

# DATA VISUALIZATION ON WATER AND SANITATION USING TABLEAU

Dataset used: Affected Habitations all over the  
country

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## 1. INTRODUCTION

### 1.1 OVERVIEW

This project focuses on depicting the number of drinking water habitations affected by the contaminants like Arsenic, Flourides, Iron, Nitrates and Salinity all over the country. Through this project we will be able to visualize the number of districts affected too and then be able to pinpoint the block and panchayat names if possible.

### 1.2 PURPOSE

This project can be used to pinpoint the zones on high-alert with regards to the contamination of drinking water and then the required plan of action can be taken by the government for treatment of these water bodies.

## 2. LITERATURE SURVEY

### 2.1 EXISTING PROBLEM

Drinking water habitations in many states of India are affected by contaminants like Arsenic, Flouride, Iron, Nitrate and Salinity. These contaminants can be very detrimental towards the health of humans, animals and plants around that are consuming it.

*Arsenic:* This element is introduced into water habitations through the dissolution of minerals and ores, industrial effluents and also atmospheric depositions. Arsenic is very toxic to humans i.e. some of its compounds are carcinogens. They can lead to cancer, thickening and discolouration of skin, problems with blood vessels, high BP, heart diseases and effects of nervous system.

*Flouride:* Some amounts of Flouride can be beneficial in preventing tooth decay, but excess can lead to dental and skeletal fluorosis (damages bone and joints). Can be introduced in water due to industrial discharges in water bodies.

*Iron:* Its present in rocks and minerals, hence appreciable amounts of iron maybe present in groundwater. But high amounts of iron can be harmful to aquatic life hence the water should be treated. Iron in water can lead to poor skin, like damage of healthy skin cells, early onset of wrinkles etc. It can also cause iron overload in body leading to hemochromatosis- damage to liver, health and pancreas. It can also lead to plumbing issues in the piping and drainage systems. The taste of the water is affected and tastes metallic.

*Nitrate:* Oxidation of ammonia containing fertilizers leads to nitrates in the drinking water. Its very harmful for the infants as it can lead to the 'blue baby syndrome'. Prolonged exposure to the nitrates can also lead to increased heart rate, nausea, abdominal cramps and headaches in adults.

*Salinity:* Salinity is introduced in the drinking water due to presence of salts in the water. Drinking water high salinity levels can lead to cardiovascular diseases, diarrhea, and abdominal

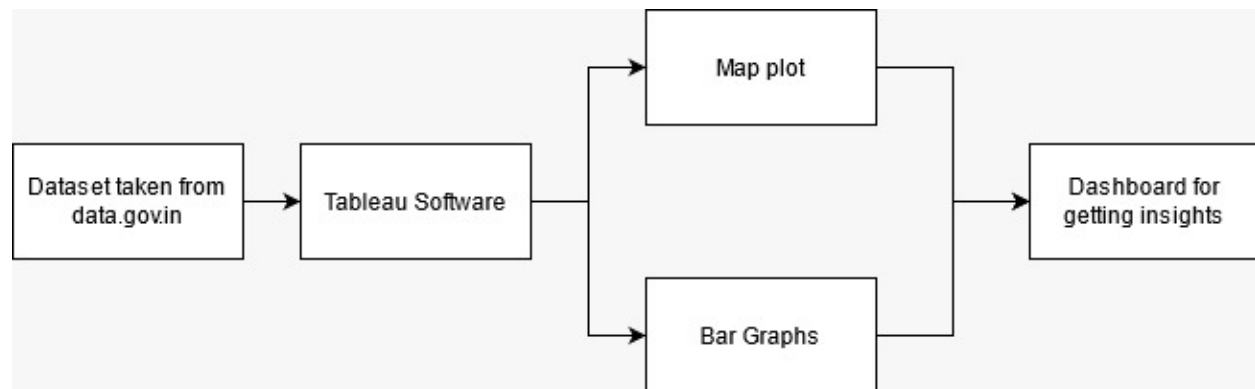
pain.

## 2.2 PROPOSED SOLUTION

The Tableau data visualization dashboard will visualize the distribution of the affected drinking water habitations across the country. But we won't really go by numbers in the state, but narrow down to the blocks and districts that are the most affected i.e. more number of affected habitations are in one of the blocks or districts. This way we'll be able to prioritize the blocks/districts that require immediate attention and water treatment to prevent people to get affected by the same.

