

Critical Issues Affecting Groundwater Quality Governance and Management in the United States

Jacob D. Petersen-Perlman, Sharon B. Megdal, Andrea K. Gerlak, Mike Wireman, Adriana A. Zuniga-Teran and Robert G. Varady

Survey Questionnaire

Section 1 Background Agency Information

Q1.1 Which state do you work in?

- ☐ Alabama
- ☐ Alaska
- ☐ Arizona
- ☐ Arkansas
- ☐ California
- ☐ Colorado
- ☐ Connecticut
- ☐ Delaware
- ☐ Florida
- ☐ Georgia
- ☐ Hawaii
- ☐ Idaho
- ☐ Illinois
- ☐ Indiana
- ☐ Iowa
- ☐ Kansas
- ☐ Kentucky
- ☐ Louisiana
- ☐ Maine
- ☐ Maryland
- ☐ Massachusetts
- ☐ Michigan
- ☐ Minnesota
- ☐ Mississippi
- ☐ Missouri
- ☐ Montana
- ☐ Nebraska

- ☐ Nevada
- ☐ New Hampshire
- ☐ New Jersey
- ☐ New Mexico
- ☐ New York
- ☐ North Carolina
- ☐ North Dakota
- ☐ Ohio
- ☐ Oklahoma
- ☐ Oregon
- ☐ Pennsylvania
- ☐ Rhode Island
- ☐ South Carolina
- ☐ South Dakota
- ☐ Tennessee
- ☐ Texas
- ☐ Utah
- ☐ Vermont
- ☐ Virginia
- ☐ Washington
- ☐ West Virginia
- ☐ Wisconsin
- ☐ Wyoming

Q1.2 For whom do you work? The answer to this question will be referred to as “agency” hereafter.

Q1.3 For how many years have you worked for this agency?

Q1.4 For how many years have you worked in the water resources sector?

Q1.5 What is your disciplinary background? Please include degree and discipline.

Q1.6 Is your agency the sole agency at the state level that manages groundwater quality? If not, please list other agencies involved.

- ☐ Yes
- ☐ No _____

Q1.7 Does your agency also manage groundwater quantity? If not, which agency manages groundwater quantity?

- ☐ Yes
- ☐ No (please indicate the agency in the space provided) _____
- ☐ Shares responsibility with another agency (please indicate which agency or agencies in the space provided) _____

Q1.8 Are you able to answer questions about state regulation of groundwater quality?

- ☐ Yes
- ☐ No

Answer If Are you able to answer questions about state regulation of groundwater quality? No Is Selected

Q71 Please submit the survey at this time, and we will contact you to follow up.

If Please submit the survey at... Is Displayed, Then Skip to End of Survey

Section 2 Groundwater Concerns and Use

Q2.1 What are the groundwater concerns in your state? Select all that apply.

- ☐ Quality
- ☐ Quantity
- ☐ Aquifer overdraft
- ☐ Inadequate communications around water quality with other agencies
- ☐ Budget
- ☐ Staffing issues
- ☐ Climate change
- ☐ Drought
- ☐ Health/vulnerability of private well users
- ☐ Other (please specify) _____

Q2.2 Please rank the top three concerns from question 2.1. 1 being of most concern.

- ☐ 1. _____
- ☐ 2. _____
- ☐ 3. _____

Q2.3 What contaminant sources are your state's top groundwater quality concerns? Select all that apply.

- ☐ Land application of wastewater or residuals
- ☐ Oil/gas exploration and production
- ☐ Oil/gas wastewater disposal (Class II injection wells)
- ☐ Injection wells (other than Class II)
- ☐ Coal ash impoundments/disposal
- ☐ Wastewater impoundments
- ☐ Naturally-occurring contaminants
- ☐ Saltwater intrusion
- ☐ Concentrated Animal Feeding Operations (CAFOs)
- ☐ Agricultural sites
- ☐ Underground storage tanks
- ☐ Septic tanks
- ☐ Industrial sites
- ☐ Storm water
- ☐ Mine drainage (abandoned or active)
- ☐ Superfund/CERCLA sites
- ☐ Other (please specify) _____

Q2.4 Please rank the top three concerns from question 2.3. 1 being of most concern

- ☐ 1. _____
- ☐ 2. _____
- ☐ 3. _____

Q2.5 What contaminants are your state's top groundwater quality concerns? Select all that apply.

- ☐ Metals
- ☐ Nitrate/nutrients
- ☐ Contaminants associated with production, transport and use of oil and gas
- ☐ Chlorinated solvents
- ☐ Chloride
- ☐ Pesticides
- ☐ Other (please specify) _____

Q2.6 Please rank the top three concerns from question 2.5. 1 being of most concern

- ☐ 1. _____
- ☐ 2. _____
- ☐ 3. _____

Q2.7 In an average year, what approximate percentage of total human demands (i.e. domestic, commercial, industrial, and agricultural) is met through use of groundwater supplies in your state?

