Hazard Mapping:

The Risks Posed to Public Schools by Oil and Gas Wells in Los Angeles County

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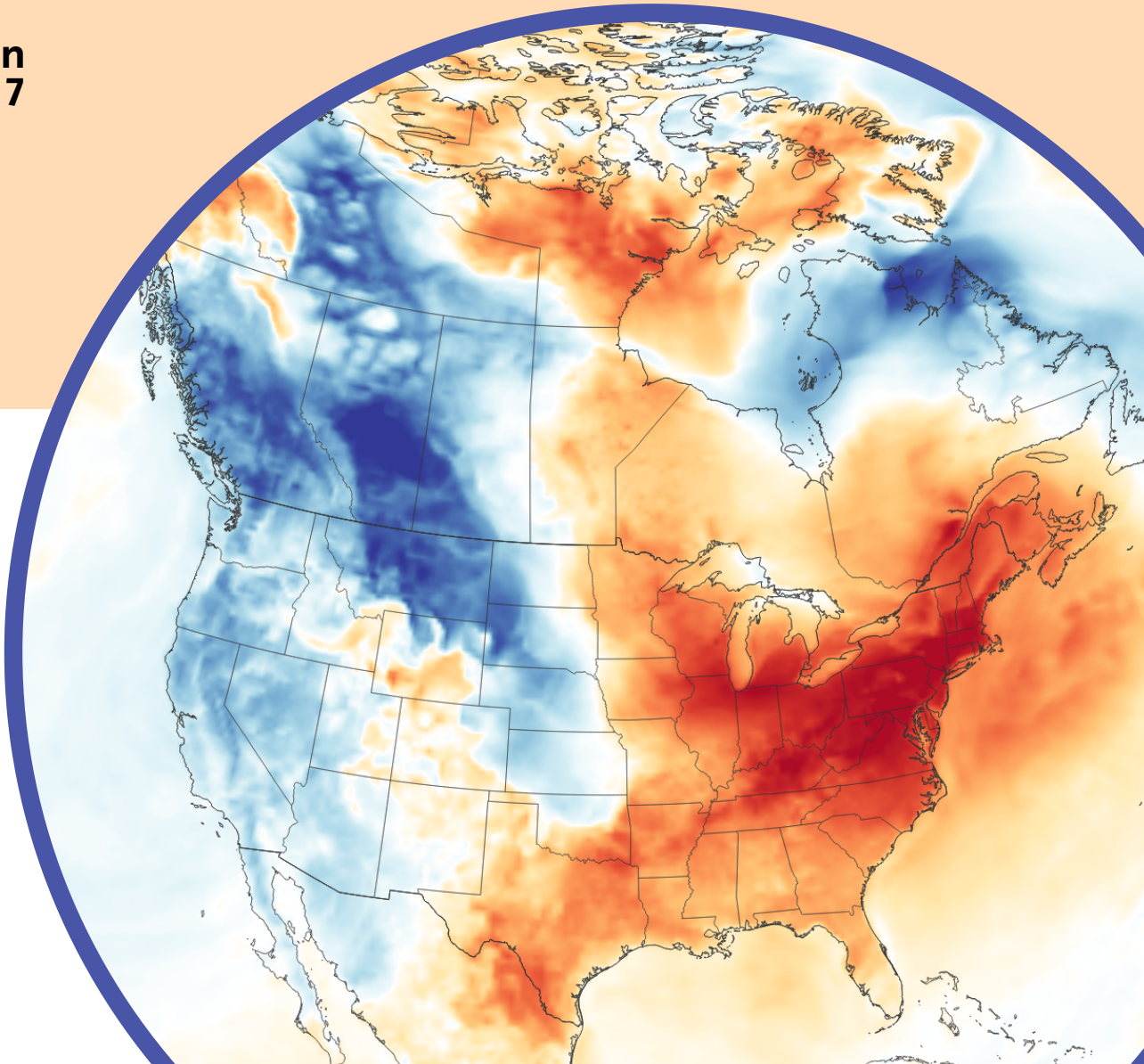
