized projects out of \$14.6 billion nationally are in the Mississippi watershed**



What is Needed Now ?

- Renewed or return of understanding about federal investments
- Continue the democratization of water resource decisions and resourcing
- Evolution of USACE 3.0
- Creation of environmental movement 2.0
- Active involvement of producers (agriculture & manufacturers), shippers, transportation, recreators, sportsmen, naturalists, secondary business owners, YOU!



Nothing is as easy as it looks or sounds



WWII

Because Scissors always beat paper.



America's Watershed: A 200-year working vision

An Intergenerational Commitment

Our people enjoy a quality of life unmatched in the world. We ...

- **Lead secure lives along the river or tributary.**
- **Enjoy fresh air and the surrounding fauna, flora and forests while hunting, fishing and recreating.**
- **Travel easily, safely and affordably.**
- **Drink from and use the abundant waters of any river, stream or aquifer.**
- **Choose from an abundance of affordable basic goods and essential supplies that are grown, manufactured and transported along and by the river to local and world markets.**

Leveraging local citizens' input, international dialogue, science, engineering, technology and public policy



The Mississippi watershed is 41% of the US, 31 states, 1.25 million square miles, over 250 tributaries

Balancing needs for ...

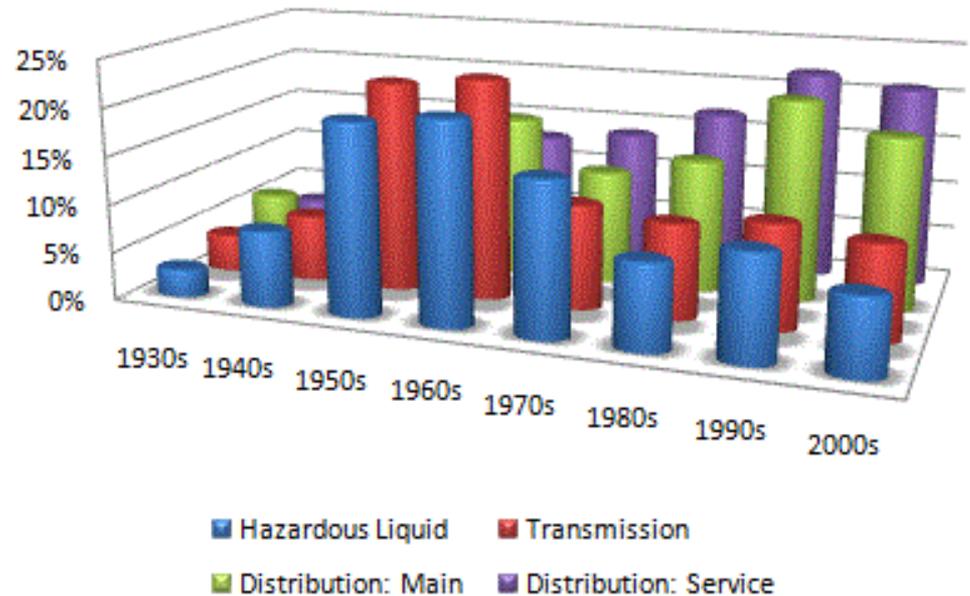
- ❖ **National security, flood control and flood damage reduction**
- ❖ **Environmental sustainability & recreation**
- ❖ **Infrastructure & energy**
- ❖ **Water supply & water quality**
- ❖ **Movement of goods; agriculture & manufacturing**

join the dialogue, visit:
www.mvd.usace.army.mil/mrc
cemvd-ex@usace.army.mil

Aging Pipeline Infrastructure

Decade	Hazardous Liquid	Transmission	Distribution	
			Main	Service
UNK/Pre 20s	2%	---		
1920s	2%	2%	---	---
1930s	3%	4%	6%	3%
1940s	8%	7%	2%	2%
1950s	20%	22%	10%	8%
1960s	21%	23%	17%	13%
1970s	16%	11%	12%	14%
1980s	9%	10%	14%	17%
1990s	11%	11%	21%	22%
2000s	8%	10%	18%	21%

Source: Pipeline Safety Update, U.S. Department of Transportation, September 2012,
<https://www.hSDL.org/?view&did=722017>



Hazardous Liquid and Gas Transmission Pipelines

Pipelines as of June 2010

