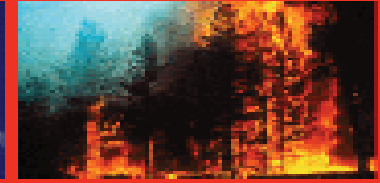
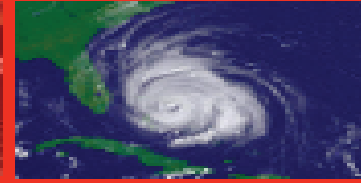
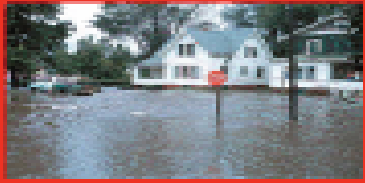
An aerial photograph showing a levee system. A wide, light-colored dirt or gravel levee runs diagonally from the bottom left towards the top right, separating a large, dark blue flooded area on the right from a dry land on the left. On the dry land, there is a paved road with a yellow school bus driving on it. In the background, a small white house with a blue roof is visible among some trees. The flooded area on the right has some small trees and structures partially submerged. The overall scene illustrates the impact of a levee in flood control.

**Levee Is Not
a Four
Letter Word,
But...**

Natural



Dealing with Levees – in the Absence of National Policy

June 19, 2008
Washington, DC



Gerald E. Galloway, Jr., PE, PhD
Water Policy Collaborative, University of Maryland
Visiting Scholar, US Army Corps of Engineers, IWR



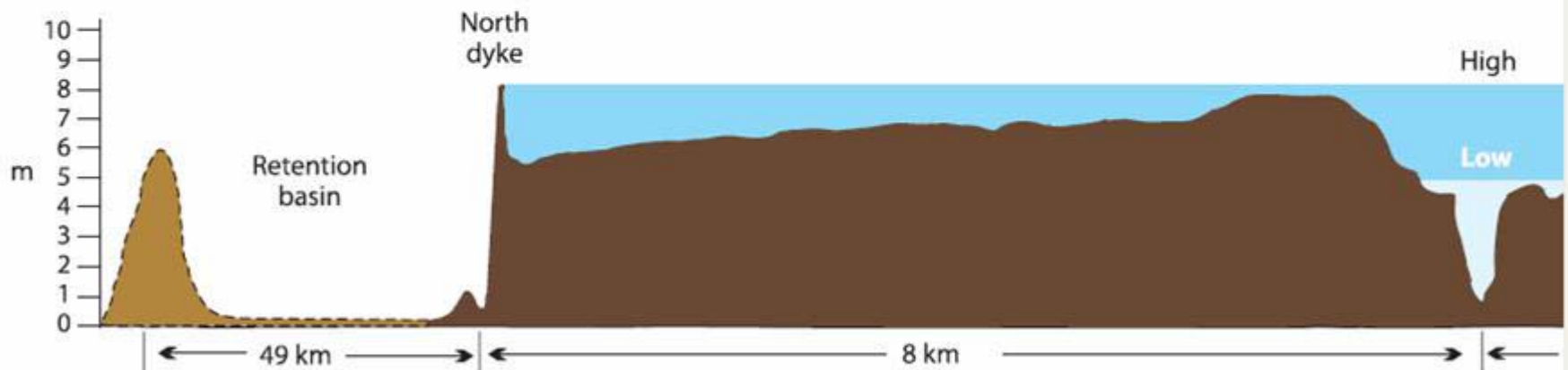
Floods and the Need for Protection Have Been Around for a Long Time



