

2005 National Water Quality Conference, San Diego

“Water Quality Monitoring in Rural Mississippi”

By

Dr Edmund Merem

Department of Urban and Regional Planning

Jackson State University Mississippi

09/02/05

Scope of the Presentation

- Purpose of the Research
- Background Information and the Issues
- Study Area and Methods
- Existing Efforts
- Factors Responsible For the Problems
- Findings
- Recommendations and Conclusions

Objectives of the Research

- To present a simple approach for analyzing rural water quality issues at the state level
- To update the literature on rural water protection issues with a focus on Mississippi
- To generate a tool for informing public decision making in rural water protection and monitoring
- To contribute to the latest advances in studies dealing with the monitoring of rural water quality

Background Information/Issues

- The threat to water quality and the environment are growing at a significant rate in the rural areas of the US and the state of Mississippi (Bengsten 1995)
- In the case of Mississippi, farmers in the state apply millions of pounds of agricultural pesticides each year to produce crops (MSU 2004c)
- While the exact amount of these products remain unknown, the accumulation constitutes a major problem on many farms and a threat to water quality (Nett et al 2004)
- There are also issues of cross-connections between small rural water systems and a major one comes from a water system and potentially contaminated source
- The other problems involve ineffective management and limited funds to attract qualified staff to maintain water infrastructure and comply with regulations

Study Area

- The study area in Figure 1 is a predominantly rural state with 82 counties
- Over 2.5 million people (or 96% of the population) rely on safe drinking water provided by the state's 1586 public water system
- The State's Department of Health as the water regulatory agency requires water systems to meet safe drinking water requirements
- Water systems are required to supply samples for testing, notify the public when contaminants exceed the prescribed standard and take corrective actions to ensure quality (Table 1-1b)
- Monitoring the risk is a fundamental step towards the prevention of water pollution and ensuring the protection of rural residents

