

Statement of
Gerald E. Galloway, PE, PhD
Brig Gen (US-Army Retired)
Acting Director, Center for Disaster Resilience
A. James Clark School of Engineering, University of Maryland
College Park, MD 20742 (██████████)

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Concepts for the Next Water Resources Development Act: Promoting Resiliency of our Nation's Water Resources Infrastructure

Chairperson Napolitano, Ranking Member Westerman, Members of the Committee. It is a distinct privilege to participate in this important and timely hearing and I want to thank the Committee for the opportunity. I am Gerald E. Galloway, a Glenn L. Martin Institute Professor of Engineering and Acting Director, Center for Disaster Resilience at the A. James Clark School of Engineering, University of Maryland, where I teach and do research in water resources and natural disaster management. I came to that position following a 38-year career in the US Army and eight years service in the federal government, most of which was associated with water resources management. I served for three years as District Engineer for the Corps of Engineers in Vicksburg, MS and later, for seven years as a member of the Mississippi River Commission. From 2009-2018 I served as a member of the Governor of Louisiana's Advisory Commission on Coastal Protection, Restoration and Conservation and from 2016 to date as a member of the Maryland Coast Smart Council. I am currently a member of the Advisory Board of the Center of Climate and Security, and Vice Chair of the CNA Military Advisory Board dealing with climate change and national security. In 1993 and 1994, I was privileged to be assigned to the White House to lead an interagency study, *Sharing the Challenge*, of the causes of the Great Mississippi River Flood of 1993 and to make recommendations to the President concerning the nation's floodplain management program.¹ More recently, I have had the opportunity as a member of the National Academy of Engineering to participate in two studies defining and discussing the importance of building resilience in our nation as a means of reducing the impacts of natural and anthropogenic disasters.

Our nation has been dealing with natural disasters over its entire history. As technology changes we see more opportunities for anthropogenic disasters. Over the last several decades we have witnessed an increase in the severity and length of water related disasters and while they affect all aspects of water resources infrastructure - water supply, navigation, hydropower, environmental sustainability, etc., in the interest of time, I will limit my testimony to discussing the challenges we face in dealing with flood risk and how the 21st century is and will be requiring the nation to rely heavily on resilience to deal with these increasing challenges.

In 1936, the US Congress passed a flood control act, launching the federal government into a major effort to reduce flood losses that were occurring throughout the United States. Even though millions of Americans have been protected from the disastrous consequences of floods by projects authorized and funded by the Congress, flood damages continue to increase. As we approached the present century, we began to face a turning point as the combination of pressure for development, frequently in unsuitable locations, deteriorating infrastructure, failure to complete planned flood damage reduction efforts, and changes in climate and weather threatened to place major challenges in front of us. During the last decade of the 20th century

major floods in the United States and abroad caused nations around the world to move from flood control to managing flood risk and recognizing that we must be prepared to deal with these uncertain futures – to be resilient to what comes. It is time to consider new concepts that will promote our resilience in the managing our water resources infrastructure in general and of our flood risks in particular.

THE FUTURE

Driving our future will be:

-) Significant changes in how the weather and climate are affecting our nation and the world. 2020 will not look like 1936 weather-wise. The areas subject to flooding are increasing as sea level rises and storm events grow in intensity and length. The 2020 Midwest Floods, Hurricanes Harvey, Irma, and Maria in 2017 and the Detroit Flood in 2014 provided vivid proof of the power of nature and how it is changing.
-) Population growth and development in risk areas. Many communities and states are not controlling development in high risk areas when it is occurring and many people who move into such areas are unaware of the risks they face
-) Deteriorating infrastructure. Much of the infrastructure in which we have invested is reaching the end of its usable life and we are not maintaining or updating it as needed. Many projects can no longer deal with the flood threats they face today. Some of this infrastructure was built under federal programs but much is the result of decades of local construction and operation. In many areas there is no comprehensive management of the complex system of dams, levees and other structures that protect a watershed's residents and their economy, Thousands of miles of levees do not meet national standards.
-) Growth in billion-dollar disasters. Although there have been increases in the number of floods, the value of property in high risk areas has also increased.
-) Inequitable treatment in providing flood risk reduction to low-income communities This is most obvious in low-income areas across the nation and results from the criteria we use to develop and approve projects and programs.
-) The growing challenge of flooding in urban areas where considerable losses occur on a repetitive basis as a result of an inability of outdated and undersized systems to handle the increasing number of heavy precipitation events as opposed to riverine flood events. In 2006, Constitution Avenue in Washington, DC, was under three feet of water from rainfall flooding the Federal Triangle. In 2014, the Detroit, Michigan metro area suffered a major rainfall event that caused over \$1.8 Billion in damages.²

