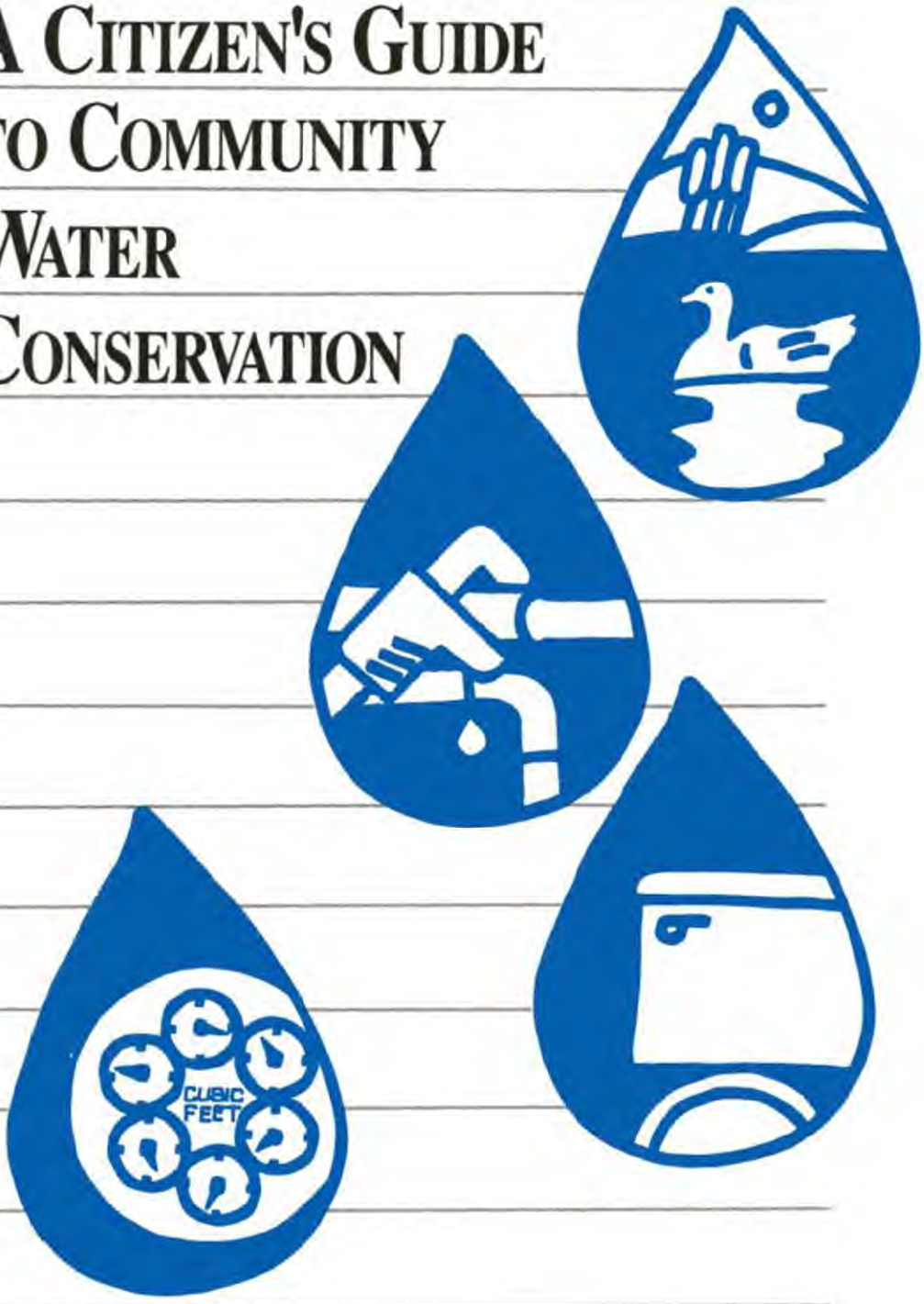
A Citizen's Guide to Community Water Conservation



NATIONAL WILDLIFE FEDERATION WATER RESOURCES PROGRAM

AN INVITATION

Water conservation is more than making do with less water. This guide will familiarize you with the opportunities available to meet community water demands. This booklet also invites you to find water conservation solutions for your home and your community, and presents you with some of the key ideas that have proven effective for other communities.

Water conservation provides an alternative approach to the twin problems of increasing demand for water in a community and finding new water sources for that demand. Conservation is not just a short-term fix, but can help close the gap between the water available to a community and its water demand, both over the long term and during times of peak use. Conservation manages water demand so that the customer gets the same service from less water.

Water conservation includes both short and long term actions. It can involve everyone, from individuals at home and at work, to water suppliers, to local, state and federal government.

Water Conservation Could Pay in Colorado

Environmental groups in Colorado have advanced a set of alternatives to the construction of the Two Forks dam project for metropolitan Denver's water supply. The dam is expected to cost from $550 million to $1 billion. The alternatives, which rely heavily on water conservation, can provide water at less cost with significantly less environmental damage, while preserving economically important stream-based habitat and recreation. Community conservation measures — installing water-efficient fixtures in existing residences, leak detection, metering of all uses, and water-efficient landscaping — can supply over 57,000 acre-feet a year, more than half of the Two Forks project supply, at one eighth the cost of Two Forks water.

WHY CONSERVE?

To protect our water resources

Conserving water can help protect fish and wildlife habitat and wetlands. Important habitat may be irreparably damaged if there is not enough water to sustain it, with serious ecological consequences and, in many communities, economic impacts as well.