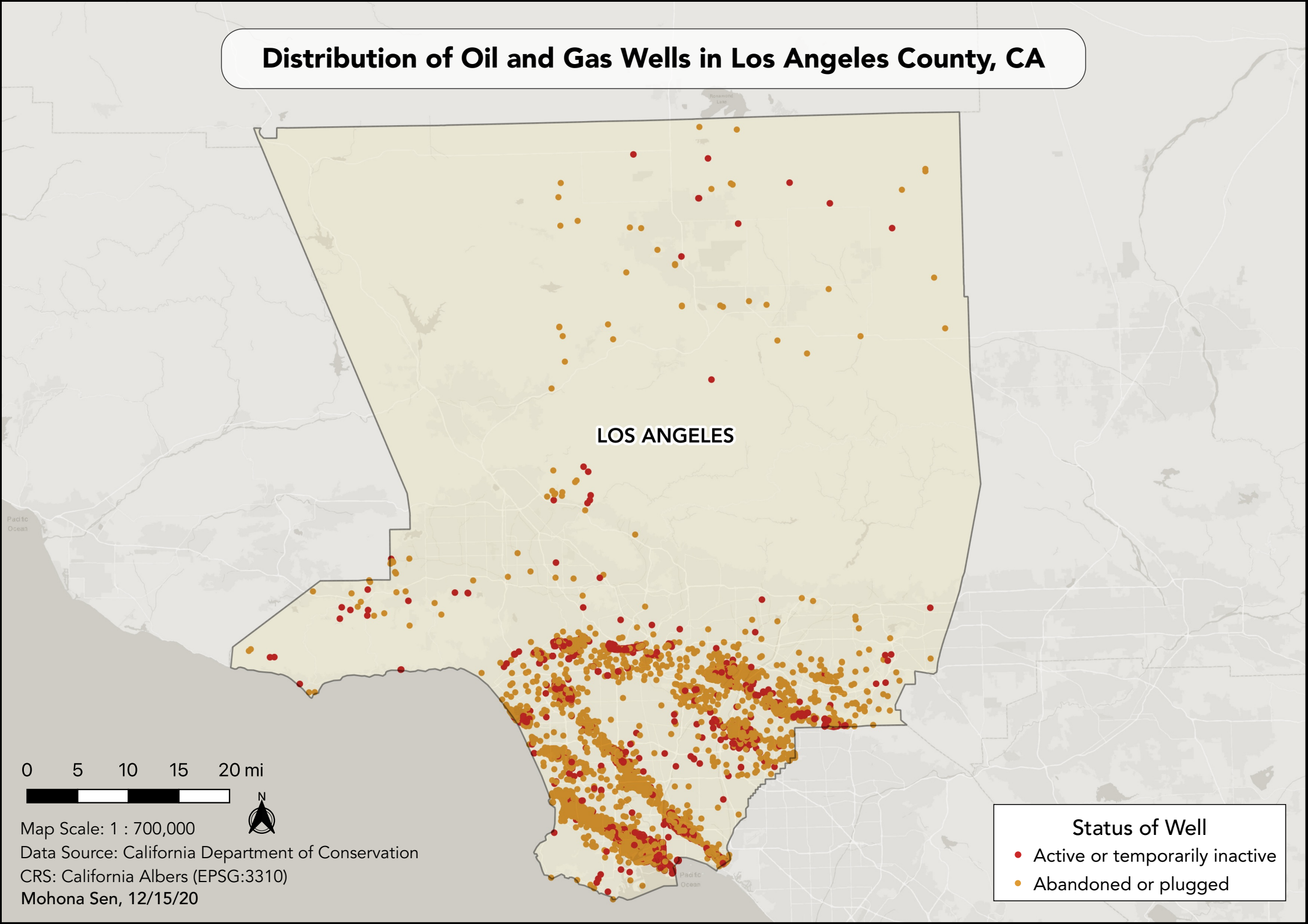
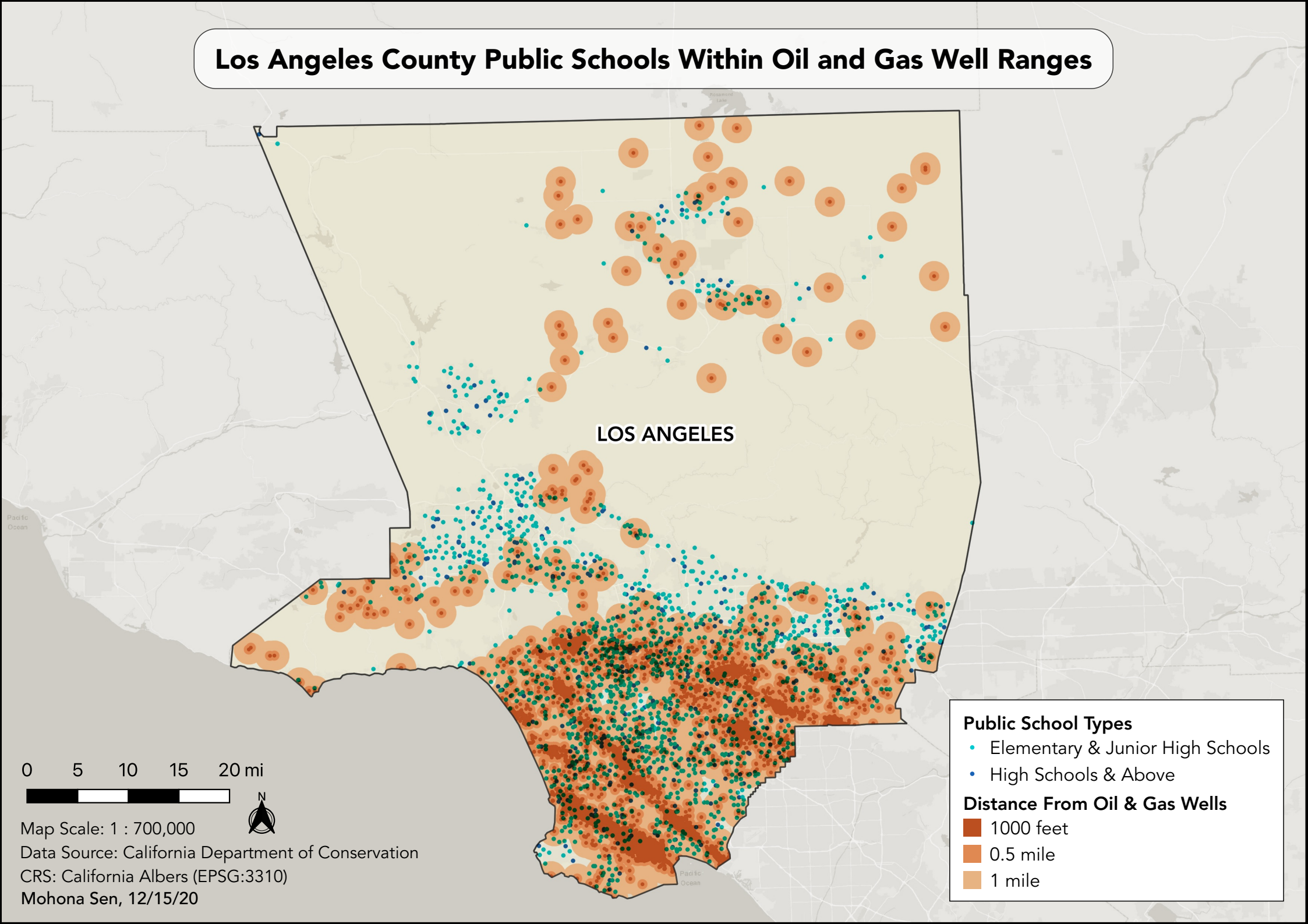
Geography 7



