Where Is All the Water?
Examining Public Conversations on X About Produced Water

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Introduction & Need for Research

The Ogallala Aquifer underlies 111.8 million acres in parts of eight states: Colorado, Kansas, Nebraska, New Mexico, Oklahoma, South Dakota, Texas, and Wyoming (McGuire & Strauch, 2024). However, there has been a sharp decline of available water for agricultural and municipal purposes, with loss estimates of approximately 276.4 million acre-feet (McGuire & Strauch, 2024). As traditional water resources become more limited, produced water has emerged as a potential supplemental water source in semi-arid climates. In Texas and New Mexico, the Permian Basin produces approximately 6,000 barrels of oil each day (U.S. Energy Information Administration, 2024). With every barrel of oil extracted, water is also pumped to the surface as a byproduct, referred to as produced water (American Geosciences Institute, 2018). While historically treated as a waste product, treated, desalinated, polished produced water' (i.e., purified produced water) is gaining visibility in public, regulatory, and environmental discussions as interest grows in its possible reuse for agricultural and natural resource applications such as for irrigation.

However, the use of purified produced water must be approached with caution, considering the potential risk related to the environment, soil, and food safety. Although technology is advancing to make purified produced water treatment more feasible, public opinion of the topic determines the success for beneficial reuse (Fielding et al., 2019). Social media has become a primary channel for information sharing, making today's scientific topics delivered and digested through devices (Murthy et al., 2021). To better understand how this emerging issue is framed and discussed in public online spaces, the purpose of this study was to examine the primary topics and overall sentiment present in social media conversations about produced water.

Theoretical Framework

This study is grounded in the risk perception theory, which explains how individuals interpret and respond to risks. Risk perception research demonstrates that public responses to risk are shaped by values, emotions, prior experiences, and levels of trust in institutions and information sources (Slovic, 1987). In the digital age, social media has evolved from a communication tool into a strategic asset, influencing consumer behavior and decision-making (Rimadewi et al., 2025). This makes social media a space where perceptions are formed and reinforced, which allows users to interpret emerging science and technology based on values, emotions, and experiences.

Methods

Data were collected using social media listening through Sprout Social, a social media monitoring and analytics platform. Posts were collected from X (formerly Twitter) between November 2025 to January 2026. A Boolean keyword search query was used to identify relevant posts, incorporating terms related to *produced water* (e.g., fracking water, oilfield wastewater) and its *potential for beneficial reuse* (e.g., irrigation, crops). Academic experts and stakeholders in engineering, communications, law, plant and soil sciences, and natural resources reviewed the keywords for accuracy and validity (Wimmer & Dominick, 2014).

The initial dataset consisted of 557 X (Twitter) posts. A stratified sampling approach was used to ensure representation across the three-month period. Posts were included if they directly

referenced produced water and excluded if they were duplicated. The final sample included 202 posts. A quantitative content analysis was conducted to examine dominant topics and sentiment within the sample (Wimmer & Dominick, 2014). A codebook categorized the dominant topics that emerged from the conversation on X such as environmental, policy/regulation, and health, which were derived from an initial scan from ChatGPT, and considerations from a state senate bill, prior literature, and expert panel review (OpenAI, 2025; S.B. 601, 2021). Sentiment was coded to capture overall tone toward produced water, specifically support and opposition of produced water and neutral expressions. Intercoder training was conducted with three coders and was assessed using ReCal 3.0's calculation of Krippendorff's alpha. The results indicated acceptable agreement for topic (0.86) and sentiment (0.84; Wimmer & Dominick, 2014).

Results

Treatment and technology emerged as the most frequently discussed theme (n = 60; 29.7%), followed by multiple themes (n = 36; 17.8%), and reuse (n = 30; 14.9%). Economics (n =14; 6.9%), policy and regulation (n = 10; 5%), and health (n = 6; 3%) were discussed less frequently. The overall sentiment toward produced water was primarily supportive (n = 102; 50.5%) and neutral (n = 61; 30.2%). Thus, the oppose sentiment (n = 39; 19.3%) was the lowest sentiment present in the conversation. Crosstabulation of theme and sentiment revealed posts focused on treatment and technology were most frequently supportive (63.3%), with minimal opposition. Reuse-related posts also leaned supportive (66.6%), though a portion of neutral and opposed sentiment suggests cautious acceptance. In contrast, environmental posts showed higher levels of opposition (71.4%). Posts addressing multiple themes demonstrated mixed sentiment, highlighting the complexity of produced water discussions.

Conclusions

Conversations about produced water on X suggest public understanding of the topic is still developing. Posts centered on treatment and technology tended to receive more supportive responses, while health, environmental, and policy/regulatory frames are more likely to generate skepticism. This indicates public concerns are less about the existence of produced water and more about potential risks and accountability. These patterns align with risk perception theory, which explains individuals evaluate emerging technologies not solely on scientific evidence but through emotional and value-based lenses (Slovic, 1987). Overall, these discussions reveal clear patterns in which solution-oriented messaging builds acceptance; whereas, risk framing shapes perceptions of uncertainty, reinforcing the role of social media in shaping narratives.

Implications, Recommendations, & Impact on Profession

Social media platforms present an opportunity to identify misinformation or confusion early and respond with strategic messaging. This digital strategic asset can help influence consumer behavior and decision-making (Rimadewi et al., 2025). Within these platforms, emphasizing treatment processes, safeguards, and reuse outcomes may reduce skepticism, while overly risk-forward framing about health or the environment may create or increase concern. Future research should further examine who (i.e., the source) is shaping these conversations and extend social listening over time. We also suggest a national public opinion study to more fully assess knowledge gaps, trust, and acceptance related to produced water.

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