Civilizations Have Grown Around Water Infrastructure

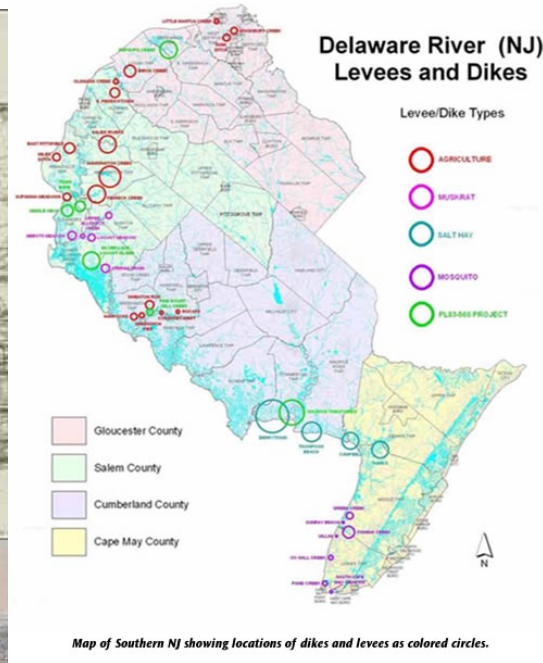


FIGURE 2
Representative cross-section of the "suspended" Yellow River.



Mark Giordano, Zhongping Zhu, Ximing Cai, Shangqi Hong, Xuecheng Zhang and Yunpeng Xue After Ronan

And People Tried to Deal with the Flood Challenge



Levees Were a Key Method of Defense

Levee - "...a man-made structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water so as to provide protection from temporary flooding."



And They Kept the Water Out



Sound Levees Have Provided Protection to Millions of People and Saved Billions of Dollars



But Some Levees Fail or Overtop –and Damages Occur



Floodplain Development Including Levees Has Substantially Altered the Natural Environment (and Increased Risk)