RESILIENCE AS AN ANSWER

If we accept that we do face future significant flood threats and do realize that we will not have the resources to address all flood risks with structural projects, we must turn to resilience to help us face reality. In 2009, nine federal agencies came to the National Research Council of the National Academies of Science, Engineering and Medicine (NASEM) and asked the NASEM to

examine how attention to resilience might assist in the reduction of the impacts of natural disasters. In 2012, an Academy committee issued a report that defined resilience as:

“The ability to prepare and plan for, absorb, recover from or more successfully adapt to actual or potential adverse events.”³

Similar definitions began to shape programs of the government, business and non-governmental organizations. Resilience requires, in its preparation and planning phase, that those facing these disasters adequately identify the hazards with which they might have to address and develop the plans that they would have to make to deal with them. As you will hear this morning from other panelists, the integration of resilience into the day-to-day operations of government agencies at the state and local level, businesses, and even non-governmental organizations continues to grow.

Becoming resilient requires communities and those practicing resilience in such areas as building infrastructure to follow a path that leads to full consideration of what is necessary to be able to recover from a disaster. It all begins with identifying the risks that must be faced. You cannot be prepared to deal with a potential disaster if you don't know what it might be. In looking at risks, the tendency is to take the easiest path and deal with the “get by” approach. This just doesn't work. Risk must be defined in its complete terms and across the spectrum of consequences. In the flood world, all too often, risk consideration is limited to what flood was last seen, rather than the flood that could be most devastating. True resilience also requires consideration of the impact of a flood on all elements of the community as the interdependence of communities' health, social welfare, environment, governance and economy are all closely tied to the total well-being of the community

The community must also develop a strategy for dealing with its risk as it seeks to mitigate the consequence of a hazard event. It frequently becomes obvious that a desired solution to deal with the potential risk, e.g. no losses, cannot be accommodated with the resources available to the community. The strategy must consider how to handle a more severe event. Plans must be developed to deal with a variety of conditions and clear decisions must be made on what is to be implemented. Even if the ultimate plan cannot be funded, communities must plan for what happens under those circumstance – e.g. the new levee is not complete or is overtopped. How will the community survive? How can steps taken ahead of time dampen these consequences to allow the community to bounce back.

All the above actions require close cooperation and coordination within the affected communities and the state and federal agencies that are assisting them. This mean everybody must be at the table as they develop their strategies and parochial turf issues must be avoided.

PROMOTING RESILIENCY OF OUR NATION'S WATER RESOURCES INFRASTRUCTURE

Bringing the concepts of resilience into the 21st-century management our nation's water resources infrastructure will require implementation of new ways of doing business.

Resilience requires:

-) Considerably greater cooperation and coordination among federal agencies, among federal, state, tribal and local entities, and ultimately, considerably more refined all-hands effort in dealing with specific problems. In a 1989 report, the western governors identified some major causes of conflict and frustration with

current federal water policies, "A principal characteristic of federal water policy is that policies are made in an ad hoc, decentralized manner. No agency of the executive branch or committee of Congress is responsible for keeping an eye on the "big picture."

