Vol 6 Issue 8 May 2017

ISSN No : 2249-894X

Monthly Multidisciplinary Research Journal

Review Of Research Journal

Chief Editors

Welcome to Review Of Research

RNI MAHMUL/2011/38595 **ISSN No.2249-894X**

Review Of Research Journal is a multidisciplinary research journal, published monthly in English, Hindi & Marathi Language. All research papers submitted to the journal will be double - blind peer reviewed referred by members of the editorial Board readers will include investigator in universities, research institutes government and industry with research interest in the general subjects.

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ISSN: 2249-894X Impact Factor : 3.8014(UIF) Volume - 6 | Issue - 8 | may - 2017

Review Of Research

CONCEPTUAL ANALYSIS OF GROUND WATER DEPLETION – A STUDY

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ABSTRACT:

Water has a natural level underground known as the water table. It droughts the water table drops, in heavy rain it raises and is drained away by rivers into the sea. So, there is a natural reservoir of water under our feet. Thus water is an inevitable part of environment question naturally arises whether environmental rights could preserve ground water. Groundwater, the only source of water which is stable than any other source is increasingly coming under threat because of greater demand, pollution and mismanagement. Excessive withdrawals of groundwater, pollution and mismanagement can deprive future generation of these natural resources. It might lead to drying up of wells and land subsidence. It is often believed that groundwater is relatively free from pollutants and may be used for drinking, domestic and industrial purposes. But once an aquifer gets contaminated, remedial measures may be extensive and even impossible, because ground water is invisible and danger to it is often disregarded. Thus, pollution of groundwater is a serious environmental problem which calls for immediate attention of planners.

KEYWORD: *Ground water, Depletion, Pollution, Monsoon, MGNREGA, Government Scheme.*

INTRODUCTION :

Water is a gift of nature, but many regions are facing water shortage due to its being polluted by human activities, or increasing demand by industrialization and high population growth. In the present scenario most of the wastes which are discharged into natural water bodies such as lakes and rivers, it also affects the ground water quality. Groundwater is the alternative source of fresh water in areas where surface water is polluted and deficit. However, the ground water that is polluted by various sources e.g. solid waste, Industrial waste etc.

The combined forces of population growth and urbanization are creating rapid population growth in urban areas. By 2030, the urban population will have risen to 5 billion, 60 per cent of the world's population. Growing cities are the engines of the world's economic development. One of important resources to sustain urban growth is water

resources. Groundwater has historically provided a locally available low-cost source of water for public supply and domestic use. As groundwater is generally of good quality and requires less treatment, groundwater is increasingly being exploited in preference to surface water for drinking water supply.

People are mostly depending on groundwater resources for their livelihood in both developed and developing countries. In developed countries the solid waste is properly managed due to awareness among the public sector, private sector and the people. In developing countries though public sector is involved in the proper management people cooperation is not at satisfactory level due to unawareness on the consequences of the solid waste dumping. The study aims to analyze the groundwater contamination due to dumping and the consequences of the contamination on the human habitations.

Urbanization and rising incomes are the two most important factors that lead to enormous waste generation. Inappropriate solid waste management causes air, land and water pollution leading not only to environmental degradation but also to a growing list of human health problems. Ground water is the largest source of fresh water in developing countries and it is also subjected to such danger. During the past 7-8 years (2003-2010) the solid waste has increased from 1000 tons to 3000 tons per day. Landfills have been identified as one of the major threats to ground water resources. The solid waste placed in landfills or open dumps are subjected to either groundwater underflow or infiltration from precipitation or any other possibility of infiltration of water. During rainfall, the dumped solid wastes receivers' water and the by-products of its decomposition move into the water through the waste deposition.

Apart from the problem of the over-exploitation, groundwater pollution in urban areas is a growing environmental problem in the world. Worldwide, surface water and shallow groundwater have been found polluted from diffusive sources of intensive agricultural activities and urban runoff. Direct waste water discharge and solid waste disposal from rapid urbanization and industrialization have polluted many rivers and groundwater. In developing countries, groundwater pollution commonly results from indiscriminate disposal of municipal and industrial wastes, extensive use of on-site sanitation systems and urban agriculture. Urban areas include a wide diversity of land uses. The increased diversity and intensity of these land uses generate a wider variety of pollutants at higher concentrations than are found in rural or wild land areas.

Urbanization creates serious challenges for protecting water quality and aquatic ecosystems. The management and control of water quality within large urban catchments demand an integrated and interdisciplinary approach. With the increasing pressures on groundwater resources, strategies for protecting urban groundwater should be formulated based on unbiased scientific information from monitoring and assessment of groundwater quality.

OBJECTIVES

o To know the sources of ground water
o To study the reason for ground water
o To give suitable to conserve depletion water

METHODOLOGY

This paper is review paper information gathered from secondary sources the journals, newspaper and web search

SOURCE OF GROUNDWATER

Rainfall is the only source of groundwater. Rainfall that falls on the ground, a part of which evaporates, some as surface runoff and part of it percolates into the soil and further flows downward to recharge the groundwater storage in the weathered and fractured zones of rocks. The climate, which allows only a little part of the rainfall to contribute to the groundwater recharge and the geological environment are the two limiting and controlling factors for the occurrence of groundwater and its movement. Groundwater occurs both in the water table condition in the weathered zone and probably in semi confined or unconfined condition in the fractured zone.

