

an additional water source. The analysis to sub-humid to arid areas estimate that the total global groundwater depletion to have increased from 126 (± 32) km³ 1 in 2000. The latter equals 39 (± 10)% of the global yearly groundwater abstraction, 2 (± 0.6)% of the global yearly groundwater recharge, 0.8 (± 0.1)% of the global yearly continental runoff and 0.4 (± 0.06)% of the global yearly evaporation, contributing a considerable amount of 0.8 (± 0.1) mm a⁻¹ to current sea-level rise. -1 in 1960 to 283 (± 40) km³.

Kumar et. al. (2011) revealed on the Rain Water Harvesting and Ground Water Recharging in North Western Himalayan Region for Sustainable Agricultural Productivity. The study of low cost traditional water harvesting structures that helps in improving the socio-economic status of the poor farmers of the hill region. It is estimated that about 40 per cent of the total geographical area of Himachal Pradesh, Uttarakhand and Jammu and Kashmir is highly degraded. Soil loss through erosion is about 3.6 to 80 t ha⁻¹. The most efficient and cheapest way of conserving rainwater at the agricultural farm was found to be in-situ runoff management, which also reduces soil losses and increases the opportunity time for ground water recharging. In addition, good results of harvesting and storage are being achieved in ferrocement water storage structures of different dimensions of 3 to 5 m deep and 1 to 3 m in diameter.

Ward et. al. (2008) studied on the rainwater harvesting: model-based design evaluation. In which they investigated the rate of uptake of rainwater harvesting (RWH) in the UK has been slow to date, but is expected to gain momentum in the near future. It was found that design methods based on simple approaches (such as used in these two cases) generate tank sizes substantially larger than the simulation model. Comparison of the actual tank sizes and those calculated using the simulation model established that the actual tanks installed are oversized for their associated demand level and catchment size. The importance of catchment size was demonstrated, a factor neglected in the simpler methods commonly used in practice. Financial analysis revealed that RWH systems within large commercial buildings may be more financially viable than smaller domestic systems.

Gerolin et. al. (2010) revealed there has been growing interest in the use of rainwater harvesting systems in recent years. The impact of rainwater harvesting practices on drainage systems, mainly during extreme rainfall events, has been a secondary consideration, one reason being that these two functions, namely supplying water and managing storm water runoff, appear to be contradictory. The study uses a time series modelling approach to assess the benefits achieved in runoff reduction at a plot scale during heavy rainfall events, across three locations in England. Considering the assumptions of the model, the results show that substantial reductions can be achieved in areas where the rainfall supply is smaller than the non potable domestic demand in the households.

Singhal & Goyal (2011) revealed that the development of representative conceptual groundwater flow model is an important step before translating it into a numerical model. In his, research a methodology for development of conceptual groundwater flow model has been presented in

which spatially distributed values for groundwater recharge has been utilized instead of lump sum average values of recharge normally obtained by water budgeting method and study also extensively uses GIS for preprocessing of hydrological, hydrogeological and geological data.

Mahadevaswamy et al. (2013) observed the modeling of groundwater flow in watersheds is of great concern in characterizing the hydrogeological environments. The study presents an application of groundwater flow model using the finite difference method, to simulate flow conditions. Results from this computation served as a methodology for analyzing the groundwater behavior at micro level. During the modeling procedures, it has been found that the head changes in the aquifer system of watershed at any specified time is a function of various aquifer characteristics. These changes are obtained by solving the equation of flow through porous media. The output obtained from this model is of practical application to hydro geologists and similar stake holders for applying appropriate aquifer management practices.

Kaviyaran et. al. (2013) observed that the groundwater flow modeling for an unconfined coastal aquifer surrounded by saline water bodies plays a significant role in providing the information on direction and magnitude of groundwater flow with respect to seasons and location. The modeling package MODFLOW was employed in the Visual MODFLOW Pro 2009.1 was applied to simulate the steady state run for Kalpakkam coastal aquifer. The steady state simulation was in good agreement with respect to groundwater flow field. The model output results show the groundwater flow was found to follow topography. The model outputs are helps to determine the groundwater flow paths, also helps to delineate the recharge and discharge areas in the coastal aquifer.

Helmreich et. al. (2009) suggested that, the depending on precipitation intensity rainwater constitutes a potential source of drinking water. In addition, its proper management could reduce water and food crisis in some of these regions. Rainwater harvesting (RWH) is a technology where surface runoff is effectively collected during yielding rain periods. In order to support such technologies RWH systems should be based on local skills, materials and equipment. Harvested rainwater can then be used for rainfed agriculture or water supply for households. Unfortunately, rainwater might be polluted by bacteria and hazardous chemicals requiring treatment before usage. Slow sand filtration and solar technology are methods to reduce the pollution. Membrane technology would also be a potential disinfection technique for a safe drinking water supply.

Mathur et. al. (2012) concluded that the water crisis continues to become severe, there is a dire need of reform in water management system and revival of traditional systems. Their study attempts to formulate an Environmental Management Plan to conserve and utilize rainwater in the University. It was concluded that in University the Environmental Management Plan for Rain Harvesting System will be very important for campus as that collected water can be used for different purpose in various Departments of University and also the excess of rain water

which can be used for ground water recharge it will increase the ground water table in surrounding area of University.

Rahman et. al. (2012) investigated the water savings potential of rainwater tanks fitted in detached houses at 10 different locations in Greater Sydney, Australia. A water balance simulation model on daily time scale is made and water savings, reliability and financial viability are examined for three different tank sizes, 2 kL, 3 kL and 5 kL. It is found that the average annual water savings from rainwater tanks are strongly correlated with average annual rainfall. It is also found that the benefit cost ratios for the rainwater tanks are smaller than 1.00 without government rebated. It is noted that a 5 kL tank is preferable to 2 kL and 3 kL tanks and rainwater tanks should be connected to toilet, laundry and outdoor irrigation to achieve the best financial outcome for the home owners.

Eroksuz et. al. (2010) studied the rainwater harvesting in multi-unit buildings in Australia is less common. They investigated the water savings potential of rainwater tanks fitted in multi-unit residential buildings in three cities of Australia: Sydney, Newcastle and Wollongong. They found that for multi-unit buildings, a larger tank size is more appropriate to maximize water savings. It is also found that rainwater tank of appropriate size in a multi-unit building can provide significant mains water savings even in dry years. A prediction equation is developed which can be used to estimate average annual water savings from having a rainwater tank in a multi-unit building in these three Australian cities.

Singh et. al. (2014) Concluded that the seawater intrusion is a widespread environmental problem of coastal aquifers where more than two third of the world's population lives. Computer-based models are useful tools for achieving the optimal solution of seawater intrusion management problems. Various simulation and optimization modeling approaches have been used to solve the problems. Optimization approaches have been shown to be of great importance when combined with simulation models. It is recommended that the future research should be directed toward improving the long-term hydraulic assessment by collecting and analyzing widespread spatial data, which can be done by increasing the observation and monitoring networks. The coupling of socioeconomic aspects in the seawater intrusion modeling would be another.

3. Conclusion

Through this review study we concluded that the aquifer modeling should be apply for the assessment of ground water potential and rain water potential for the good water quality and quantity improvement feasibility and design of rainwater harvesting system. Review study will be helpful by providing better means of rainwater harvesting and groundwater recharging after careful analysis of study area and application of suitable scientific technique to fulfill the demand of current generation and to retain the sustainability of the future generation. It will also help in the development of the nation.

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