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Depletion of Groundwater Resource and Need of the Study

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To meet the ever-increasing demand of water has resulted in over exploitation of ground water resource causing continuous declining water table in various parts of the country. The situation calls for a constant monitoring of ground water behavior, in all the areas that are getting fast depleted, and requires adoption of judicious ways to control withdrawals, so as to keep them within the limits of recharge capacities. As a result, over exploitation of ground water has occurred leading to continuous decline of water table in different parts of the country.

As per Central Ground Water Board's National Report on Ground Water Resources, 249 blocks / mandals / taluks / watersheds fall under "over-exploited" category (utilization greater than 100%) and 179 blocks / mandals / taluks / watersheds in dark category (utilization > 85% but < 100%) in 12 states of the country viz. Andhra Pradesh, Bihar, Gujarat, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Punjab, Rajasthan, Tamil Nadu and Uttar Pradesh (Thampi, 2008). Saline water ingress affecting ground water quality has been observed in coastal areas where groundwater levels declined in the states of West Bengal, Gujarat, Tamil Nadu, Pondicherry etc.

The problem of declining water table was experienced in the study area mainly because of a lack of proper planning of a systematic groundwater extraction programme. Over-exploitation of groundwater was taking place to meet the increased demand of irrigation water for crop production, expansion of industrial and domestic activities etc. Some of the factors responsible for lowering of water table may be described as growing of heavy-duty crops irrespective of soil conditions prevailing in the area, continuous increasing trend of construction of minor irrigation structures and reduction of area under canal and pond irrigation etc.

Most of our water bodies have become polluted due to industrial growth; urbanization and manmade problems mainly the result of population growth. Poor sanitation and contaminated drinking water arising from human activity and neutral phenomena create serious

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problems in human health. The major sources of water pollution are sewage and other waste, industrial effluents, agricultural discharges and industrial wastes. They create a large problem of water pollution rendering water no longer fit for drinking, agriculture and, as well as for aquatic life. People are affected by water quality problems either due to growing population, or the prevalence of fluoride, arsenic, nitrate or iron deposits, or due to discharge of effluents. The pollution of land and water resources not only affect the human being but also affect the capability of land and its production, therefore, keeping the above in view the quality of land and water resources were assessed for their quality and suitability of different uses.

Over-exploitation of groundwater is taking place to meet the increased demand of irrigation water for crop production, expansion of industrial and domestic activities etc. Some of the factors responsible for lowering of water table may be described as growing of heavy duty crops irrespective of soil conditions prevailing in the area, continuous increasing trend of construction of minor irrigation structures and reduction of area under canal and pond irrigation etc.

There is an urgent need to change the prevailing cropping pattern by allocating and encouraging more area under low water demanding crops but of more value for reducing pressure on groundwater up to a certain extent. This may be achieved by introducing and propagating more area under pulses and oilseed crops such as Arhar, Mung, Urd, gram, pea, lentil, mustard etc. Such crops also come under the category of cash crops. The farmers of the problematic areas should also be discouraged for growing crops like mentha, paddy and some vegetable, which are very high-water demanding crops. Certain steps should also be taken to make the farmers aware of the aspects of land evaluation. This will help them to cultivate a particular crop where it is suitable and will give higher yields. Growing crops in the area, where they are suitable to grow, will need less care and irrigation. This may ultimately be a preventive step towards the problem of over-exploitation of groundwater.

Indiscriminate rise in number of minor structures and reducing the network of canal irrigation in the study area caused havoc on the depletion of groundwater resource. Thus, the increasing load on groundwater is the main cause resulting in the groundwater depletion.

The indiscriminate exploitation of groundwater is leading to water table decline. There are various regions in our country where groundwater levels are depleting very fast and need attention of planners for developing some control measures. The water table decline has been occurring at a fast rate in these areas because of various regions, though it is due to increased

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intensity of cropping and misbalance in recharge and withdrawal but a peculiar phenomena has been observed that it is increasingly being observed in the areas where a high ET demanding crop like rice has been introduced in a big way. In order to maintain equilibrium between availability and withdrawal of groundwater, suitable and economical recharge techniques need to be adopted. The techniques should be easy, cost effective and sustainable in the long term. The scientific database on soil and water resources is prerequisite, in the areas where these resources are limited. The areas where the water table is continuously declining, it becomes necessary to study the soil and land characteristics in a sustained manner to arrest the declining water table at the desired level.