By diverting less water, we leave more water to maintain stream flow for other uses, from recreation to power production. Maintaining stream flow improves water quality — aquatic life is more vulnerable to contamination during periods of low flow. Reduced water use leads to reduced wastewater discharge, which also may improve water quality.

Using less water protects the environment in another way, by minimizing the pressure to build new dams and reservoirs — projects that can destroy wildlife habitat. And by conserving water, we can prevent our groundwater resources from being withdrawn faster than they can be replenished naturally.

To save money for you and your community

Using less water reduces your personal expenses, not just for the water that registers on your meter, but for sewer charges (that probably register on the same meter) and for the energy to heat your hot water. And in many communities across the United States, the price of water and sewer service is skyrocketing. For example, if you live in the Boston, Los Angeles, or New York City area, your bill has probably risen 25% or more in recent years, and is expected to continue to climb.

Your community also saves, in reduced expenses for treating and delivering water, and removing and treating your wastewater. These savings include the treatment chemicals to provide safe drinking water, operation and maintenance costs, and energy for pumping the water to you.

If you are not connected to public water and sewer service, conservation still saves: on reduced pumping costs for your well, on the extended life of the well, and on the extended life and better performance of your septic system.

Reducing water demand can also delay or eliminate construction of a costly new water supply for your community. And since as much as 90% of the water used in homes may be returned to the sewer, conservation may also postpone costly new wastewater treatment facilities. Communities from California to Washington, DC have already invested in conservation to reduce sewerage flows.

To increase the reliability of your water supply

Long term conservation efforts, coupled with a drought emergency plan, can build in a hedge against dry weather, and reduce the impact of inevitable short-term droughts. The California drought of 1976-77 may be rivaled in the late 1980's. Large portions of the rural Midwest did not have enough rainfall in 1988. And reservoirs in apparently water-rich areas of the northeast, including New York City and Boston, were water-short in the spring of 1989.

Contamination threatens both existing and future water supplies, especially groundwater. Contaminated groundwater is expensive and difficult to clean up. In Massachusetts, interest in community water conservation was sparked by the shutdown of over 100 public wells because of contamination in the early 1980's.

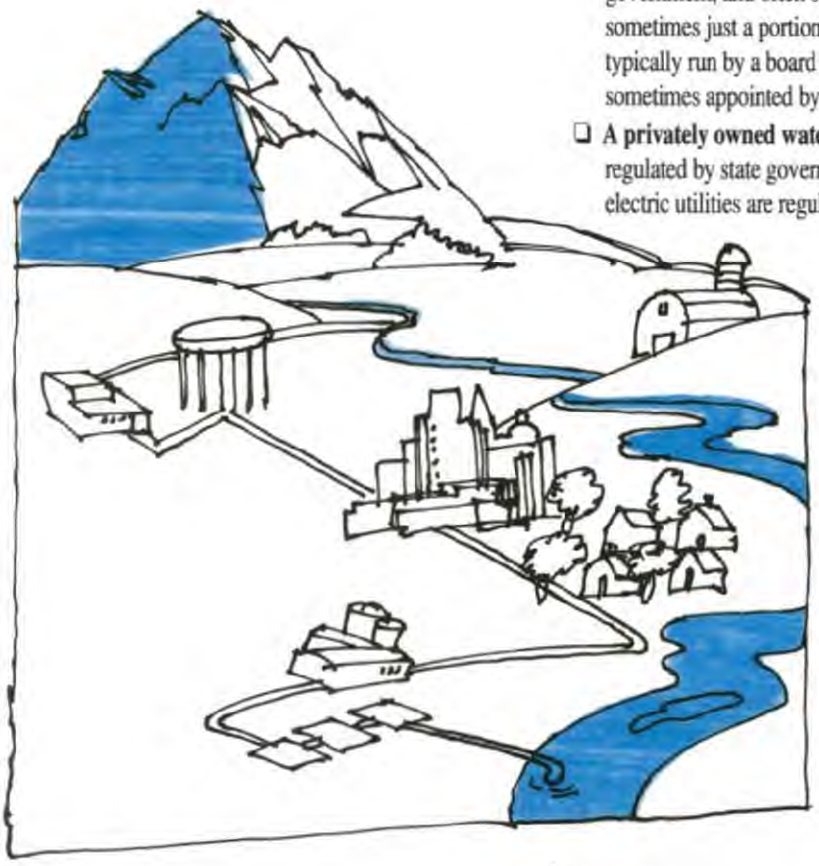
Throughout much of the United States, high quality new surface and groundwater sources are scarce, and thus expensive to acquire and develop. Conservation efforts can deliver water more quickly than building a new water supply system can.

WHERE WATER COMES FROM

The water we drink comes from the natural environment. We divert water from a river or stream, withdraw from a natural lake, or build a reservoir to store up water for use during summer's peak demand. Or we sink wells into the ground to tap aquifers, large underground storage areas where water has been accumulating for many years.

In 1985, 60% of our publicly supplied water came from surface water sources and 40% from groundwater. This varies across the country: surface water supplies about 3/4 of water for the northeast and Great Lakes. In California, 3/4 is groundwater. In the Sunbelt, it's half and half.

Whatever the source, only a finite amount of water is available for human use. The amount varies depending on rainfall and climate. This variation, which occurs over days, months, or years, can contribute to short term water supply shortages. But it's important to remember that a long-term limit exists, as well.



HOW WATER GETS TO YOUR COMMUNITY

If you have your own well, like some 40 million U.S. residents, water arrives in your home after you pump it up through pipes to your faucets. Water suppliers serving nearly 200 million other Americans work essentially the same way. They pump water from the natural environment to plants that treat the water to maintain or improve its quality. New water quality rules under the federal Safe Drinking Water Act are expected to increase the quality — and in some cases the cost — of treated water.

