



## AN OVERVIEW OF KARNATAKA'S WATER RESOURCES AND POLLUTION

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### ABSTRACT

The Karnataka State is the eighth largest state in the Country and is located in the Deccan Plateau. The climate of Karnataka State varies from very humid rainy monsoon Climate in the west coast the ghats and malnad areas of semiarid warm dry climate on the east. Agriculture is the main occupation of the State. Irrigation place utmost significant part in obtaining increased yields from the land. The development of irrigation in the State was slow and unsystematic during the pre independence era. However, Groundwater contamination is a serious, but relatively ignored issue in the state . This contamination occurs in either through geogenic or anthropogenic means. Fluoride contamination is one such example of geogenic contamination that is widely found in the several districts of Karnataka. In order to make groundwater sustainable, there is a need to understand the aquifer characteristics as well as its overall geological setting. This understanding will help in: planning regulated use of groundwater, planning suitable mechanisms for groundwater recharge.

**KEYWORDS:** Deccan plateau, geogenic, groundwater, suitable mechanisms, Karnataka *etc.*

### INTRODUCTION

Water is of paramount importance for sustaining life, development and the environment. The availability of water is the key determinant of economic growth and social prosperity. However, water is a finite resource and its use for one purpose reduces its availability for other purposes. In years to come, its increased demand with population rise, economic development, and shrinking supplies due to over exploitation and pollution. In India, with development, the demand for water is increasing both in urban and rural areas. This may create increased tension and dispute between these areas for sharing and command of water resources. The emerging scarcity of water has also raised a host of issues related to the sustainability of the present kind of economic development, sustanious water supply, equity and social justice, water financing, pricing, governance and management<sup>1-2</sup>.

#### Karnataka's water situation

Karnataka's water resources are fast dwindling due to population explosion and increased utilization of water for the rapidly growing economic activities. Water demand on the one hand for consumptive (drinking, health and sanitation needs) and productive uses (agriculture, industrial production, power generation, mining operations and navigation, and recreational activities) has increased tremendously, and on the other hand, water supply has declined with depletion and degradation of water resources causing water distress or scarcity in the state. Depletion of quantity and degradation of quality of water has restricted the availability of water for consumptive and productive uses and has consequently caused "negative externality" which imposes economic and social cost on society. The

declining trend in the economic contribution of water resources has occurred due to physical and economic water scarcity which results in insufficient use, poor management, declining water productivity, and increasing environmental and economic costs. Obviously, the outcome is growing imbalance between water needs and supply augmentation capability of the state.

#### Study Area

In the present work an attempt has been made to study the 'Water Resource in Karnataka State. Karnataka State has been selected as the Study Area. The Location of the Karnataka State is considered it lies between 15000| North Latitudes, and 75000| East longitudes,. The total area covered by Karnataka State is 1,91,791 sq. km. Accounting for 5.91% of the total area of the country and 52,850,562 lakh population of the State. According to the census 2001. The present Study has certain Specific research objectives *i.e.* study the water Resources in Karnataka State and to study the Ground Water Quality Problems in Karnataka State.

#### Data and Methodology

The Study is restricted to State level in Karnataka State. Data used in this Study has been collected from both primary & Secondary sources *i.e.* water resource department Government of Karnataka State. Bureau of economics and Statistic, Govt. of Karnataka, Bangalore and Economic Survey 2010-11, Department a planning Programming and monitoring Govt. of Karnataka Bangalore.

## Karnataka's water resources and pollution

### 1. Water Resources in Karnataka Status of water Resources

**TABLE 1: Water Sources in Karnataka**

| Sl. No | Source          | Percentage (%) |
|--------|-----------------|----------------|
| 1      | Canals          | 36             |
| 2      | Tanka           | 6              |
| 3      | Wells           | 12             |
| 4      | Tube            | 34             |
| 5      | Lift Irrigation | 4              |
| 6      | Other Sources   | 9              |
| -      | Total           | 100            |

Source: Water Resource Department, GOK 2007-08

Karnataka is prone to frequent droughts and floods. The agriculture sector continues to be the mainstay of the state and its production and productivity is directly linked to availability of surface and ground water resources Table 1 reveals the sources wise water availability in the state.

Below table 2 describes water resources, the state has river basins with availability of 3475.2 TMC of water only

1690.30 TMC of water is being used for developmental needs and the state has also reached the stage where it cannot further enhance the utilization of water through construction of storage facilities (dams) by tapping the surface of the rivers, as interstate water disputes are slowing down the developmental activities.