Levees Come in Many Forms



Natural



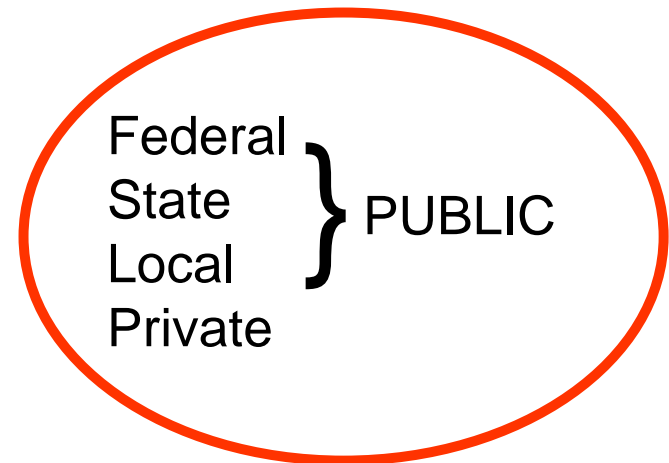
Windrows



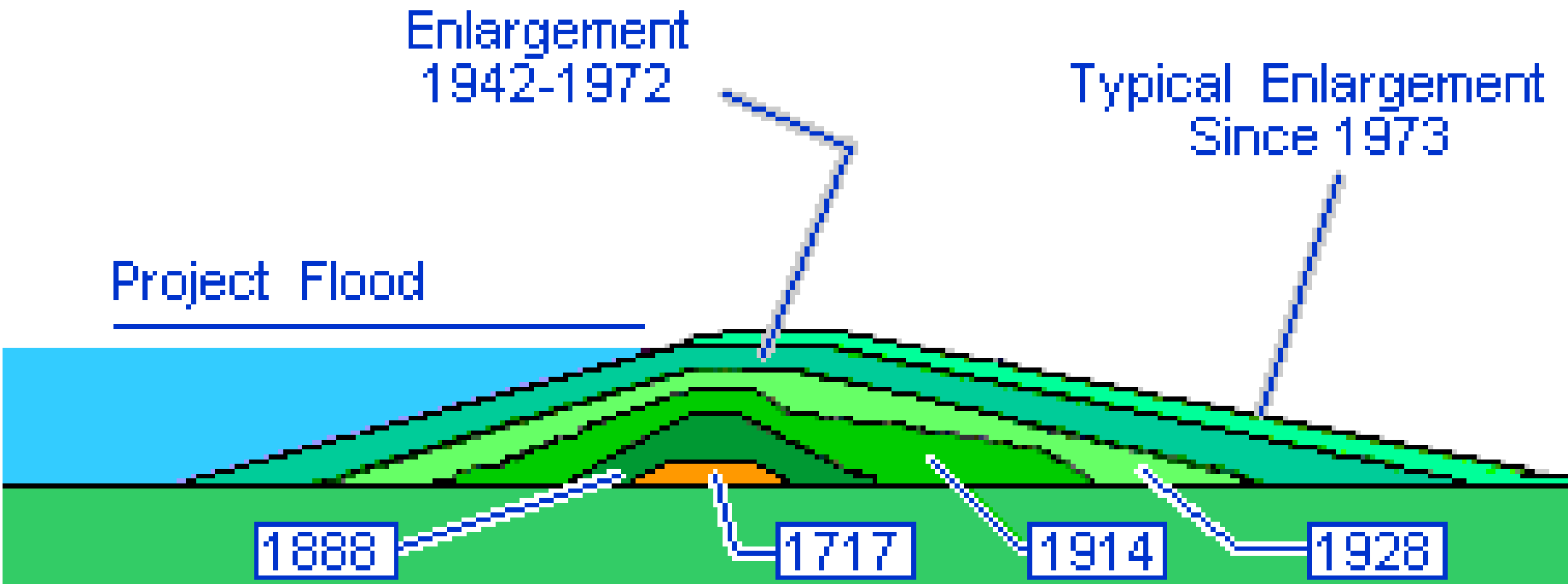
Roads and Railroads



Engineered



And Levees Grow



But We Don't Know What Need to Know About Levees

- How Many They Are
- What Are Their Characteristics
- What Is Their Status – Integrity

And This Is Not a New Problem!

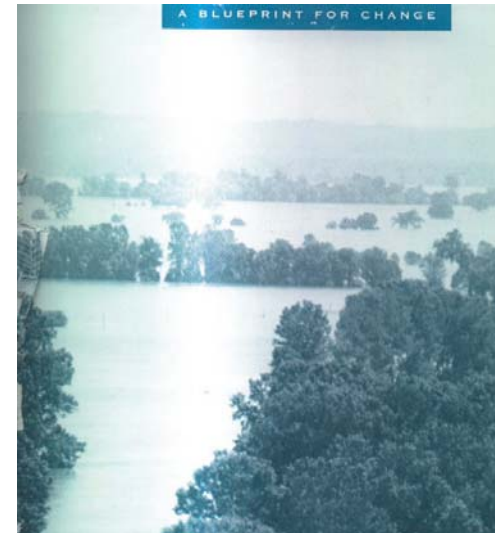
What's Inside?

- Trees
- Carts
- Junk
- Nothing



Sharing the Challenge -1994

- The current flood damage reduction system in the upper Mississippi River Basin represents a loose aggregation of federal, local, and individual levees and reservoirs. This aggregation does not ensure the desired reduction in the vulnerability of floodplain activities to damages.
- Many levees are poorly sited and will fail again in the future. Without change in current federal programs, source of these levees will remain eligible for post-disaster support. Levee restoration programs need greater flexibility to provide for concurrent environmental restoration.
- Population centers must be protected against at least the (SPF) or greater flood



Levees Have Different Levels of Protection

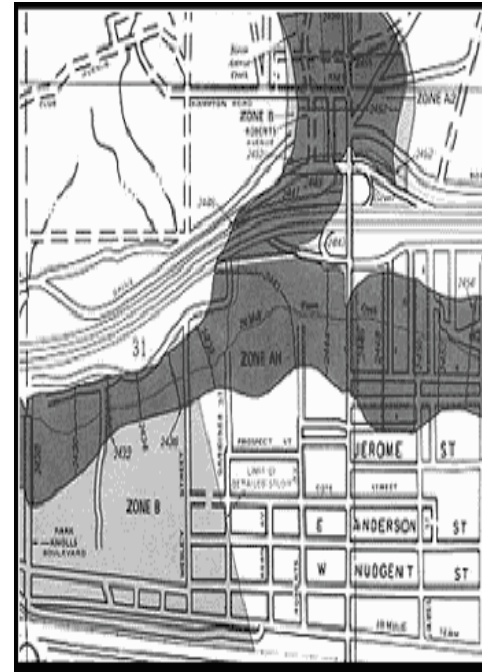
1936 -1965

500 -1000 year
protection



But Things Began to Change with Levees and the NFIP 1977-1980

- **USACE**
 - 100-year **urban levees** could be imprudent
 - Standard Project Flood (SPF), should be adopted as the required level of protection
- **FEMA**
 - Recognize (for NFIP) only SPF levees
 - Crediting a levee system with protection against the 100-year flood could violate the spirit of the National Flood Insurance Act



