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EMPHASIS ON WATER HARVESTING AND IT's CONSERVATION

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ABSTRACT: Water is the most important nutrient for every animal, and it is essential to ensure that animals have ample access to clean water. Animal life requires a steady supply of water to fulfil its physiological/metabolic processes. Water keeps animal life functioning. It is well known that when waters run dry, people can't get enough to drink, wash, or feed crops, and economic decline may occur. Of all the water on Earth, less than 1 percent is fresh and available to supply human demands. Feeding an additional 2 billion people by 2050 will require a 15 percent increase in water required (WWF, 2017). Water scarcity is a rapidly growing concern around the globe. Water harvesting and conservation of rainwater helps in recharging the aquifers. Storing rainwater helps in preventing urban flooding due to excess rain. Stored water is also used for irrigation practices. Harvesting has its importance in collecting natural precipitation from prepared watersheds for beneficial use. In scientific terms, rainwater harvesting refers to collection and storage and prevention of rainwater by different engineering interventions aimed at conservation. Studies have shown that water harvesting and conservation provide flexible solutions that can effectively meet the needs for domestic and agricultural uses. This review paper focuses on water consumption, harvesting and conservation for the entire 20th century.

Key words: - Rainwater, Harvesting, Conservation, Seepage

INTRODUCTION :

The two thirds of the Earth's surface is covered by water, and it is evidently clear that water is one of the important nutrients responsible for life on the Earth. It is not only important for maintaining life or existence, but equally essential for socio-economic development. Due to the high exploitation of human beings with nature, results change in the global environment and the water resources are depleting gradually. The global population is facing problems of fresh water shortage and food security and scarcity. Indian states are facing the worst ever crisis of water shortage for the last many years, as water available for any given use has become increasingly scarce. Around 1.2 billion people, or almost one-fifth of the world's population, live in areas of physical scarcity, with another 500 million people approaching this situation (Amarsighe & Sharma, 2009). Urbanization, industrialization and increase in agricultural field pressures on the groundwater and surface water resources which result in deterioration in water quality. The conventional water sources namely, well, river and reservoirs etc. are inadequate to fulfil water demand due to unbalanced rainfall. The rainwater harvesting system investigates a new water source (Abhijeet et al., 2016). According to Kim (2005), rainwater harvesting may be one of the best methods available to recover the natural hydrologic cycle and enable urban development to become sustainable. Rainwater harvesting (RWH) for domestic urban activities can be a sustainable option of adapting with the rising demand of soft water in such an arid/semiarid area (Ehsaan et al., 2021). Water conservation is the practice of using water efficiently to reduce unnecessary water usage. Water conservation is important because fresh clean water is a limited resource on Earth. Water conservation basically aims at matching demand and supply. The strategies for

water conservation may be oriented or supply oriented and management oriented (Mamta & Jagdeep, 2016).

DISCUSSIONS:

Water is a crucial resource found on the Earth important for human survival. Clean, safe drinking water is scarce, even though the Earth is made up of 70 percent water. Only 3 percent of freshwater is available to us, only 0.06 percent is readily accessible (Ahuja, 2017). From ancient times humans have depended on natural water resources. But there is wide recognition that future humans use these natural resources and it depends on maintaining healthy aquatic ecosystems.

Fresh water resources in India:

Our country is endowed with vast and varied resources possessing river ecological heritage and rich biodiversity. In India freshwater sites are varied like 45000 km. of rivers, 1,26,334 Km. of canals, ponds, and tanks 2.36 million hectares and 2.05 million hectares of reservoirs (Ayappan & Birdar, 2004). There is a general feeling that the country with its mighty rivers and vast aquifers has abundant freshwater resources. Studies have shown that India has a large population which is increasing rapidly and a high GDP growth of more than 8 percent is putting enormous pressure on its water resources.

