BRAIN STORMING SESSION

ON

# HYDROLOGICAL PROBLEMS AND PERSPECTIVES

IN

# WESTERN HIMALAYAN REGION

MARCH 14, 1997

## *Groundwater Status in the State of Jammu & Kashmir*

BY

**S N Dulloo, CGWB, Jammu**

*WESTERN HIMALAYAN REGIONAL CENTER*
*NATIONAL INSTITUTE OF HYDROLOGY*
*JAMMU CANTT 180 003, INDIA*

# GROUND WATER STATUS IN THE STATE OF JAMMU AND KASHMIR

S N DULLOO
SCIENTIST 'D'
CENTRAL GROUNDWATER BOARD
JAMMU

## INTRODUCTION

The department of Central Ground Water Board an apex body for exploration, exploitation and conservation of Groundwater resources of the country enlarged its activities to the State of Jammu and Kashmir in 1972 and has gone a long way in this direction since then. The department extended the activities of Groundwater hunting to the far flung trans Himalayan areas of the State. About 15 tubewells have been drilled in Leh plain so far. In all about 160 exploratory test wells have been drilled spread over to all the three provinces of the state.

The State of Jammu and Kashmir, the northern most state of India has a unique distinction in Geology, Hydrology and Geomorphology not only in India but vis-a-vis the entire Indian Sub continent. The vast valleys, the mighty mountains and the reverberating rivers adorn in the landscape of the state. The State has been blessed with huge water resources both surface and ground. The mighty Indus, the gentle Jhelum and the romantic Chenab all flow through the length and breadth of the State. But because of rugged topography, steep and variable gradient the most of the water goes as a run off to the oceans and seas. The State has ;been endowed with springs of copious discharge such as Veerinag, Kukernag, Arapat and Achabal. The best lakes such as Wuler, Dal, Manasbal and Mansar, the hot springs such as Chumathang, Pugga and Tatepani.

It is worthwhile to mention here that out of the total water resources of the world, 97.2% is present in oceans and seas and only 2.8% is present in the form of fresh water, out of which 2.15% is present in solidified mass in the form of polar ice caps and glaciers 0.31% is so deep seated that it involves mining of water resources is available as a source of water.

The occurrence of groundwater in the state is very complicated because of varied hydrological parameters, the topogrpahical barriers, hydrological boundaries and

diversified geological settings. However, the same can be classified as under :

1. Piedmont deposits of outer plains of Jammu.
2. Dun belt of Outer Himalayas.
3. Isolated valley fill deposits of Lesser Himalays.
4. Fluvioglacial-lacustrine deposits of Kashmir valley.
5. Moranic and fluvio glacial deposits of Ladakh.

**1. PIEDMONT DEPOSITS OF OUTER PLAINS OF JAMMU**

This plain about 120 km long and 25 kms wide lying between river Ravi in the east and the river Munawar Tawi in the west comprises mainly of unconsolidated to semi-consolidated sediments ranging in age from upper Pleistocene to the recent. The sediments towards North consist of coarse clastics varying in size from boulders to gravels loosely held in a clayey matrix and occasionally alternating with sand lenses of variable thickness, kanker is also interspearesed at various places at different depths and variable amounts. The same deposits grade into finer sediments towards south and comprise of alternate layers of sands and clays with subordinate lenses of gravel and pebbles.

Ground water in this plain occurs under four different regimes:

A. Ground water in recent river terraces and present day flood plains.
B. Groundwater in the Kandi (Bhaber) zone.
C. Groundwater is Sirowal (Terai) zone.
D. Groundwater in the transitional zone between Kandi and Sirowals.

**A. Groundwater condition in recent river terraces**

The limited quantities of groundwater are available in aquifers of limited thickness and areal extent in the recent river terraces and flood plains which can suffice the water supply requirements of few hutments in and around the Groundwater structures there. The groundwater in this zone is found under perched water table conditions. These terraces are deposited over the Siwaliks and because of limited thickness and areal extent of these overlying deposits, the composition of Siwalik formations, the rugged topography, steep gradient resulting in major run off and many other negative factors for groundwater replenishment these flood plains and terraces and also the underlying Siwaliks are not feasible for large scale Groundwater development.

**B. Groundwater conditions in Kandi (Bhabar) zone**

The area lying immediately to the foot slopes of Siwaliks is known as Kandi zone.

The average altitude of the area varies from 320 to 400 m. msl. Water level in the area is very deep seated and the discharge is less. The Groundwater in Kandis occur mostly under deep water table conditions.