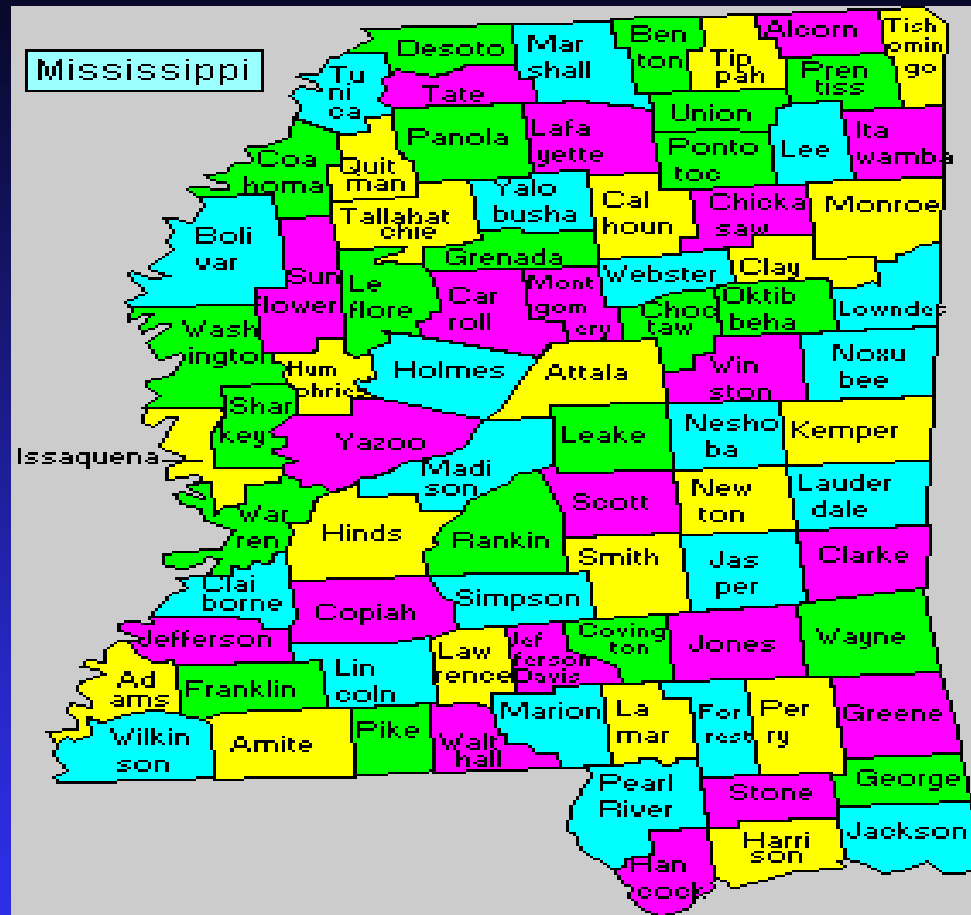


Figure 1: Map of The Study Area Mississippi

Table 1a Primary Standards

Contaminant	Maximum Level (mg/L)
Inorganics	
Arsenic	0.05
Barium	1.00
Cadmium	0.01
Chromium	0.05
Fluoride	4.00
Lead	0.05
Mercury	0.002
Nitrate (as N)	10.00
Nitrate (as No ₃)	45.00
Selenium	0.01
Silver	0.05
Organics	
Endrin	0.0002
Lindane	0.004
Methoxychlor	0.10
Toxaphene	0.005
2,4D	0.10
Total Trihalomethanes	0.10
Microbiological	
Total Coliform	1/100 ml

Table 1 b Current Secondary Standards for Drinking Water

Contaminant	Maximum Level (mg/L)
Chloride	250
Copper	1
Fluoride	2
Foaming Agents	0.5
Iron	0.3
Manganese	0.05
Sulfate	250
Total Dissolved Solids (TDS)	500
Zinc	5
Color	15 color units
Corrosivity	Non Corrosive
Odor	3 TON (treshold odor number)
Ph	6.5-8.5 on scale

Methodology

- The project stresses a three stage approach involving data gathering activities, literature search, data design and analysis
- **Stage 1: Data gathering**
 - Identification of variables
 - The variables ranges from the number of boil water alert to the number of violations
- **Stage 2: Literature Search**
 - Keyword based search for the relevant documents on rural water quality protection
 - Information from government databases and abstracts that are currently available
- **Stage 3: Design of Data Matrices and Analysis**
 - The design of data sets containing different variables
 - The measure of descriptive statistics and analysis of the trends

Existing Efforts In the State

■ Monitoring efforts

- Boil water alert bulletins issued on a regular basis by the Mississippi Department of Health (MDH)
- Total maximum daily load case study for fecal coliform completed off the Gulf Coast by the MDEQ

■ Capacity Assessment Program

- The MDH runs a rating program that identifies water systems incapable of providing safe drinking water
- The program allows the MDH to channel technical assistance to water systems with low capacity ratings

■ Joint Nutrient Management/ Water Quality Initiatives

- Mississippi State provides research and extension leadership in nutrient management and water quality
- Under the program, nutrient loads in the Tangipahoa watershed was reduced by 27%

■ Education and Grant Opportunities

- “Farm A Syst/ Home A Syst” is helping farmers and rural home owners minimize the risk to drinking water
- More than 3000 citizens have received educational information on how to protect drinking quality
- Several funding opportunities have been made available to address water quality problems in rural areas

Table 2a Boil Water Alert Bulletins in Selected Counties

Yaer	County	No of Occurrences	No of People Affected	Reasons
2003	Carol	1	N/A	Coliform
2003	Lee	1	324	Pressure loss, Contaminants
2003	Quitman	1	N/A	Contaminants
2004	George	2	250	Coliform, Contaminants
2004	Franklin	1	137	Pressure loss, Contaminants
2004	Marion	1	125	Pressure loss, Contaminants
2004	Greene	1	474	Pressure loss, Contaminants
2004	Jackson	1	45	Pressure loss, Contaminants
2004	Jefferson	2	100	Pressure loss, Contaminants
2004	Kemper	1	940	Pressure loss, Contaminants
2004	Deklab	1	520	Pressure loss, Contaminants
2004	Marion	1	125	Pressure loss, Contaminants
2004	Perry	1	95	Pressure loss, Contaminants
2004	Yaloshuba	1	244	Pressure loss, Contaminants
2005	Calirborne	1	4845	Coliform
Total		17	8224	