## 3. THEORETICAL ANALYSIS

### 3.1 BLOCK DIAGRAM



### 3.2 SOFTWARE DESIGNING

Tableau software and Tableau Public are required to carry out this project.

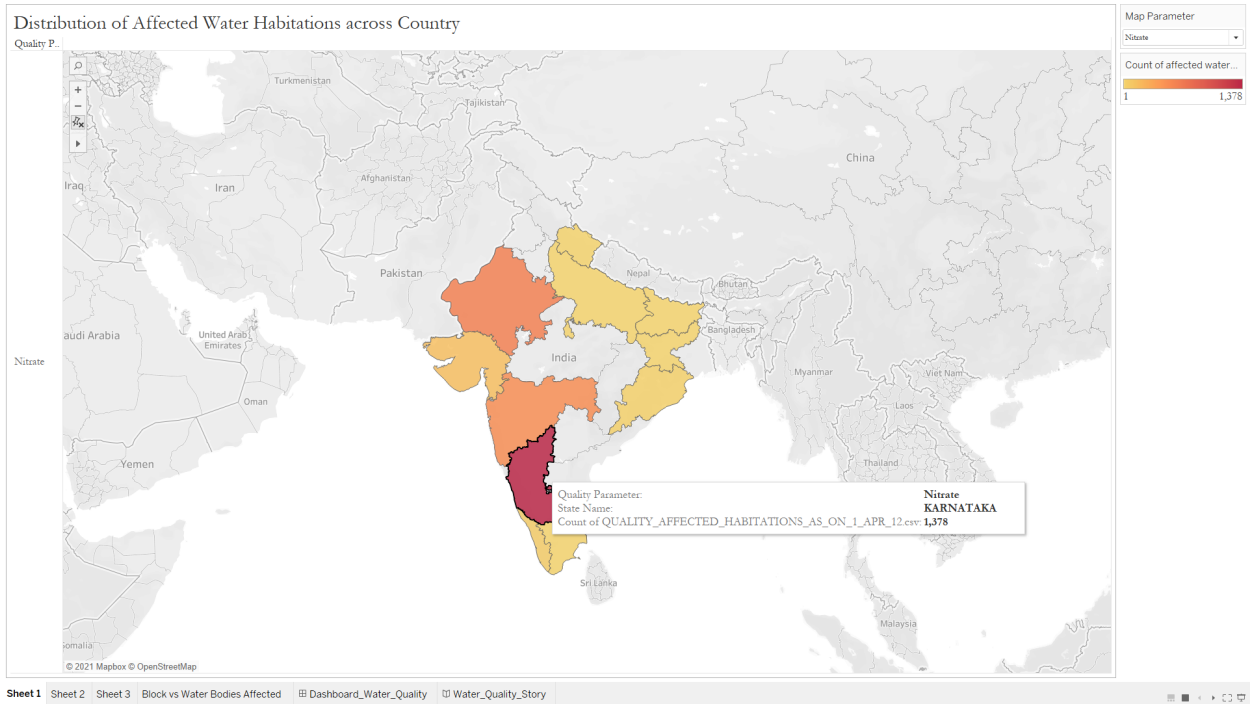
## 4. EXPERIMENTAL INVESTIGATIONS

First, step in the analysis after downloading the dataset was to present the data to the audience in the most informative way. I plotted the map plot to show the distribution of the affected water habitations across the country, to get an idea about the most affected state in each case i.e. Arsenic, Nitrates, Flouride, Salinity and Iron affected states. The most affected district or block wasn't really visible in this map plot, hence the next step was to plot the bar graphs for most affected blocks and districts in case of each parameter.

The expected output was to get the districts and blocks from the most affected state itself. But, instead in case of few parameters we got blocks and districts from other states that had more affected habitations in a place. This outcome, made it clear that districts and blocks had to be prioritized since the condition of drinking water is so affected by the affluents.

For example, in the map plot for nitrate affected habitations, it showed that Karnataka has

highest number of affected habitations.



But Block vs Water Habitations affected showed block affected from Rajasthan the most affected one (Osian, Jodhpur, Rajasthan).



Plotting through panchayat names was getting tedious as they are many in number. Just in case details are required, I have added a tabular column with heirarchial variables so that once we expand the blocks, we get to see which panchayat is the most affected. From the table below we observe that Osian from district Jodhpur, Rajasthan is the most affected one. But under that

block Matora panchayat area has the most number of affected habitations.

