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WATER CONSERVATION: STRATEGIES AND SOLUTIONS

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ABSTRACT

India has 16% of the world's population and only 4% of the world's water resources, which are depleting rapidly. The demand for water is expected to grow from 40 billion cubic metres (bcm) currently to around 220 bcm in 2025. Water is one of the most important inputs essential for crops. Both its shortage and excess affects the growth and development of the plants, yields and quality of produce. There are numerous methods to reduce such losses and to improve soil moisture. These are mulching, cropping, planting of trees, utilization of fog or dew by 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 such as distillation, electro-dialysis and reverse osmosis, use of efficient watering systems such as drip irrigation and sprinklers will reduce the water consumption by plants. 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.

Keywords: Water, conservation, technology, Rainwater-harvest, drip-irrigation.

INTRODUCTION

Water, *Paani, Jal, Tanni, L'eau, Wasser, Acqua* perhaps the most familiar and widely used word in the world. Water needs no introduction, the importance of this is known to one and all. However, despite water being the basic human need, this precious resource is being wasted, polluted and getting depleted. Every drop of water is precious but we continue to waste it like it is a free natural commodity. 98% of water on this planet is salty and is not fit for human consumption. Out of the 2% of fresh water reserves, 1% is locked up in form of ice in various regions around the world. Hence, only 1% of total water reserves are available for our domestic & industrial use. Many cities in India and around the world are already facing severe water shortages due to reduced rainfall, man-made climatic changes, reduction in ground water levels, population explosion, industrialization and staggering amount of water wastages because of negligence by users & dilapidated water supply systems. The importance of water in a country's economic growth should not be undermined.

Water pollution, unavailability of drinking water, inadequate sanitation, open dumping of wastes, loss of forest cover are some of the problems faced by many parts of India. Heavy toll of infant mortality due to water borne diseases, the daily struggle for procuring water, mismanagement of waste water, improper sanitation are common features and are leading to

serious consequences on human health and the economy of the country. The situation demands immediate intervention in the management of these rapidly growing problems, especially through an integrated approach for water, sanitation and related issues.

WATER CONSERVATION

Water conservation can be defined as:

1. Any beneficial deduction in water loss, use, or waste.
2. A reduction in water use accomplished by implementation of water conservation or water efficiency measures; or,
3. Improved water management practices that reduce or enhance the beneficial use of water a water conservation measure is an action, behavioral change, device, technology, or improved design or process implemented to reduce water loss, waste, or use. *Water efficiency* is a tool of water conservation. That results in more efficient water use and thus reduces water demand. The value and cost-effectiveness of a water efficiency measure must be evaluated in relation to its effects on the use and cost of other natural resources.(e.g. energy or chemicals)¹

GOALS

The goals of water conservation efforts include:

- Sustainability- To ensure availability for future generations, the withdrawal of fresh water from an ecosystem should not exceed its natural replacement rate.
- Energy conservation- Water pumping, delivery, and wastewater treatment facilities consume a significant amount of energy. In some regions (e.g. California²) of the world over 15% of total electricity consumption is devoted to water management
- Habitat conservation- Minimizing human water use helps to preserve fresh water habitats for local wildlife and migrating waterfowl, as well as reducing the need to build new dams and other water diversion infrastructure.

CONSERVATION TECHNOLOGIES

Process of conservation may be synonymous of preservation against loss or waste. Briefly stated it means putting the water resources of the country for the best beneficial use with all the technologies at our command. Water conservation basically aims at matching demand and supply. The strategies for water conservation may be demand oriented or supply oriented and/or management oriented. The strategies may vary depending upon the field of water use, domestic, irrigation or industrial use.

1) Rainwater harvesting- 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 seawater ingress, i.e. prevent seawater from moving landward, and conserve surface water run-off during the rainy season³.

Advantages

1. Provides self-sufficiency to water supply
2. Reduces the cost for pumping of ground water
3. Provides high quality water, soft and low in minerals
4. Improves the quality of ground water through dilution when recharged
5. Reduces soil erosion & flooding in urban areas

6. The rooftop rainwater harvesting is less expensive & easy to construct, operate and maintain. In desert, RWH only relief.
7. In saline or coastal areas & Islands, rainwater provides good quality water

2) Better Irrigation Practices- Conservation of water in the agricultural sector is essential since water is necessary for the growth of plants and crops. A depleting water table and a rise in salinity due to overuse of chemical fertilizers and pesticides has made matters serious. Various methods of water harvesting and recharging have been and are being applied all over the world to tackle the problem. In areas where rainfall is low and water is scarce, the local people have used simple techniques that are suited to their region and reduce the demand for water.

For crop irrigation, optimal water efficiency means minimizing losses due to evaporation, runoff or subsurface drainage. An evaporation pan can be used to determine how much water is required to irrigate the land. Flood irrigation, the oldest and most common type, is often very uneven in distribution, as parts of a field may receive excess water in order to deliver sufficient quantities to other parts. Overhead irrigation, using center-pivot or lateral-moving sprinklers, gives a much more equal and controlled distribution pattern. Drip irrigation is the most expensive and least-used type, but offers the best results in delivering water to plant roots with minimal losses⁴.