Treated water then flows through the distribution system pipes to customers, often traveling tens or even hundreds of miles to arrive in your home or workplace. Pumping may be required to move some or all of this water to where it is used.

Public water is supplied by one of three types of organization, each of which has different people making the decisions about water supply and rates:

- **A water department**, which is a branch of city or town government, and is directly responsible to the elected officials of your local government.
- **A water supply district**, which is separate from local government, and often serves more than one community, sometimes just a portion of one town. A district is typically run by a board that's often elected, but is sometimes appointed by local officials.
- **A privately owned water utility**, where rates may be regulated by state government in the way that most electric utilities are regulated.

WHERE WATER GOES

Water suppliers delivered an average of 105 gallons per person per day for home indoor and outdoor use in 1985, and 183 gallons per person per day for all uses supplied in the community (from residential to industrial). That's 36.5 billion gallons per day for all the uses of water from supply systems, a 7% increase from 1980. Part of this growth is due to increased population; but per person use is rising as well.

Water use in the home

The bathroom uses three quarters of home indoor water. One flush of a conventional toilet consumes about 3.5 gallons, 5-7 gallons for the older toilets found in about 4/5 of all homes. One 5 minute shower with a typical showerhead uses as much as 25-35 gallons.

HOME INDOOR WATER USE

Source: EPA Instructional Resources Center, 1981

Outdoor water use varies with the climate. In Arizona cities it accounts for up to half of total domestic annual water use. Even in New England's cooler, wetter climate, perhaps 30% of summer household water use is outdoors. In general, water use per person tends to be higher in western states, and lower in rural areas nationwide.

Water use in the community

Nationwide, homes use 57% of publicly supplied water. Public use and unaccounted for losses average 11%; the rest goes to businesses and industries. But many farms, businesses and industries are self-supplied: irrigation withdrawals alone total more than three times those for public water supply systems, though a quarter of these withdrawals are returned to the environment after use.

COMMUNITY WATER DELIVERIES, 1985

Source: U.S. Geological Survey, 1985

National averages can blur local differences. In Seattle, commercial and industrial use is 40% of total customer use; in suburban Norfolk, MA (pop. 4,000), residences use 91%. Each community has its own mix of customers and uses.

Unaccounted for water

Not all water that's withdrawn is accounted for. Water suppliers lose water through leaks in the pipes, faulty meters, and water that's used but not measured: for fire protection, system maintenance, and unmetered municipal buildings. Much of this water loss can be identified and recovered.

Wastewater

After water is used, it must be disposed of. Since it's usually dirty, it must be treated, typically in a sewage treatment plant. Then it is returned to the environment, often cleaner but not as clean as before.

WHAT YOUR WATER SUPPLIER CAN DO

Identify who uses water

For effective conservation action, you must first identify the major water users in your community by type (residences, business, industry), and also determine the amount of water withdrawn from the environment that is not delivered to customers. Unaccounted for water in many systems tops 20%: that's one fifth lost in the pipes, the system, or unmetered uses. Each community will find different opportunities for action, once water uses are identified.

Meter all water users

If each individual water user, including those who don't pay a bill, is metered, it's easy to identify total water use and track individual consumption. But not all users are metered, especially in smaller systems and in older cities. And old meters need adjustment, repair, and eventually replacement to give accurate readings.

Meters allow the water supplier to charge based on use. Meters that undermeasure water use are lost revenue to the supplier. When people learn how much water they're using, use often drops. The Denver Water Department showed that installing meters alone dropped water use by 20% in two single-family neighborhoods. Universal metering reduced water use in the 1970's in Troy, NY by 25%; in Kingston, NY by 20%.

Adopt a pricing scheme that encourages conservation

Most water is priced below the cost of delivering it. Raising rates provides customers with an incentive to use less. Consider these approaches.

Public water suppliers that are also branches of local government may not be charging the full cost of finding, treating, pumping, and delivering water to customers. Changing to a system that charges the full cost of delivering water can raise rates enough to encourage conservation. Without the revenues from full cost pricing, a water supplier is less likely to have funds for investments in the system, including metering and leak repair.

Some water users, most likely public agencies or institutions, may be receiving water free of charge. In Philadelphia, the city provided water to its zoo without cost for 118 years. Upon receiving the first bill, the zoo director announced plans for a technical review of the zoo's water use, to identify conservation opportunities.

What rate does your supplier charge? Flat, or even declining rates, where water costs less as consumption increases, are still common. Increasing block rates, which charge more per gallon the more water you use, are now in effect in about 15% of the major cities across the country. Increasing block rates for homes in Tucson, AZ reduced water use by 7% over 5 years, for the residential customers that use the most water in their homes.

Since water is in most demand at peak seasons (usually summer), water supplied at that time should be priced higher. In Tucson, summer pricing which was 16%-29% higher, depending on the customer's use, reduced residential demand by 11%, primarily by discouraging excess or careless outdoor water use.

Increase billing frequency

Water suppliers, in contrast to electric, gas, and telephone companies, most often bill quarterly or semi-annually. Coachella Valley Water District in CA bills customers monthly, and adds a bar chart comparing current monthly use with the last 24 months. With this kind of information, it's easier for customers to track their water use and the effectiveness of their conservation efforts. Customers who are billed more frequently have added incentive to act promptly to curb excessive use.

Find and repair leaks in water pipes

Leaks in water distribution pipes can add up to major water losses. Leak detection and repair costs money, but it also saves. And fixing leaks is often cheaper than building a new water supply.

