Chapter – 6

Conclusion

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6. Inferences and Future Aspect:

In the present study, groundwater condition of *Murshidabad* District of *West Bengal* is evaluated and probable relationship with human health is analyzed. The following inferences have been inferred from the present study-

1. The analyzed groundwater parameters have definite relationship with pre-monsoon, monsoon and post-monsoon seasons. The concentration of *arsenic* during monsoon season decreases while in pre-monsoon and post-monsoon season the concentrations were analogous. The parameters like *pH, TDS* and *EC* have considerable temporal variations, while minute variation is observed in *nitrite* concentration. The levels of *total hardness as* $CaCO_3$, *sulfate* and *chloride* have shown variations with the rainfall.

2. Temporal variation of different parameters, revealed significant variability with seasons. *Iron* is the only exception to this.

3. River *Ganga* and *Bhagirathi* along with their tributaries and distributaries are playing a significant role in controlling the concentration of *TDS* and *EC*.

4. During pre-monsoon season, the concentration of *TDS, EC* and *sulfate* were considerably higher while during monsoon season *total hardness as* $CaCO_3$ is

much higher. During post-monsoon season the concentration of *nitrite* had higher level.

5. Higher factor scores were largely concentrated in the eastern part of the district and showed the elevated contribution of different groundwater parameters while in the western segment, the factor scores decreased.

6. The four clusters depicted higher concentration of *arsenic* in different seasons in the eastern portion of the district.

7. Thick unconfined aquifer located in the eastern part of river *Bhagirathi* had higher level of concentration of groundwater parameters while western portion of the river related to thick semi-confined aquifer had relatively lesser concentration. It indicated the probable relationship with the aquifer condition and ground water geochemistry.

8. The eastern portion of the district (blocks of *Domkal, Raninagar-1, Raninagar-2, Jalangi* and *Beldanaga-1)* had higher threat to contamination of groundwater, while the western segment (blocks of *Kandi, Khargram, Burwan* and *Nabagram*) is less vulnerable.

9. The correlation between the prevalence rate and the arsenic concentration in groundwater depicted a positive relationship.

10. The people of the *Murshidabad* district demonstrated symptoms ranged from non-specific general symptoms like limb pain, nausea/vomiting to the symptoms of *Arsenicosis* like *Melanosis, Keratosis, Carcinoma* and *Severe cases of Gangrene.*

11. *Katlamari* village of *Raninagar-2* block, *Garaimari* village of *Domkal* and *Khayramari* village of *Jalangi* block had the higher prevalence rate.

12. Through DRASTIC model, five vulnerability zones of *Murshidabad* district are depicted. The north eastern portion depicted highest vulnerability index while western segment had least vulnerability index.

13. Amongst seven of the groundwater hydrological factors, depth to the water and impact of vadose zone played most important role.

14. 12.82% of the hand pumps are located in the zone with highest vulnerability. These sampling locations are mostly located in the eastern side of *Murshidabad* district comprising of the blocks of *Bhagawangola-1, Bhagawangola-2, Raninagar1, Raninagar-2* and parts of *Jalangi.*

15. 31.43% of the hand pumps having *arsenic* concentration more than 0.05 mg/l throughout the years are located in the zone with highest vulnerability.

The present study can be extended by-

1. Analysis of time series data with more geochemical parameters for longer time span can give more information about the subsurface hydrology.

2. Long and continuous subsurface core can give the concentration of different parameters at different depths. High resolution deeper core data can depict the relation between the accumulation zones of the particular parameter and the type of sub-surface lithological unit which can represent the probable relationship exists between them.