Levee Liability - Paterno

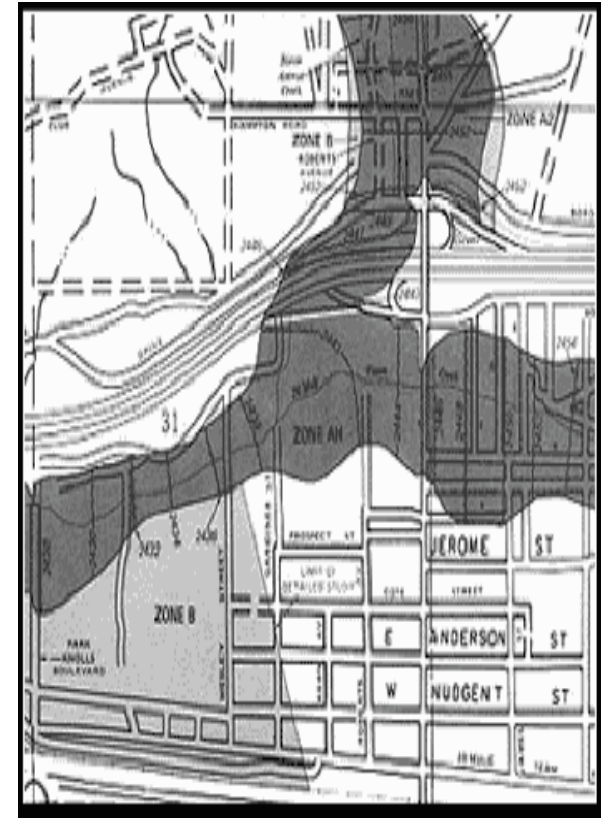
- When a public entity operates a flood control system built by someone else, it accepts liability as if it had planned and built the system.
- California is responsible for defects in a Yuba County levee foundation that existed when the levee was constructed by local agricultural interests in the 1930's.
- California may ultimately be held responsible for the structural integrity of much of the Central Valley flood control system —

Paterno vs. State of California
November 2003



Levees and Map Mod - FEMA 2004

- I Map Mod Examination of Levees in the NFIP Indicated that:
 - »Conditions (Integrity, Compliance) Are Not Known
 - »Many Levees Questionable and No Inspection
 - »Existing Levee Standards (65.10) May Not Be Up to Date (19 years old)



Not Maintaining and Upgrading Our Infrastructure

- Corps of Engineers [studies]... suggest that a large percentage of private or locally built levees...are or can be expected to be poorly designed and maintained (1981)
- Cannot identify location and ensure adequate maintenance of flood protection structures such as levees and floodwalls. (1994)
- Nation's infrastructure is being neglected (ASCE)



Levee Condition

- Levees Must Meet Prescribed Standards
 - Sound Engineering Practice
 - NFIP (Certification)
 - PL 84-99
 - Inspection of Completed Works
- Failure to Meet Standards Violates Public Trust
- Funds for Assessment Not Available

