Division of GSI at Calcutta. Subsequent work was assigned to Shri S.N. Sen my senior colleague, who was doing systematic mapping in the area. He located several more gas and oil shows in Tripura, utilizing the excellent photo-geological map of Tripura state prepared by Stanvac in 1953-54. In the sixties, large-scale mapping was carried out by ONGC and the Russians. Large reserves of gas and oil were discovered which led to the construction of a gas based power station of a 45 MW capacity in Tripura.

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DISCUSSION

ESTIMATION OF GROUNDWATER POTENTIAL IN INDIAN ARID ENVIRONMENT USING ISOPACH MAPPING TECHNIQUE: A CASE STUDY

by M.A. Khan and Mukesh Sharma. Jour. Geol. Soc. India, v.61, 2003, pp.403-410

R.K. Ray and **D.S. Thambi,** Central Ground Water Board, NCCR, 2nd Floor, Reena Apartments, Pachpedi Naka, Raipur - 492 001, comment:

Occurrence and movement of groundwater is a complex phenomenon and its estimation requires a holistic approach considering several factors (GEC, 1997), many of which are not measurable directly. The methodology followed by the authors for the estimation of groundwater potential is too simplified and extended, overlooking the dynamism of the groundwater resources. The estimated resources appear to be far from reality. It is felt that the following points require further explanation/consideration:

1. Static Water Level: It is not clear, what the authors exactly mean by 'Static Water Level'. There is no mention in the paper that the water levels pertain to which period/month/season. It gives an impression that the water level remains the same throughout the year/ years.
2. As shown in Fig.3 groundwater in nearly 50% of the area is saline and nearly 30% is brackish in nature, whereas in computation of groundwater potential, it has been considered that less than 10% (4.69 km^2 out of 48.75 km^2) area is unsuitable for groundwater development.
3. The interpretation of the geophysical data and its correlation with the hydrogeological conditions is not convincing. At places where the depth to water level is more than the depth to geoelectric bed rock, saturated thickness has been taken as 1 m, which seems to be illogical.
4. The groundwater potential of Luni Block, Jodhpur District has been estimated as 49 mem per year. This means 49 mem of groundwater gets replenished every year. Since there is no mention of other sources of recharge, rainfall seems to account for the entire replenishable recharge to groundwater. The average annual rainfall in the block has been reported as 362.8 mm. Recharge from rainfall can be estimated using the following formula.

   Recharge from rainfall (Rrf) = Average annual rainfall (RF)* Area (A)*Rainfall Infiltration Factor (RIF)

   In this case the area of the block (A) = 48.75km^2 and the average annual rainfall (RF) = 0.36238 m which means the total volume of rainfall falling in the area is 17.68 mem/year of which ET and other losses are inevitable. Even after assuming an infiltration factor (RIF) of 0.2 (Which is on the higher side), the recharge to groundwater is estimated to be only 3.5 mem/year or a meagre 7% of the total estimated resource.

   It is felt that no attempt has been made to correlate the estimated resources with the natural conditions or figures computed using other methods.
5. The groundwater potential of the area, which has been estimated as 1.11 mcm/km^2/year, has been referred to as limited. On the contrary, it represents a huge groundwater potential. Even in humid areas with highly favourable hydrogeological conditions,

groundwater resources are normally less than 0.5 mcm/km^2/year.

6. Such an overestimation of groundwater resources has resulted from considering the entire saturated thickness for estimation of dynamic resources. In fact, only a part of the entire saturated thickness forms the dynamic resource and gets replenished every year. This replenishable resource has to be computed using the water level fluctuation and not the saturation zone thickness.

M.A. Khan and **Mukesh Sharma,** Central Arid Zone Research Institute, Jodhpur - 342 003 reply:

Our reply to the points raised are as follows:

1. Our paper deals with only static water level (groundwater level) actually measured during the course of field work (post-monsoon).
2. As mentioned in the abstract that actual groundwater potential of suitable quality is 49 mem. Since in western Rajasthan the groundwater with Ec up to 6000 umhos/cm is widely used for irrigation, therefore, only the tract (4.69 km^2) bearing highly saline groundwater with Ec > 8000 umhos/cm has been excluded in estimation of groundwater potential.
3. As stated in the text that under the situation where depth to water level is more than the depth to geoelectric bed rock, a minimum of 1 m has been considered as saturated layer on the grounds that some water seeps through weathered/fractured rock matrix. This is widely used by the groundwater experts working in this area.
4. The body of the text is self explanatory that no attempt has been made by the authors to evaluate dynamic reserves/water balance in the study area. As such, recharge/withdrawal estimation has not been attempted. Only static reserve has been estimated.
5. With 5% specific yield, 1.11 mcm/kmVyear reserves cannot be considered as huge.
6. As stated above (point 4) during the present studies dynamic groundwater resources have not been attempted.

References

GEC-97 (1997) Report of the Ground Water Resource Estimation Committee, Ground Water Resource Estimation Methodology, Ministry of Water Resources, Govt, of India, New Delhi, June 1997, 107p.