

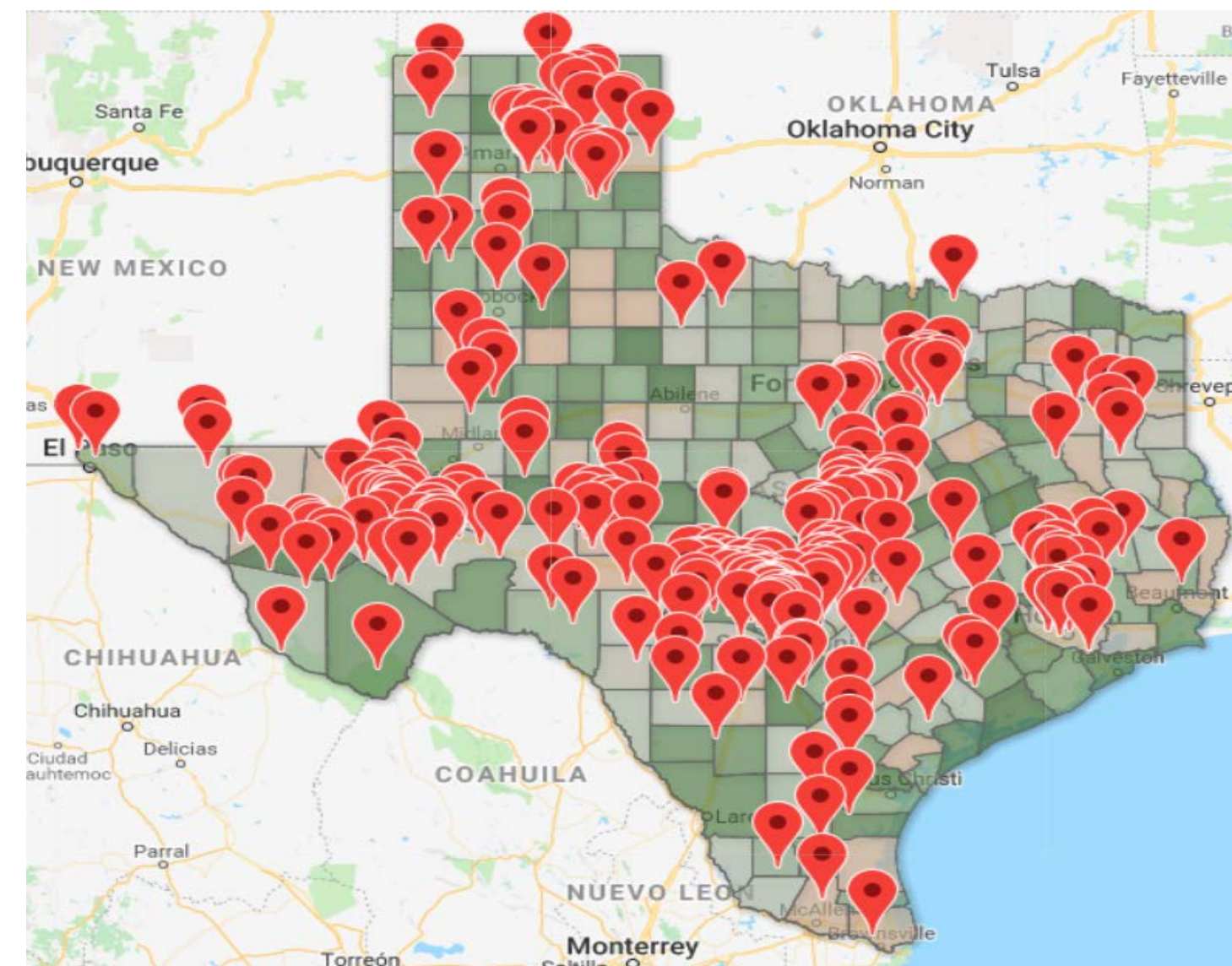
SMART AND CONNECTED MODEL FOR WATER RESOURCE MANAGEMENT