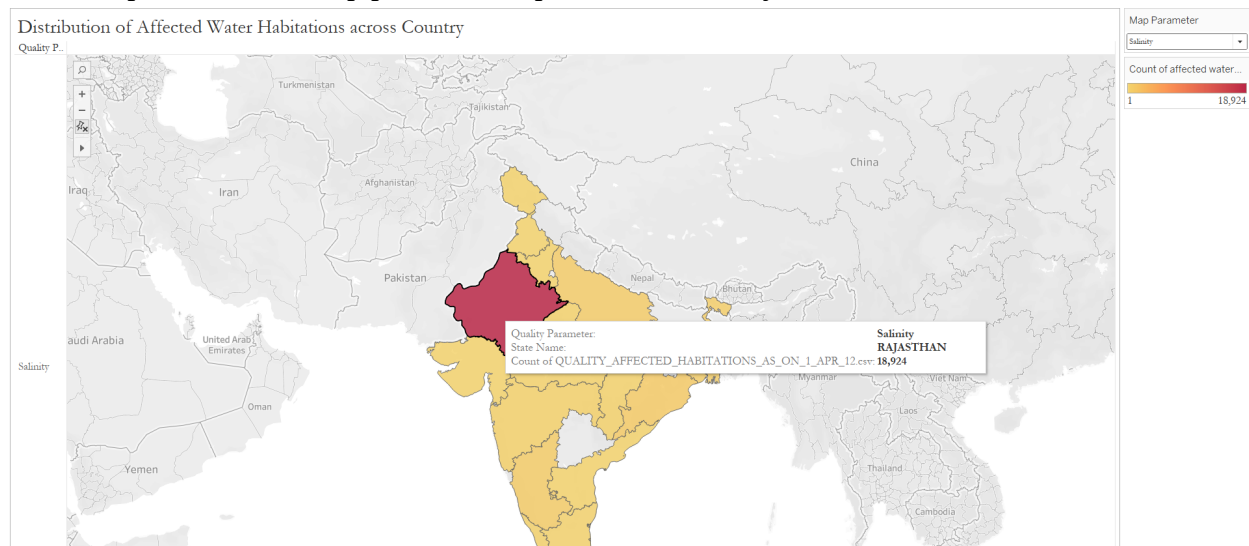
### Heirachial table for pinpointing the panchayat, district etc.

State Name	District Name	Block Name	Panchayat Name	Quality Par. Nitrate
RAJASTHAN	UDAIPUR	KOTRA	JHED	1
		BADGAON	CHIRWA	2
			VARDA	1
			ISWAL	1
			BADI	1
	JODHPUR	OSIAN	MATORA	73
			HATUNDI	20
			CHANDRAKH	20
			JELU GAGARI	15
			BALARWA	2
			BAPINI	1
	BHOPALGARH		OSTRA	14
			RAJLANI	10

The map plot did show the most affected states well, but due to the way too high number of affected habitations in one state might leave the other states on sideline (the numbers are high enough to not be ignored). It thus just gives the generic view of the distribution.

Bar plots definitely helped a lot to get a clearer insight about which district and block are the most affected. They depicted the most affected area, that requires immediate attention of the government institutions.

For example the below map plot is set to parameter: Salinity



Here Rajasthan has the highest number of affected water habitations (almost 19k) but Orissa has the second highest with 1000 affected water habitations that cannot be ignored

