

Hydrology and Its Relevance In Urban Context

INDRANATH CHAKRAVORTI Advisor & Consultant, Ballardie Thompson and Matthews Pvt. Ltd.

Classical hydrology is study of water cycle in different regions of the world and essentially is confined to determine the quantity of surface run off, ground water recharge from precipitation of rainfall etc. The study of groundwater however is a specialised section as hydro-geology, which in addition to hydrology assess the function of subsoil geophysical formations. Rainfall, percolation, absorption, transpiration vary widely on areas and urban systems of water supply, sewerge and sainage of excess run-off is substantially influnced by the hydrology and hydrogeology of the particular urban area. The paper presents several examples on the problems and prospects of surface run off, ground water Rain water harvesting and aquifer recharge. The volume of run-off from a catchment is a function of soil absorption factor, rainfall intensity and area of catchment. There are different empirical formulae for determining run-off volumes, applicable in different areas. Surface run off contributes to replenishment of natural reservoirs and increased river flow. Some cities perpetually faces inundation during monsoon period. On the other hand, a perenmial minor water flow provides adequate source of drinking water even during very dry seasons.

Cities or river without a stream source or a lake source, invariably depend on ground water as source for domestic, industrial or institutional use. Large scale extraction of ground water by civic administrations in cities like Delhi or Kolkata has resulted in depletion of groud water level, with consequential ill effects. Natural recharge of aquifers, by transfer of water from water bearing stratum to a dry stratum is very slow, extending to decades. A high water table, on the other hand poses difficulty in installation of deep sewer lines and cause greater infiltration load in sewer lines. Urban areas consist mostly built-up surfces, and vertical seepage of rain water into the ground is negligible. The entire run-off can be collected in ponds, lakes or reservoirs, to be used as source for water supply. Annual Rain Water Harvesting Potential (ARHP) for a town is very high, as the run-ff co-efficient is large for built up surfaces. For recharging ground water aquifer, special constructions are needed, in the form of Recharge Pit/Trench / Shaft suited for different hydro-geological conditions. Semi arid areas with an annual rainfall in the range of 400 to 750 mm having rolling or undulating terrain, can benefit from harvesting, by construction of dykes or dams. Planning of urban centres, of any size and at any location, has to be based on vital parameters set by the local hydrology and hydro-geology of the area. Hydrological data need be collected for projected locations, over sufficient time span, with local variatious. Such data should be used in planning by city planners.