Mixing Oil and Water?: Fracking and the Risk of Water Quality Contamination in the Greater Chaco Region

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Introduction & History

- The Navajo Nation has a long history of environmental injustices due to its rich natural resources and deep-rooted discrimination (Marlow 2017), however the tribe is also an economic benefactor.
- Nicknamed, the "**checkerboard**" region, Northwest New Mexico is home the easternmost part of the Navajo Nation and is comprised of a diversity of land use types and ownership.
- Due to the disordered combination of BLM, state, public, and tribal lands, the policies concerning hydraulic fracturing exploit mineral rights.
- In recent years, due to ongoing policy changes and **advancements in horizontal hydraulic fracturing**, more oil and gas development is occurring in the Southwest.

Figure 1. Drilling tanks and drilling operation unfolding next door to a local's home (Photo: Jonathan Thompson, N.d.).

- **Communities in the Greater Chaco Region have an inseparable connection to the land**. Due to hydraulic fracturing, the health and overall wellbeing of these communities are at great risk. Increases in air pollution, traffic, and water pollution will negatively affect these populations first, and most intensely.

Research Question

Due to oil development encroachment in the Greater Chaco Region and surrounding Navajo communities, what groundwater quality issues have occurred over the last 10 years, and are predicted to occur in the next 10 years?

Methodology

My research includes a literature review and GIS data analyses. My project relies on the mapping of the area focusing on water sources, well access, and proposed oil development locations. The secondary focus is determining what water quality impediments are likely to occur due to the ongoing and proposed oil development.

Hydraulic Fracturing & Water Quality Reporting (EPA 2016)

- Water withdrawal from "limited or declining groundwater sources."
- Spilling of hydraulic fracturing fluids, chemicals, and/or produced water.
- "Injection of hydraulic fracturing fluids into wells with inadequate mechanical integrity, allowing gases or liquids to move to groundwater resources."
- "Injection of hydraulic fracturing fluids directly into groundwater resources."
- "Discharge of inadequately treated hydraulic fracturing wastewater to surface water resources."
- "Disposal or storage of hydraulic fracturing wastewater in unlined pits, resulting in contamination of groundwater resources."

Results

- 2016 Water testing results from 3 public drinking water facilities.
  - Total dissolved solids (TDS) were high (621 mg/L) in Site #2
  - **All 3 sites violated the EPA secondary regulatory limit** with readings over 600 mg/L (500 mg/L is the EPA secondary regulatory limit)
  - High sodium, sulfates and overall alkalinity are also high in all 3 samples along with conductivity (1000 µmhos/cm)
  - However, **no detected contaminants violated any EPA water regulatory standards**.

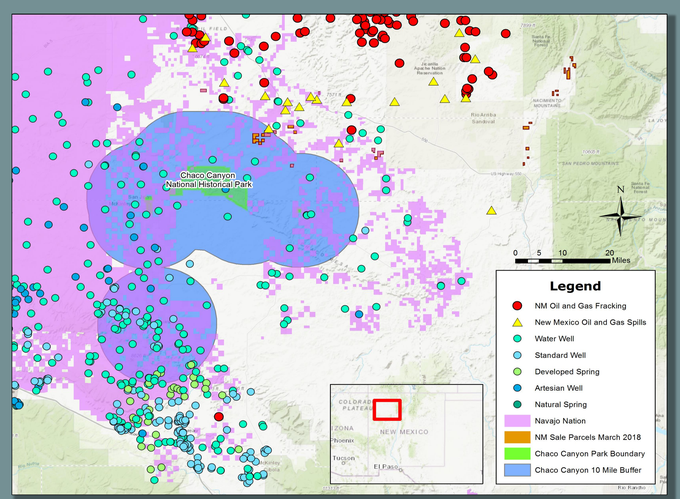

Figure 2. **Fracking in Chaco**: Hydraulic fracturing and water sources in the Greater Chaco Region (SOURCE: USGS and EBSCO). Map Created by: Nicholas G. Chischilly