- ☐ 0-8%
- ☐ 8.01-14%
- ☐ 14.01-28%
- ☐ 28.01-50%
- ☐ 50.01% and above

Q2.8 Are there aquifers or parts of aquifers in your state where withdrawals significantly exceed recharge? If so, please indicate the aquifers and/or geographic location in which this occurs.

- ☐ Yes _____
- ☐ No

Section 3 Groundwater Quality Management and Monitoring

Q3.1 Does your state have explicit groundwater quality management goals? If so, please indicate your state's top three goals.

- ☐ 1. _____
- ☐ 2. _____
- ☐ 3. _____
- ☐ This state does not have explicit groundwater quality management goals.

Q3.2 If you indicated groundwater quality management goals above, to what extent do you expect your agency will meet these goals and expectations?

- ☐ N/A
- ☐ Fall far short of expectations
- ☐ Fall short of expectations
- ☐ Meet expectations
- ☐ Exceed expectations
- ☐ Far exceed expectations

Q3.3 Has your state compiled groundwater vulnerability/sensitivity maps to aid in managing groundwater quality?

- ☐ Yes
- ☐ No

Q3.4 Have there been significant changes to groundwater quality policy in the last 10 years? If so, please indicate what changes there have been. Select all that apply.

- ☐ There have been no significant changes
- ☐ Establishment/declaration of intended uses
- ☐ Removal of intended uses
- ☐ Establishment of groundwater quality standards based on intended use
- ☐ Repeal of standards
- ☐ Aquifer exemptions
- ☐ New legislation/laws related to water quality standards
- ☐ Policy/procedures related to the Clean Water Act Total Maximum Daily Loads requirements
- ☐ New water quality regulations related to oil and gas development
- ☐ New rules/regulations related to Concentrated Animal Feeding Operations
- ☐ Change in Standards
- ☐ Groundwater/surface water interaction
- ☐ Nondegredation
- ☐ Mixing zones
- ☐ Stormwater
- ☐ Well construction
- ☐ Limits on groundwater withdrawals
- ☐ Other (please specify) _____

Q3.5 What is the status of exploration/production of unconventional oil or gas resources in your state?

- ☐ Occurring and regulated
- ☐ Occurring but unregulated
- ☐ Not occurring because there is no potential
- ☐ Not occurring for other reasons (please specify) _____

Q3.6 Is there a driller certification process? If so, are all water well drillers required to obtain this certification?

- ☐ Yes, but not all water well drillers are required to obtain this certification
- ☐ Yes, all water well drillers are required to obtain this certification
- ☐ No

Q3.7 Is continuing education required for water well drillers?

- ☐ Yes
- ☐ No

Q3.8 Which agencies and/or organizations in your state conduct groundwater quality monitoring? Select all that apply.

- ☐ N/A, there is no groundwater quality monitoring in this state
- ☐ This agency
- ☐ State Geologic Survey
- ☐ State Department of Agriculture
- ☐ State Engineers Office
- ☐ US Geologic Survey
- ☐ US Environmental Protection Agency
- ☐ Local agencies
- ☐ Colleges/universities
- ☐ NGOs
- ☐ Conservation/Natural Resource Districts
- ☐ Tribes
- ☐ Other federal agency (please specify) _____
- ☐ Other state agency (please specify) _____
- ☐ Other (please specify) _____

Q3.9 Does your state incorporate groundwater monitoring into its overall water resource quality monitoring strategy?

- ☐ Yes
- ☐ No
- ☐ N/A This state does not have a water quality monitoring strategy

Q3.10 To which of the following user groups is groundwater quality data provided by your agency? Select all that apply.

- ☐ Household/domestic well users
- ☐ Industrial users
- ☐ Privately owned community water systems
- ☐ Publicly owned community water systems
- ☐ Agricultural users
- ☐ Environmental Non-Governmental Organizations
- ☐ Universities
- ☐ Other government agencies
- ☐ None, this agency does not engage in monitoring
- ☐ Other (please specify) _____

Section 4 Groundwater Quality Regulatory Program

Q4.1 Does your state have groundwater quality standards? If so, what is their applicability? (all groundwater in the state or selected areas or aquifers only?)

- ☐ Yes, for all groundwater in the state
- ☐ Yes, for selected areas or aquifers
- ☐ No

Q4.2 Does your state have groundwater quality standards based on type of use?

- ☐ Yes
- ☐ No

Q4.3 Do your state's groundwater quality standards include contaminants for which there is no federal Maximum Contamination Level? If so, please list the contaminants.

