iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 9 **Issue:** XI **Month of publication:** November 2021

DOI: https://doi.org/10.22214/ijraset.2021.39129

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 9 Issue XI Nov 2021- Available at www.ijraset.com

Water Management and Conservation

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Abstract: ***Everybody knows about the importance of water. Water is the only source which distinguish our planet compare to all the others. The demand of water increasing day by day due to population growth and economic development. While the global supply of available of fresh water is more than adequate to meet all the current and fore see able water demands, its spatial and temporal distribution are not. The severity of water have direct impact in future. All of us must find ways to remove these constraints. Both central and state governments has various programmes for water conservation and management. Water conservation programs increase irrigation potential and try to improve the water and food security situation in country. In India due to rapidly growing population increase the drinking water consumption and decrease rain fall. Due to poor management, ignorance, lacking of technologies and in the absence of responsibilities by the people the water problem arise in India.***
Here is the major focus on factors responsible for water pollution and waste water treatment, so that focusing the remedy for major water pollution and waste water treatment will help to conserve water and will be helpful for effective management of our precious water. There are numerous methods to reduce water losses and improve water conservation and management like harvesting rain water, fog and dew, mulching, contour farming, and some technologies like nitration, ion-exchange and chlorination method.

I. INTRODUCTION

Water needs no introduction, the importance of water is known to one and all. Water plays an important role in the human progress. Every drop of water is precious, but we continue to waste it. India has 17.7 % of total world population and only 4% of water resources, which are depleting rapidly. 97% of water on this planet is salty and which is not fit for human consumption. Out of 3% of fresh water 1% of water is locked up in the form of ice, so only 2% of water is available for domestic and industrial use. Water could be a limiting factor in day to day human activities, so we should learn to live within the limits of available resources. Therefore its sustainable management is essential to protect the water. This include human personal household needs, community activities, agriculture and animal life sustenance. Although total earth water (71%) is constant, it goes through continuous hydrological cycle such as transpiring by vegetation, evaporation, precipitation, run of infiltration and other natural process. In recent years water table is facing serious threat due to rapid growth of population, climate change, global warming and some other natural calamities. Water withdrawal across all sectors including public use, domestic use, irrigation, thermos electric power increased dramatically. The rain fall has been changed during current years and the catchment of the rain water is decreasing. These days with increasing demands of water requirement, preservation of water resources has been increased. So human need to take care of water resources uses patterns and sustainable management and conservation at great importance.

A. Water Conservation

This precious resource (Water) is being wasted, polluted and depleted. Because of our water resources are limited and getting less year by year that's why water conservation become a compulsory need everywhere. A consumer should be more aware of the need for water conservation. Conservation means using the available resources wisely and care it properly. Our available water is finite.
There are many factors which are to be taken care for water conservation and management. Majorly water pollution and water wastage are prime responsible for having water crisis worldwide. Causes of water depleting mainly are a. Rapid growth of population b. Rapid urban development c. improper sewage disposal d. Use of toxic chemicals for plants e. Dumping the chemical wastage by big factories f. Discharge of radioactive waste g. Oil spills h. Throwing the plastics in the ocean any may more.
By treating aforesaid we can prevent water pollution and can conserve & manage water for ourselves and next generations. There could be several methods for the treatment of water conservation and management.
Both agriculture and industry based economics depends upon water. Science and technologies have a great progress, and on the other hand we are forgetting the importance of water. Our ancestors had many methods that helped in conserving water. There are several ways to conserve water 1. By harvesting rain water. 2. by right use of existing resource and reuse. 3. To get additional sustainable water from oceans. 4. by applying mulch to the soil to reduce the evaporation. 5. by mechanical auditing. 6. Contour farming 7. Desalination. 8. Fog and dew method. 9. Soak pit construction. 10. Allocation of water charge a. RUBS (Ratio utility bill system) b. Sub metering.

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India, a land of river and monsoon is now suffering from a water crises. According to some reports six hundred million Indians facing extreme water stress, and in future it will be going to worse, as per NCIWRD (National commission for integrated water resources development) of India, by 2050 the total demand for water is expected to reach 973 bcm (billion cubic meters) for a low demand scenario. In recent years India has also experimented with a number of water technology related recycling and reuse of waste water. We need to improve water quality by reducing the industrial and domestic waste from India. To save rivers and lakes we need to increase the sewage treatment capacity.

We can also treat water at home by using eco-friendly cleaning products. By using bio-degradable cleaners like tea tree oil, vinegar, lime and baking soda also helps to reduce water consumption.

Grey water is waste water generated from showers, car washing, kitchen, washing machine, laundry except toilet water. It can be treated by physical, chemical, biological and natural methods or a combination of these methods. Grey water can be reused for toilet flushing, garden and plant irrigation, agricultural irrigation, floor washing, car washing, ground recharging etc. after a suitable treatment. Grey water is easy to treat and recycle in comparison of black water because it has less contamination.

A study by International Water Management Institute (IWMI) predicted that there will be severe water scarcity in India by 2025. In India the per capita surface water availability goes on decreasing with time and it is projected to reduce drastically by the year 2050.