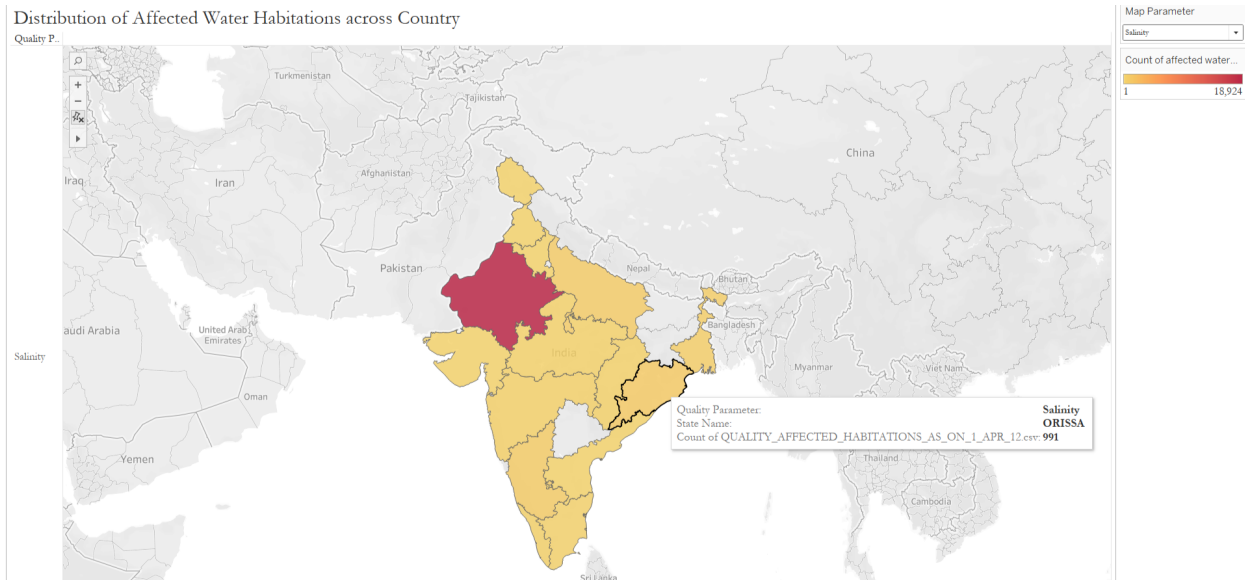
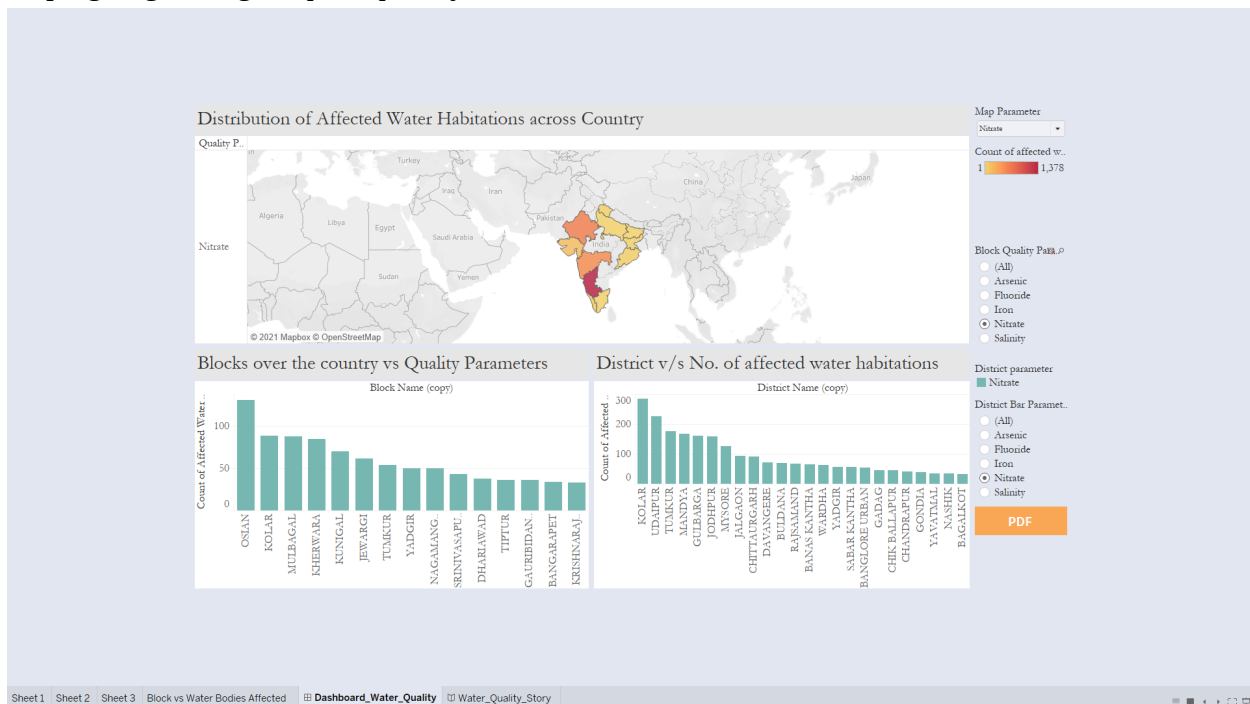


