INTERSTATE GROUNDWATER DISPUTES AND THE U.S. SUPREME COURT

Tuesday, Jan. 24, 2 p.m. EST
FREE CSG webinar presented by CSG West and CSG South/Southern Legislative Conference
Grand Theft Groundwater! 
What Would Elvis Do?
Implications of the 
Groundbreaking Mississippi v. 
Tennessee Groundwater Case

The Council of State Governments 
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Michael E. Campana 
Technical Director, AWRA 
Professor of Hydrogeology and 
Water Resources Management 
Oregon State University, Corvallis, OR, USA 
aquadoc@oregonstate.edu

WaterWired blog: http://www.waterwired.org
WaterWired Twitter: http://twitter.com/waterwired
Presentation Outline

• Why the Interest?
• Location and Background
• Memphis Sand: Some Hydrogeology
• The Issues
• Groundwater Hydraulics: Nice Pictures!
• The Plot Thickens…
• Observations
• Where There’s a Dream, There’s a Nightmare
• Additional Information and References
So Why Is a Hydrogeologist from Oregon \[and born in NYC!\] Involved in and Intrigued by This Case?

- Contacted by Tom Charlier of the Memphis *Commercial Appeal* and Mississippi Public Radio in 2007
- Area experts reluctant to talk
- Seems like a story made for the Western USA – water quantity at issue
- Hydro-Irony: Two states in one of the USA’s wettest regions adjacent to one of the world’s largest rivers arguing over *groundwater*!
Location of Memphis, Shelby County, and Tennessee
Memphis Background

• City-owned utility, Memphis Light, Gas, and Water (MLGW) provides water to about 1.1M people. Started pumping groundwater c. 1924.

• High quality groundwater is primarily from Memphis Sand (aka Sparta Sand or Middle Claiborne aquifer) & Fort Pillow Sand aquifers.

• Daily pumpage: 160 – 200 million gallons per day (MGD; 490 – 615 acre-feet/day).

• Cameron (2009) claims Memphis is world’s largest city relying *solely* on GW (Oh no, San Antonio!)
Memphis Sand

- Underlies 10,000 mi\(^2\) of AR, TN, MS, KY; up to 900 feet thick
- Very coarse sand with interbedded lenses of clay and silt - good water storage & transmissive properties
- Replenished via precipitation (average annual precipitation ~ 55 inches) on outcrop belt in western TN, MS
- Said to contain 100 trillion gallons of water (MLGW website). That’s > 300 MAF!
NW-SE Hydrostratigraphic Cross Section beneath Memphis, Tennessee (TN) and Adjacent States of Arkansas (AR) and Mississippi (MS)
(note vertical exaggeration – strata dip more like 1%)

[Courtesy of the Department of Geosciences, Mississippi State University, Starkville, MS; modified from Brahana et al. (1987)]
The Issues

• MLGW pumping from 10 well fields and > 175 wells has caused pumping effects to expand into Mississippi

• Mississippi claims that MLGW is ‘stealing’ its groundwater: currently ~24 MGD and 365 billion gallons (1.1 MAF), 1965 - 2005

• At one time: MS listed Memphis as biggest user of its groundwater!
## Summary – State Groundwater Allocation Laws

(courtesy Ken Rainwater, Texas Tech University)