Distribution of Oil and Gas Wells in Los Angeles County, CA



Los Angeles County Public Schools Within Oil and Gas Well Ranges



Map Scale: 1 : 700,000
Data Source: California Department of Conservation
CRS: California Albers (EPSG:3310)
Mohona Sen, 12/15/20

THE NUMBERS BEHIND THE MAPS

WITHIN 1,000 FEET OF LA COUNTY'S OIL AND GAS WELLS, THERE ARE:

256 schools — 13% of all public schools in LA county.

WITHIN HALF A MILE, THERE ARE:

37% of all public schools in LA county. — **730 schools**

WITHIN A MILE, THERE ARE:

1,218 schools — 62% of all public schools in LA county.

WITHIN 1,000 FEET OF LA COUNTY'S PUBLIC SCHOOLS, THERE ARE:

1,664 wells — 62% of all oil & gas wells in LA county.

WITHIN HALF A MILE, THERE ARE:

38% of all oil & gas wells in LA county. — **8,091 wells**

WITHIN A MILE, THERE ARE:

16,067 wells — 76% of all oil & gas wells in LA county.

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RISK ASSESSMENT:

EFFECTS OF OIL & GAS WELLS ON LA COUNTY STUDENTS

What do we already know about oil and gas extraction in LA County?

In 2015, a methane gas leak occurred in the Alison Canyon Natural Gas Storage Facility.

The leak was caused by the deterioration of a well lining. The immeditaly noticeable effect was on people nearby, who suffered from "nosebleeds, dizziness and respiratory problems," and 8,300 of whom had to evacuate (Zaveri). Furthermore, on a regular basis, hydrogen sulfide leaks from various drilling locations across Los Angeles.

The decision to continue hosting such risks, such as leaks, lies in the hands of policymakers who must caution on the side of safety. LA County officials must oversee oil and gas extraction companies like SoCalGas, which failed to look into 60 other leaks at Aliso Canyon (Zaveri). Thus, we see that much of LA is potentially affected by these lapses in oversight over safety risks.

Health effects of being near oil and gas sites

People who live near oil and gas sites are often in danger, which can be present both covertly and explicitly.

For example, the pollutants released from well facilities contribute to smog, and at high concentrations, this air quality is toxic to humans, and can cause breathing and respiratory issues in the long term, such as asthma (STAND-L.A.). Outright calamities like gas explosions and acid spills can also occur. Children, in particular, face a greater risk to toxic oil and gas pollution due to the larger ratio of their intake to adults (STAND-L.A.). Thus, schoolchildren who spend 6-8 hours a day near oil and gas facilities face greater exposure to health hazards, which increase with proximity to drilling sites.

Policy decisions for LA County officials

LA County officials must implement additional regulations to ensure that schools are not at particularly heightened risk of harm from oil and gas extraction.

From our GIS data, we can see that 76% of all oil and gas wells in LA County lie within a mile of all LA County public schools. This is over three quarters of all oil and gas facilities, which is a concerning initial observation. However, from the first map, we also see that many wells are in orange dot points, meaning that many are plugged or abandoned, and perhaps not contributing as many harmful effects as the ones that are active in operation or temporarily halted (but to be started up again).

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A CLOSER LOOK:

SCHOOLS ON THE MAP PARTICULARLY AFFECTED BY FRACKING

Schools Within **One Mile** of a Hydraulic Fracturing Well:

SCHOOL DISTRICTS:	Long Beach USD	Los Angeles USD	Culver City USD	Total School Districts: 3
PUBLIC SCHOOLS:	Franklin Classical Middle	George De La Torre Junior Elementary	El Rincon Elementary	Total Public Schools: 15
	Chavez Elementary	Wilmington Park Elementary		
	California Academy of Mathematics and Science	Fries Avenue Elementary		
	Stevenson Elementary	Gulf Avenue Elementary		
		Phineas Banning Senior High		
		Avalon High		
		Glenn Hammond Curtiss Middle		
		Magnolia Science Academy-3		
		Annalee Avenue Elementary		
		Broadacres Avenue Elementary		
	Total: 4	**Total: 10**	**Total: 1**	

Fifteen schools listed above are in a one mile radius of a well that conducts fracking as a means of oil extraction. Fracking especially causes neurodevelopmental lags and neuropsychological shortcomings in children, which could impact their brain health throughout the rest of their lives; researchers like Ellen Webb from the Center for Environmental Health advise that **children should not play or spend prolong periods of time outside within 1 mile of oil and gas development locations** (Zaveri)- yet our GIS data reveals that within a mile of LA County's oil and gas wells, there are 1,218 schools. LA County officials must consider discontinuing or severely liming the use of fracking, as it is hence a particularly harmful form of drilling.

OF THE 21,259 OIL AND GAS WELLS IN LA COUNTY:

14,485 are plugged or abandoned.

1,059 are active.

1,059 are idle.

