Team Name: Zero++

Organisation Name: Central Ground Water Board (CGWB), Ministry of Jal Shakti

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Problem Statement : **Data analytics to provide complete solution for groundwater management for the country** (PS CODE: **DM84**)

Groundwater is the major source of freshwater for drinking, irrigation and industrial purposes and has always been a hidden treasure because of its dynamic nature. The health of the groundwater system is reflected in the groundwater levels of the region. There is a need to develop a robust application to understand the groundwater scenario and its resources of the regions. Representative groundwater level data needs to be analyzed using statistical and arithmetical solutions along with the groundwater resources of the country to identify the blocks/district/state which has been critical compared to previous decade.

Domain Bucket**: Miscellaneous**

Category**: Software**

Organisation Name: **Central Ground Water Board**

PS Number: **DM84**

Team Leader – **Hrishikesh Mahajan**

School: **WPU**

Our Solution – IndiaGWanalytics.in (App + Website)

IndiaGWanalytics.in is a application that provides **visualization** of **Groundwater scenario** in India with **GIS mapping, graphs and various analysis tools**.

Link to video: https://drive.google.com/open?id=1zU28kcVHMIsH1HWq2yLm3kLMOU4Rz1Oa

Ground-Water crisis in India

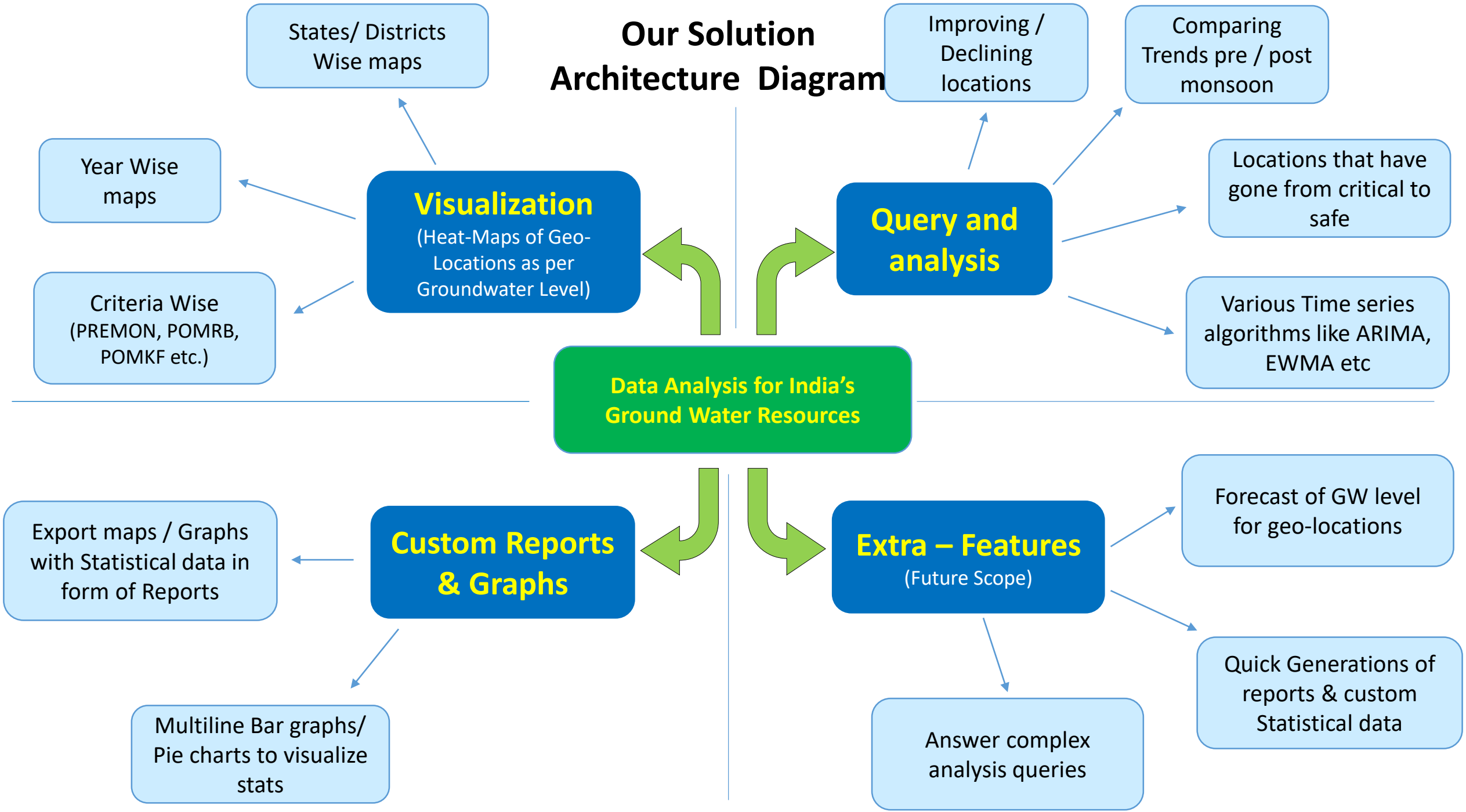
India Groundwater Statistics

- More than **50%** of Indian districts and cities are facing water supply problems for years.
- In many parts of country groundwater table is **declining** at the rate of **1-2 m/year**.
- **21 cities** predicted to **run out** of **groundwater** in **2020** (including Bengaluru, Delhi, Chennai)
- If this trend continues India will undergo a major water crisis and would lead to irreversible losses.
- **Atal Bhujal Yojana** worth **6000 crore** launched for preserving regions with low water table.

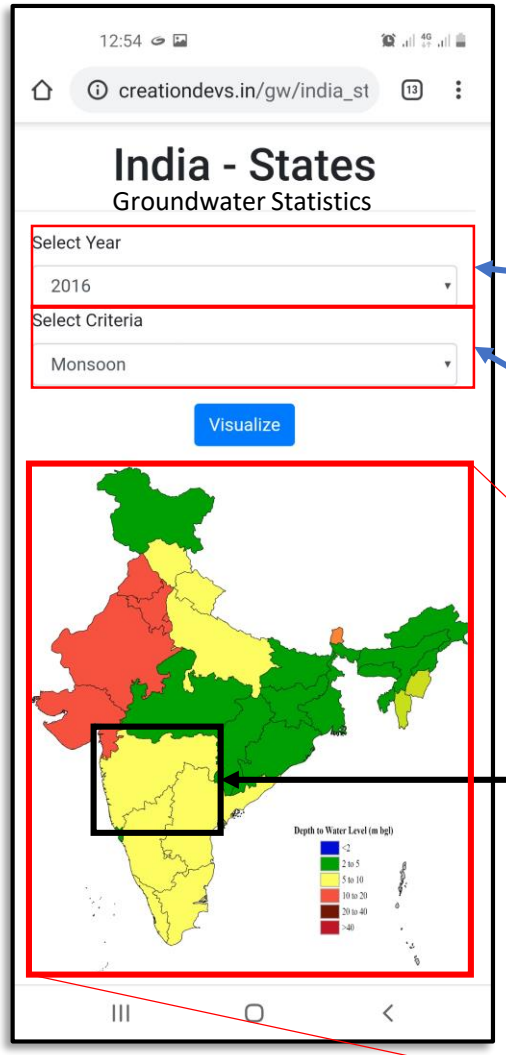
Chennai (May 31, 2018)

Chennai (June 19, 2019)

Our Solution Architecture Diagram



Our Solution



India Groundwater Statistics View of data analytics website

Selected State

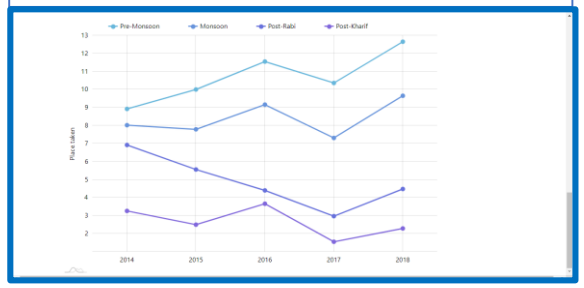
Select any year from 1996 to 2019 for visualizing that year

