

## Three Metaphors for Flooding in North Carolina:

1. College Basketball
2. A General after a battle
3. Saving and investing for retirement

Martin Doyle

Duke University

Professor of River Science & Policy – Nicholas School of the Environment

Director for Water Policy – Nicholas Institute for Environmental Policy Solutions

[martin.doyle@duke.edu](mailto:martin.doyle@duke.edu)

(919) 613-8026

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Just taking the major Hurricane-related disasters (Fran, Flood, Matthew, Florence)

- 4 disasters in 25 years = 1 disaster every 6 years (on average)
- Major disasters in NC: “6-year event” (6-yr recurrence interval)
- In any given year, there is a 1-in-6 chance of having a flood or hurricane-related disaster

This is the same as rolling any particular number on a die

## Think like basketball:

Over past 80 years, there has been national college basketball tournament

A North Carolina team has one 13 times

Based on past experience, there is 1-in-6 chance of winning

We are tempted to think of natural disasters as rare and unpredictable. But based on past experience, we can say...

**In 2019, the state of North Carolina is as likely to have a flooding or Hurricane-related disaster as we are to win a men's national college basketball championship.**



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Quarter century ago – in 1993 – there was a devastating flood in the Midwest.

Described similarly to the floods in NC in 2018

- Flood of record
- Unprecedented
- 500-yr event

Federal government frustrated that after 60 years of staggering federal investment in flood control infrastructure in the Missouri River basin that such floods still happened.

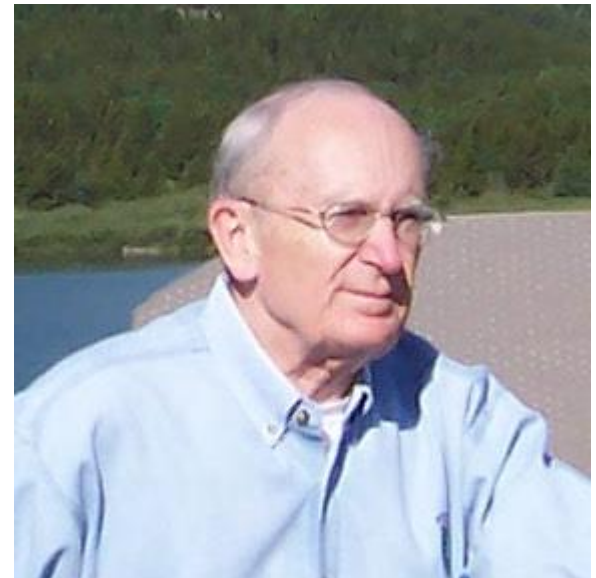


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After the flooding, the federal government charged a General with post-disaster assessment of what to do next

Gerald (Gerry) Galloway

- Brigadier General – US Army Corps of Engineers
- Commandant of US Military Academy at West Point
- Division Engineer of Vicksburg District
- “Blue Blood Corps”
- PhD from UNC-Chapel Hill

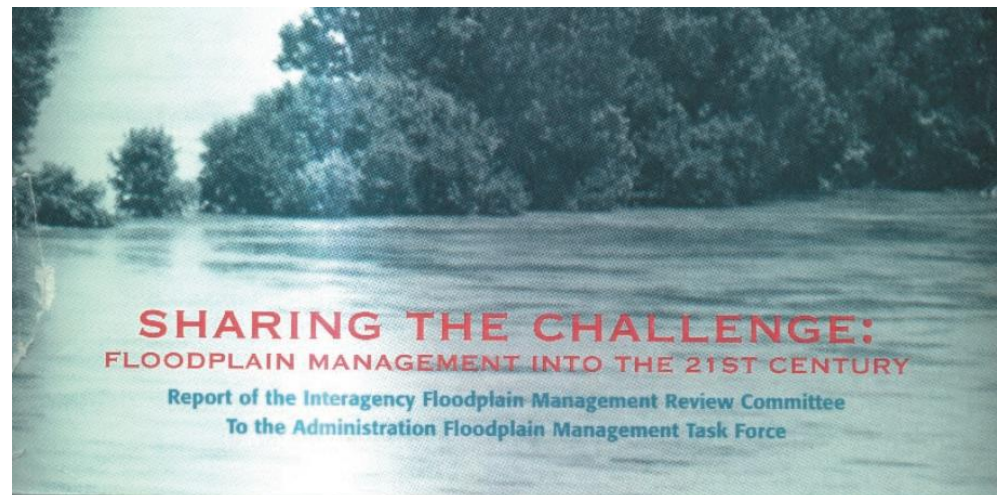


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“Galloway Report” has become assigned reading for anyone in floodplain management

