



# Insights into Collective Efficacy and Community Resiliency from Naturally Occurring Environmental Threats:

*The 2011 Case of Blue-green Algae on Grand Lake O' the Cherokees, OK*

A.M. Mason, Ph.D.

Pittsburg State University

Jim Triplett, Ph.D.

Pittsburg State University

# Overview

- BGA, *cyanobacteria*
- Precautionary Principle
- Comparative Case Analyses



Marion  
Reservoir



Lake of  
the  
Ozarks

# Acute Disease Service- 8.21.2011

- The ADS conducted phone interviews with 49 out of 54 reports of possible BGA exposures occurring between the dates of June 5, 2011 and August 20, 2011.
- **Of the 37 cases reported in Oklahoma, 20 of the cases were directly and negatively impacted by harmful algae blooms (HABs) on Grand Lake.**



# Distinction

## Risk Comm.

## Crisis Comm.

- ✓ Known probabilities of future negative outcomes
- ✓ Disseminated routinely by technical or scientific experts
- ✓ Carefully considered over an extended period of time
- ✓ Persuasive
- ✓ Controlled

- ✓ Report knowledge based on current states
- ✓ Disseminated infrequently from authority figures or crisis managers
- ✓ Result from reactivity
- ✓ Informative
- ✓ Usually helpful

# Key Terms

- *Adjusting Information*
- *Media Sources*
- *Quote Content*
- *Public Reactionary Statements*
- *Response Efficacy Measures*
- *Animal Welfare/Safety*

**GreenWater Laboratories** aquatic analysis ... research ... consulting

**Microcystin Data Report**  
Project: Grand River Dam Authority

| Sample Identification | Sample Collection Date |
|-----------------------|------------------------|
| Horse Creek (Tow)     | 110627                 |
| Horse Creek (Grab)    | 110628                 |
| Duck Creek (Tow)      | 110628                 |
| Duck Creek (Grab)     | 110628                 |

**Toxin - Microcystin (MC)**

**Sample Prep** - The samples were ultra-sonicated to lyse cells and release toxins. Sample dilutions (1 for & 10x) were necessary to accommodate the calibrated range for ELISA analysis.

**Analytical Methodology** - A microcystin enzyme-linked immunosorbent assay (ELISA) was utilized for the quantitative and sensitive congenic-independent detection of MCs. The current assay is sensitive to down to a LOD/LOQ of 0.15 µg/L for total MCs. The average recovery of the lab fortified blank (LFB) spiked with 1 µg/L MC/LR was 85%.

Liquid chromatography-mass spectrometry (LC/MS) was utilized for the determination of four of the most common microcystin variants and their relative abundances. The [R(+)] isomer for LR (w/w 995.5), RR (w/w 519.5), YR (w/w 1045.6) and LA (w/w 910.5) provided both specificity and sensitivity. Microcystin-LR was found to be the dominant variant present in the Horse Creek (Tow) sample with a small level of MC/LR present as well.

| Sample             | MC Levels (µg/L) |
|--------------------|------------------|
| Horse Creek (Tow)  | ≈ 125            |
| Horse Creek (Grab) | ≈ 49             |
| Duck Creek (Tow)   | ≈ 358            |
| Duck Creek (Grab)  | ≈ 10             |

LOD/LOQ = 0.15 µg/L

Submitted by: *[Signature]*  
Mark T. Ash'd, Ph.D.  
Date: 6/30/11

## Test Results

| Sample             | MC Levels (µg/L) |
|--------------------|------------------|
| Horse Creek (Tow)  | ≈ 125            |
| Horse Creek (Grab) | ≈ 49             |
| Duck Creek (Tow)   | ≈ 358            |
| Duck Creek (Grab)  | ≈ 10             |

LOD/LOQ = 0.15 µg/L

World Health Organization 2003:  
Warns of High Probability of Adverse  
Health Effects When Microcystin ≥ 20ug/L

# Research Questions

- *RQ1:* How did the media frame the public health threat severity and potential public susceptibility of the BGA outbreak?
- *RQ2:* Did key stakeholders (policymakers, business owners, media, and GRDA) speak in one voice during the crisis response in regard to general public health and wellness?
- *RQ3:* Were there differences in the instructional and adjusting message content provided to general audiences over the course of the crisis event?
- *RQ4:* How did key stakeholders convey community-based messages of recovery and renewal in the post-crisis stage?