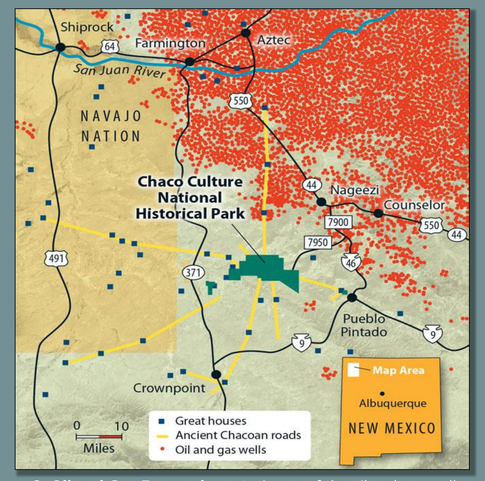

Figure 3. **Oil and Gas Encroachment**: A map of the oil and gas wells near Chaco Canyon National Historical Park in New Mexico (Sierra Club 2018).

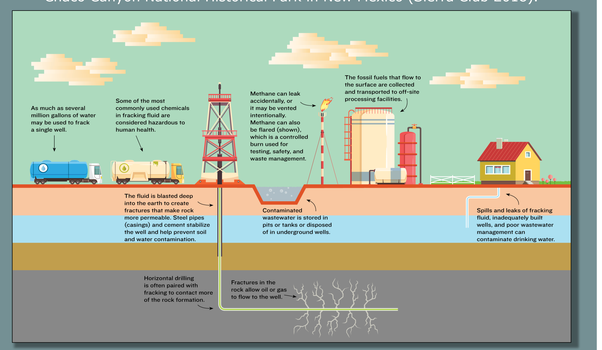

Figure 4. **Fracking Operations**: A simplified illustration of hydraulic fracturing operations, and associated groundwater sources (NRDC n.d.).

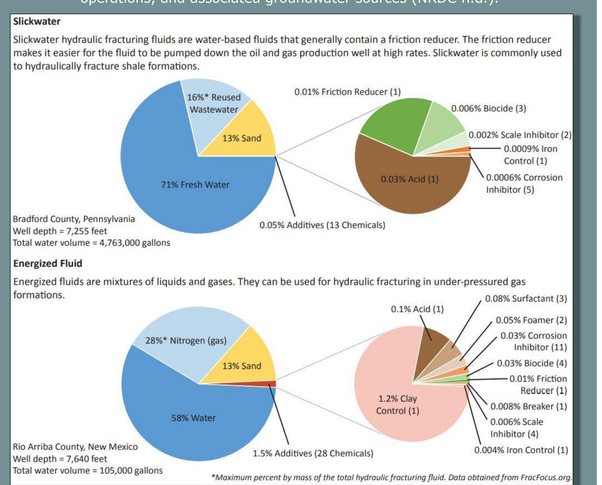

Figure 5. **Hydraulic Fluids**: 2 types of hydraulic fracturing fluids used for drilling and corresponding the chemical compositions (EPA 2016).

Results

- July 2016 – Explosion of drilling site burned for 5 days, and caused 55 people to evacuate the area.
- 11 Navajo Chapters passed resolutions that halts all pending and future federal fluid mineral BLM leases within the Eastern Navajo Nation Agency until:
  - Management Plan Update
  - Comprehension of environmental and health issues caused by horizontal hydraulic fracturing

Discussion

- More water quality testing needs to be conducted in addition to the 2016 testing.
- New policies should require an extensive environmental assessment of water quality and quantity prior to the establishment of any well in order to ensure water quality standards.
- Each community should have a say in where the wells are placed as some are drilled under individual's parcels, and the health issues impact the homeowners first before anyone else.
- Full disclosure of hydraulic fracturing fluids and health impacts to communities.

References

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