Water conservation

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Water conservation encompasses the policies, strategies and activities to manage fresh water as a sustainable resource to protect the water environment and to meet current and future human demand. Population, household size and growth and affluence all affect how much water is used. Factors such as climate change will increase pressures on natural water resources especially in manufacturing and agricultural irrigation.

# Contents

1. Goals
2. Strategies
3. Social solutions
4. Household applications
5. Commercial applications
6. Overhead irrigation, centre pivot design
7. Minimum water network target and design

# Goals

* The goals of water conservation efforts include as follows:
* 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 waste water treatment facilities consume a significant amount of energy. In some regions 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 infrastructures.

# Strategies

In implementing water conservation principles there are a number of key activities that may be beneficial.

1. Any beneficial reduction in water loss, use and waste.
2. Avoiding any damage to water quality.
3. Improving water management practices that reduce or enhance the beneficial use of water.

# Social solutions

Water conservation programs are typically initiated at the local level, by either municipal water utilities or regional governments. Common strategies include public outreach campaigns, tiered water rates (charging progressively higher prices as water use increases), or restrictions on outdoor water use such as lawn watering and car washing. Cities in dry climates often require or encourage the installation of xeriscaping or natural landscaping in new homes to reduce outdoor water usage.

One fundamental conservation goal is universal metering. The prevalence of residential water metering varies significantly worldwide. Recent studies have estimated that water supplies are metered in less than 30% of UK households, and about 61% of urban Canadian homes (as of 2001). Although individual water meters have often been considered impractical in homes with private wells or in multifamily buildings, the U.S. Environmental Protection Agency estimates that metering alone can reduce consumption by 20 to 40 percent. In addition to raising consumer awareness of their water use, metering is also an important way to identify and localize water leakage. Water metering would benefit society in the long run it is proven that water metering increases the efficiency of the entire water system, as well as help unnecessary expenses for individuals for years to come. One would be unable to waste water unless they are willing to pay the extra charges, this way the water department would be able to monitor water usage by public, domestic and manufacturing services.

Some researchers have suggested that water conservation efforts should be primarily directed at farmers, in light of the fact that crop irrigation accounts for 70% of the world's fresh water use. The agricultural sector of most countries is important both economically and politically, and water subsidies are common. Conservation advocates have urged removal of all subsidies to force farmers to grow more water-efficient crops and adopt less wasteful irrigation techniques.

New technology poses a few new options for consumers, features such and full flush and half flush when using a toilet are trying to make a difference in water consumption and waste. Also available in our modern world is shower heads that help reduce wasting water, old shower heads are said to use 5-10 gallons per minute. All new fixtures available are said to use 2.5 gallons per minute and offer equal water coverage.

# Household applications

Water-saving technology for the home includes:

1. Low-flow shower heads sometimes called energy-efficient shower heads as they also use less energy,
2. Low-flush toilets and composting toilets. These have a dramatic impact in the developed world, as conventional Western toilets use large volumes of water.
3. Dual flush toilets created include two buttons or handles to flush different levels of water. Dual flush toilets use up to 67% less water than conventional toilets.
4. Saline water (sea water) or rain water can be used for flushing toilets.
5. Faucet aerators, which break water flow into fine droplets to maintain "wetting effectiveness" while using less water. An additional benefit is that they reduce splashing while washing hands and dishes.
6. Raw water flushing where toilets use sea water or non-purified water
7. Wastewater reuse or recycling systems, allowing:

* Reuse of rainwater for flushing toilets or watering gardens
* Recycling of wastewater through purification at a water treatment plant.

1. Rainwater harvesting
2. High-efficiency clothes washers
3. Weather-based irrigation controllers
4. Garden hose nozzles that shut off water when it is not being used, instead of letting a hose run.
5. Using low flow taps in wash basins
6. Swimming pool covers that reduce evaporation and can warm pool water to reduce water, energy and chemical costs.
7. Automatic faucet is a water conservation faucet that eliminates water waste at the faucet. It automates the use of faucets without the use of hands.

# Commercial applications

Many water-saving devices (such as low-flush toilets) that are useful in homes can also be useful for business water saving. Other water-saving technology for businesses includes:

* Waterless urinals
* Waterless car washes
* Infrared or foot-operated taps, which can save water by using short bursts of water for rinsing in a kitchen or bathroom
* Pressurized water brooms, which can be used instead of a hose to clean sidewalks
* X-ray film processor re-circulation systems
* Cooling tower conductivity controllers
* Water-saving steam sterilizers, for use in hospitals and health care facilities.
* Rain water harvesting.
* Water to Water heat exchangers.

# Overhead irrigation, centre pivot design

For crop irrigation, optimal water efficiency means minimizing losses due to evaporation, runoff or subsurface drainage while maximizing production. An evaporation pan in combination with specific crop correction factors can be used to determine how much water is needed to satisfy plant requirements. 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 centre-pivot or lateral-moving sprinklers, has the potential for a much more equal and controlled distribution pattern. Drip irrigation is the most expensive and least-used type, but offers the ability to deliver water to plant roots with minimal losses. However, drip irrigation is increasingly affordable, especially for the home gardener and in light of rising water rates. There are also cheap effective methods similar to drip irrigation such as the use of soaking hoses that can even be submerged in the growing medium to eliminate evaporation.

As changing irrigation systems can be a costly undertaking, conservation efforts often concentrate on maximizing the efficiency of the existing system. This may include chiselling compacted soils, creating furrow dikes to prevent runoff, and using soil moisture and rainfall sensors to optimize irrigation schedules. Usually large gains in efficiency are possible through measurement and more effective management of the existing irrigation system.

# Minimum water network target and design

The cost effective minimum water network is a holistic framework/guide for water conservation that helps in determining the minimum amount of freshwater and wastewater target for an industrial or urban system based on the water management hierarchy i.e. it considers all conceivable methods to save water. The technique ensures that the designer desired payback period is satisfied using Systematic Hierarchical Approach for Resilient Process Screening (SHARPS) technique.

See also

* Water portal (2016)
* Environment portal
* Ecology portal
* Earth sciences portal
* Energy portal
* Sustainable development portal
* Berlin Rules on Water Resources
* Conservation biology
* Conservation ethic
* Conservation movement
* Deficit irrigation
* Ecology movement
* Environmental protection
* Green Plumbers
* Micro-sustainability
* Pan evaporation
* Peak water
* Sustainable agriculture
* Utility sub meter
* Water cascade analysis
* Water metering
* Water pinch