NEWS AND NOTES

Is there Real Dearth of Water Resources in Bengaluru?: Some Ground Analysis – K.C. Subhash Chandra, Hydrogeologist and Former Expert Member in Karnataka Groundwater Authority (Email: subcha@gmail.com)

Bengaluru with a population of 8.5 million (2011 census) is the third most populous city in India. Out of the city extent of 800 km², nearly 365 km² forms a part of the Arkavathi river catchment of the Cauvery river basin and 435 km² forms a part of the Ponnaiyar river catchment. Nearly 75 percent of the city extent is now a built area and the rest, a natural landscape. The city with normal annual rainfall of 830 mm is benefitted by both SW and NE monsoon rainfall. Considering that the population of Bengaluru would reach 9.5 million by the year 2020, the water requirement at 140 lpd/head (51M³/head/year), would stand at 485Mm³ / year. As against this requirement, BWSSB has tapped an effective resource of 530 Mm³ (1450 MLD) from the Cauvery river system. This resource should serve about 10.4 million people. But, out of 530 Mm³ of the water resource, so being tapped, nearly 40% (212 Mm³ /year) is regularly lost through leakage, conveyance and other losses, resulting in the effective supply getting reduced to 318 Mm³; implying only 6.23 million people of Bengaluru getting water at 140 lpd /head or that the BWSSB have resorted supplying water to the present population at around 37M³ / head/year instead of 51 M³ / head/year.

Apart from mosaic cover of concrete structures and asphalt roads in the city, the presence of 3-4 m thick clayey lateritic soil over 30-50 m thick clayey saprolite in certain pockets of the Ponnaiyar river catchment have virtually prevented infiltration of rain water into the aquifer body. The gneisses and granites which constitute the chief rock types of the area, being massive and devoid of joints / fractures beyond an average depth of 280 m, form a non-aquifer basement. Thus, while the Arkavathi river catchment forms a composite aquifer system (with unconfined to semi-unconfined to semi-confined aquifers in succession), the Ponnaiyar catchment in certain parts where saprolites prevail, form a 'confined aquifer zone'. The water stored since geological past in the 'confined aquifer' is recklessly exploited, resulting in bore wells of even 280 m depth going dry or getting dried up. An independent estimate by Hegde and Subhash Chandra (2012), while had indicated groundwater exploitation at 378 % or nearly four times more than the annual normal groundwater recharge from about 3,20,000 bore wells, the count of bore wells now is said to have reached nearly 4 lakh. Overall, the continued exploitation of groundwater for more than 15 years, in excess of normal annual recharge in the city

has resulted in 'mining and dwindling of groundwater resources'. The groundwater as of now is not a sustainable resource.

The availability of various forms of water resources within the limits of Bengaluru if protected, stored, freed from pollution and measures taken in bringing these resources to potable level, there will not be dearth of water in Bengaluru for many years to come. The suggested measures are:

- 1) If the leakage and transmission and conveyance loss of at least 30% of 530 Mm³ / year i.e., 159 Mm³ / year or 435 Mld of river water is plugged, the supply can meet the requirement of 9.3 million people.
- 2) The precious storm water of 170 Mm³ / year in Bengaluru which is being wasted by letting into the drains carrying sewage water, if at least 50% of it is effectively conserved, protected, freed from pollution and brought under public water supply, the water requirement of about 1.7 million people can be met.
- 3) Out of 401 Mm³ (1100 Mld) of sewage water generated in the city, if 70% of it (281 Mm³ / year or 770 Mld) is initially treated up to secondary level and further 60% of the secondary water so treated (168 Mm³ / year or 462 Mld) is brought up to potability standard after tertiary treatment, it would meet the water requirement of 3.3 million people of the city.
- 4) Considering there are about 5,00,000 houses in Bengaluru, each having an average roof area of 100 km², with the normal rainfall being 830 mm, about 41.50 Mm³ / year or say 40 Mm³ of rainwater/year can be conserved by roof top rainwater harvesting measures. If at least 70% of such a resource is properly protected and stored, it can meet the annual requirement of 6,00,000 people.

From the above suggested measures, altogether, the water requirement of about 15 million people at 140lpd/head can be met without any dependency on any other distant water resources and on the groundwater resource which is no more sustainable. Further, non dependency and non-exploitation of groundwater resources for a few years would automatically promote the city aquifers to get revived and that can be used subsequently with certain imposed better management system.

(Gist of the lecture delivered at the monthly scientific meeting of the Geological Society of India on 22 February 2017)