**TABLE 2: Estimated Yield of Water from River Basins of Karnataka**

| Sl. No. | River System          | Catchment Area |       | Available Quantity in TMC | %*    | Utilization in TMC | %*    |
|---------|-----------------------|----------------|-------|---------------------------|-------|--------------------|-------|
|         |                       | Sq. km         | %*    |                           |       |                    |       |
| 1.      | Godavari              | 4,405          | 2.30  | 49.97                     | 1.44  | 22.37              | 1.32  |
| 2       | Krishna               | 1,13,271       | 59.10 | 969.44                    | 27.90 | 1156.00            | 68.40 |
| 3.      | Cauvery               | 34,273         | 17.80 | 425.00                    | 12.23 | 408.62             | 24.17 |
| 4.      | West Flowing reverses | 26,214         | 13.70 | 1998.83                   | 57.51 | 0                  | 0     |
| 5.      | North Pennar          |                |       |                           |       |                    |       |
| 6.      | South Pennar          | 13,610         | 7.10  | 32.00                     | 0.92  | 103.31             | 6.11  |
| 7.      | Palar                 |                |       |                           |       |                    |       |
| 8.      | Total                 | 1,91,773       | 100   | 3475.2                    | 100   | 1690.30            | 100   |

Source: Water Resources Department, Government of Karnataka, 2009-10, \* indicates the percentage (%)

Surface water bodies, particularly rivers and lakes, are highly polluted with increasing pollution load from agricultural discharge, industrial effluents and domestic waste. The project report on the Bio – Mapping of major rivers in Karnataka carried out by Karnataka State Pollution Control Board (KSPCB) in 2006-07 shows that there was a change in the environmental quality of Tunga, Bhadra and Tungabhadra rivers. This implies that rivers are the common dumping sources for untreated effluent release from various industries and municipal sewage. Mining industries involved in large scale mining of iron ore and other minerals have also inflicted water pollution through discharging tailings in Bellary, Chitradurga, Chikkamagalore, Tumkur, Belgaum, Bagakot and Bijapur districts.

The demand for ground water has increased many folds while the availability and supply of surface water for many developmental activities has receded with the passage of time. The ground water table has gone down beyond the natural rechargeable limit in recent years and managing it is one of the biggest challenges for the policy makers. The overdraft of water has reached the stage of 70 percent in the state indicating growing scarcity of ground water resource. Many districts including Bangalore Urban, Bangalore Rural, Kolar, Tumkur, and Chitradurga have exceeded in an overdraft of ground water beyond cent per cent. Of the total ground water available for economic use, the agriculture sector alone siphons off 91 percent of water whereas other two sectors utilise merely 9 percent.

**TABLE 3: Groundwater Resources of Karnataka as on 2004 and 2009 (HAM)**

| Sl. No | Particulars                                                            | As on 2004 | As on 2009 |
|--------|------------------------------------------------------------------------|------------|------------|
| 1      | Net Annual Ground Water Availability                                   | 1529659.5  | 1481015    |
| 2      | Existing Ground water draft for Irrigation                             | 974731     | 900712     |
| 3      | Existing Ground water draft for domestic and industrial water supply   | 96581      | 99975      |
| 4      | Existing Ground water draft for all uses                               | 1071312    | 1000687    |
| 5      | Provision for domestic and industrial requirement supply for 2025      | 140693     | 126380     |
| 6      | Net Annual Ground Water Availability for future irrigation development | 647580     | 618071     |
| 7      | Stage of Ground water development (%)                                  | 70         | 68         |

Sources: Government of Karnataka (2011)

There is growing disparity between over exploitation and replenishability of ground water as the total replenishable groundwater resources have reduced from 16.3 lakh hectare metres (HAM) in 1992 to 15.3 lakh HAM in 2004, with the

draft of groundwater increasing from 4.1 lakh HAM to 10.7 lakh HAM during the same period. Consequently, the ground water balance for future development has fallen from 9.7 lakh HAM in 1992 to 6.5 lakh HAM in 2004. The

impact of overdraft of ground water has a detrimental effect, as about 124 taluks have reached above 70 percent

exploitation causing severe impacts on the environmental balance of the region.

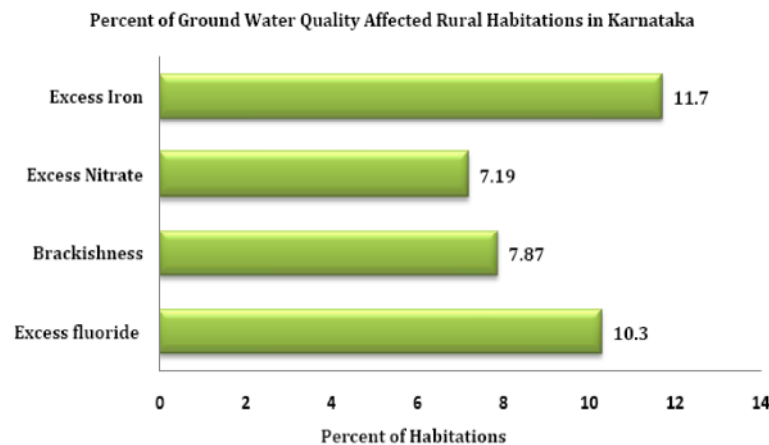
**TABLE 4:** Assessment of Dynamic Ground Water Resources of Karnataka State (2008-09)

| Sl.No | Category                              | Watersheds | Taluks |
|-------|---------------------------------------|------------|--------|
| 1     | Safe                                  | 123        | 70     |
| 2     | Semi Critical                         | 13         | 10     |
| 3     | Critical                              | 2          | 3      |
| 4     | Over Exploited                        | 64         | 35     |
| 5     | Mixed Category                        | 32         | 58     |
| 6     | Total                                 | 234        | 176    |
| 7     | Stage of Ground water development (%) | 70         | 68     |

