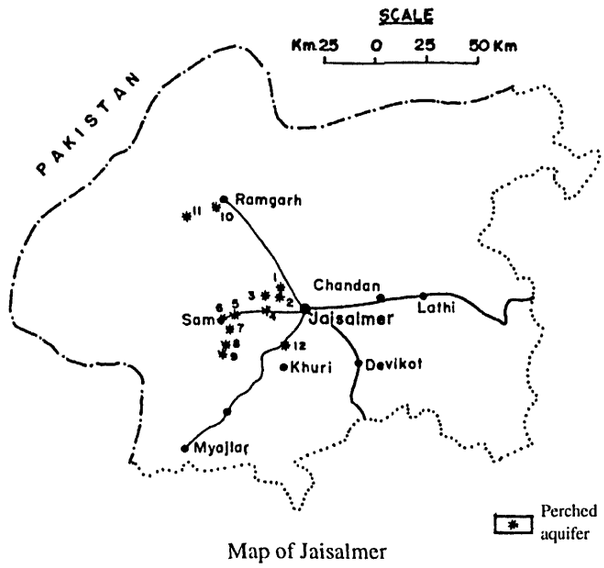

Map of Jaisalmer

through a group of such shallow wells is called Par. Such perched water zones are seen in alluvial and aeolian fills developed over the Jurassic Baisakhi shales and Eocene bentonitic clays. Other alluvial and aeolian fills and palaeochannels also host such perched waters. In interdunal areas, hard pan depressions are covered by thick aeolian fills. The shale and bentonitic clay zones, particularly those situated in depressions, when covered with loose sand, fragment or porous material, act as repositories of water during rainfall. In Baisakhi terrain, alluvial fills over Jurassic shales (Baisakhi Formation) near Rupsi, Lodurva, Chhatrel and Khaderon-ki-Dhani have become congenial for development of shallow perched water conditions. Baisakhi shale being an impervious layer, accentuates the accumulation of water in alluvial fills. In the western part of the area near Kanoi, perched water aquifers are developed over Abur sandstone and limestone (Middle Cretaceous) in a subsidence zone near NW-SE trending Kanoi fault. Further west and southwest in the Sam-Ganga-Niba-Samdani area, Berris are located in bentonitic clay horizons. West of Bida, Berrris are located at the topographic break covered by aeolian sand. This N-S trending topographic feature possibly represents a N-S trending fault. In the northern part of the area near Khuiala and Biprasar, perched aquifers are located over bentonitic clays. North of village Pithala, on Jaisalmer-Khuri-Myajlar road, alluvial fills are developed in *nala* bed over Jurassic fine grained limestone and sandstone (Jaisalmer Formation). In south-western part of Jaisalmer District, aeolian fills over the impervious hard pans along the depressions in the interdunal areas have developed into perched aquifers. Perched aquifers of Rupsi, Chhatrel, Lodurva, Khuiala, Khaderon-ki-Dhani (near Damodara), Kanoi, Ganga, Pithala are perennial, while the other perched aquifers are seasonal. The quality of water of these aquifers is potable, as they are periodically recharged during rainfall.

Depressions with impervious layers at the bottom, with a cover of porous material, are suitable areas for development of perched water zones. At places, faults have contributed to the development of perched water zones.

10/805 Malviya Nagar
Jaipur - 302 017

V.P. LAUL

DISCUSSION

SALINITY INTRUSION FROM TIDAL RECHARGE AND ITS IMPACT ON GROUNDWATER QUALITY IN GOA STATE by K. Keerthiseelan, S.L. Kapoor, A. Suresha and T.R. Prakash. Jour. Geol. Soc. India, 2001, v.57, no.3, pp.257-262

S. Das, 18 Madhusudan Nagar, Unit 4, Bhubaneswar - 751 001 comments:

This is an interesting case study of saline water intrusion in Goa. However, I have following observation to make:

1. The study is confined to 'shallow zone'. But the shallow zone, as tapped by dug wells and borewells, has not been clearly defined.
2. Why the salinity intrusion from tidal recharge is confined only to areas adjoining the Chapora river, and not observed in the vicinity of other rivers like Mandovi, Zuari or in the coastal fringe areas?
3. Pre-monsoon (May) and post-monsoon (November) groundwater samples were collected and studied, because of seasonal water quality variations. But the river water samples were collected in November only

and studied in conjunction with a mixed set of groundwater samples collected in May and November. In fact, river water has maximum salinity in summer (May) and cause maximum saline water invasion of aquifers, as the freshwater flow dwindles. River water samples should have been collected both in May and November and studied in conjunction with groundwater samples of the same period to bring out the groundwater quality in relation to the river water charged with tidal influx.

4. Tables 1 and 2 do not distinguish between pre- and post- monsoon samples, although authors have reported distinct differences in salinity levels between pre- and post-monsoon groundwater samples.
5. Tidal fluctuations are accompanied by cyclic diurnal change of water quality due to mixing in continuous and varying proportions of original river water with sea water. The aquifer water samples, contaminated with salinity intrusion from tidal recharge, also show sympathetic fluctuation in concentration of salinity and other quality parameters, and tend towards sea water composition as salinity level rises. This has been observed in an aquifer close to the river Hoogly (Handa, 1978, 1989).

The present case study in Goa, should have yielded interesting results in corroboration of authors' conclusion drawn on the basis of ionic ratios.

K. Keerthiseelan, Central Ground Water Board, North Eastern Region, Tarun Nagar, Bye Lane no.1, Guwahati - 781 005 replies:

I thank the critic for his valuable comments and furnish my reply as under:

1. The study is confined to the shallow zone, which is purely from the dug wells not from borewells. However, no borewell samples were collected during the study period. The dug wells are mostly used for development of irrigation/domestic use. These wells are not saline and are still in use. The coastal belt is free from salinity. NHS have an EC ranges less than 500 micro/mohs at 25°C/cm.
2. Figure 2 shows sampling points influenced by salinity and tidal recharge. The figure indicates that type 7 water is distributed along the Chapora river, the basin between Mondovi and Chapora rivers and at Konakona basin in the south. The EC of these samples ranges from 50 to 3080 micro/mohs at 25°C and the bromium chloride ratio ranges from 0.65 to $0.097 \times 10_4^{-2}$. Since Chapora river has medium gradient towards the sea, the backwater of sea enters into the river to a distance of 15 km from the coast. Hence, conspicuous intrusion of sea water is noticed around Chapora river. In the case of other rivers, the backwater entry is not more than 5 km from the coast. Hence the Chapora river is influenced by the salinity of tidal recharge.
3. The survey of this area has been commenced after the pre-monsoon period. The river samples were not collected during the pre-monsoon period, because these rivers flow at a greater depth. Due to these reasons, samples were not collected during pre-monsoon period. It is true that river samples during the pre-monsoon period will contain more salinity than post-monsoon period. These suggestions are very useful and it will be utilised as and when further work is taken up.
4. Detailed chemical analysis of pre- and post-monsoon water samples are not incorporated keeping the length of the paper in mind.
5. The Kolkata example is appropriate. The quality of water changes during diurnal effect and the intrusion of salinity will take place as tidal recharge.

References

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