A survey of 58 small rural water suppliers in Alabama found 44 suppliers with fixable leaks. In Arlington, MA (population 50,000) a leak detection and repair program reduced per person use from 131 to 100 gallons per person per day. The East Bay Municipal Utility District of Oakland, CA recovered 4 million gallons per day in the first two years of its leak detection program, water that had simply been wasted.

Leak Detection Gets Results

In 1987, California completed a statewide leak detection program. After surveying 5100 miles of pipe in 57 communities with less than 100,000 service connections, leaks totaling 4900 gallons per minute were fixed. For every $1 spent, the communities saved $2.80. The statewide program was undertaken after three pilot communities of different sizes showed that finding and fixing their leaks cost less than half the value of the water saved over two years.

Link hookup fees for new users to conservation measures

New users of public services are often charged a fee to hook up to the service. Hookup fees that are adjustable to credit conservation measures can encourage developers to think about the efficiency of their projects. A Monterey, CA sliding scale hookup fee gives discounts for each toilet installed that is more efficient than the local plumbing code; now most new toilets in Monterey work on 1 gallon per flush. In North Marin Water District, CA, hookup fee discounts for water-efficient landscaping in multifamily developments have reduced outdoor water use by 40% in these homes.

Reduce excess pressure in water pipes

Water suppliers often keep the pressure in their pipes high, to cover emergencies and to ensure adequate pressure throughout the system. But some portions of the system may receive unnecessarily high water pressure. Pressure reduction can reduce water lost through leaks, and also reduces water use in situations where an exact volume is not required, such as washing your hands. A 1984 federal report of a three city test showed that average water pressure in the system could be lowered as much as 30-40 pounds per square inch (psi), saving 3-6%.

Installing pressure reduction valves for specific neighborhoods or large customers can achieve the same effect. An apartment complex in Amherst, MA reduced pressure from 115 psi to 45-55 psi. This reduction, together with more efficient showerheads, reduced water use by 33% and cut plumbing repairs in half when compared with neighboring high pressure apartments.

Encourage installation of water-efficient plumbing fixtures

A water supplier may find it more cost-effective to do this than to pay the substantial costs of finding a new water supply, developing it, and treating it. These programs are further described in the section "WHAT YOUR TOWN OR CITY CAN DO".

Reuse treated wastewater where appropriate

A water supplier can encourage reuse of water by specific customers who don't need drinking water quality, such as golf courses and some industries. The water supplier serving Palm Springs, CA, rather than build a new water supply, invested in a high quality wastewater treatment plant. That water is now sold to several golf courses and the city for irrigation. The city of Pompano Beach, FL has a similar project underway, intended to reduce the city's groundwater pumping.

Include conservation in forecasting future water demand

Building a new water supply takes time and money, and is often justified by a long-range forecast of water demand. Both population and per capita water demand are frequently portrayed as rising. A community water demand forecast should include the effects of conservation programs on demand, and should consider intensive conservation efforts as a way to delay or eliminate developing the new source.

WHAT YOUR TOWN OR CITY CAN DO

Whether your local government is the water supplier or just a customer, effective use of governmental authority can achieve significant water savings. Here are some ideas.

Adopt water-efficient plumbing and building codes

Ensuring that new building construction and renovations include water-efficient plumbing fixtures can make a large difference in future water needs. Reductions in toilet, shower, and lavatory and kitchen faucet use are most effective.

Readily available water-efficient toilets use about 1.6 gallons per flush or less, instead of the conventional 3.5 gallons or the older models using 5 gallons or more. That will mean savings of up to 17,500 gallons per year per household in Santa Monica, CA, which adopted a 1.6 gallon standard in 1987.

Applying these standards to commercial buildings, such as hotels, can save even more. For the city of Los Angeles, plumbing standards adopted in 1988 for new construction and retrofits of all types of buildings will mean water savings of up to 10% or more over 5 years, with reduced wastewater flows, a cleaner bay, and a longer life for the current wastewater treatment facility.

Hot water pipe insulation saves water as well as energy by reducing the time a faucet or shower runs to get the water hot. Building codes should require such insulation in all new or renovated buildings.

Organize a program to retrofit plumbing fixtures in older buildings

The next step is to actively organize the installation of water-efficient plumbing fixtures, instead of waiting until they wear out. Cities as diverse as Los Angeles, Boston, Austin and Seattle have organized residential retrofit programs, with good results for both residents and the community.

Early programs simply handed out the fixtures to interested residents; newer programs will install the devices for the resident. A typical package may include an efficient showerhead, a toilet dam or bag to reduce the volume of water in the tank, faucet aerators, and a hose nozzle with automatic shutoff.

A 1985 Austin, TX program asked residents to pick up their three-part kit at a neighborhood location. The result: a 30.6 million gallon yearly reduction in wastewater flow, at a cost to the city of only $105,000. Glendale, AZ's program rebates $100 of the cost of installing a new water-efficient toilet.

Reduce municipal water use

Municipal water use is typically a small but highly visible portion of total water use. Residents are less likely to respond to appeals for water conservation if they see automatic sprinklers watering sidewalks, unrepaired open hydrants, or lavish public fountains. Some publicly owned properties may offer major conservation opportunities, such as transportation terminals, convention centers, schools, and public housing. Installing water-efficient toilets in public buildings shows people they work, and saves on municipal costs as well. Careful operation and maintenance measures reduce municipal costs and water use.