- ☐ Yes _____
- ☐ No

Q4.4 Are groundwater quality standards narrative (qualitative) numerically based (quantitative), or both?

- ☐ Qualitative
- ☐ Quantitative
- ☐ Both qualitative and quantitative

Q4.5 Which of the following groundwater quality regulations does your state have? Select all that apply.

- ☐ Class of use standards
- ☐ Municipal/Agricultural reclaimed water regulations
- ☐ Gray water regulations
- ☐ Chemigation
- ☐ Agriculture best management practices
- ☐ Nutrient management plans
- ☐ Stream buffers
- ☐ Tillage practices
- ☐ Fertilizer limits
- ☐ Concentrated Animal Feeding Operations regulations
- ☐ Wastewater irrigation/land application regulations
- ☐ Wastewater residuals (biosolids) regulations
- ☐ Nondegradation
- ☐ Groundwater classification
- ☐ Groundwater management areas
- ☐ Mixing zones
- ☐ Surface to groundwater connectivity policies
- ☐ Other (please specify) _____

Q4.6 Does your state have a groundwater classification system? If so, was it adopted by rule or legislation?

- ☐ Yes _____
- ☐ No

Q4.7 Does your state have policy or regulations aimed at managing groundwater dependent ecosystems? (e.g. fens, springs, wetlands)

- ☐ Yes
- ☐ No

Q4.8 If there are mitigation, prevention, and/or best management practice regulations for industrial, mining, and/or agriculture activities that may impact groundwater, are they voluntary or required?

- ☐ Yes, they are required
- ☐ Yes, they are voluntary
- ☐ No, this state does not have such regulations

Q4.9 Does your agency implement programs under primacy arrangements of the Underground Injection Control (UIC) program in your state? If so, for which Classes of UIC wells?

- ☐ Yes _____
- ☐ No, this state does not have UIC primacy
- ☐ No, another agency implements UIC (please indicate which agency) _____

Q4.10 If your state allows Class I injection wells, are aquifer exemptions allowed for these wells?

- ☐ Yes
- ☐ No
- ☐ Class I injection wells are not allowed

Q4.11 Which of the following strategies does your state utilize to ensure compliance with state quality standards? Select all that apply.

- ☐ Fines for violating standards
- ☐ Criminal penalties for exceeding regulations
- ☐ Fees for discharge of a regulated contaminant
- ☐ Water quality markets
- ☐ Voluntary self-reporting by water system operators
- ☐ Required self-reporting by water system operators
- ☐ Required self-reporting by dischargers
- ☐ Spot checking by the state regulatory agency
- ☐ Regular checking by the state regulatory agency
- ☐ Other (please specify) _____

Section 5 Groundwater Quality-Quantity Connections

Q5.1 Are the groundwater quantity and groundwater quality agencies in your state under the same umbrella department? If so, what is the umbrella department?

- ☐ Yes
- ☐ No

Q5.2 How do you typically coordinate with the state agency responsible for groundwater quantity management? Select all that apply.

- ☐ Little coordination occurs
- ☐ Regular meetings
- ☐ Copy each other on correspondences
- ☐ Stakeholder meetings
- ☐ Memos and briefings
- ☐ Personal relationships and networks
- ☐ Formal coordination established by statute
- ☐ Other (please specify) _____

Q5.3 To what degree do both groundwater development and managed aquifer recharge/aquifer storage and recovery regulations consider groundwater quality standards?

- ☐ Groundwater use and managed aquifer recharge regulations do not work well with quality goals
- ☐ Groundwater use and managed aquifer recharge regulations mesh with quality goals
- ☐ Groundwater use and managed aquifer recharge regulations generally mesh with quality goals, but some aspects work against quality goals
- ☐ Groundwater use and managed aquifer recharge regulations generally work against quality goals, but some aspects work well

Section 6 Resources, Research, and Collaboration

Q6.1 How are the water quality programs of your agency funded? Select all that apply.

- ☐ User fees
- ☐ Permit fees
- ☐ Taxes
- ☐ State general fund
- ☐ Mitigation fees
- ☐ Federal funding
- ☐ Other (please specify) _____

Q6.2 How does your agency's budget compare today to 10 years ago?

- ☐ Much less
- ☐ Less
- ☐ Somewhat less
- ☐ The same
- ☐ Somewhat more
- ☐ More
- ☐ Much more

Q6.3 How many FTE staff work in your agency?

Q6.4 How many staff in your agency work in groundwater related programs?

Q6.5 How would you describe the number of staff in your agency?

- ☐ Far too little
- ☐ Too little
- ☐ About right
- ☐ Too much
- ☐ Far too much

Q6.6 Which of the following full time staff does your agency employ? Select all that apply.