Water scarcity:

Almost two thirds of the world's population (4 billion people) experience severe water shortage. Half of the world's population could be living in areas facing water shortage by as early as 2025 (Seckler et al., 1998). The urbanization, industrialization and increase in agricultural field pressures on the groundwater and surface water resources which result in deterioration in water quality also increases water demand. As competition increases in many regions of the world, an increasing higher proportion of normal flow of water is likely to be consumed, and the risk of shortage in periods of low flow will increase (Andre et al., 2000). Currently, the water sector encounters great challenges imposed by the demand to ensure adequate water supplies to support a growing population and to overcome the temporal and spatial inequalities in water supply to increase climate variability (Vasileios et al., 2020). Niruban & Balakrishnan (2019) findings showed that, in India agriculture, industry and domestic are the major sectors consuming more quantity of available water storage which creates water scarcity.

Water scarcity causes:

Water scarcity is defined as 'the lack of sufficient available water resources to meet the demands of water usage. Some main factors which cause shortages may be caused by climate change, droughts or floods, increased pollution, and increased human demand and overuse of water. According to the UN Development Programme, the latter is found more often to be the cause of countries or regions experiencing water scarcity, as most countries or regions have enough water to meet household, industrial, agricultural, and environmental needs, but lack the means to provide it in an accessible manner (ScienceDaily).

Climate change:

The rising fossil fuel burning and land use changes have emitted, and are continuing to emit, increasing quantities of greenhouse gases into the Earth's atmosphere. These greenhouse gases include carbon dioxide, methane and nitrogen dioxide, and a rise in these gases has caused a rise in the amount of heat from the sun withheld in the Earth's atmosphere (UNFCCC). Studies have been shown that increase in heat has led to the greenhouse effect, and effects on the increase in average global temperature (global warming). Climate change effects the sectors include: agriculture, water resources, human health, terrestrial ecosystems

and biodiversity and coastal zones. The changes in rainfall pattern are likely to cause severe water shortage, flooding and soil erosion. Climate change is expected to affect rainfall amounts and intensity, placing significant pressure on water supplies and potentially restricting water availability for domestic, agriculture, industrial etc (John et al., 2018).

Over population:

The overexploitation of land resources including forests, increases in population, desertification and land degradation pose additional threats (UNDP 2006). Human overpopulation is the most important environmental issue, it silently forces behind global warming, environmental pollution, habit loss, pressures on natural resources, such as freshwater and fossil fuels. The demand for freshwater is rising with factors, such as population growth, water pollution and economic, as well as technological progress (Polimeni, 2006). Population growth is the major concern for many developing countries that are facing the problem of natural resources which change their efficiency.

Water pollution:

Water pollution is the contamination of water sources by substances which make the water unusable for use. The pollutants include chemicals seeping into an underground stream, then to the river, and finally to the ocean. According to Anil (2017) more than 70 percent of the fresh water in liquid form of our country is converted into being unfit for consumption. Not only India, but other countries are also suffering from the same problem. Water pollution in India has now reached a critical point. In India, the river system is now polluted to a considerable extent. Scientists of NEERI, Nagpur noted that nearly 70 percent of water in India is polluted (Martin, 1998). According to a report by the US EPA, about 1/3 of the world's water is polluted. Pollution is a factor damaging the chemical, physical and aesthetic properties of water (Kosmasi & Sharghi, 2017).

Water scarcity impacts:

The main reason behind water scarcity is climate change, altered weather patterns, including droughts or floods, pollution, and increased demand and overuse of water. Water scarcity is a situation where the available potable and unpolluted water in any region is less. Overuse of water that may results in water scarcity. Some important impacts of water scarcity are as -

Domestic impacts:

Water scarcity may result in getting enough to drink, wash, or feed crops, and economic decline. In addition, inadequate sanitation led to deadly diarrheal diseases, including cholera, typhoid fever, and other water-borne illnesses. Logically, for most countries, food scarcity can be achieved by a combination of domestic production and imports, but as was observed in the 2008 food crisis (Colin & Varma, 2010).

