

Vol 2 Issue 7 April 2013

ISSN No : 2249-894X

*Monthly Multidisciplinary
Research Journal*

*Review Of
Research Journal*

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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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GROUND WATER DEPLETION – A CRISIS: CAUSES & REMEDIES

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Abstract:

In this paper, the global problem of ground water depletion is addressed; the seriousness and the need to have concern about this crisis are emphasized. The causes for this crisis and some suggestions in handling this alarming situation at the local level with reference to Indian conditions are discussed in detail.

KEY WORDS:

Ground water depletion, Drinking water crisis, Water resource

INTRODUCTION

Ground-water depletion, a term often defined, as long-term water-level declines caused by sustained ground water pumping, is a key issue associated with ground-water use. Many areas of the India are experiencing ground-water depletion.

Since the mid 1950s, modern techniques of groundwater exploration, and pumping have created "instant irrigation" opportunities in India. The total area irrigated by wells grew by more than 150 percent between 1956 and 1986 in India. The drinking water crisis in many Indian cities is reaching alarming proportions. Urban populations suffering from irregular water supply, sometimes leading to clashes among them.

GROUND WATER REOURCES – AVAILABILITY & CONSUMPTION

The total amount of water available on earth has-been estimated at 1.4 billion cubic kilometers, about 95% of the earth's water is in the oceans, which is unfit for human consumption and other use because of its high salt content; about 4% is locked in the polar ice Caps and the remaining 1% constitutes all the fresh water in hydrological cycle including ground water reserves. Only 0.1% is available in as fresh water in rivers, lakes, and streams, which is suitable for human consumption. This highlights the significance of the need to preserve our fresh water resources.

The annual precipitation of rainfall over India is 400 million-hectare meters. The surface water resources carry 17,68,000 million cubic meters. Out of which only 50% can be put to beneficial uses. In addition, the ground water potential of 4,22,900 million cubic meters is available for utilization and about 1,00,000 million cubic meters is being exploited at present. However, the major problem is the quality of surface water in majority of the locations, which is affected by pollutants from various sources such as domestic waste discharges, industrial waste disposal, and other human activities like bathing, washing and swimming etc.

Hence, the ground water source is one of the important fresh water resources for the domestic as well as industrial use.

Title: GROUND WATER DEPLETION – A CRISIS: CAUSES & REMEDIES
Source: Review of Research [2249-894X] H.N.REDE yr:2013 vol:2 iss:7

FACTOR CAUSING DEPLETION OF THE GROUND WATER.

Groundwater crisis is not the result of natural factors; it has been caused by human actions. During the past two decades, the water level in several parts of the country has been falling rapidly due to an increase in extraction. The number of wells drilled for irrigation of both food and cash crops have rapidly and indiscriminately increased. India's rapidly rising population and changing lifestyles has also increased the domestic need for water. The water requirement for the industry also shows an overall increase. Intense competition among users — agriculture, industry, and domestic sectors — is driving the groundwater table lower.

The quality of groundwater is getting severely affected because of the widespread pollution of surface water. Besides, discharge of untreated waste water through bores and leachate from unscientific disposal of solid wastes. Also contaminates groundwater, thereby reducing the quality of fresh water resources.

1) Depletion of underground water resources through over pumping.

The food we consume requires 500 times as much water as we need to drink every day and agriculture is the most water-intensive sector of the economy. Seventy per cent of all water pumped from underground or diverted from rivers is used for irrigation, 20% is used by industry and 10% goes to domestic residences. Over the last ten years, the number of borewells has risen by an average of five times; however, no attempts have been made to conserve the groundwater resources of the region. Which probably explains why no water has been found in several instances, even though the borewells were dug at least a thousand feet deep.

2) Pollution of groundwater resources

it has become a major problem today. The pollution of air, water, and land has an affect on the pollution and contamination of groundwater. The solid, liquid, and the gaseous waste that is generated, if not treated properly, results in pollution of the environment; this affects groundwater too due to the hydraulic connectivity in the hydrological cycle. For example, when the air is polluted, rainfall will settle many pollutants on the ground, which can then seep into and contaminate the groundwater resources. Water extraction without proper recharge and leaching of pollutants from pesticides and fertilizers into the aquifers has polluted groundwater supplies. In addition, leachates from agriculture, industrial waste, and the municipal solid waste have also polluted surface- and ground-water. Some 45 million people the world over are affected by water pollution marked by excess fluoride, arsenic, iron, or the ingress of salt water.