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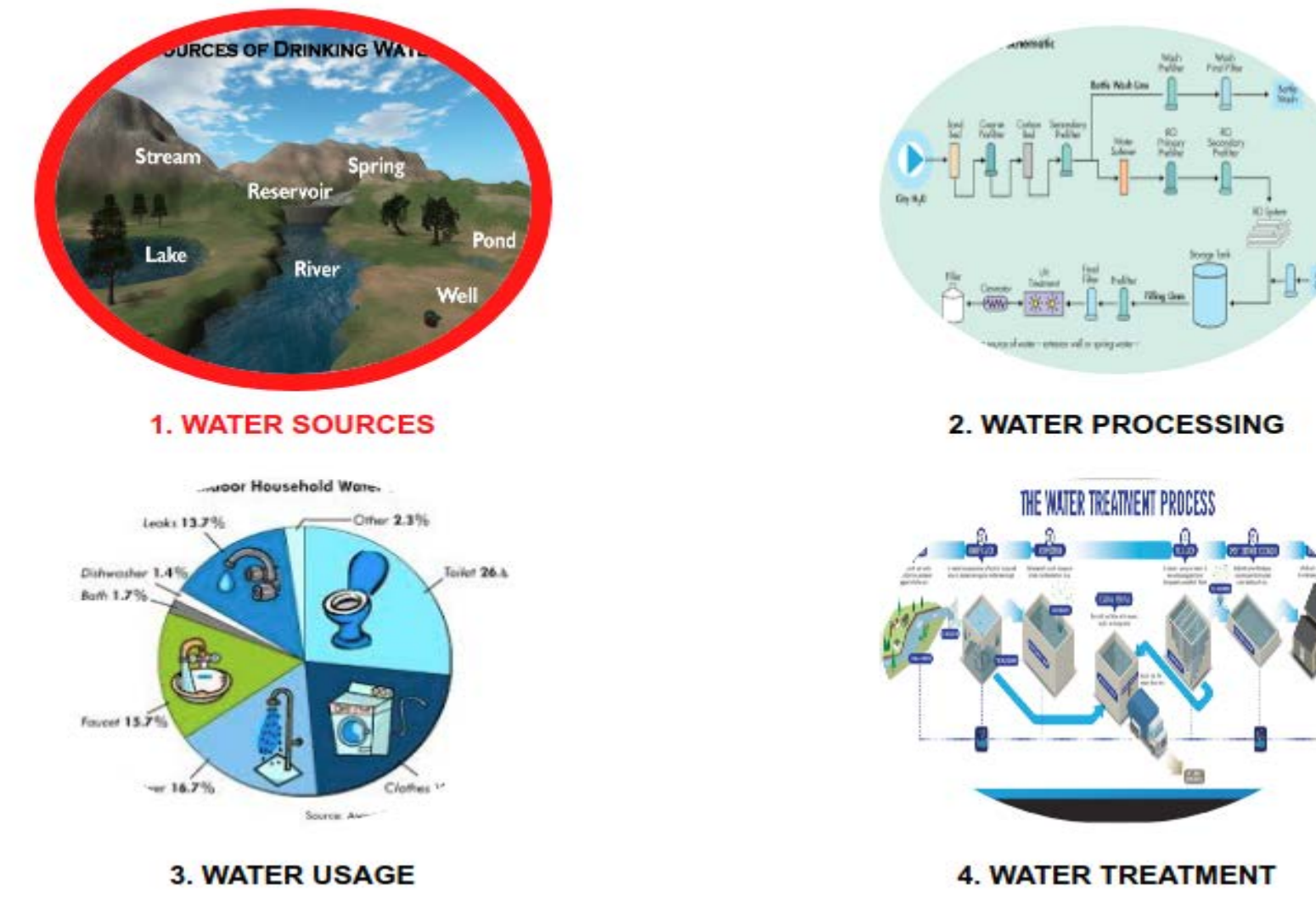