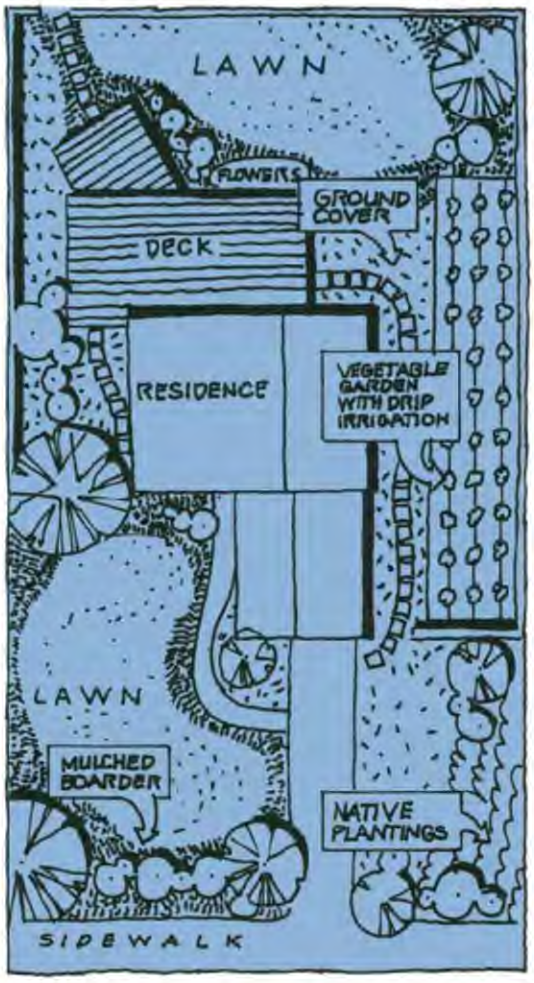
San Jose's Community Retrofit Program Delivers

The city of San Jose, CA adopted an ambitious conservation program to reduce wastewater flows and defer a $180 million wastewater plant expansion by four years or more. Door to door delivery of a three-part residential conservation kit (toilet dam, showerhead, and leak detection tablets) to 210,000 households, along with installation of this kit on request, dropped water use in those neighborhoods by over 10%, and saved 11.5 gallons per person daily in participating households.

Adopt a water-efficient landscaping ordinance

In dryer regions, where outdoor watering is a large part of water use, local rules can govern the types of sprinkler systems installed, the amount of turf area, or the types of plants used in new construction. Called xeriscaping, this combination of smaller lawns, drought-resistant plants, and thoughtful watering practices can cut water use substantially. In a North Marin, CA study, water-conserving landscaping cut water use by half, with 61% fertilizer reductions and 44% fuel savings. Aurora, CO limits the amount of turf grass to a percentage of lot size, on a sliding scale.

Communities with more regular summer rainfall can still save on the cost of delivering high quality drinking water for landscaping, through ordinances that require new sprinkler systems to be water-efficient and that regulate water use for fountains, golf courses, and commercial landscaping.



Adopt a groundwater resource protection ordinance

Contaminated groundwater supplies are expensive and often impossible to clean up; replacement water supplies often must be found. Thus protection of the *quality* of a community's groundwater can also protect the *quantity* of the community's water supply.

The types of activities, development, and land uses within the land area that directly affect the quality of groundwater can be controlled to protect groundwater. Defining this "area of contribution" to the groundwater that supplies drinking quality water is the first step. The Federal Safe Drinking Water Act requires the development of "Wellhead Protection Areas" around public water supply wells to encourage protection of groundwater quality. Such action is often taken at the local level, where most other zoning and land use rules are adopted.

Require water conservation by developers

Morro Bay, CA requires developers to create their own water supply for development, by installing water-efficient fixtures in old buildings that save as much water as their new buildings will use.

Educate water users

Communities and water suppliers across the country have significantly reduced residential water use through public education campaigns designed to raise awareness and offer simple tips for saving water. Others have targeted their efforts at large water users, such as business and industry, that may need more in-depth assistance to reduce their water use. The Massachusetts Water Resources Authority, serving the Boston area, conducted water audits of 40 large water users, to illustrate the potential water and dollar savings to these users and to others.

WHAT YOUR STATE GOVERNMENT CAN DO

Efficient water use is already official policy in many states. For example, in both Texas and Arizona, state water policy includes efforts to reduce per person water use. States can encourage and support the actions of individuals, businesses, and communities, through education and technical assistance. States can provide incentives for water conservation, and can require particular actions. Your concern can translate into support for these actions, if your state has not already taken them.

Encourage coordinated operation of water supply systems

Too often, a Balkanized pattern of water supply agencies leads to major inefficiencies in water supply. Better coordinated operation of water supplies can take many forms. In rural areas, efforts to share equipment and expenses, or to form a regional water supply district, can save community costs, deliver a better service, and save the time and expense of developing or expanding new wells or surface water sources.

In metropolitan areas, interconnections protect against emergencies. In the Washington, DC area, regional sharing of water supplies and the construction of a small storage reservoir eliminated the need for up to 16 new reservoirs.

Prepare a water supply protection strategy

Formal adoption of a state law to protect water supplies will encourage their protection, and recognizes that watersheds and aquifers often cross town boundaries. In Arizona, this thinking extends to designation of special groundwater management areas, where management plans are required and all new wells must be registered. The Safe Drinking Water Act requires states to develop wellhead protection programs to prevent contamination, but these programs alone will not be adequate to fully protect water supplies.

Establish conservation pricing policies

Pricing is considered one of the most important incentives to reducing water use. State government has leverage on this issue in several ways. State legislation can require it. Regulatory agencies can include it as one factor in decision making. And grant programs can make it a requirement for receiving funds.