3) Changing lifestyles

In urban areas, the construction of houses, footpaths and roads has left little exposed earth for water to soak in. In parts of the rural areas of India, floodwater quickly flows to the rivers, which then dry up soon after the rains stop. If this water can be held back, it can seep into the ground and recharge the groundwater supply. Due to modern life style the Househols use of water has been increased These include [drinking water](#), [bathing](#), [cooking](#), sanitation, and [gardening](#). Basic household water requirements have been estimated by [Peter Gleick](#) at around 50 liters per person per day, excluding water for gardens. Recreational use of water as in case of water sports such as anglers, water skiers, white water boating. swimming pools is also a contributory factor for the depletion of ground water resourses.

REMEDIES TO HANDLE THE PROBLEMS**1. Recharge of ground water**

This has become a very popular method of conserving water especially in the urban areas. Rainwater harvesting essentially means collecting rainwater on the roofs of building and storing it underground for later use. Not only does this recharging arrest groundwater depletion, it also raises the declining water table and can help augment water supply. Rainwater harvesting and artificial recharging are becoming very important issues. It is essential to stop the decline in groundwater levels, arrest sea-water ingress, i.e. prevent sea-water from moving landward, and conserve surface water run-off during the rainy season.

2. Use of conservation requirements.

a) drip and/or sprinkler irrigation systems, b) low-water consuming crops, c) improved discharge efficiency through use of quality electrical pumps and Delivery pipes and d) installation of correct capacity pumps.

3. Instalation of electric and water meters and Price electricity on pro- rata basis.

Electric meters and water meters should be installed to measure groundwater use on farms. Even if the cost of administering the metering work is considerable, it would give information on the amount of resource used.

This information could be used to fix incentives and impose penalties,

and provide a basis for prescribed amounts of water. This would provide flexibility of water rights by facilitating the transfer from lower to the higher remunerative use. Price discounts could be offered for conservation efforts and for those who consume the right quantities prescribed for the crop in the region and penalties could be charged for those farmers who over irrigate the Crops according to the prescription. This should also encourage use of prescribed pump sizes

4. Time electricity supply for improved water management

Supply during the dark hours has resulted in excessive use of groundwater because of the difficulty in managing the irrigation. Supply during the daylight hours would help conserve water and also enable the farmers to monitor the water use.

5. Price electricity depending on the type of- crop.

Electricity for high-water crops (rice, sugarcane, maize, vegetables, and mulberry,) should be priced more than that for low-water crops (groundnut, sunflower, sorghum, ragi). This would dissuade farmers from growing high-water consuming crops using groundwater. If farmers persist in growing these crops using well irrigation, it may be necessary to ration the supply of electricity, as is often done for urban power consumers.

6. IMFORCEMENT BY LAW

Town planners and civic authority in many cities in India are introducing bylaws making rainwater-harvesting compulsory in all new structures. No water or sewage connection would be given if a new building did not have provisions for rainwater harvesting. Such rules should also be implemented in all the other cities to ensure a rise in the groundwater level. Realizing the importance of recharging groundwater, the CGWB (Central Ground Water Board) is taking steps to encourage it through rainwater harvesting in the capital and elsewhere. A number of government buildings have been asked to go in for water harvesting in Delhi and other cities of India.

7. Regulate well drilling agencies.

Permits should be obtained by the well drilling agency rather than farmers, before sinking wells. This would make management for the groundwater authority easier, as the drilling agencies are few in number.

8. Make an efficient irrigation system part of the loan program.

Including sprinkler and/or drip irrigation equipment in the component of well loan would serve as a package for conservation and planning for proper water use. The use of quality materials during installation could be mandatory for sanction of a loan.

9. Regulate the depth of drilling and spacing between wells

The DMG has information on the depth to the water table in different aquifers. This information is of use in regulating the depth of drilling and space between wells in order to prevent cumulative well interference.

CONCLUSION

The depletion of underground water resources through overpumping is a far more serious issue than the depletion of oil reserves, There are substitutes for oil but there are no substitutes for water. Excessive pumping for irrigation to satisfy food needs today almost guarantees a decline in food production tomorrow.

The fresh water depletion and the drinking water crisis in many Indian towns and cities are becoming serious and alarming. The need of the hour is to have concern about the situation and to find out appropriate solutions for the same

The most important step in the direction of finding solutions to issues of water and environmental conservation is to change people's attitudes and habits - this includes each one of us. Conserve water because it is the right thing to do. We can follow some of the simple things that have been listed above and contribute to water conservation.

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