OBJECTIVES

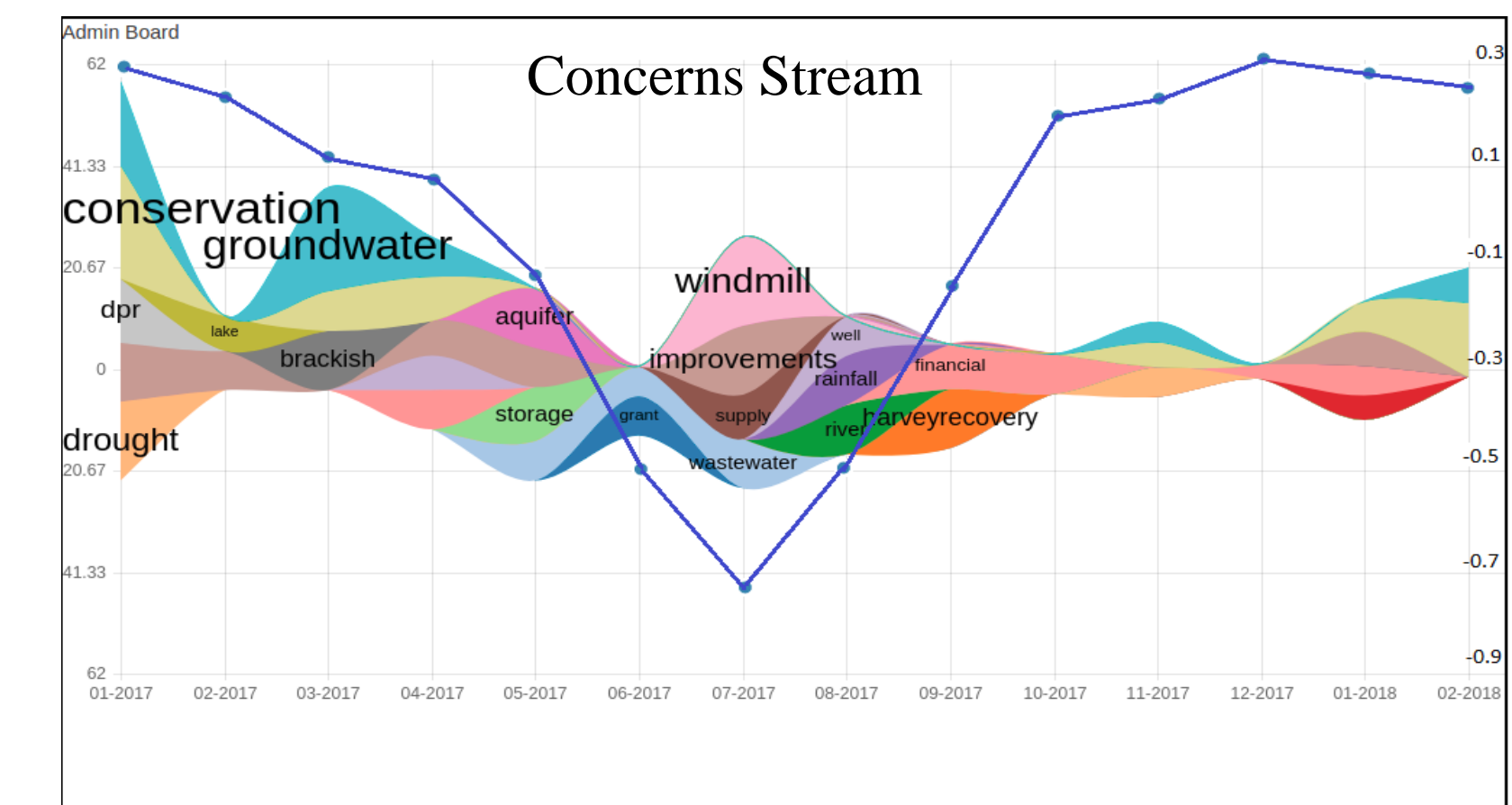
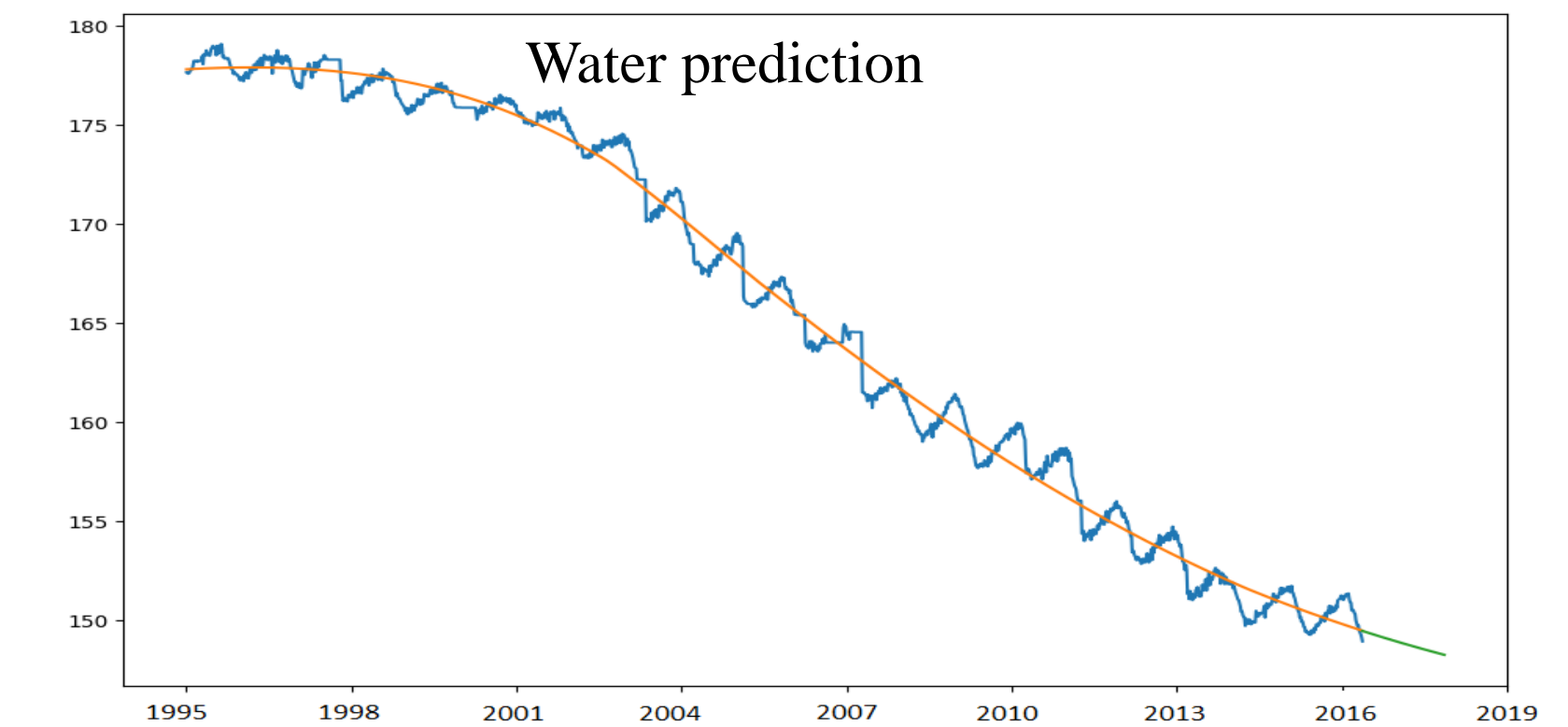
1. Improve Resilience of Rural Communities of Texas through improved water resources management.
2. Provide a bird's-eye view of Texas's underground water supply in the map. For each well, users can see its historical water level changes and report any concern or comments.
3. Understand different water stakeholders primary needs and key concerns in different periods.