C. Groundwater conditions in Sirowal (Terai) Belt

Lying south to the Kandis is what is known in the Indian stratigraphy is terai zone and locally called as Sirowals. The area lies below the altitude of 300 m. amsl. Topographic gradient is very gentle. The water level is shallow and the Groundwater is found under confined as well as under un-confined conditions. The piezometric head of the confined aquifers in this zone stands higher than the water table of the area. This is the most potential Groundwater bank of the state.

D. Ground Water Conditions in the Transitional Zone between Kandis and Sirowals

This is a belt in between the kandis and Sirowals. It is through this belt that the Kandis pass into Sirowals. The area is located on the topographic contour of 300-320 m amsl. there is a marked spring line almost all along 320 m contour line.

2. DUN BELT IN THE OUTER HIMALAYA

The Dun belt occurs as a series of terraces across the outer most hills of Jammu and are enclosed within the Lesser Himalayas. This belt extends from Basoli in the east to Reasi in the west. The sediments are a few meters to few tens meters thick occurring in the form of isolated sub recent to recent valley fill deposits. They comprise of coarse clastics nature of the boulders. cobbles. and pebbles interbedded with lenticular bodies of clays and silt. sands and gravels.

Groundwater present in this area is limited either as perched water bodies or localised water bodies. Minor seepages in the form of small springs and ;dug wells cater to the water supply of the respective areas.

3. ISOLATED VALLEY FILL DIPOSITS IN MIDDLE HIMALAYAS

Kishtwar plateau is a typical example of this zone the deposits consist of lacustrine to fluvio-glacial sediments as well as turbulent stream laid deposits. They appear in nature and chronology to the Karewas of Kashmir. Groundwater in this areas occur under perched water table/or water table/or under confined conditions.

4. FLUVIO GLACIAL LACUSTRINE DEPOSITS OF KASHMIR VALLEY

These deposits are known as karewas of Kashmir in the Indian stratigraphy. They cover an area of about 56 sq km. area in the valley. These deposits consists of a

huge pile of alternating thin bands of sand, salt and clay, intersper bed at one or two levels by glacial boulders bed/beds, groundwater occurs under water table and or under confined conditions. The Karewas are very potential source of Groundwater Resources.

5. MORANIC AND FLUVIO GLACIAL DEPOSITS OF LADAKH

The Groundwater Exploration has been confined so far to Leh plain only.The sediments here consists of morainic material in association with lacustrine deposits and mechanically disintegrated glacial boulders and cobbles and alluvial deposited in a loose sandy matrix. Ground water in this plain occurs under perched water table condition giving rise to a number of springs or under unconfined to semi confined conditions.

The total ground water resources of the State amount to 3712 M.C.M. ending 1995. The district wise distribution of these resources is shown as per the Annexure enclosed herewith (Table 1).

From the perusal of the Table 1 it is seen that the level of Groundwater development in J&K state is as low as 1.33% which at the National level stands at 31.92% and in case of Punjab and Haryana it is as high as 93.85 and 83.88% respectively. From these figures it is seen that there is vast scope of exploring the huge Groundwater Resources of the state which at present stand explored underground.

***

TABLE 1: STATUS OF GROUNDWATER RESOURCES IN J&K STATE

| S.No. | District | Available GW Resources for Irrigation in net terms (MCM/year) | Net Draft (1993) (MCM/yr) | Balance GW Resources for Future use (MCM/yr) | Level of GW Development (%) |
|---|---|---|---|---|---|
| 1 | Anantag | 1215.23 | 0.16 | 1215.07 | 0.01 |
| 2 | Badgam | — | — | — | — |
| 3 | Barmulla | 491.40 | 1.56 | 489.84 | 0.32 |
| 4 | Doda | — | — | — | — |
| 5 | Jammu | 1219.41 | 46.80 | 1172.61 | 3.84 |
| 6 | Kathua | 495.57 | 1.31 | 494.61 | 0.26 |
| 7 | Kargil | — | — | — | — |
| 8 | Kupwara | — | — | — | — |
| 9 | Leh | — | — | — | — |
| 10 | Pulwama | — | — | — | — |
| 11 | Rajouri | — | — | — | — |
| 12 | Srinagar | 340.35 | 0.19 | 340.16 | 0.06 |
| 13 | Udhampur | — | — | — | — |
| 14 | Poonch | — | — | — | — |
| | Total | 3761.96 | 50.02 | 3711.94 | 1.33 |