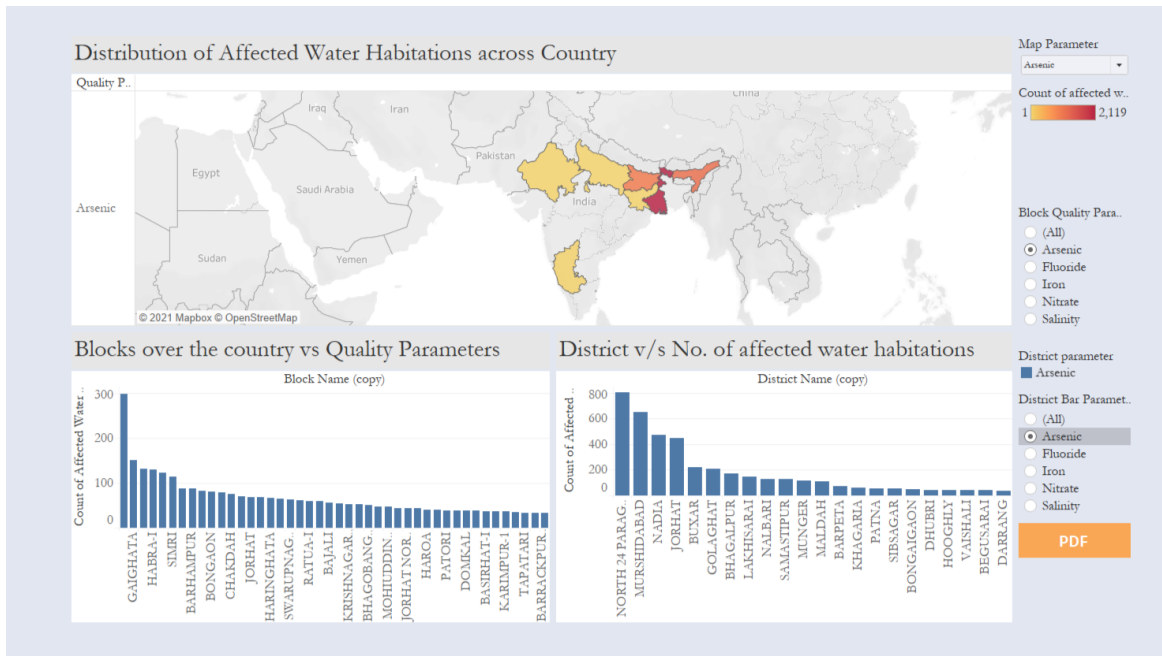
Tableau dashboard: This dashboard helps us visualize all the three visualizations in a go! Thus helping to get insights quite quickly.