If there is abnormal rainfall, the excess accretion to the water table will be drained away. With the introduction of an extraneous cause such as tube well pumping, a new dynamic equilibrium may be set up. If the additional draft due to pumping is met with the recharge due to rainfall and other sources, the water table may be unaffected by the pumping. It is, however, possible that the regime may be disturbed for few years with the introduction of pumping but later recharge or draft may be so adjusted that a fresh regime is set up at a lower level of water table. If, however an overdraft is created due to pumping which is not met with by the recharge, the regime is disturbed and the water table will keep on following continuously which will create numerous problem in the form of non-availability of water for drinking and other uses from wells in the areas within the command of tube well pumping.

Groundwater depletion is a serious threat to the environment. The majority of our bodies and the Earth is made up of water. We may see the beautiful, flowing surface waters that make up the oceans, lakes and rivers, but this water is not always safe for consumption and is much more difficult to filter than groundwater. Consequently, water from the ground is especially valuable.

Groundwater depletion most commonly occurs because of the frequent pumping of water from the ground. We pump the water more quickly than it can renew itself, leading to a dangerous shortage in the groundwater supply. As a growing world with a population that continues to rise, the more we pump water from the ground at a rapid rate, the more difficult it is for the groundwater to provide us with the amount of water that we need.

Groundwater depletion can also occur naturally. The problems we would face with freshwater shortage is sure to cause problems in every aspect of our lives. The activities that

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lead to groundwater depletion come mostly from humans, but a portion of it also comes from changes in our climate and can speed up the process.

Effects of Groundwater Depletion

Groundwater depletion will force us to pump water from deeper within the Earth. The more we extract groundwater right below the Earth's surface, the further down we have to go in order to get more. As we have to extract water from deeper within the Earth, we find that there is less water available. Consequently, we will have to use even more resources to develop alternative methods to reach further into the ground.

We should reduce our use of chemicals and dispose of them properly. Many people are not paying attention and are simply unaware of how important it is to keep pollution from occurring beneath the ground. The water from businesses and private residences that run into the streets and sewage systems are commonly laden with chemicals. These chemicals find their way into larger bodies of water and absorb into the ground, poisoning animals and the soil. By using less chemicals and discarding of them carefully, we keep them from adding toxic materials into our water supply.

More comprehensive research and additional funding can help with groundwater depletion. The best way to approach the topic of groundwater depletion and to find a solution is to think on both a personal and government level. Laws that are in place for the pumping of groundwater should be more strict and follow specific regulations.

Natural recharge during monsoon may not help much if groundwater depletion becomes acute, as rainfall of past years controls current storage with 230 billion metre cube of groundwater drawn out each year for irrigating agriculture lands in India, many parts of the country are experiencing rapid depletion of groundwater. The total estimated groundwater depletion in India is in the range of 122–199 billion metre cube.

If groundwater is depleted and the region experiences drought for two–three years consecutively, there will be serious challenges. Availability of even drinking water will be a huge problem. Natural recharge during monsoon may not help much if groundwater depletion becomes acute, as rainfall of past several years controls the current groundwater storage levels.

Groundwater recharge has declined between 1996 and 2016 in northwest and north central India due a reduction in low-intensity rainfall. Low-intensity rainfall during the monsoon is responsible for groundwater recharge in northwest and north central India. The

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study also found that carbon dioxide emission from pumping groundwater and release of carbon dioxide into the atmosphere from the soil when groundwater is depleted is less than 2-7% of the total carbon dioxide emissions in India.

Some of the negative effects of groundwater depletion:

- Lowering of the Water Table.
- Excessive pumping can lower the groundwater table, and cause wells to no longer be able to reach Ground Water
- Increased Costs.
- Reduced Surface Water Supplies.
- Land Subsidence.
- Water Quality Concerns.

Groundwater contamination occurs when man-made products such as gas, oil, road salts and chemicals get into the groundwater and cause it to become unsafe and unfit for human use. For example, pesticides and fertilizers can find their way into groundwater supplies over time.