Groundwater Vulnerability Mapping to seawater intrusion using GALDIT INDEX : A Case Study of the Talaja to Jafarabad Coastal Region of Gujarat.

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Abstract : Groundwater Contamination in Seawater Intrusion Refer to Process Groundwater Quality Due to Flow of Sea water Intrusion Increase. Different Groundwater Vulnerability Methods are Involve Seawater Intrusion Galdit, Synetx, God, Drastic Method.When Present Study Describe Using Galdit Method is Applied To assess Vulnerability of seawater Intrusion in coastal region From Talaja to Jafarabad in Gujarat .The parameters of Galdit method Include aquifer Type, Aquifer Type, Aquifer Hydraulic conductivity, Groundwater level above sea level, Distance from shore, existing Status of Sea water Intrusion in area and thickness of Aquifer. Most Part of these coastal zone are vulnerable to seawater intrusion.The expected outcomes include a Vulnerability maps using GIS for seawater intrusion. These Result are expected to support for Future Planning, decision making by local authorities of Groundwater resources.

Key words : Groundwater vulnerability , Seawater, Salinity, aquifer.

1.Introduction :

- Gujarat Lying on west coast of india has a coastal stretch of about 1600km. Groundwater is an Important Resource for human Life. In region, where surface water is limited for the water supply,Groundwater is a reliable source for Daily water use such as Drinking, Irrigation, and industrial activities. Seawater intrusion is the movement of seawater intrusion into fresh water aquifers.it is one of the main cause for groundwater Pollution.Seawater intrusion Represents the flow of seawater through coastal aquifer,But it also affects Surface water bodies such as channels, canals, wetlands reference by [3].

    - A Map of SWI vulnerability is an effective tool for the prevention of groundwater salinization. GALDIT method developed By Chachadi & Lobo-Ferreira (2001) and presented in chachadi & Lobo ferreira (2007) by Ref [1].

    - The Entire Seawater Intrusion phenomenon is governed by Ghyben – Herzberg relation (1980)

- Coastal Aquifer, GALDIT model proved essential in estimating suspectibility to seawater intrusion and informing management methods amidst growing hazards. The vulnerability of groundwater to seawater intrusion emerges as an important global concern,especially in coastal places where such intrusion offers a considerable danger to groundwater quality .

- The Intrusion of saltwater into coastal aquifers has occurred around the world as a result of the significant groundwater resources being of growing population. since coastal regions hold 45% of the world's population.

- The effects of seawater intusion of seawater into urban population wellbeing as well as both economic and cultural changes in the coastal environment ,have prompted a wide range of studies.

- Coastal Aquifers are highly sensitivity to both regional and coastal phenomenon that include sea-level rise, storm surges, change in climate condition, shoreline erosion, coastal flooding etc by ref [5].

- Galdit Model Vulenrability index map identifies Potentially vulnerable locations that are more Prone than other zone to saltwater intrusion.

- The Assessment is Based on six parameters Related with Seawater Intrusion Potential, which are

- G -groundwater occurance,
- Aquifer hydraulic Conductivity,
- L – Height of Groundwater level above sealevel,
- D – Distance from the shore,
- I – Impact of existing Status of Seawater Intrusion,
- T- Thickness of the aquifer.
- The Galdit is simple Method and Provide Reasonable Results of SWI vulnerability in coastal areas (Lobo-ferreira at 2007,2016).

2. Study Area

- The Gujarat lying on west coast of india has a coastal strench of about 1600km by ref [4]. The Study Area Comprise of Four Talukas i.e., Talaja, Mahuva, Rajula, Jafarabad. The talaja, Mahuva, Rajula is a taluka in Bhavnagar District. Jafarabad is a taluka in Amreli District.

- The Study Area Falls in the Longitude Range of 72,21'41"E and 71,19'56"E and latitude Range of 21'51'38"N and 20'88'56"N. The Climate of Talaja, mahuva, Rajula, Jafarabad is humid because of Gulf of Khambhat. The main River of talaja tehsil is the shretunji river and in mahuva tehsil is the bagad river ref.[2].

3.Methodology :

- GALDIT Factors are used to device a numerical ranking system to assess seawater intrusion in Hydrogeologic settings. The system contains three Significant parts: Weights, Ranges and important ratings. GALDIT index is based on following parameters by reference [2] :

- G - Groundwater occurance
- A - Aquifer hydraulic conductivity
- L - height of groundwater level above sea level
- D - Distance from shore
- I - impact of existing status of seawater intrusion
- T – Thickness of Aquifer

- Each GALDIT factor has been evaluated with respect to the respect to the other by assigning a relative weight to determine the relative importance of each other.

- Each of the SIX indicators has a pre determind fixed weight that reflects its Relative importance to seawater intrusion.The Galdit index is then obtained by computing the individual indicator scores and summing them as per the following expression by,ref [6]:

  - **GALDIT INDEX :**

$$\sum_{i=1}^{6}(W_i \times R_i)/\sum_{i=1}^{6} W_i$$

W_i = Weight of the parameter

R_i = rating of The parameter

4.Conclusion :

- The application of galdit method indicates that the vulnerability of coastal aquifer to seawater intrusion depend on the combined influence of hydrogeological parameters such as Groundwater occurance,hydraulic conductivity, groundwater level,distance from shore, impact of seawater intrusion, aquifer thickness
- The computed GALDIT index classifies the study area into Low, moderate and high vulnerability zones.

5. Reference :

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