Multivariate spatio-temporal visualization of over-pumping the High Plains aquifer and impacts on the Arkansas River in western Kansas

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Background

- Excessively pumping puts stress on the groundwater supply
- Groundwater decline from the previous year
- Periods in between these wet periods
- People to irrigate even more acres of land

The High Plains Aquifer (HPA)

- Extensive development began in the 1940s
- PDSI of 5.5, yet neither streamflow nor groundwater were affected due the excess groundwater in the aquifer
- Groundwater at 85 ft (26 m) below the surface

Results and Discussion

Dry Period 1

- Peak streamflow of 1.5 ft³/s (0.04 m³/s) in 1975
- Decline from the previous year
- Small dry seasons have a greater impact on the landscape

Dry Period 2

- Peak streamflow of 1 ft³/s (0.03 m³/s) in 1980
- Small dry seasons
- Again, smaller dry seasons have a greater impact on the landscape

Dry Periods & Pumping

- Streamflow begins to more or less stabilize
- A series of small dry seasons
- Streamflow was barely flowing at 0.5 ft³/s (0.01 m³/s), and there is some delay as the hydrologic system is unable to support this much pumping

Wet Periods

- The climate switched to a mild dry season in 1980
- Pumping had decreased some through a mild wet periods
- Periods in between these wet periods

Wet Periods & Pumping

- Streamflow increases in groundwater, but some of the peaks extend past the blue boxes indicating there is some delay as the hydrologic system is unable to support this much pumping

Pumping & Streamflow

- The pumps were being pumped at an average of 60 ft³/s (1.7 m³/s) water was measured was 27.4 ft³/s (0.78 m³/s) below the surface. This was a severe dry period
- October 1980

Conclusion

- Groundwater Level:
- Streamflow
- Groundwater use density
- Groundwater decline and populate the charts and datasets were extended across the monthly records.

DiscoverWater

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Future Work

- Add multiple stressors such as rain
- Export Time Series Map Using QGIS2Web Plugin*

References

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