Some of the major findings and recommendations that are relevant to North Carolina now

- Federal infrastructure (dams and levees) worked as designed, but there was still major flooding.
- Local infrastructure did not work well; insufficient and incomplete and unreliable
- Few incentives for state and local governments to be involved in floodplain management because federal government provided financial assurances.
- Natural restoration can reduce flood peaks for small floods, but not for major floods





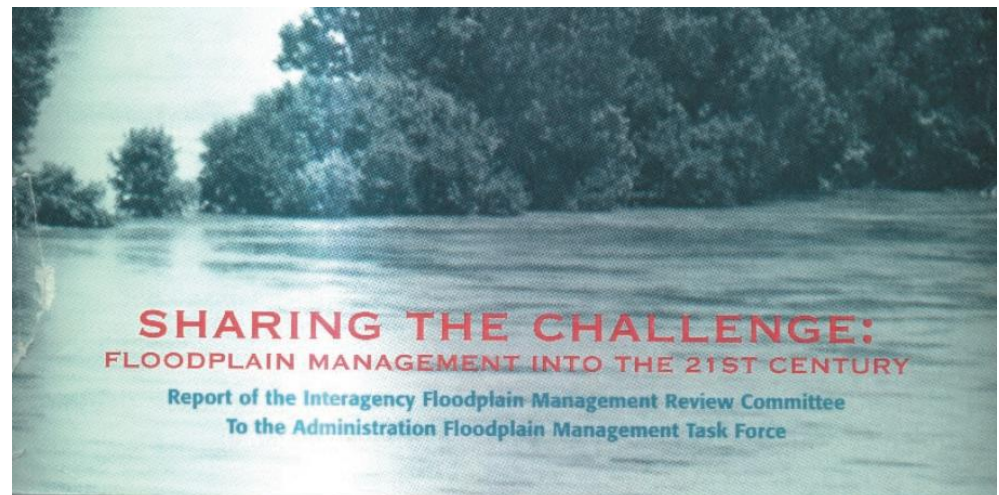
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### “Galloway Report” Recommendations

- Buyouts for floodprone homes and flood-damaged lands reduce flood losses.
- Provide for the purchase of mitigation insurance to cover the cost of elevating, demolishing, or relocating substantially damaged buildings.
- Tough love is needed: reduce the amount of post-disaster support to those who were eligible and able to buy flood insurance, but chose not to do so
- Provide some safety net for low income flood victims unable to afford flood insurance, but work to move them out of harm’s way

### Overall Lessons

- Make room for rivers
- Decrease reliance on federal government



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Investing means building a portfolio; different tools have benefits and weaknesses. None are silver bullet, but may have a role in portfolio:

- Reservoirs
- Levees
- Natural restoration
- Mitigation

Caution about reservoirs:

- 20+ yr permitting, design, construction
- Very high cost, unclear efficacy for genuinely large floods (> 100-yr events)
- Unclear benefits for hurricane-derived storms (coming from east-to-west)
- Increased flooding exposure after infrastructure is build (levees as well)
  - People move toward rivers after reservoirs and levees are built

Caution about natural ecosystem/restoration approach:

- Unclear benefits for storms/floods > 25-yr

Basically, we are talking about significant hydrometeorological events



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What works for retirement: SAVING

Similarly, what we know works immediately and assuredly for flooding: **mitigation**

Consider portfolio of options, but what we need to get done:

- Floodplain delineation: know what the liability to state/local government is and what properties we need to focus on or protect
  - We have to do this regardless of approach we take
- Mitigation: Move people and properties out of floodprone properties
- Insurance: Increase flood insurance penetration

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Planning for Retirement

Planning for River Basins

Eisenhower: “Plans are useless, but planning is indispensable.”

Galloway Report recommended river basin commissions

- Planning-focused, non-regulatory
- Coordinate information and blunt assessment of vulnerabilities and trends
- Federal, state, local, public/private, rural/urban

Something similar for North Carolina’s river basins, or a collective river basins commission

Note that river-based disasters are disturbingly varied and frequent:

- 2017-2018: Hurricanes and floods
- 2007-2008: Droughts of record
- 1997-1998: Toxic algal blooms/pfisteria

## **Flooding in North Carolina:**

1. College Basketball: we are as likely to have a devastating flood as we are to win a basketball championship
2. A General after a battle: draw lessons now from what went wrong, and start planning now for the next event
3. Saving and investing for retirement: we can build a portfolio of options, but only one is assured to work: mitigation and planning

Thoughts for next steps:

Consider river basin commissions (or singular commission) focused on disasters

Clear, up-to-date floodplain delineations

Mitigation can be implemented quickly/immediately

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