There is a water crisis today, but the crisis is not about having too little water, it is a crisis of managing our water so badly, that's why billions of people and environment suffers. Waste water or sewage originates from human and home waste water industry, rain runoff and ground water filtration.

In India common effluent treatment plants are also necessary for industries. Uncontrolled discharge of industrial effluence contain many inorganic and organic pollutants are certainly causing serious damaging effects, eventually making water resources unfit for domestic consumption. Many materials in the chemical industry are toxic, mutagenic, carcinogenic and almost non bio degradable. Chemical industrial waste water can also be treated by some biological methods such as trickling filter, rotating biological contactor (RBC), activated sludge. Several industrial waste water may contain heavy metals such as sb, cr, cu, pb, Zn, Co, Ni etc. The toxic metals must be treated from waste water. Various treatment method may be applied to remove heavy metals. Chemical precipitation process is most commonly used technology. In recent years some new technologies have been developed and extensively used to treat or remove heavy metals from waste water like bio-sorption, neutralization, precipitation, ion-exchange and chlorination method.

A chemical process which is also commonly used in many industries to treat the waste water is neutralization. Neutralization consist of addition of acid or base to adjust ph level back to neutrality.

A variety of inorganic techniques to be used to measure trace elements in waste water, flame atomic absorption (FAAS), spectrometry and graphite furnace (or electro thermal) atomic absorption spectrometric (GFAAS or ETAAS), inductively coupled plasma optical emission spectrometry (ICP/OES) and inductively coupled plasma mass spectrometry (ICP-NS).

B. Water Management Plan

A successful water management program starts with a comprehensive strategic plan. The plan needs active participation of each and every individual in the country. The process for developing a strategic plan is generally the same for an individual facility or an agency. The plan provides information about current water uses and charts a course for water efficiency improvements, conservation activities, and water-reduction goals. A strategic plan establishes the priorities and helps a site or agency allocate funding for water-efficiency projects that provides the biggest impact. This paper describes the general steps for creating a water management plan.

1) Reuse grey water for non-potable use such as cleaning of floor, toilet flushing, car washing, gardening etc. Greywater is specifically wash water. That is, bath, dish, and laundry water excluding toilet wastes and free of garbage-grinder residues. When properly managed, greywater can be a valuable resource which horticultural and agricultural growers as well as home gardeners can benefit from. It can also be valuable to landscape planners, builders, developers and contractors because of the design and landscaping advantages of on-site greywater treatment/management.
2) Need to install a mini sewage plant to recycle waste water.
3) One should be trained to conserve and manage for better utilization of resources. Conserving energy and water is a top priority for national and local governments. In this training, participants will learn why resource conservation is so important. Participants will also gain insight how limited energy and water resources affect not only our communities but our businesses. They will be provided beforehand online calculators to understand their current energy and water use before the training. During the training, learners will learn specific steps they can take in the home and office to conserve energy and water. Participants will be asked to make their own personal commitments to reducing energy and water.

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4) Behavioural practice is must. Unless citizen of the country are accepting the behavioural change of conservation of water and its effective management, it is next to impossible for anyone to implement and can be benefited.

5) Use advanced irrigation methods such as dripping and rationalization. The country requires immediate action on two accounts to achieve its ambition to become a Water Secure nation• Increase in assured water supply by construction of new irrigation infrastructures and elimination of farmer distress (more than 12000 farmers lost their lives from 2013-17).• Focus on improving water use efficiency by improving and maintaining the existing irrigation infrastructure in the country.

6) To reduce evaporation choose the appropriate time for irrigation and select local plants. Indian agriculture perpetually remains under various threats such as groundwater depletion, salinization, droughts, unusual or sudden heavy rains, and the inability to access water reserves. Precision irrigation works as a solution to combat most of these concerns through appropriate and adequate planning and usage of water.

7) Inspection Programme for Piping and Hoses. If the average water use (base level) is measured for all operational activities separately, the identification of leaks is simple: wherever water consumption rises above the base level, the presence of some form of water loss (e.g. a leak) is likely. Conduct regular inspection of equipment or areas where leaks could occur, like pipe-work joints, connections and fittings. Indications include dampness, rust marks or swelling boards. Significant leaks can often be detected by listening in the absence of other noises.

8) Improve the efficiency of the distribution system. Safety planning, water budgeting and accounting followed by sectoral allocation for domestic, industrial and agricultural usages. Rigorous and independent surveillance and monitoring systems to produce intelligent data to optimise the water distribution network.

9) Reducing Water Use in Our Parks and gardens. We can propose less water consuming plants in our parks so that water in the soil is intact for longer time and available for the plants in the surrounding area. We can propose rotational water system fountains (same water used in rotational system for a longer time).

10) Water management helps to conserve energy.

'Water water everywhere, not a drop to drink.' It is a very old saying in a different reference to the situation. But, this is exactly what we fear will happen very soon, if we do not wisely use and conserve our water resources. Research shows that by 2025, India, along with many other countries will face a serious scarcity of water. Many regions in our country are currently undergoing the process of 'water stress. According to a research by Falken Mark, a Swedish expert on water, 'water stress' happens when the water availability falls below 1000 cubic meters per person per day.