Sources: Government of Karnataka (2011)

Table 4 reveals that the ground water position and nature of the state, results which were mentioned in the table, observations are not in a good position. Now, water contamination has been increased at a rapid rate in the connection government has put forward the good policy governance. While facing severe depletion of ground water table due to over-exploitation on the one hand, on the other, the state is also facing rapidly growing ground

water pollution in many parts. About 64 of the 234 watersheds have serious water quality problems in the state as per the recent analysis of ground water samples by the Department of Mines and Geology. Ground water is highly polluted with excess concentration fluoride, arsenic, iron, nitrate and salinity due to both anthropogenic and geogenic factors.



**FIGURE 1:** Ground Water Quality Affected Rural Habitation in Karnataka (%)

Sources: Government of Karnataka (2011)

**TABLE 5:** Ground Water Quality Problems in the State

| Sl. No | Ground Water Contaminants                  | Districts Affected (in part)                                                                                                                                                                                                           |
|--------|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1      | Salinity (EC > 3000 $\mu$ S/cm at 25 ° C)  | Bagalkot, Belgaun, Bellary, Davangiri, Gadag, Gulbarga, Raichur                                                                                                                                                                        |
| 2      | Fluoride (>1.5 mg/l)                       | Bagalkot, Bangalore, Belgaun, Bellary, Bidar, Bijapur, Chamarajanagara, Chikmagalur, Chitradurga, Davanagere, Dharwad, Gadag, Gulbarga, Haveri, Kolar, Koppala, Mandya, Mysore, Raichur, Tumkur                                        |
| 3      | Chloride (> 1000 mg/l)                     | M M Kaval village, Gubbi taluk, Tumkur District                                                                                                                                                                                        |
| 4      | Iron (>1.0 mg/l)                           | Bagalkot, Belgaum, Gadag, Dharwar                                                                                                                                                                                                      |
|        | Excess Concentration of fluoride: 9.18mg/L | Bagalkot, Bangalore, Belgaum, Bellary, Bidar, Bijapur, Chikmagalur, Chitradurga, Dakshina Kannada, Davanagere, Gulbarga, Hassan, Haveri, Kodagu, Kolar, Koppala, Mysore, Raichur, Shimoga, Tumkur, Udupi, Uttar Kannada                |
|        | Excess concentration of Iron: 8.3mg/L      | Devalakere village, Pavagada taluk, Tumkur district                                                                                                                                                                                    |
| 5      | Nitrate (>45 mg/l)                         | Bagalkot, Bangalore, Belgaum, Bellary, Bidar, Bijapur, Chamarajanagara, Chikmagalur, Chitradurga, Davanagere, Dharwad, Gadag, Gulbarga, Hassan, Haveri, Kodagu, Kolar, Koppala, Mandya, Mysore, Raichur, Shimoga, Udupi, Uttar Kannada |
|        | Excess concentration of Nitrate: 983mg/L   | Mudgal Village, Kustagi taluk, Koppal District                                                                                                                                                                                         |
|        | Excess concentration Hardness: 3080mg/L    | Devanahalli village, Channagiri Taluk, Shimoga District                                                                                                                                                                                |

According to the table ground water level has been decreased due to the over exploration this has led to the chemical materials have been contaminated the ground water quality, mentioned chemical composition negatively impact on human health, in this issue government has to take to improve the water quality in the state.

Water pollution caused by large, medium and small scale industries has had significant impact on environmental resources. The state is recognised as one of the "top five" industrialized states in the country for sheltering a vast industrial base. The state has 132 industrial areas covering about 40,000 acres. However, since the self monitoring is very poor under compliance and the provision of the Water Act, the Air Act and the provisions of the Environment (Protection) Act. These industries have generated a total of 5, 96,000 kilolitre of effluent and liquid wastes.

### **2. Karnataka announced its State Water Policy in January 2002. The objectives of the Policies are:**

- Provide drinking water at the rate of 55 LPCD in rural areas, 70 LPCD in towns, 100 LPCD in city municipal council areas and 135 LPCD in city corporation areas.
- Create an ultimate irrigation potential of 45 lakh hectares under major, medium and minor irrigation projects. Facilitate creation of an additional irrigation potential of 16 lakh hectares by individual farmers using ground water. Improve performance of all water resources projects.
- Improve productivity of irrigated agriculture by involving users in irrigation management. Along with Harness the hydropower potential in the state.
- Provide a legislative, administrative and infrastructural environment, which will ensure fair, just and equitable distribution and utilization of the water resources of the state to the benefit of all and Formation of revised State Water Policy, is in progress.

### **CONCLUSION**

All of this will result in increased consumption of water. That is why there is an urgent requirement to address the

issue of water scarcity, water quality, poverty and inequality in Karnataka and India to make better policy decisions which will affect its availability in the future. If the conditions remain same; water will turn out to be the world's most precious resource soon.

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