

## Flood Analysis of Domestic Rooftop Rainwater Harvesting in Low Lying Flood Plain Areas at Gomti Nagar In Rain-Dominated Monsoon Climates

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**Abstract :** Rapid urbanization, rising population, changing lifestyles and in-migration, Lucknow is groundwater over-exploited area, with an abstract rate of 1968 m<sup>3</sup>/day/km<sup>2</sup> in Gomti Nagar. The groundwater situation in Gomti Nagar is deteriorating day-by-day. According to the work, the calculated annual water deficiency in Gomti Nagar area will be 28061 Million Litre (ML) in 2022. Within 30 yrs., the water deficiency will be 735570 ML (till 2051). The calculated groundwater recharge in Gomti Nagar was 10813 ML/y (in 2022). The annual groundwater abstraction from Gomti Nagar area was 35332 ML/yr. (in 2022). Bye-laws ( $\geq 300$  sq.m) existing RTRWHs can recharge 17.71 ML/yr. in Gomti Nagar area. The existing RTRWHs are contributing 0.07% for recharging groundwater table. In Gomti Nagar, the water level is dropping at a rate of 1.0 metre per year, and the depth of the water table is less than 30 metre below ground level (mbgl). Natural groundwater recharge is affected by the geomorphological conditions of the surrounding area. Gomti Nagar is located on the erosional terrace (Te) and depositional terrace (d) of the Gomti River. The flood plain in Lucknow city is less active due to the embankments on the both sides of the Gomti River. The alluvium is composed of clay sandy up to a depth of 30m, and the alignment of the Gomti River reveals the presence of sandy soil at shallow depths. Aquifer depth 120 metre. Recharge as in Gomti Nagar (it may vary) 0 - 150 metre. Infiltration rates in alluvial floodplains range from 0.8 to 74 cm/hr. Geologically and Geomorphologically support rapid percolation of rainwater through alluvium in Gomti Nagar, Lucknow city, Uttar Pradesh. Over-exploitation of groundwater causes natural hazards viz. land subsidence, development of cracks on roads and buildings, development of vacuum and compactness of soil/clay which leads towards land subsidence, devastating effects on natural stream flow. Gomti River already transitioning phase from 'effluent' to 'influent', and saline intrusion in Aquifer -II (among Five aquifers in Lucknow city). A 250 m long crack developed in 2007 due to groundwater depletion in Dullu Khera and Vader Khera village of Kakori, Uttar Pradesh. The groundwater table of Lucknow is declining and water table imbalance occurs due to 17 times less recharge than groundwater exploitation. Uttar Pradesh along with four states have extracted 49% of groundwater in the entire country. In Gomti Nagar area, 27305 no of houses are present and available build up area 3.8 sq. km (60% of plot area) based on Lucknow Development Authority (LDA) Master plan 2031. If RTRWHs would install in all the houses, then 12% harvested rainwater contribute to the water table in Gomti Nagar area. Till 2051, Gomti Nagar area will harvest 91110 ML of rainwater. There are minimalistic chances that any incidence of flood can occur due to RTRWH. Thus, it can conclude that RTRWH is not related to flood happening in urban areas viz. Gomti Nagar.

**Keywords :** RTRWH, aquifer, groundwater table, rainwater, infiltration

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