Agricultural impacts:

Agriculture sector causes more than others due to water scarcity. Farming accounts for almost 70 percent of all water withdrawals, and up to 95 percent in some developing countries. The extensive water use for irrigation is expected to occur in the context of increasing competition between agriculture and other sectors of the economy. Problem of water scarcity has a huge impact on food production. Agricultural production is affected by climate and weather variability. Drought early warning systems are vital for the agricultural sector to prepare for this variability, strengthening its resilience to drought (NIDIS). Water scarcity is the abiotic factor that adversely affects crop plant growth and development, especially warm and dry areas (Fathi et al., 2016). Drought impairs normal growth, disturbs water relations, and reduces water use efficiency in crop plants (Farooq et al., 2009). The water scarcity stress is seriously

affecting crop production stability which limits the crop from reaching its yield potential due to erratic and insufficient rainfall.

Industrial impacts:

The problem of water scarcity has become the single greatest threat to food security, human health and the natural ecosystem. The rapidly growing population, expanding irrigation areas, and growing urban and industrialization are putting more stresses on water resources. Studies have been shown that industries that have a high usage of water include: brewery, dairy industries, sugar mills, refineries, textile, paper mills, oil and gas industries etc. waste water from the industries is directly discharged into large water bodies which content pollutants and creates major problem in the global context (Mathuthu et al., 1997). Industrialization is growing continuously and putting pressure on the natural water resources. Today, due to industrialization the most affected part of the environment is the water resources.

Water management solutions:

The water management activity is controlled by minimizing the damage of natural water resources and also to maximize the efficient beneficial use. If the management of water is good in reservoirs and other natural water resources reduces the risk of harm caused due to flooding. Water management is a process of developing, optimizing and planning of water resources via many practices which are defined by many policies and regulations. Everyone can play an important role in minimizing the wastage of the water. A little water conservation method that can be practised by individuals to reduce the wastage of water. Some important majors that play key role as –

- Installing flow-restricting shower heads to save water during showers
- Turning off the tap while shaving or brushing
- Taking bucket-baths instead of showers
- practicing rainwater harvesting to reduce the wastage of rainwater
- Immediately fixing any leaking taps and pipes in our houses

Importance of water harvesting and its conservation:

Harvesting and conservation of rainwater is a sustainable process that helps in preserving water for future needs. The process of rainwater harvesting is a good way to conserve water. Around the globe, the last few decades have seen a dramatic rise in the demand for water, triggered by the rise in population, causing increased demand for food production and domestic water supplies; and industrial growth resulting in increased demand (Dinesh & Vishwa, 2000). As a result, groundwater resources are over-exploited of surface and groundwater. Due to the water scarcity problem now, there is an urge to think about harvesting and conservation management. Rainwater harvesting and artificial recharging are becoming very important issues. This process stops the decline in groundwater levels. There are numerous methods for the losses and conservation of water such as mulching, cropping, planting of trees, utilization of fog or dew net-surfacing traps or polythene sheets, contour farming, transfer of water from surplus areas to deficit areas by inter-linking water systems through canals, desalination technologies etc. reduce the water consumption (Mamta & Jaydeep, 2016). Advantages of rainwater harvesting are –

- it provides self-sufficiency to supply water
- it reduces the cost for pumping of groundwater
- it improves the quality of groundwater through dilution when recharged
- it reduces soil erosion and flooding in urban areas

CONCLUSION:

As water is a key resource for the development of any human activity. In many countries, the

available water supply, distribution and water scarcity is the pressing issue across the world. Studies have projected that a large share of the 2/3 of world's population will be affected by water scarcity problems over the next several decades. In future availability of water for domestic, agriculture, industrial purposes are major subjects. Due to pollution problems and certain anthropogenic activities by man, the monsoon schedule is get disturbed, which creates water scarcity issues. Harvesting and conservation of rainwater is a sustainable process that helps in preserving water for future needs. The process of rainwater harvesting is a good way to conserve water. Recharging of the groundwater along with limited use of freshwater are the basic requirements in the coming days. Water management strategies at the national level play an important role in the conservation of water. Now, it is efficient to manage the natural water resources, sufficient measures are not taken up immediately, we will face a crisis which will be detrimental to the survival of mankind. Scientists, environmentalists, communities, as well as policy makers need to find more solutions against this situation.

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