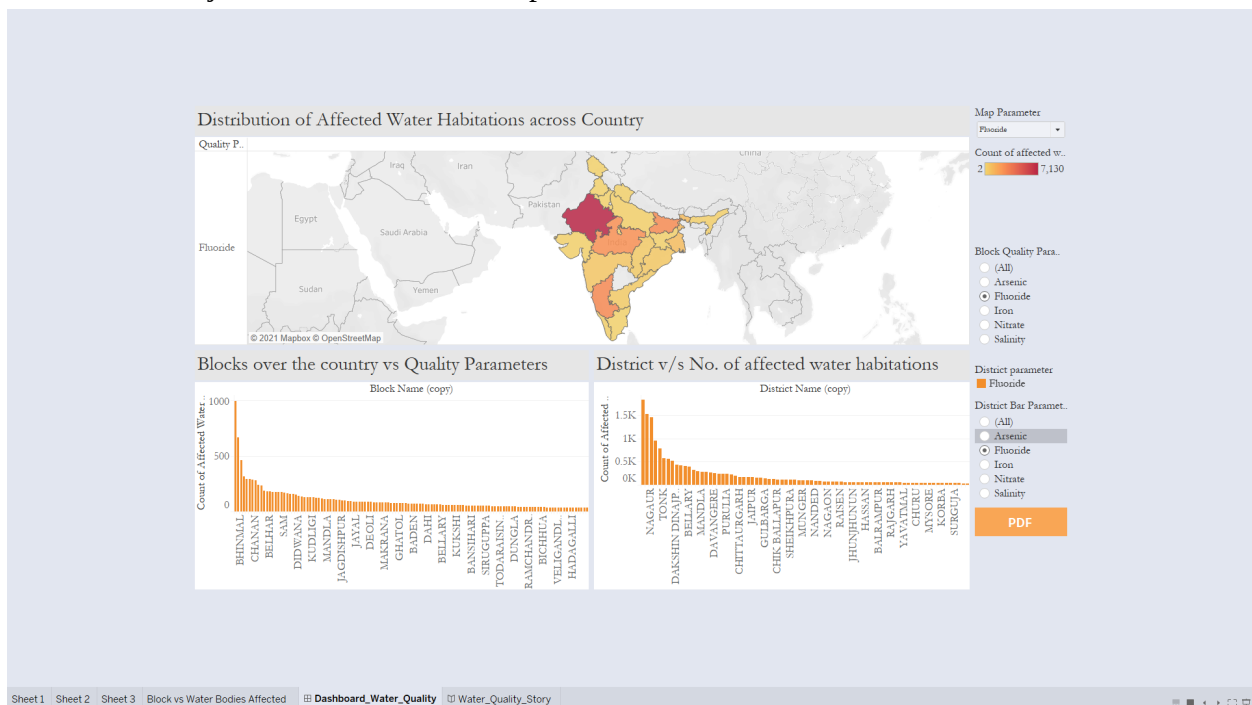
## 5. RESULTS

- In case of Arsenic affected habitations we observe from map plot that West Bengal is the most affected state in the country. Most affected district is "North 24 Paraganas" from West Bengal (807 affected) but the most affected block is Titabhar, Jorhat from Assam

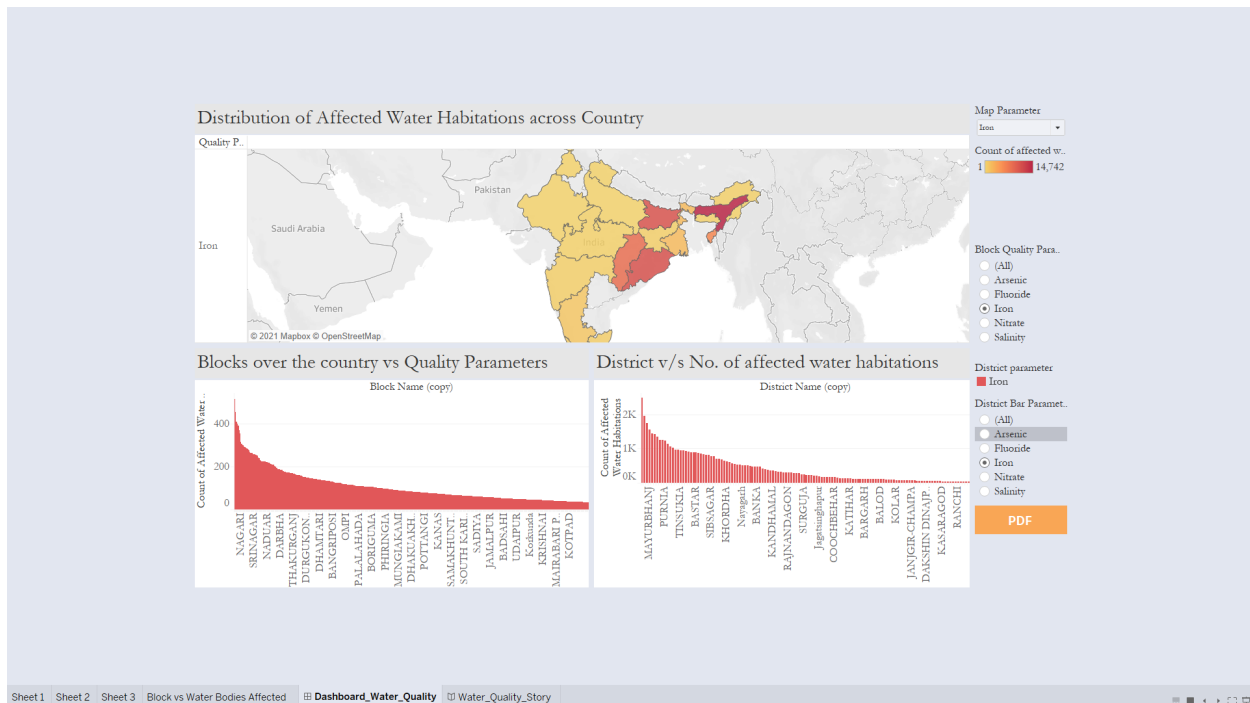
(300 affected habitations).