Require conservation as part of water supply grants and loans

State revolving loan funds now being established to replace federal grants for water treatment facilities present an opportunity to build in water conservation. Criteria for issuing these grants and loans should include conservation measures. The state of Massachusetts, for example, requires a local water conservation plan before a community can receive state funds for water-related projects.

Adopt a statewide plumbing code for water efficiency

States, like local governments, can require water-efficient fixtures in new construction and renovations, for both residential and commercial use. Legislation or changes in state plumbing and building code standards can accomplish this. Some states also bar the sale and distribution of products that do not conform with code requirements. This is increasingly important as a growing share of plumbing products are retailed directly to consumers for do-it-yourself installation.

A 1989 change to the Massachusetts code, to require 1.6 gallon flush toilets for new construction and renovations, is expected to ultimately save about 45 million gallons of water a day in homes statewide.

Promote water conservation in state facilities

As in municipal buildings, water conservation in state facilities sets a good example and saves the government money. State facilities include universities, office buildings, hospitals, jails, and park lodging. Savings from retrofitting water-efficient bathroom and kitchen fixtures can be substantial. States can also set the specifications for state government purchases to require that all future installations be water-efficient.

Update state water law to promote conservation

Water law in many western states reflects a "use it or lose it" allocation philosophy, which discourages conservation of water resources. Oregon has pioneered changes in state law that assure that water users will not forfeit their water rights when acting to conserve water.

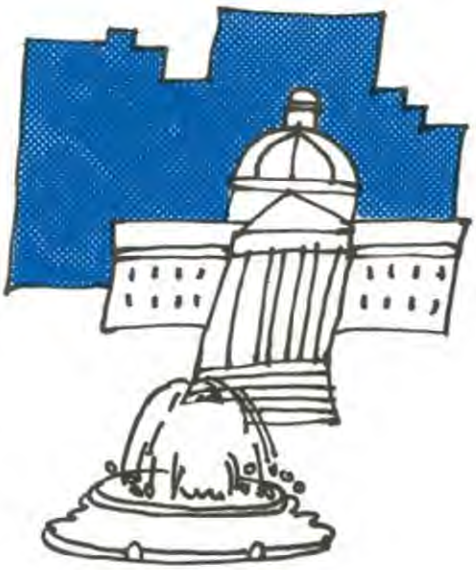
All states can and should require registration and metering of all major water users — those using over 10,000 gallons per day, for example — as a first step in understanding how water resources are used. Also, modern water-saving technology and management practices should be factored into definitions and interpretations of what is a "reasonable use" of water.

Consider conservation as an alternative to new water supply projects

Often a water supplier must receive state approval for some aspect of a water supply project, at a minimum for certification of drinking water quality. The state can see that conservation alternatives are explored, or even exhausted, before granting that approval. The state can also ask that water demand projections build in the assumption of future water conservation. Older state water supply plans should be revised to reflect water conservation as well.

Require conservation when issuing permits or licenses for water or wetland development

An increasing number of states issue permits for withdrawal of water from surface and/or ground sources for all uses, not just public water supply. Other states issue permits for development in or near wetlands. Both provide excellent leverage for building in conservation requirements. A New Mexico state law, for example, requires the state engineer to consider water conservation efforts in granting a municipal application for water rights. A new water withdrawal permit program in Massachusetts requires a conservation plan from all applicants.



WHAT LARGE WATER USERS CAN DO

Particularly in urban communities, and in suburban towns with business and industrial parks, a few large water users may make up a large share of water demand. Targeting actions to reach this group can achieve big results. Citizens concerned about water conservation should understand what the options are for large water users in their community, and encourage water saving programs in their work place. Community officials can look for these actions when large users seek building permits, zoning variances, or other municipal approvals. There are plenty of benefits for the large water user: reduced water and sewer charges, energy costs, and in-house treatment and discharge costs.

INDUSTRIES:

Assign someone to be in charge

Simple as it sounds, someone must be responsible for identifying water use and ways to reduce it. Polaroid Corporation's 18-building complex in Waltham, MA reduced water by one third, relying heavily on the work of water stewards assigned to each building. The highly successful Gillette Company program to cut water use in its facilities worldwide started in 1973 with a top-down commitment to cut water use and costs; the program has saved 34-70% per facility.

Conduct a water audit

As with home and community water conservation, knowing where water is used is the first step. A typical industry uses water for its manufacturing processes, for cooling, for sanitary use, and for routine maintenance and operations. A water audit will identify ways to reduce water use in each of these areas, along with estimated costs and savings.

Investigate water reuse

Much industrial water does not require drinking water quality. Cooling water, up to 70% of a plant's total water use, lends itself to reuse. The American Water Works Association estimated that during the 1976-77 drought in Los Angeles, 45 area firms saved an average of 45% on their water use, primarily through recycling. A Fort Smith, AR steel mill reduced water use 90% by recycling cooling water.

Invest in conservation technologies

Process water use can often be reduced by installing equipment that will save on other costs as well. Digital Equipment Corporation in Hudson, MA retrofitted its plant drainage system to recycle rinsewater. Lower costs for energy and chemicals produced dollar savings that were 3 1/2 times greater than the savings resulting from lower water and sewer charges alone, while water use was reduced by 70%. An electroplating firm in southeastern Massachusetts eliminated 95% of its process water, reduced wastewater treatment and sewer costs, and halved its chemical waste discharges, by installing a closed loop filtering system for its plating water.

Design conservation in to new facilities

New facilities and major renovations are excellent opportunities to build in water-efficient equipment and processes. Communities can insist on designs that include these features as conditions of permits or approvals.

Reduce operation and maintenance water use

Little things — hoses, equipment washing, leaky pipes and valves — can add up to big water losses. Fixing these items is good maintenance procedure for other reasons as well, including reduced energy costs and extended equipment life.