Well Distribution



Discussion Board



METHODS

Water level prediction model: LSTM with multiple gate units.

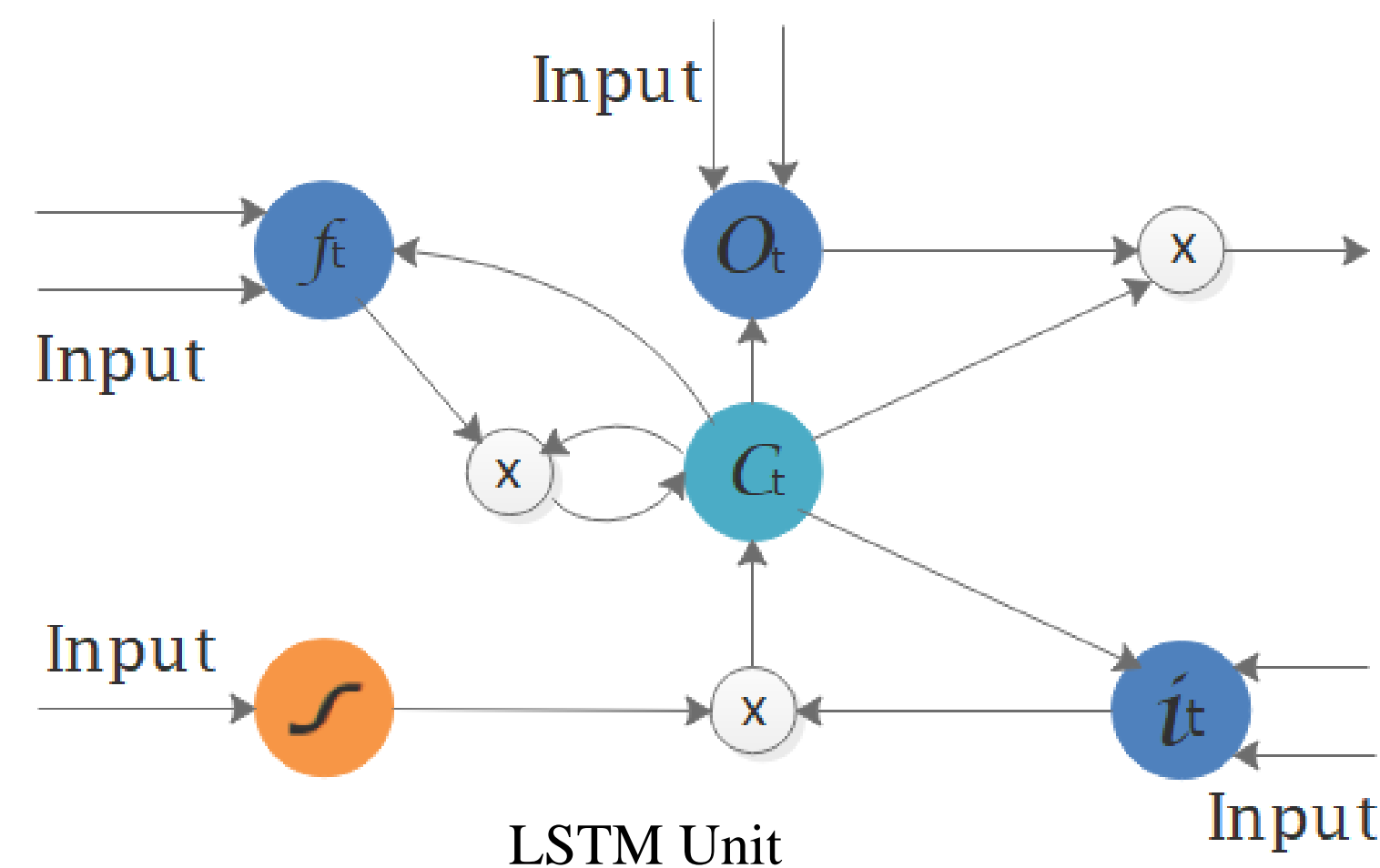
$$i_t = \sigma(W_{xi}x_t + W_{hi}h_{t-1} + W_{ci}c_{t-1} + b_i) \quad (1)$$