3) Use of Saline Water for Irrigation- Saline water is widely available but rarely used for agriculture because it restricts plant growth and yield. Salt resistant varieties of crops have also been developed in recent times.

4) Mulching, i.e., the application of organic or inorganic material such as plant debris, compost, etc., slows down the surface run-off, improves the soil moisture, reduces evaporation losses and improves soil fertility.

5) Fog and dew contain substantial amounts of water that can be used directly by adapted plant species. Artificial surfaces such as netting-surfaced traps or polyethylene sheets can be exposed to fog and dew. The resulting water can be used for crops.

6) Contour farming is adopted in hilly areas and in lowland areas for paddy fields. Farmers recognize the efficiency of contour-based systems for conserving soil and water.

7) Tippy Tap for water conservation: - *Tippy Tap* is a simple device which dispenses a limited amount of water slowly and facilitates a thorough hand wash. In case of piped water supply, every time the tap is opened for a hand wash, an average of 300 - 500 ml of water is utilized. Using *Tippy Tap* it is possible to have a good hand wash with only 60 to 80 ml of water

8) Propagation of Dry Garden / Eco Lawns- As a step towards water conservation and propagation of native plant species, drought resistant plantation (plants requiring less water) should be carried out.

9) Soak pit construction- Water run offs and water logging are combated by constructing soak pits near water points like hand pumps. This is a sanitation measure and also helps in recharge of ground water.

10) Tree plantation in water catchments area/riverbanks and clean-up drives near water bodies are some of the other initiatives taken up to preserve our water resources.

11) Desalination- To augment the depletion of fresh water resources in coastal areas due to excessive abstraction, desalination like distillation, electro-dialysis and reverse osmosis are available. Selection and use of these processes is site specific.

12) Long Distance Transfer of Water- Transfer of water from surplus basins by creating storage at appropriate locations and inter-linking various systems is yet another strategy for increasing the benefits considerably⁵.

MEASURES OF WATER CONSERVATION

Water conservation measures in industries should include: (i) review of alternate production processes and technologies from water consumption point of view; (ii) ensuring sound plant maintenance practices and good house keeping, minimizing spills and leaks; and (iii) optimization of treatment to achieve maximum recycling. Another established technique for maximum water recovery is the water pinch analysis technique. However, this technique only focuses on maximizing freshwater and wastewater reduction via reuse and regeneration⁶.

WHAT WE CAN DO TO CONSERVE WATER?

- Use only as much water as you require. Close the taps well after use. While brushing or other use, do not leave the tap running, and open it only when you require it. See that there are no leaking taps.
- Use a washing machine that does not consume too much water. Do not leave the taps running while washing dishes and clothes.
- Install small showerheads to reduce the flow of the water. Water in which the vegetables & fruits have been washed - use to water the flowers & plants.
- At the end of the day if you have water left in your water bottle do not throw it away, pour it over some plants.
- Re-use water as much as possible
- Change in attitude & habits for water conservation
- Every drop counts!

IMPROVE WATER MANAGEMENT

- The close link between forests and water, and the traditional relationship between agriculture and water, need to be recognized and protected to ensure sustained productivity.
- National water management policies should take account of the impact of trade in water-intensive goods on water availability and ecosystems integrity. For example, in water scarce regions, people should grow crops with low water requirements, or of high value compared to the water used. Options for improving the water balance by importing water intensive goods from water-rich regions should be explored, where appropriate and cost-effective.
- The potential of rainwater harvesting for augmenting rural and urban water supply is increasingly becoming recognized. This alternative should be further explored and utilized.
- Proper water pricing must be an integral part of water policies. However, care must be taken to ensure that the poor and socially disadvantaged are not denied access. Moreover, there must be adequate monitoring and control of market mechanisms.

- It is necessary to study and analyze the impacts of subsidies (on water, energy, and other relevant inputs) on water use. Subsidies that inhibit water use efficiency or cause negative effects on the environment should be reduced.
- Our traditional water management approaches and systems were both sustainable and accountable. These need to be revived and invigorated. Policies must recognize and build on these.
- Principles of reuse and recycling of water resources must be incorporated into water management plans and strategies. There must be incentives for water conservation⁷.

PUBLIC EDUCATION AND AWARENESS

- Public awareness and education on the importance of protection of the coastal and ocean environment helps to meet social and economic needs and aspirations of the country in the long run.
- Awareness campaigns on existing regulations for management of coastal areas need to be conducted. Education and communication material on the need for conservation and protection of rare and endangered species need to be developed.
- Research findings on marine resources, their development and management have to be demystified. The educational and communication material targeted at the public has to be developed in local languages.
- Opportunities for interactions between communities, policy makers, regulating agencies, NGOs, scientists, etc. need to be increased.
- Appropriate strategies and decision making tools that would enhance the capabilities of professionals, Government, and non government organizations to take up local and community level action programmes need to be developed⁸.

CONCLUSION

Water problems will not go away by themselves. On the contrary, they will worsen unless we, as a global community, respond and use water responsibly. So, before it is too late, let us all, as individuals, families, communities, companies & institutions, pledge towards using water wisely. Intelligence is not in lavishness but in conservation, so that our future generations can continue to enjoy the blissful feeling and touch of water.

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