BUSINESS AND INSTITUTIONS:

Conservation actions for businesses and institutions are similar to those for the home, as the major uses of water are similar. And again, the first step is to identify areas of largest water use. Here are two common areas where water-saving efforts work.

Reduce water use for sanitary purposes

A typical business uses much of its water for the personal sanitation of its employees. In a hotel, this proportion is even higher. Reducing water use in the kitchen of a restaurant or hotel saves money twice: through water savings and energy savings.

Installing efficient plumbing fixtures can pay. A Princeton, NJ community housing corporation retrofitted an 88-unit multifamily building with 0.8 gallon per flush toilets at a cost of $28,000, but has saved $9,100 a year. The Lenox Hotel in Boston replaced its old showerheads and 7 gallon per flush toilets with low-flow fixtures, saving about 15%. A Dover, DE office building replaced ten toilets for its 165 employees, and reduced water use 47%. The Park Plaza Hotel in Boston installed 2.5 gallon showerheads in the 1970's, with a 30 day payback, and has saved annually on rising water costs ever since.

Reduce water use for landscaping and for air conditioning

Well-timed and well-maintained sprinkler systems and recycling fountains can reduce water use without affecting business. Recirculating water-cooled air conditioning systems can cut water use dramatically compared with once-through systems.

GOLF COURSES :

Your local golf course can be a major water user. But large water savings are possible on a typical course while maintaining a green green, through these and other water-saving actions.

Carefully schedule irrigation to reduce water use

The time of day, the weather, and the method of irrigation all help decide when and how much to water. Watering in the morning instead of mid-day cuts evaporation loss, for example. Monitoring soil moisture can guide careful watering.

Repair and maintain the irrigation system

Installing new sprinkler heads makes more efficient use of water. Fixing leaks, scheduling mowing, and routine maintenance and operations can reduce water loss, as for any business.

Consider water reuse

A golf course in Aurora, CO irrigates with municipal water from the wastewater treatment plant, and pays a lower price for the reused water. This course and other golf courses and parks in Aurora reuse 150 million gallons a year, enough water for about 1,000 families.

Develop a new course with water savings in mind

Developers can plant drought-resistant grasses on a new course, and install a water-efficient sprinkler system. Local officials can look for these actions when approving new development.

A WORD ABOUT AGRICULTURE:

Irrigated agriculture, for both large western farms and smaller eastern operations, is the largest water user in the U.S. Most agricultural water is not delivered through water supply systems. Still, increased water efficiency can save money and protect against drought. It can also free up water for urban areas that draw on the same water source or delivery system.

Like golf course operation, scheduling irrigation for cooler times of day saves. Repairing irrigation systems and fixing leaks gets water where it is needed most. Lined and/or covered irrigation canals reduce seepage losses and evaporation.

A farm soil and water conservation plan, done with the help of the U.S. Agricultural Stabilization and Conservation Service, can identify further areas for effective action.

A soil moisture monitoring program can specify the amount of water needed for various crops at a particular time, based on local weather and soil moisture conditions. Such a program is available to farmers statewide in California.

WHAT YOU CAN DO AT HOME

One good place to start a community water conservation program is in your own home. Here are several things you can do easily to cut your home water use.

Do a home water use analysis

Read your water meter once a week to see how much water you use, and how effective your conservation efforts have been. Many meters measure in cubic feet, not gallons. (To convert to gallons, multiply by 7.48.) Comparing past and current water bills helps. If you're new to your home, ask your water supplier for past bills to track water use.

Find and repair water leaks

You can test your system for leaks by reading your water meter twice, an hour apart, and not using any water in between. Don't forget to turn off any automatic water users, such as an icemaker. If the readings are different, you've got a leak worth fixing.

A federal study of home water use showed that one out of five toilets leaks, and that the average savings from fixing these leaks is 4.3 gallons per person per day. You can find leaks that aren't obvious, by dropping food coloring into the tank in back and waiting 15 minutes to see if color shows up in the bowl.

Leaky faucets also waste water: a slow, steady drip can add up to 75 gallons a week. Fixing hot water leaks and drips can save money twice, by reducing your hot water heating bill as well as your water and sewer bills.

Install water-efficient plumbing fixtures

You don't have to wait for a community program to install these commonly available devices in your home and start saving now.

If your toilet was installed before 1980, it probably uses at least 5 gallons a flush. More recently installed toilets use about 3 1/2 gallons per flush. Installing toilet dams in conventional toilets can save a gallon a flush; installing a plastic bag or bottle saves up to 1/2 gallon.

But installing a new, water-efficient toilet can save much more. If you replace an older toilet that uses 5 gallons or more, you can reduce your indoor water use by up to 25% with this one step. Toilets that use only 1.6 gallons per flush are available from many manufacturers; toilets that use one gallon or less can also be found.

Water-efficient showerheads that can save 50% per shower or more are easy to install yourself. When energy savings from not heating that hot water are considered, a water-efficient showerhead for a household of three can pay for itself in less than 2 months. Even simple faucet aerators help: they can reduce tap water flow by 25% or more, saving gallons per day.

Check your water pressure. If it is above 50 pounds per square inch, it is probably unnecessarily high. A pressure reducing valve is easily installed by a plumber, and may be a cost-effective way to save water.

Eliminate wasteful water use habits

Many little actions can add up to big water savings. For example, run your dishwasher or clothes washer only when full. When you buy a new washer, look for a front loader, which is more efficient. Throwing things away in the wastebasket instead of the toilet saves, every time you don't flush.