**Need technology
need to monitor
levee condition!**





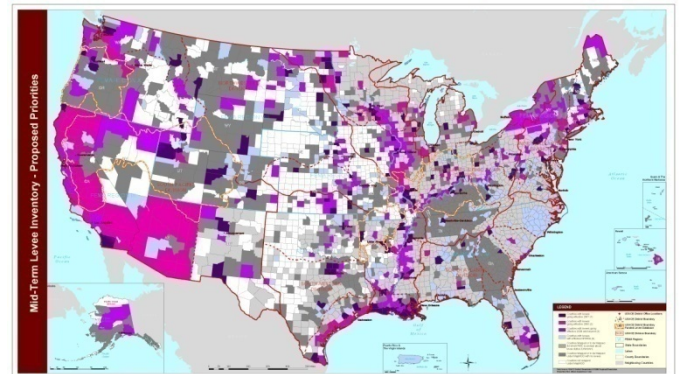
An aerial photograph showing a city completely inundated with floodwater. In the foreground, a large concrete dam is visible, with turbulent, white water cascading over its edge. The city beyond the dam is a dense collection of buildings and trees, all submerged in murky, brown floodwater. The water level appears to be high enough to completely surround the urban area. The sky is overcast, and the overall scene conveys a sense of catastrophic flooding.

What Should We Do?

Development of a Levee Inventory

- Information about the location and condition of levees across the Nation is spotty and is not in a form that supports effective management and decision making.

- FEMA and **NO DOLLARS** Joint database structure that will meet the needs of both agencies and other Federal and State organizations to maintain an inventory and assessment of flood damage reduction structures, including levees.



National Levee Safety Program Act of 2007

- | Directs the Secretary to establish a National Levee Safety Committee to: (1) advise the Secretary in implementing a national levee safety program; (2) support programs, policies, and guidelines to enhance levee safety for the protection of human life and property; and (3) support coordination and information exchange between federal and state agencies that share common problems and responsibilities relating to levee safety.
- | (Sec. 2054) Directs the Secretary to: (1) establish and maintain a national levee safety program; (2) prepare a strategic plan; (3) establish federal guidelines relating to levee safety and periodically publish an inventory of levees; (4) conduct an assessment of the potential for failure or overtopping that would pose a risk. Provides for state participation in assessments of levees.
- | Requires: (1) each state to conduct assessments of nonfederal levees located within the state; and (2) the Secretary to provide funds to state levee safety agencies to assist states in establishing, maintaining, and improving levee safety programs, subject to approval of a state levee safety agency's application. Permits the Secretary to periodically review any program carried out using funds under this section.
- | Directs the Secretary to: (1) carry out a program of technical and archival research regarding levee construction, rehabilitation, inspection, safety, security, and management; and (2) establish a program to train state levee safety agency staff and inspectors.

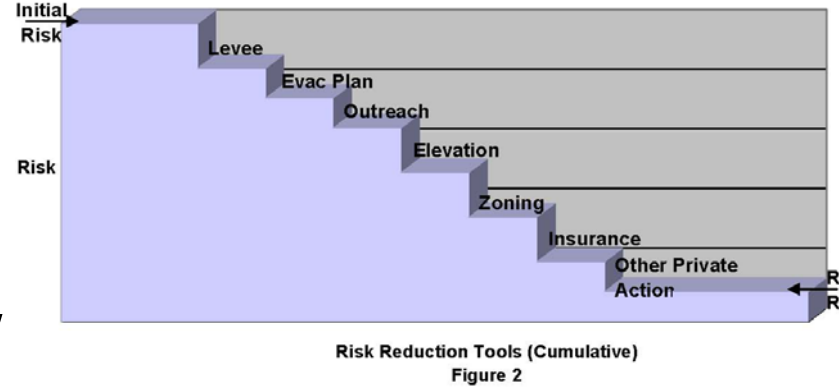
The Big Issues

- | Don't have levee or flood policies
 - » Result – limited supervision
 - » Build anywhere
 - » Enforcement not popular
 - » EO out of date
- | Speaking honestly not popular
 - » Don't want to know truth
- | Levees Only Part of Solution