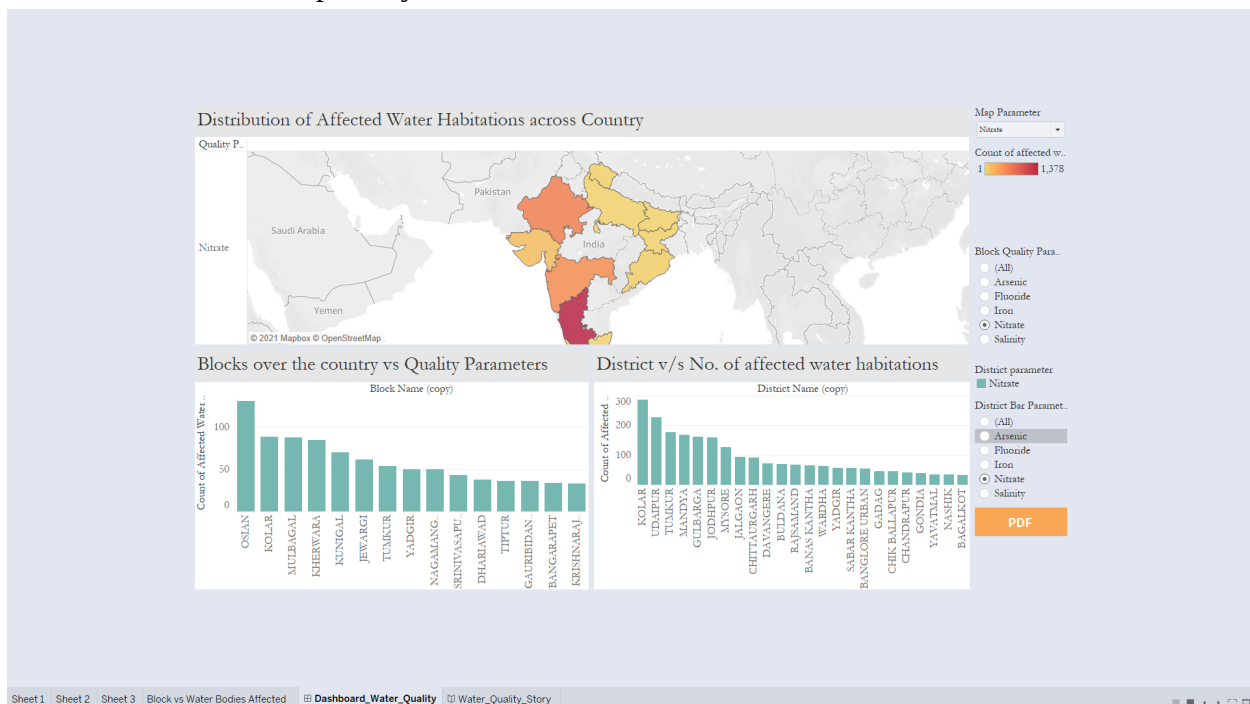
📌 Rajasthan is the most affected with 7130 flouride affected habitations. But the most affected district is seen to be Banka district from Bihar. Yet the most affected block is still from Rajasthan: Osian from Jodhpur.



📌 Assam, Orissa, Bihar and Chattisgarh are the most affected states in case of Iron affected drinking water habitations. Most affected district is Supaul from Bihar with 2500 affected habitations and most affected block is Basantpur from the same district.