- ☐ GIS developer(s)
- ☐ Groundwater modeler(s)
- ☐ Hydrogeologist(s)
- ☐ Environmental protection specialist(s)
- ☐ Engineer(s)
- ☐ Biologist(s)
- ☐ Attorney(s)
- ☐ Hydrologist(s)
- ☐ Economist(s)
- ☐ Geochemist(s)
- ☐ Other (please specify) _____

Q6.7 Please rank the following resources most needed for your department to better accomplish its goals? 1 being most needed

- _____ Budget
- _____ Equipment or tools
- _____ Staff
- _____ Regulatory authority
- _____ Technical expertise
- _____ Greater stakeholder participation/engagement
- _____ Other (please specify)

Q6.8 To what extent does your agency rely on local agencies (e.g. County Health Department or Water Conservancy District) to implement groundwater quality regulations?

- ☐ Rarely
- ☐ Sometimes
- ☐ Always

Q6.9 To what extent does your agency rely on federal agencies to implement groundwater quality regulations?

- ☐ Rarely
- ☐ Sometimes
- ☐ Always

Q6.10 To what extent do county agencies in your state play a role in groundwater quality management? Please indicate any counties that are heavily involved in groundwater quality management.

- ☐ None
- ☐ Little _____
- ☐ Some _____
- ☐ A lot _____

Q6.11 To what degree are the following sources information about groundwater influential for you (or your organization) in learning about emerging groundwater management issues? On a scale of 1-5 (5 = very influential; 1 = not at all influential).

- _____ Internal memos and briefings
- _____ Popular news
- _____ Professional associations
- _____ Professional meetings/conferences
- _____ Continuing education
- _____ Trade journals
- _____ Universities
- _____ Peer-reviewed journal articles
- _____ Professional meetings/conferences
- _____ Webpages
- _____ Government reports
- _____ Other (please specify)

Q6.12 What sources of information are most likely to be influential in shaping agency management or policy decisions on groundwater? On a scale of 1-5 (5 = very influential; 1 = not at all influential).

- _____ Internal memos and briefings
- _____ Popular news
- _____ Professional associations
- _____ Professional meetings/conferences
- _____ Continuing education
- _____ Trade journals
- _____ Universities
- _____ Peer-reviewed journal articles
- _____ Professional meetings/conferences
- _____ Webpages
- _____ Government reports
- _____ Other (please specify)

Section 7 Looking Forward

Q7.1 Which of the following issues in your state will require more attention in the next 10 years? Select all that apply.

- ☐ Litigation
- ☐ Interstate conflicts
- ☐ Water rights
- ☐ Increased groundwater pumping
- ☐ Resource development (oil/gas, mining, timber)
- ☐ Climate change
- ☐ Primacy program requirements/responsibilities
- ☐ Tribal water rights settlements
- ☐ Stakeholder disagreements
- ☐ International conflicts
- ☐ Management of industrial waste
- ☐ Oil and gas exploration and production
- ☐ Mine drainage
- ☐ Saltwater intrusion
- ☐ Water quality monitoring
- ☐ Water level monitoring
- ☐ Other (please specify) _____

Q7.2 Please rank the top three concerns from question 7.1. 1 being of most concern

- ☐ 1. _____
- ☐ 2. _____
- ☐ 3. _____

Q7.3 In the next five years, to what extent do you think changes in groundwater quality regulation will be considered by the regulatory agency in charge of groundwater quality?

- ☐ Strongly unlikely to be considered
- ☐ Not likely to be considered
- ☐ Likely to be considered
- ☐ Strongly likely to be considered

Q7.4 Based on current aquifer water levels, water use projections, contamination issues and water planning efforts -what kinds of new groundwater regulations and/or policies do you think will be likely to occur in the next 5 years? Select all that apply.

- ☐ None
- ☐ Pumping regulations
- ☐ Injection regulations
- ☐ New water quality standards for unregulated contaminants
- ☐ Regulations/policies to better manage groundwater dependent ecosystems
- ☐ Regulations/policies to help assure sustainable use of groundwater
- ☐ Recharge regulations
- ☐ Regulations of surface activities that affect groundwater
- ☐ Oil and gas exploration and production
- ☐ Groundwater classification
- ☐ Groundwater quality standards
- ☐ Other (please specify) _____

Q7.5 Do you see existing groundwater quality regulations becoming more stringent, less stringent, or staying about the same in the next five years?

- ☐ More stringent
- ☐ Less stringent
- ☐ About the same

Q7.6 Please write any additional comments you think might be of interest.

Q7.7 If there were questions you were unable to answer; whom do you recommend we contact for responses?