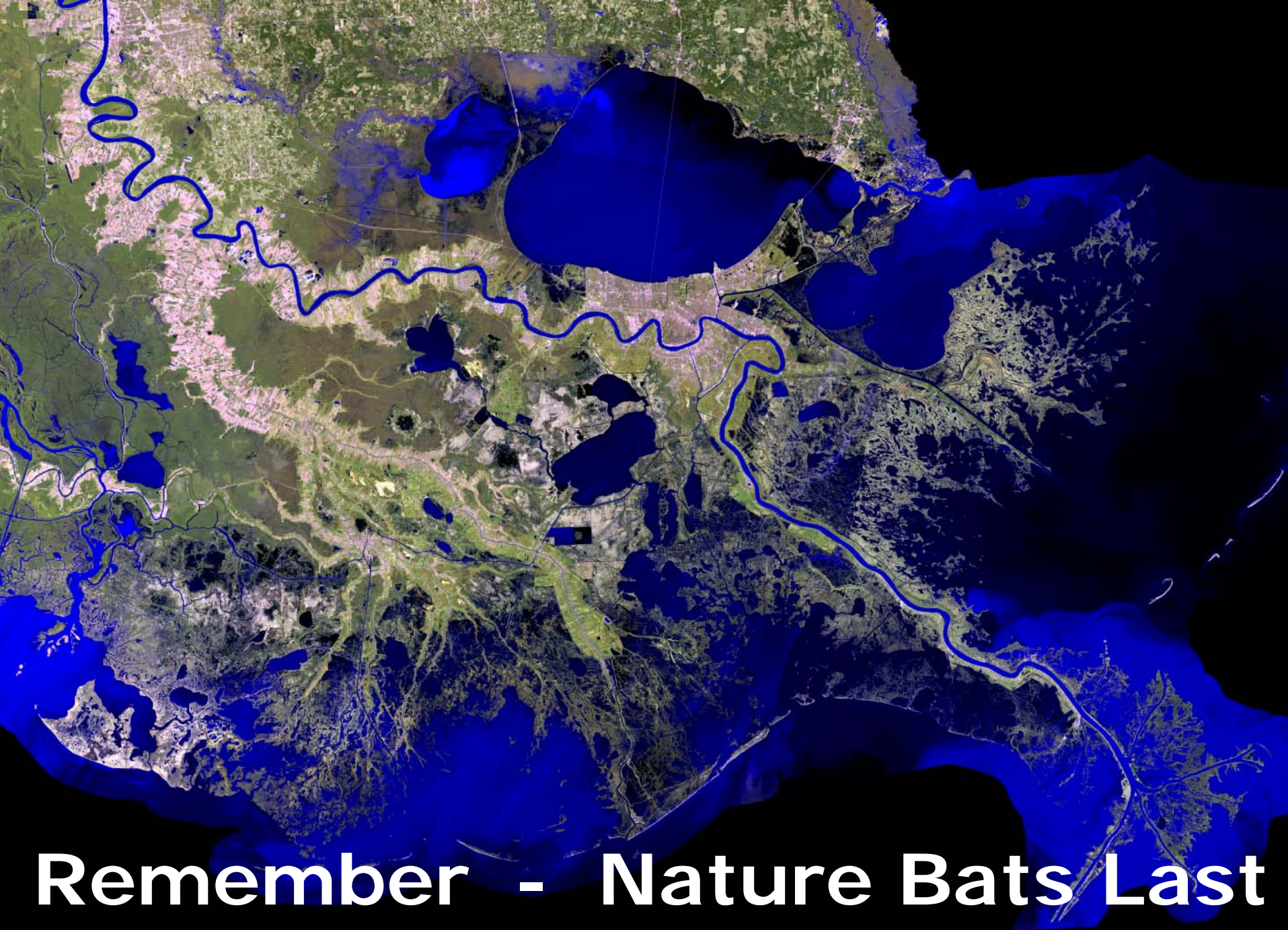
**WE NEED TO
DO
SOMETHING!!**

History Tells Us



- Levee Problems Are Not New
- Solving Levee Problems Requires a New Approach
 - Every level of government and the public must play a role and assume their responsibilities
 - Adequate funding must be provided to support levee operation, inspection and maintenance
 - Levees must be used responsibly
 - Must plan for future conditions
 - Levees are only part of overall flood risk reduction





Remember - Nature Bats Last

Thank You



**FLOODS ARE AN ACT OF
GOD; FLOOD DAMAGES
RESULT FROM ACTS OF MEN.**

House Document 465, 89th Congress, 2d Session:
A Unified National Program for Managing Flood Losses,
August 1966