MOVEMENT OF GROUNDWATER

Ground water in its natural state is invariably moving. Water moves from high energy level to low energy level by the principles of hydraulic conductivity. Water from rainfall percolates down to recharge the groundwater storage. The porosity, permeability, fractures and lineaments play a significant role in the movement of groundwater and its accumulation.

GROUNDWATER LEVEL FLUCTUATIONS

The groundwater level fluctuation is mainly due to anthropogenic, it is well known that the groundwater withdrawal from an aquifer induces water level decline creating a cone of depression depending among other parameters on the aquifer hydrodynamic parameters and geometry. Ocean tides are also known to affect the groundwater fluctuation in the coastal aquifers (Marechal et al., 2002).

The average water level since 2001 to 2012 in the study area fluctuates over 20.02m bgl for pre-monsoon and 19.75m bgl for post monsoon, respectively. There are 16 observatory wells in the study area the same are maintained by CGWB as well as Department of Mines and Geology. These wells are monitored four times in a year during May (pre-monsoon), August, November (post monsoon) and January. The trend lines in the hydrographs show fall in water level for pre-monsoon and rise in water level for post monsoon.

POLLUTION SOURCES WERE INVESTIGATED:

o Domestic wastewater
o Industrial wastewater
o Urban storm water
o Solid waste disposal sites
o Polluted rivers/sewer drains
o Diffusive sources

Mankind's dependence on environment to extract their basic needs has given birth to restless pursuit of social and scientific progress. Comfort and security has resulted in increased stress on environment – especially on land and water. Our demand for the 'blue gold'(water) is increasing at a faster pace with passing time and thousand more people are compelled to survive in a water stressed condition throughout the world. The changing land use demand more and more water for three to four crops in a year. Little attention is received by the fact of disappearance or depletion of ground water.

CONCEPT OF GROUNDWATER BALANCE

Water balance techniques have been extensively used to make quantitative estimates of water resources and the impact of human activities on hydrologic cycle. The study of water balance is defined as the systematic presentation of data on the supply and use of water within a geographic region for a specified period. With water balance approach, it is possible to evaluate individual contribution of water sources in the system over different time, periods and to establish the degree of variation in water regime due to changes in components of the system.

The basic concept of water balance is
Input to the system - Outflow from the system = Change in storage of the system (over a period of time).

UNIT FOR GROUNDWATER RECHARGE ASSESSMENT

An appropriate hydrological unit for groundwater resource estimation is a watershed with well-defined hydro-geological boundaries. In hard rock areas, the hydro-geological and hydrological units normally coincide which may not be the case in alluvial areas where the aquifer traverses the basin boundaries. In hard rock area, assessing the groundwater of watershed as a unit is desirable, which is adopted for the present study. The availability of data required for the computation of groundwater on the basis of watershed as a unit is also the same unit for groundwater estimation.

GROUNDWATER RECHARGE

In general, groundwater recharge is defined as the downward flow of water reaching the water table, forming an addition to the groundwater reservoir (De Vires and Simmers, 2002). In study area, the recharge to groundwater table is considered mainly infiltration of rainfall, field irrigation and tanks.

SUGGESTIONS AND CONCLUSION

Following suggestions are ventured to strive towards conservation and optimum use of ground water with social justice.

o The law governing ground water under Indian Easements Act shall be modified by comprehensive state legislation which makes an integrated approach of managing surface and ground water, conservation and development of ground water, fixation of priorities of use and prevention of waste and pollution of ground water.

o Such legislation should establish a system of licensing and registration for sinking of wells by conferring discretionary power upon the ground water authority, which should be an expert body consisting of qualified persons from the concerned fields. The licensing procedure has to be just and there shall be provision for an appeal to a state ground water body.

o While granting license, the interests of possible and existing competent users shall be taken into consideration. Further, exemption from licensing requirement in case of sinking wells, bore wells for domestic purposes may be considered as reasonable, looking to the quantum and purpose of use. However the exemption should be only up to 20m depth.

o Stringent measures shall be taken to prevent the wastage of water because of negligent use of water by manufacturers and users.

o Legal check should be introduced to regulate the sale of ground water to the multinational corporations.

o Though augmentation of ground water resources is necessary more importantly the stress should be on the effective utilization of the available resource. Here greater emphasis should be on the quality, and the precautionary principle should be effectively implemented. The Water Act, 1974, should be suitably amended so as to make it more effective with respect to ground water pollution.

o Integrated management of water resources as contemplated by the National Water Policy, 2002 is absolutely essential. Many ground water laws like the Kerala Ground water (Control and Regulation) Act, 2002 have failed to take note of this vital aspect. So certain legal regulations are to be made in this subject.

o Traditional water conservation strategies are to be adopted through people's participation.

From the result we can conclude that the status of ground water quality is degrading as years goes on which may lead threats to the living community near the dump site. The quality of ground water is improved as the distance of well is increased from the dump site. The main reason for the degrading water quality is due to continuous dumping of wastes from the local residents. To reduce the contamination of pollutants on ground water, many awareness programmes need to be conducted to the people about the ground water importance, health issues, treatment methods, waste disposal etc.

Therefore, this research is urgent in need, to find out the ways how to educate the society to make them realize, understand the necessity to conserve fresh, sweet water, conserve the groundwater recharge areas, to adopt appropriate practices of irrigation for different crops and how to become the beneficiaries of various State Government and Central Government Schemes under MGNREGA specially in the field of water conservation, micro irrigation and soil development. Education and mass communication among human being can confirm in conserving and optimally use of resources; employ the wisdom and natural world knowledge and overall advancing of a country.

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