***72 are new.**

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1,227 out of 1,974 schools -- 62% of public schools in LA County -- are elementary or junior high schools. These schools contain the youngest children in the education system who are the most at risk to oil and gas facilities.

The abundance of elementary and middle schools as compared to high schools, colleges, and adult schools is very prominent in looking at our second map as well. The maps show a much higher concentration of oil and gas drilling near South LA, which disproportionately impacts the health and safety of residents and children of South LA County.

SUMMARY OF PROPOSALS FOR LA COUNTY OFFICIALS

- Recognize the immediate environmental and health impacts of oil and gas drilling
- Recognize that the majority LA County wells are currently plugged, abandoned, idle, or otherwise unused, so those should be completely shut down first
- Stop creating new wells beyond the 72 wells currently being developed or recently developed
- Reevaluate whether the wells currently being developed are necessary for industrial needs
- Provide additional funding to school districts with schools are within a mile of oil/gas sites, for students' medical needs related to health hazards
- Focus efforts on South LA County, where the concentration of oil and gas facilities is much greater
- Redirect funding from SoCalGas operations related to oil/gas drilling to renewable energy sources, including but not limited to
  - Solar technology
  - Wind energy
  - Hydropower
  - Geothermal energy

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METHODOLOGY:

QGIS TECHNIQUES AND PROCESSES USED

Part 1 - Mapmaking

For my first map, I added a light grey ESRI Web Map to allow LA County to be situated in context. I also lowered the opacity of my LA County layer to allow some topography and roads to be subtly visible under my county layer and points. Within the symbology of my oil and gas well layer, I used "Rule-based" symbols to enter equality expressions that divided my well data points into the different statuses of the wells and to "Multiply" the orange and red points. I split the data into 2 well statuses: 1) wells that are either active or only temporarily inactive and 2) wells that are abandoned and/or plugged. Though there were more well-status fields, I thought that these two would be most concise and useful since they allow for a depiction of the distribution of wells that are more prone to currently causing damage than inactive wells that are no longer in use.

For my second map, I maintained the basic setup mentioned above. However, this time, I created 3 buffer layers for the necessary distances away from oil and gas wells (1,000 feet, 0.5 mile, and 1 mile). I put all three buffers on the same map to allow for the complete visualization and comparison of the expanses of public schools that each buffer reaches. Once again, I used "Rule-based" symbology categories, this time to divide my public school data into sky-blue for points elementary and junior high schools (which also includes intermediate schools that contain both elementary and middle school students), and navy-blue points for older students in high school or schools for adults. I used this split to allow us to see the disparities between the way that young children versus older teenagers and adults are affected by oil and gas well impacts.

Part 2 - Data Accumulation

I used the Select by Location tool to find the number of public schools contained in and intersecting the distance buffers. Then, I found the total number of schools in the attribute tables of the original public school layer (1974 public schools total) and divided by this number to find the percentages of schools that fall within the 3 oil and gas well buffers.

Next, I created the 1,000 foot, 0.5 mile, and 1 mile buffers around all the public schools in the data. Then, I used the Select by Location tool to find the number of oil and gas wells contained in and intersecting the distance buffers. I divided these numbers by the total numbers of oil and gas wells, which was 21,259 wells. I found this value in the attribute table of the oil and gas well layer.

To find the schools that lie within a mile of a hydraulic fracking well, I filtered wells with the expression "HydFrac" = 'Y,' after which I made a 1-mile buffer around these fracking wells. Using the clipping feature on the schools that fell within this buffer allowed me to refer to the new attribute table containing the school names found within the buffer and their respective districts.

I also conducted further data analysis by doing "Select Features by Expression" to find the number of wells that were plugged/abandoned, idle, active, and new. To find the number of elementary schools and junior high schools compared to the rest of the schools, I filtered out the elementary, intermediate, and middle schools and performed summary statistics to find their sum (1,227).

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Sources

Zaveri, Mihir. “Corroded Well Lining Caused Aliso Canyon Gas Leak That Displaced Thousands, Report Says.” The New York Times, The New York Times, 18 May 2019, www.nytimes.com/2019/05/17/business/porter-ranch-gas-leak.html.

“Health and Safety of Oil Drilling in Los Angeles.” S T A N D - L.A., www.stand.la/health-and-safety.html.

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