Table 2b Grants and Expenses On Rural Water Programs

Program	Type of Facilities	Eligible Recipients	Grants/Loans	Min/Maximum Amount
Development Infrastructure Program	Water, Waste Water, Storm Water	Counties and Municipalities	Grants	No Minimum Maximum \$150,000
Capital Improvements Revolving loan Program	Water , Waste Water, Industrial Strom Water	Counties and Municipalities	Loans	Maximum \$500,000 per Year, Outstanding \$2,500,000
Mississippi Business Investment Act Program	Water, Strom Water,	Counties and Municipalities	Grants	Minimum and Maximum Determined by MDA Director
US Department of Commerce, Economic Development Adminsitration	Water, Waste Water, Strom Water, if included in economic development projects	Public Entities, Non-Profit Utility, District Associations, and Indian Tribes	Grants	Minimum \$100,000 Maximum \$1,500,000 Varies Depending on project
US Department of Agriculture, Rural Utilities Service	Rural Water, and Waste Water	Public Entities, Non-Profit Utility, District Associations, and Indian Tribes	Loans and Grants	None
Local Government and Rural Water Systems, Improvements Revolving Loan Program	Water	Public Entities and Rural Water Associations	Loans	\$1,500,000

Factors Responsible For the Problems

■ Land Use

-Activities associated with current patterns of land use contributing to water quality decline

■ Environment

- Agricultural runoff and effluents from hog farming threatening the water of quality in some areas

■ Technology

-Some of the public water systems lack the right technological infrastructure for effective operation

■ Economy

-Monetary constraints force communities to forgo the upgrade of public water infrastructure

■ Policy

-Lack of capital hindering technical and financial capacity to comply with the safe drinking water act

Table 3 Water Quality Violations In Selected Counties

Coliform	2002
County	Number of Violations
Bolivar	3
Clairborne	2
Desoto	2
Forrest	2
Hinds	2
Jackson	2
Lafayette	5
Lowndes	3
Monroe	3
Okitbeha	2
Pearl River	2
Pike County	2
Potomac	3
Sunflower	2
Tallahatchie	3
Yazoo	2
Total	42

Table 3 Continued

Microbiological	2002
County	Number of Violations
George	2
Lee	2
Marshal	6
Pearl River	2
Tallahatchie	2
Yazoo	2
Total	16
Nitrate	2002
County	Number of Violations
Desotto	2
Hancock	2
Harrison	4
Hinds	2
Jackson	2
Tate	5
Walthall	2
Total	19

Findings

- Rural counties in the state of Mississippi are experiencing water quality issues ranging from chemical to bacterial contamination
- In spite of the existence of Federal and State Safe drinking water standards, the MSDH remains active in water quality monitoring through its boil water alert bulletins in counties affected by contamination
- Between 2003 – January 2005 the agency raised the boil water alert level 17 times in 15 counties. A total of 8,224 people were affected with 58.9% of them in the Port Gibson area of Claiborne county
- Monitoring by the MSDH also revealed the occurrence of safe drinking water violations in selected counties. In 2002, there were 77 cases of violation due to coliform, nitrates and microbes in 29 counties
- The current state of affairs remained compounded due to a wide range of factors that are predicated on land use, environment, technology, economic and policy variables
- Apart from the efforts of other agencies to ensure good quality water through several programs, water quality monitoring has become a management challenge for planners in the state

Recommendations

- To address some of the concerns that were identified in the research, four recommendations are presented as part of the remedies
- **Long Range Ecosystem Plan**
 - Design a long term ecosystem plan in order to put monitoring of water in sync with nature
- **Adopt a Rigorous Monitoring Standard For Water Resources**
 - The decision makers should encourage a more rigorous testing for water samples
- **Refine Current Policies Along The Lines of Polluter Pay Principle**
 - Water regulators should design a new set of policies that will require polluters to pay for clean up
- **Encourage the Upgrade of Rural Water Infrastructure and Personnel Training**
 - The sector must embrace latest technological innovations as well as mandatory skills training program

Conclusions

- Three important conclusions can be drawn from this research
- 1-)Mississippi's rural counties experience considerable water quality issues ranging from chemical to bacterial contamination
- 2-)Apart from community efforts, the frequency of water quality decline in some rural counties has persisted due to problems created partly by obsolete infrastructure, land use, policy lapses and other variables
- 3-)Water quality monitoring offers policymakers a tool for tracking public water systems serving rural counties prone to contamination and an opportunity to craft effective response mechanisms in dealing with the matter