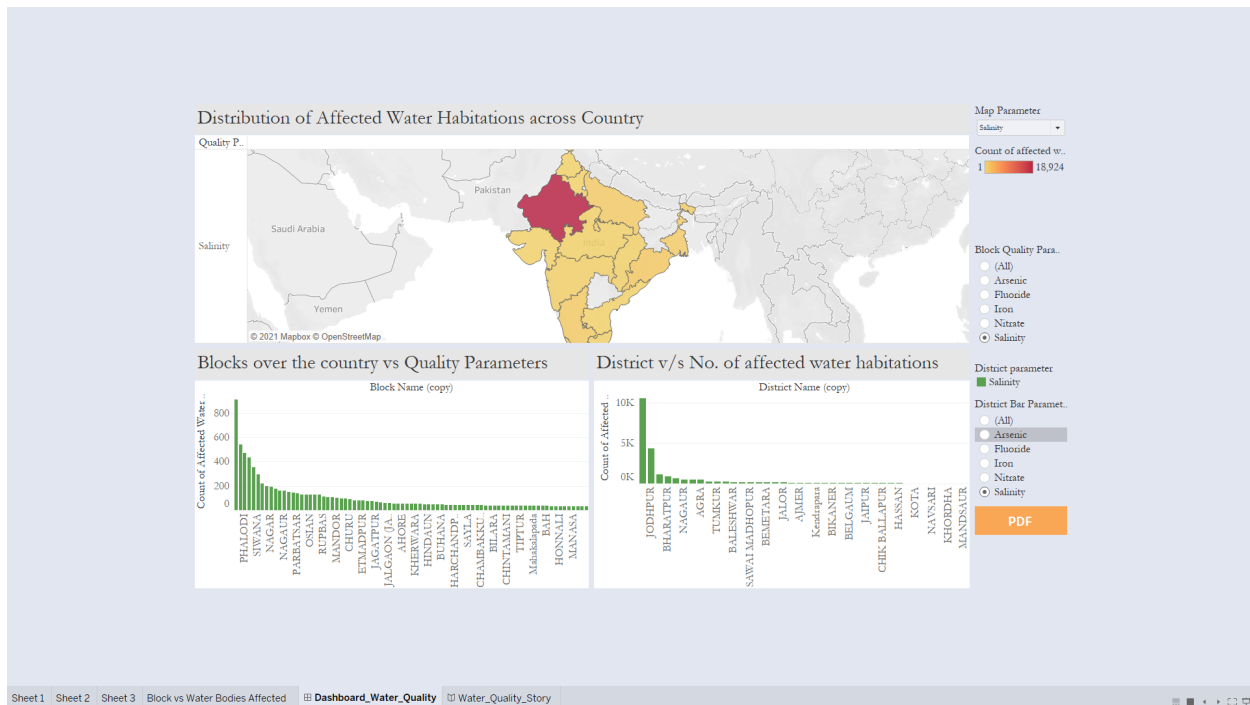


▲ Karnataka has the most number of Nitrate polluted water bodies followed by Rajasthan and Maharashtra. Kolar district from Karnataka is the most affected with 286 polluted water habitations. But the most affected block is Osia But the most affected block is Osian from Jodhpur Rajasthan.



▲ Rajasthan has the highest number of saline water habitations (18,924 as of 2012) with Sheo block from Barmer district having 913 of them.





- The most affected states in general in the country are Rajasthan, West Bengal, Assam, Bihar and Orissa.
- The most polluted water habitations seem to be situated in Osian block in Jodhpur Rajasthan

## 6. ADVANTAGES AND DISADVANTAGES

### Advantages:

- Overall generalised view is obtained about the affected water habitations across the country.
- The blocks with more number of affected water habitations can be on the radar for water treatment first.
- The districts can be allocated the fund for water expenditure according to how many districts are affected in the state.
- The most red-zone blocks are shown in the visualization

### Disadvantages:

- Panchayat names cannot be visualized thus not able to make the data viz more local.
- The data is 9 years old (2021) so these aren't really reliable insights

## 7. APPLICATIONS

Can be used to prioritize the red-zones (most affected districts and blocks by the given affluents) for the water treatment. The data visualization can be used by the health

institutions for diagnosing the health effects of people residing in the blocks. Government can use this data visualization for tracking the water treatment process over the country. Thus making drinking water habitations usable for the people.

## 8. CONCLUSION

Through this data visualization, we got the overview of the affected habitations in the country. From other visualizations we also get the exact number of blocks and districts affected by the same. We see that, country is affected the most by salinity, flouride and Iron polluted habitations so the officials can take the required plan of action against it. The health effects it can have on people is tremendous hence it is advised to prioritize the blocks and districts from the same.

## 9. FUTURE SCOPE

The dataset used in this visualization can be updated. This visualization can be thus used by the government to manage carrying out water treatment effectively and effeciently. The visualization can be made more compact if we get the geocoding and the names of the places in the dataset to match with each other.