II. USING SCIENCE FOR BETTER MANAGEMENT AND CONSERVE WATER RESOURCES

Nuclear and isotopic techniques play an important role in providing information essential to developing strategies for the improvement of agricultural water management:

A. Isotopic signatures of oxygen-18 and hydrogen-2 in the water taken from field crops allow the separation of irrigation water into soil evaporation and crop transpiration, thereby providing information essential for improving the water use efficiency of crops.

B. The soil moisture neutron probe is ideal for measuring soil water in the immediate vicinity of crop roots, providing accurate data on water availability. This helps establish optimal irrigation schedules and is the most suitable instrument for measuring soil moisture under saline conditions. It is also widely used to calibrate conventional moisture sensors.

C. The isotopic signature of nitrogen-15 is used to trace the movement of labelled nitrogen fertilizers in soil, crops and water, essential to identifying factors that potentially affect nitrogen fertilizer use efficiency and water quality in agricultural landscapes. The combined isotopic signatures of nitrogen-15 and oxygen-18 in nitrate enable the identification and segregation of sources of nitrate pollution in agricultural catchments.

D. The cosmic ray neutron probe is used to assess water fluxes at landscape level to establish sustainable land and water use management strategies

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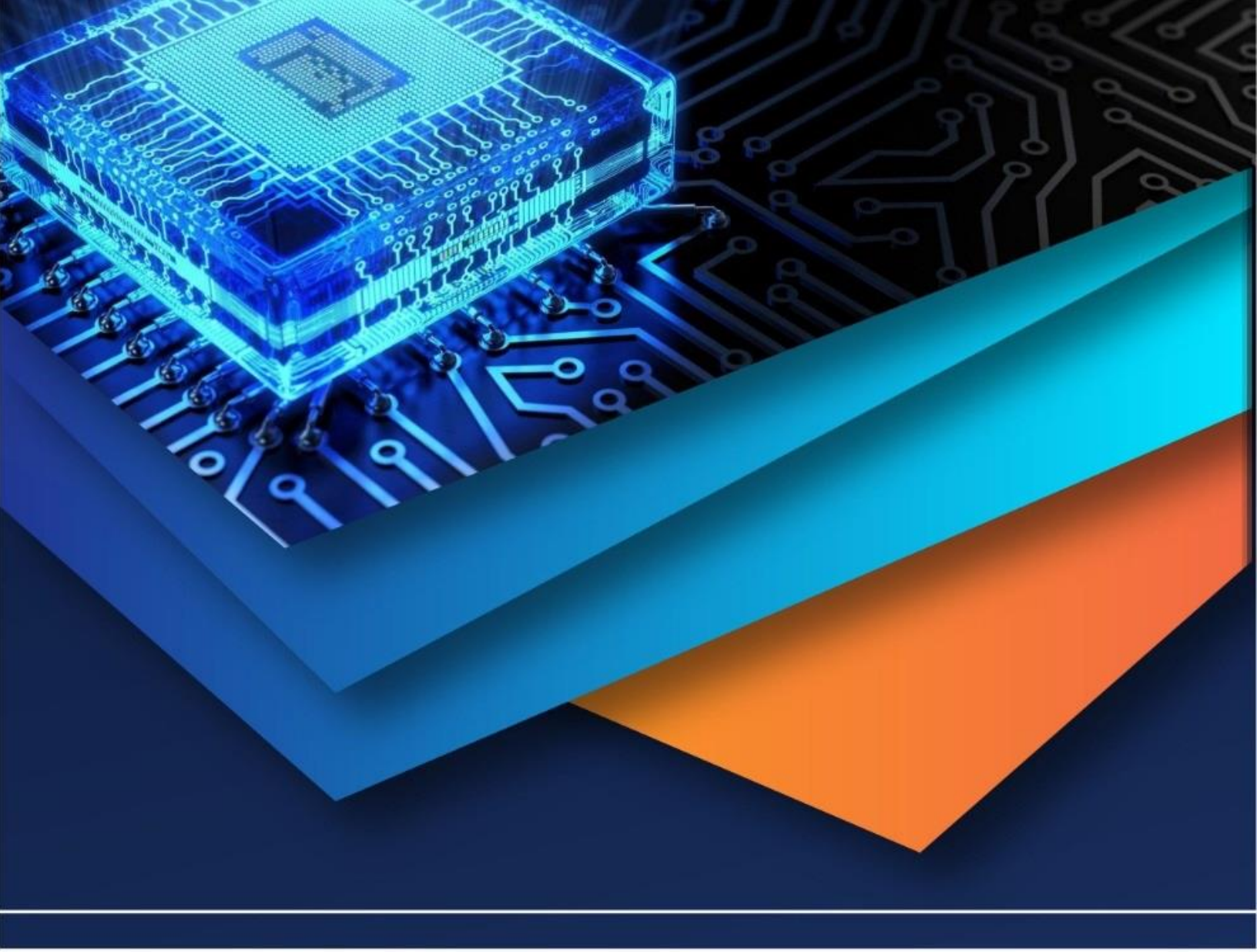

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