<table>
<thead>
<tr>
<th>Groundwater Allocation</th>
<th>No. of States</th>
<th>Ownership</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absolute Ownership</td>
<td>7</td>
<td>Connecticut, Indiana, Louisiana, Maine, Massachusetts, Rhode Island, Texas</td>
</tr>
<tr>
<td>Reasonable Use</td>
<td>16</td>
<td>Arizona, <strong>Mississippi</strong>, New York, North Carolina, Alabama, Florida, Illinois, Kentucky, Maryland, Missouri, Nebraska, Pennsylvania, South Carolina, Tennessee, Virginia, West Virginia</td>
</tr>
<tr>
<td>Correlative Rights</td>
<td>5</td>
<td>Delaware, Hawaii, Iowa, Minnesota, Vermont</td>
</tr>
<tr>
<td>Beneficial Purpose Doctrine (Restatement of Torts § 858)</td>
<td>3</td>
<td>Michigan, Ohio, Wisconsin</td>
</tr>
<tr>
<td>Reasonable Use / Correlative Rights</td>
<td>4</td>
<td>New Hampshire, Oklahoma, California, Arkansas</td>
</tr>
<tr>
<td>Absolute Ownership / Reasonable Use</td>
<td>1</td>
<td>Georgia</td>
</tr>
</tbody>
</table>
Pumping Well Cone of Depression
(Cameron 2009)
MLGW Well Fields
(Cameron 2009)
Memphis Sand Aquifer Flow Net showing Groundwater Movement (red arrows) from Mississippi to MLGW Well Fields

Note: Natural Flow is Generally East to West

[Cameron 2009]
Three-Dimensional Representation of the Cones of Depression Created by MLGW’s Memphis Sand Aquifer Pumping

[Cameron 2009]
The Plot Thickens…

• Study by U. of Memphis professors Brian Waldron and Daniel Larsen: MS GW flowed into TN before MLGW pumping; refuted argument that TN is ‘stealing’ MS groundwater. In fact, pumping in DeSoto County may have ‘stolen’ 10.7 MGD of TN’s water. See more at: http://bit.ly/IqPKpu

• Study published in the Journal of the American Water Resources Association (JAWRA). See http://is.gd/CQbBfb
Observations - 1

• Prior to the 2005 lawsuit, TN, MS, and AR were in discussions about developing a plan to manage the aquifer. MS withdrew from the discussions right before it filed suit.

• Lawsuit seemed more appropriate to the arid Western USA, not to an area that receives about 55 inches of annual precipitation and abuts one of world’s largest rivers. Shape of things to come?

• Similar state v. city case occurred in Illinois v. Milwaukee (Cameron, 2009, p.10). SCOTUS need not be involved.
Observations - 2

• Does the ‘public trust’ doctrine apply to groundwater? Mississippi invoked it - protecting groundwater for its citizens (Cameron 2009; Baxtresser 2010).

• Institutional asymmetry is interesting: state v. city in a dispute over water resources. Are new approaches for resolution of such disputes needed?

• Should we establish regional interstate agencies to manage transboundary groundwater?
Observations - 3

- Harder to prove groundwater is being diverted (compared to surface water)

- Does MLGW have right to pump so much groundwater? (Feldman and Elmendorf 2000)

- Cameron’s (2009) plots neglect pumping in DeSoto County, MS, and elsewhere. This is unrealistic.
My Dream: How About A Compact?

• Propose compact among MS, AR & TN. Use Bellagio Draft Treaty (international) [http://bit.ly/2aXPymE] or model compacts as guides

• Construct management model

• Agree to allocation of water

• Compact - needs Congressional approval

• Would be first ‘groundwater-only’ compact in USA

• Template for future – potential GW conflicts? Chance to set a precedent!
My Nightmare

Supreme Court ties 4 - 4, status quo prevails
Additional Information

• M. Campana’s more detailed PPT and comments by Prof. Gabriel Eckstein of the Texas A&M School of Law: http://bit.ly/2bjr08c

• Article by Boyce Upholt in The Atlantic (online - December 2015): An Interstate Battle for Groundwater http://theatlntc/1XPgLcl

• Memphis lawmakers plan bill to protect aquifer. http://memne.ws/2kh8TUB

• One acre-foot = c. 326,000 gallons = one USA football field covered to a depth of c. one foot (even the Ole Miss field!)
References

https://on.doi.gov/2jRSnNF


Mississippi and Memphis Representatives Discuss Water Allocation Without Their Lawyers
(courtesy: www.duckboy.com)
Email: aquadoc@awra.org
Thank You!
Noah D. Hall
Associate Professor of Law
Wayne State University Law School
Michigan
Colmon Elridge
Director, National Center for Interstate Compacts
The Council of State Governments
Questions?

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