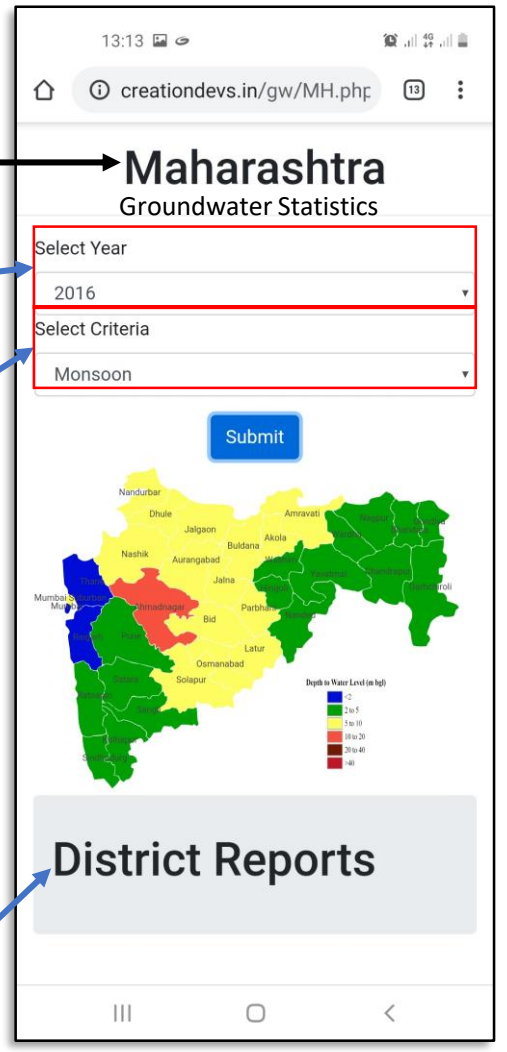
Select from four visualisation types

- Monsoon Visualization
- Post Monsoon Rabi Visualisation
- Post Monsoon Kharif Visualisation
- Pre Monsoon Visualisation

Entire Map is interactive and clicking on any state will open a new page showing data for that state.

Once district has been selected district-wise reports and visualizations will be available below.





Maharashtra Groundwater Statistics View of data analytics website

Technology Stack	For Analysis:	For the Website:	For the App:
	Python, Sklearn, Statsmodels, Matplotlib,	PHP, HTML, CSS, JavaScript , SQL Database	Android Studio (Java), XML

Features & Future Scope (Show Stopper)

Forecasting:

- Forecasting can be done by various methods such as ARIMA, exponential moving averages, Recurrent Neural Networks ,LSTM's using this data as well we can predict **future progressing** & **declining** villages to do **damage control in advance**.

Answer to complex GIS queries such as:

- Which districts in Maharashtra (say) **consumed more** than natural **groundwater recharge**?
- Show general trend of groundwater table height in India

Such queries give the application more value and help in **gaining** a **better perspective** on the groundwater situation of the country.

Report Generation:

- Just by selecting the state/district/block the user can view and **download a summary** of the groundwater scenario of that region.
- Report would include **maps**, insights from data, graphs, **visual representations** of data.

Who are going to use our solution?(Use Cases)

Water Managers: In order to plan out the water resources, a clear idea of the groundwater table is really necessary.
Farming Community: Farmers can have a general idea of the groundwater situation in order to best use this precious resource.
Planning Committee: The planning committee can decide where to place more wells/tube wells by groundwater table heights and consumption patterns.
Common Public: By being aware of the severity of the groundwater scenario, a sense of civic duty will be imbibed amongst the citizens.

Data Collection for Groundwater data

Collection of Data

- Scraped ground water level data for **state/districts/blocks** for years **1996-2018 (22 years)** from India WRIS website **.**
- **3,84,000** rows of data from the WRIS dataset consists of data for **Monsoon, Pre-Monsoon, Post-Monsoon,Post Monsoon Rabi, Post Monsoon kharif** levels for all blocks/districts/states.
- Along with that we have also extracted data from the following documents(Reports):
  - Dynamic Ground Water Resources Compilation 2017
  - GEC 2015