The late Chairman of this Committee, Congressman Jim Oberstar, in 2009, indicated that "the efforts of Federal agencies can overlap and at times conflict, and currently, there is no body within the Executive branch to provide substantive coordination or, if necessary, resolution of disagreements among agencies to ensure needed collaboration." He indicated that at that time, "the diverse water resources challenges throughout the United States are often studied, planned, and managed in individual "silos," independently of other water areas and projects. Generally, this has resulted in local and narrowly focused project objectives with little consideration of the broader watersheds that surround these projects."⁴

-) Having program goals and objectives that reflect the needs of all sectors of the community. Chairman Oberstar also saw a need to have a "National- not a Federal -vision" on how to meet current water resource needs and how to address future water resource needs and challenges.
-) Carrying out effective and inclusive planning at all levels. Every community should have a resilience plan that is developed in coordination with its partners – other government and all segments of its population, but such planning requires funding and there is little to be had.

WHAT CAN BE DONE?

If resilience is to be feasible, problems must be confronted and solved and not ignored. Following the Great 1993 Mississippi Flood considerable attention initially was placed on acting on the recommendations of the "Sharing the Challenge" report, including management of levees at all levels, development of a comprehensive plan for flood management, improving coordination of federal and state coordination, etc. However, after three years, in the face of limited support in the Congress, the Administration halted its efforts. In 2005 FEMA produced a report indicating that likely most non-federal levees did not meet standards. The 2009, National Report on Levee Safety, initiated following levee failures during Hurricane Katrina, reported a similar condition in the nation's levees.⁵ Because of major flood losses resulting from levee failures or overtopping during the 2008 Midwest floods. The Senate EPW Committee directed the Assistant Secretary of the Army to prepare a report indicating the status of implementation of the recommendations of the "Sharing the Challenge report. Although the submittal indicated that considerable work still needed to be done no action was taken. Following the 2011 Midwest flood, the Committee asked again for a report and following the submittal no action was taken. Analysis of the levee failures in the 2019 Midwest flooding will likely result in a replication of previous analyses and reports. Owners and operators of non-federal levees lack the resources to deal with the aged and unsatisfactory levees, and the arguments that exist over federal or state or local responsibilities make it difficult to come up with a satisfactory solution as to where to find resources to fill funding vacuums.

Policies that create boundaries along agencies or between agencies or hinder cooperative efforts and deprive those in need the assistance they require make little sense. Action taken by

Congress, in the 2018 WRDA, required review of a provision in the law that limits USACE's authority to deal with flood situations in urban areas where the flow is under 800 cubic feet /second. Removing this restriction could open problem solutions to multiple agencies and create cooperative ventures.

Continuing reliance primarily on economic justification of projects makes it difficult for those in rural and low-income areas to justify projects that would give them considerable social and conceivably health benefits. The recent NASEM studies of affordability of flood insurance gives a very clear picture of the differential level of flood protection under various economic situations and strong reason to consider all factors in project justification. Congressional restrictions on USACE use of more modern and broader based guidelines for project justification do not make sense and restrict full consideration of the flood risk reduction needs of the less fortunate.

IN CONCLUSION

There is a great opportunity ahead to incorporate resilience principles in the development of water resources infrastructure. From 1936 on Congress has worked hard to do the right thing. As we move in the 21st-century, now is the time to do it.

¹ Interagency Floodplain Management Review Committee, Executive Office of the President. 1994. Sharing the Challenge: Floodplain Management into the 21st Century. Washington, GPO. (available at <http://www.floods.org/Publications/free.asp>)

² In 2018 and 2019, the University of Maryland and the Texas A&M University, NASEM, the Association of State Floodplain Managers, and the National Association of Flood and Stormwater Management Agencies prepared reports identifying the growing threat of urban flooding.

³ Disaster Resilience: A National Imperative. Washington: National Academy Press. 2012

⁴ Honorable James L. Oberstar, Remarks before the USACE Conference, "Collaborating for A Sustainable Water Resources Future" August 27, 2009

⁵ National Committee on Levee Safety (NCLS). 2009. Draft Report to Congress on Recommendations for a National Levee Safety Program. Washington: US Army Corps of Engineers. Available at http://www.iwr.usace.army.mil/ncls/docs/NCLS-Recommendation-Report_012009_DRAFT.pdf