$$f_t = \sigma(W_{xf}x_t + W_{hf}h_{t-1} + W_{cf}c_{t-1} + b_f) \quad (2)$$

$$c_t = f_t c_{t-1} + i_t \tanh(W_{xc}x_t + W_{hc}h_{t-1} + b_c) \quad (3)$$

$$o_t = \sigma(W_{xo}x_t + W_{ho}h_{t-1}) + W_{co}c_{t-1} + b_o \quad (4)$$

$$h_t = o_t \tanh(c_t) \quad (5)$$



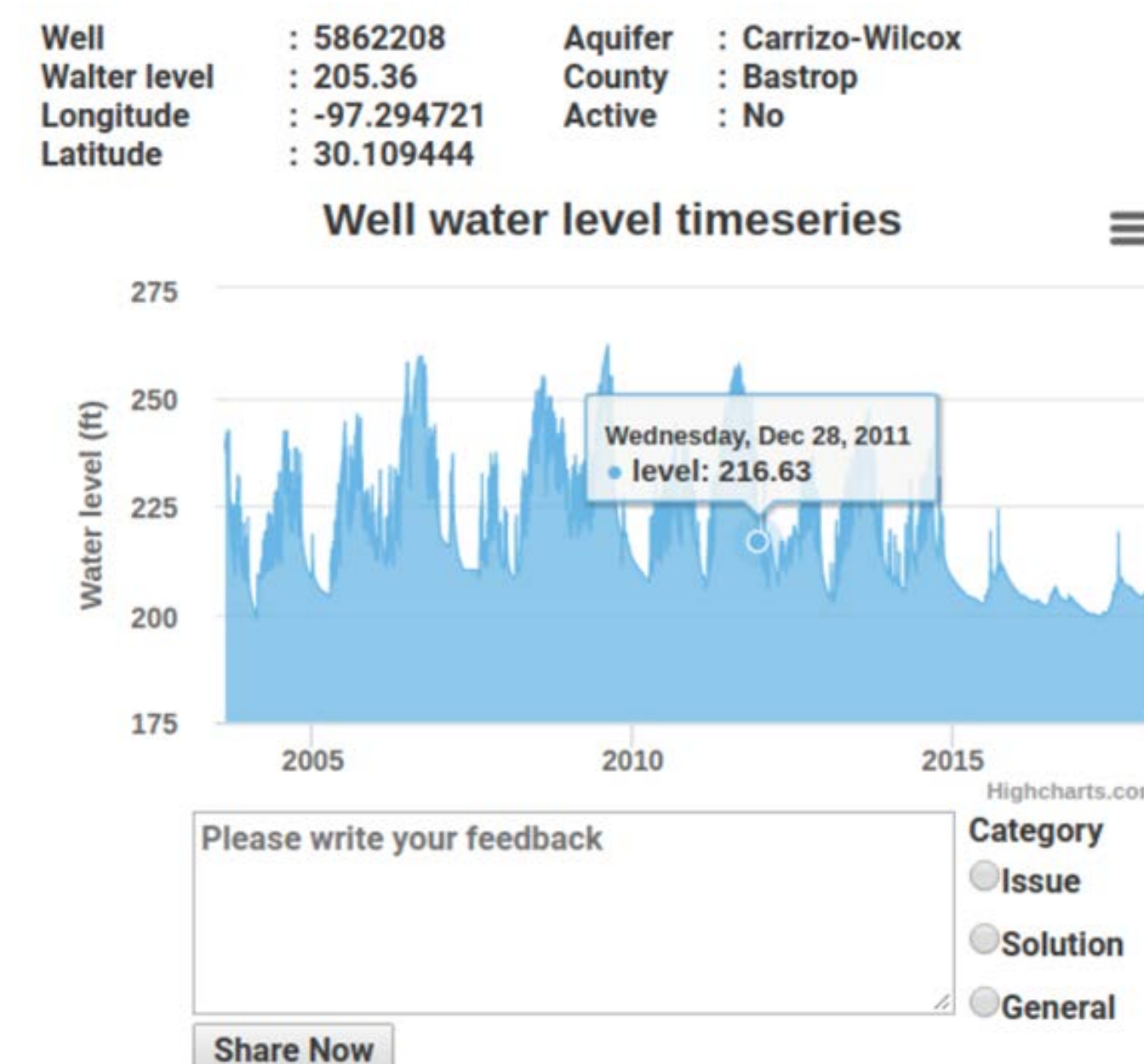
Concern Analysis:

- + Concern tweet classification: SVM classifier was built to classify tweets with concern regarding water
- + Concern extraction: NLP tool is developed to extract nouns, verb and adjective and considered as concerns.
- + Concern normalization: Synonyms are used to replace variant to have the unique concern

Knowledge Sharing:

- + LDA model to classify article into specified topics
- + Recommendation for interested users.

$$P(w_i) = \sum_{j=1}^T P(w_i|z_i = j)P(z_i = j)$$



DISCUSSION

- Present a novel unified model for a smart and connected community for water resource management
- One of the first in incorporating stakeholders' concerns from social media about water level.
- Community engagement provides insights into water issues: Solution, planning and enhancement.

REFERENCES

1. NGWA, "Facts about global groundwater usage." Westerville, Ohio43081-8978 USA, 2016.
2. S. Hochreiter, "The vanishing gradient problem during learning recurrent neural nets and problem solutions," International Journal of Uncertainty, Fuzziness and Knowledge-Based Systems, vol. 6, no. 02, pp. 107-116,1998.