Pre-  
Crisis

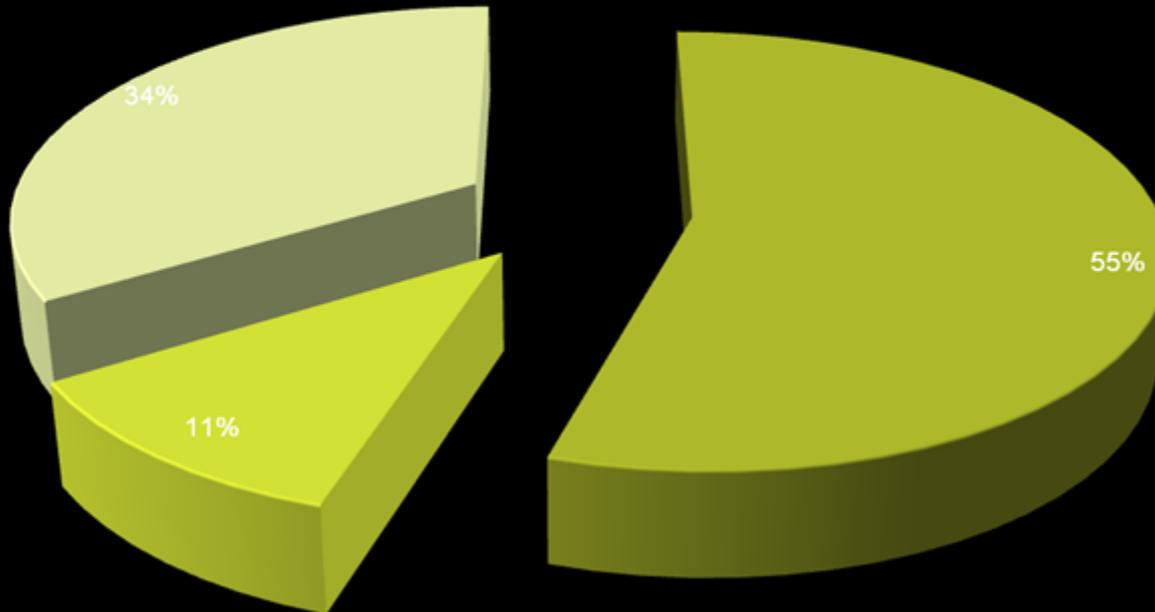
Crisis

Post-  
Crisis

# Method

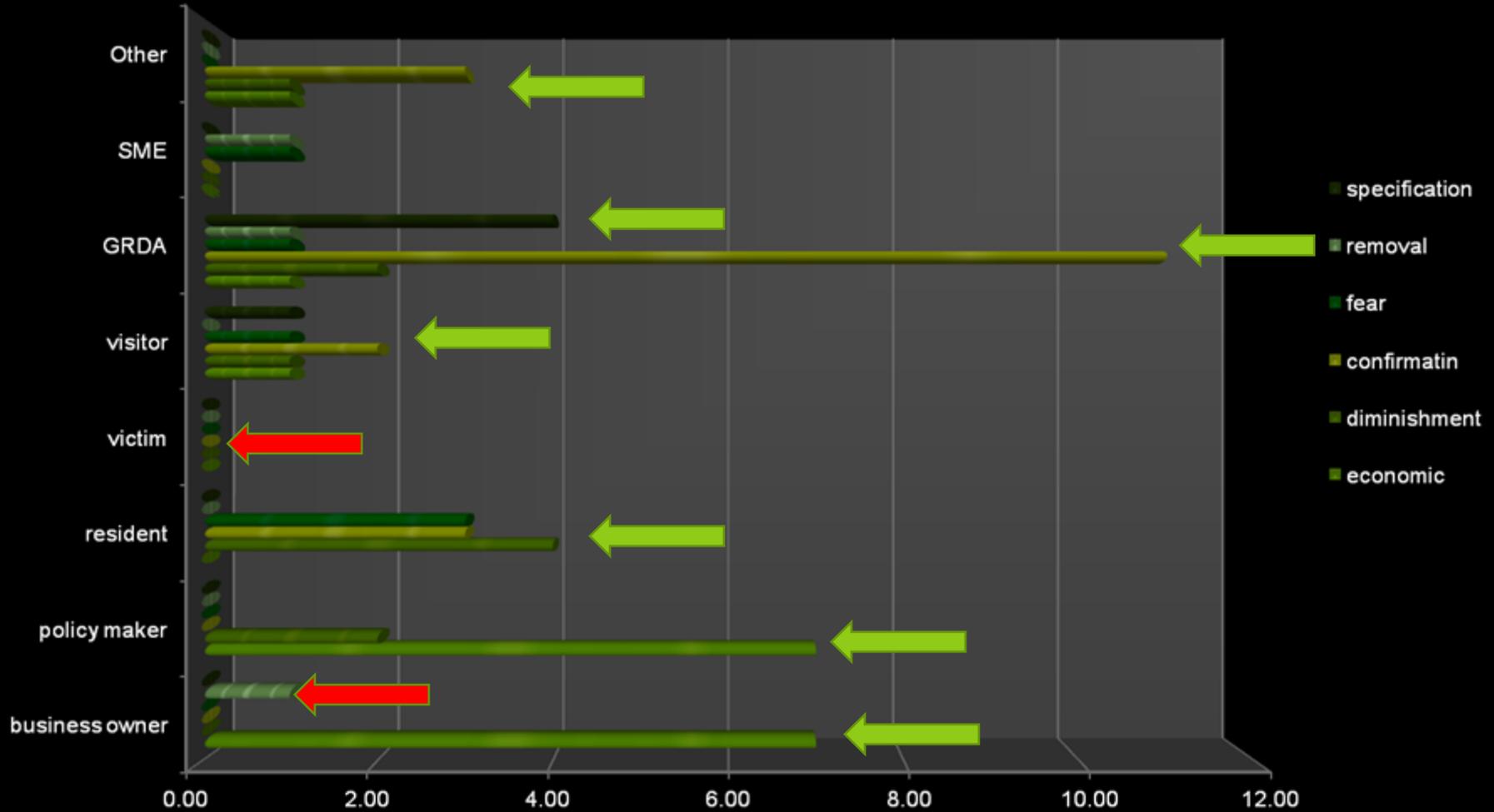
## Units of Analysis

■ onlinepress ■ social/blogs ■ traditional



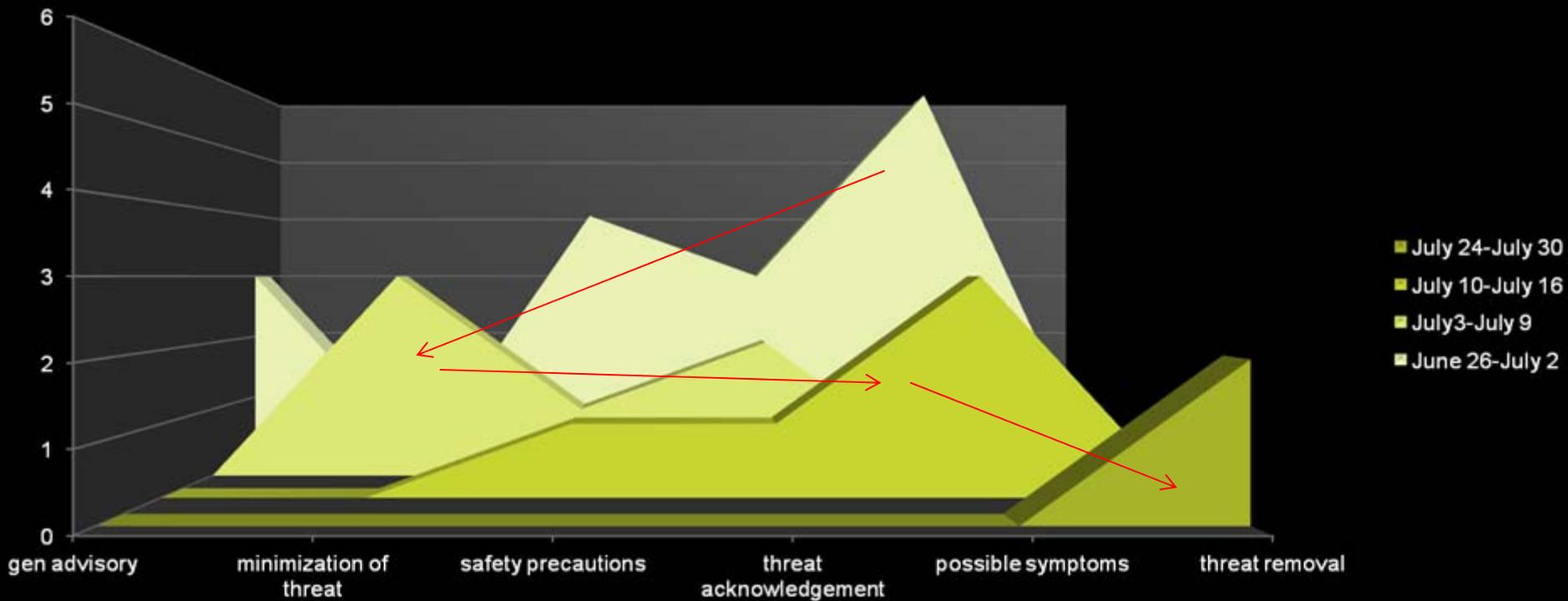
# Findings

## Threat Response Characteristics



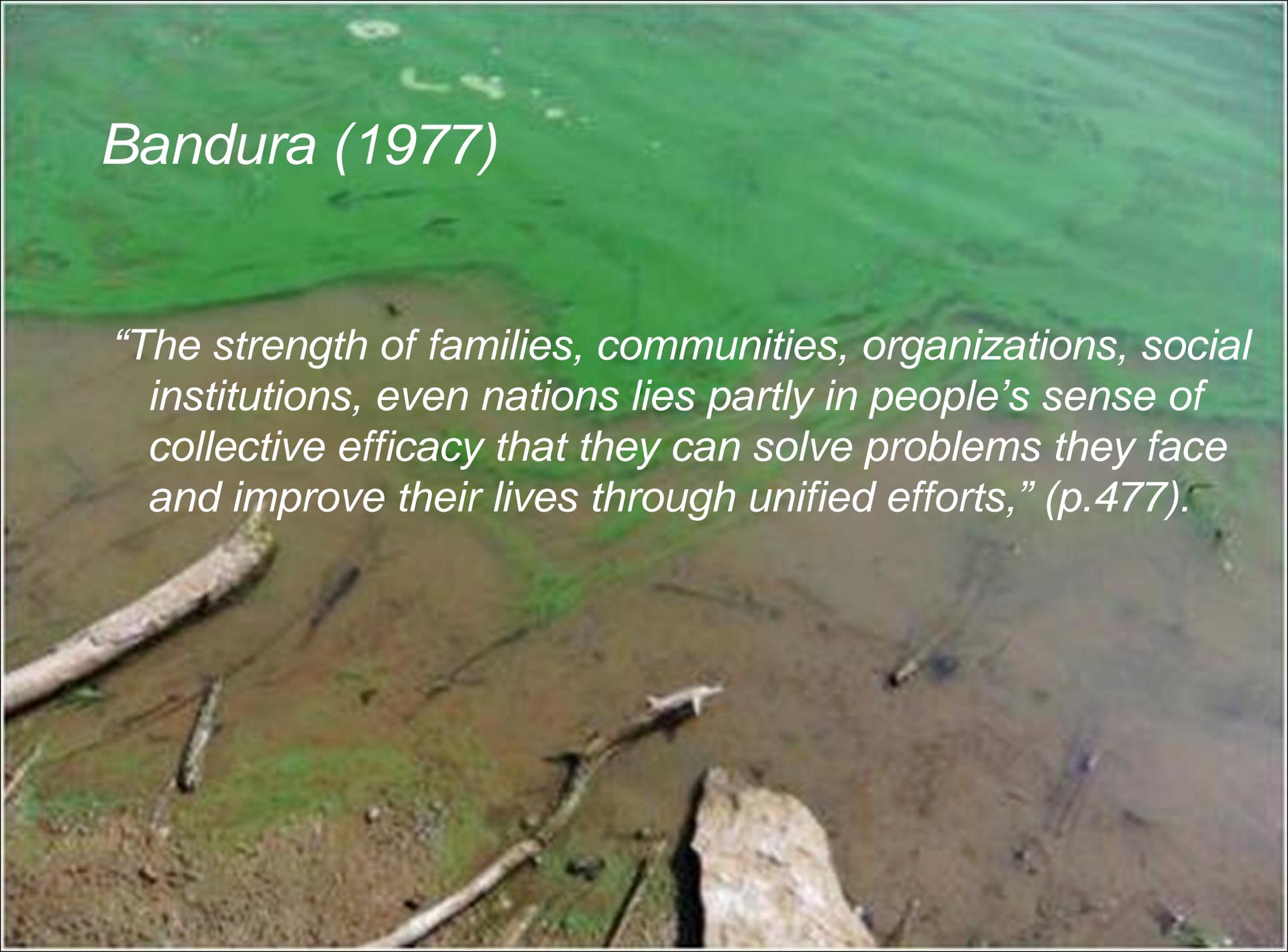
# Findings

## Communicated Crisis Messages



# Conclusions

- GRDA used a conservative interpretation of the precautionary principle
- Policymakers at the local level and state-level, along with local business owners repeatedly endorsed and framed this crisis as one of economic impact
- No formal oppositional response engagement from the GRDA or DEQ was found within the data set, or the blogosphere
- Lack of a coordinated and structured public response strategy addressing the threat's severity, and public susceptibility
- Lack of post-crisis messaging
- There was an utter failure for government agencies and political officials to speak in one voice in the interest of public health and welfare.

A photograph of a riverbank. The top half of the image shows green, rippling water. The bottom half shows a muddy, brown bank with several pieces of driftwood and a large, light-colored rock in the foreground.

## *Bandura (1977)*

*“The strength of families, communities, organizations, social institutions, even nations lies partly in people’s sense of collective efficacy that they can solve problems they face and improve their lives through unified efforts,” (p.477).*

# Implications

- Standardize a threat assessment system
- Cultivate media relationships
- Develop tactical communication response platforms
- Foster collaborative partnerships
- Mobilize key stakeholders
- Educate those with vested interests in the outcomes