Reuse water for non-drinking purposes

Consider using "gray water" from bathroom tubs, showers and sinks for outdoor watering of landscape plants (not your vegetable garden), and for toilet flushing. Some modification in the kinds of soaps you use may be needed to make the plants happy.

Lead in Your Drinking Water

In some urban areas, there's great concern for lead in home drinking water. If you have an older home, or suspect that lead solder has been used on more recently installed pipes, first get your water tested to see if your tap water has a high lead content. If lead is present, water drawn from taps first thing in the morning tends to contain the most lead. You can collect that water from the tap for other uses besides drinking. You can also draw water for your morning coffee the night before, when lead levels tend to be lower.

Reduce outdoor water use

In summer, outdoor water use can be 30-50% of your total water use or more, depending on where you live. So efforts to save water outdoors make sense. If you don't water in the middle of the day (when evaporation is highest), and if you water only when needed, outdoor savings will mount up. Adjust your sprinklers to water only your lawn (not the sidewalk), use a hose with a shut-off attachment when washing your car, and mulch your plants to retain moisture. And you can convert lawn that's not doing well to native ground cover or low water using plants.

Less Lawn, More Wildlife

Replacing unneeded turf grass with selected ground covers and shrubs can attract wildlife, as well as save water. The National Wildlife Federation provides easy to use information on plantings for food and cover for wildlife, and maintains a registry of certified "Backyard Wildlife Habitats." For additional information on the Backyard Habitat program, write:

National Wildlife Federation
Backyard Wildlife Habitat Program
1400 16th Street, NW
Washington, DC 20036

GET TO KNOW YOUR WATER SUPPLY

Knowing who uses water and how they use it is the first step toward a community water conservation program. Use these questions to learn from your local water supplier how water is used in your community, and where it comes from.

1. Who supplies your water:
   - the local government?
   - a public water district?
   - a private utility?
   - a well or other source of your own?

2. Does your water supplier have its own sources, or purchase water from another supplier?

3. What is the natural source of this water:
   - groundwater?
   - a river or stream?
   - a combination of ground and surface water?

4. Who uses this water, and in what proportions:
   - homes?
   - businesses?
   - industries?
   - public facilities?
   - others?

5. How many people are served by your water supply?

6. How much water is supplied:
   - per year (in million gallons or acre-feet)?
   - per person?
   - per person for residences alone?

7. What percentage is unaccounted for?

8. Is the system divided into "pressure zones"? What water pressure is maintained in each of these zones?

9. What is the system's dependable yield of water? How does it compare to current and future demand?

10. Does your supplier plan to expand or build a new supply to meet future water demand?

11. How much energy (in kilowatt-hours), if any, is used for:
    - pumping water from its source?
    - potable water treatment?
    - distribution of water to customers?
    - wastewater treatment?

12. What are the current water rates charged to each class of retail customer?
    What are the current rates for water purchases, if any, by your water supplier?

You can ask the authorities responsible for wastewater treatment most of these questions as well. Many water conservation opportunities and benefits relate to the financing and management of sewer systems.

THE NEXT STEP: A CONSERVATION ACTION PLAN

Find out how your water supply system is managed

Ask if your public water supplier has undertaken these steps:

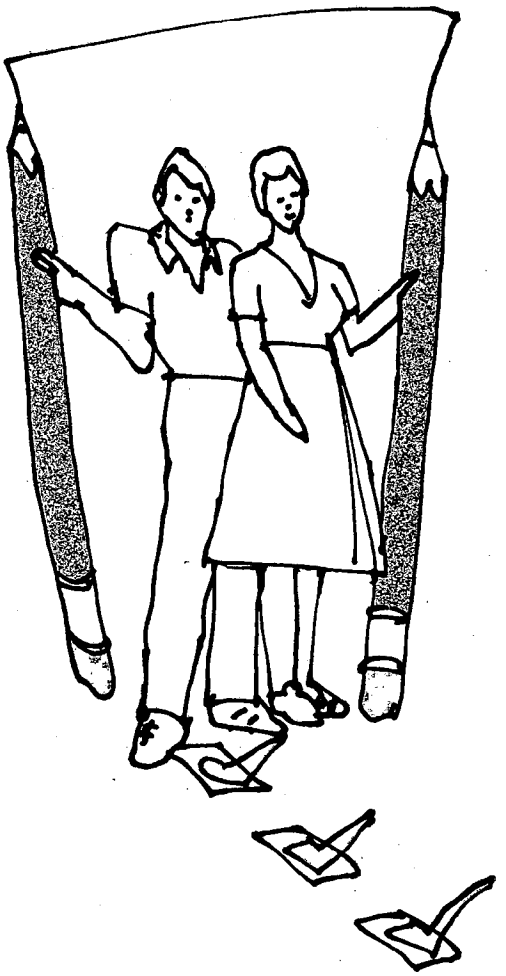
- ❑ Meter 100% of users.
- ❑ Reduce unaccounted for water losses to less than 10%.
- ❑ Conduct a continuing leak detection and repair program.
- ❑ Charge the full cost of water delivered.

Decide what actions make sense for your community

- ❑ Review the actions described in this booklet, keeping in mind the particular water supply situation in your community and what has been done already.
- ❑ Compare their cost-effectiveness for your community: their potential water savings, and how much it will cost to achieve those savings.
- ❑ Seek local ordinances for plumbing fixtures, landscaping, and groundwater protection as appropriate.
- ❑ Compare any proposed new water supply sources with water conservation savings.

Do your part

- ❑ Reduce water use at home.
- ❑ Promote reduced water use in your workplace.
- ❑ Organize a community public education campaign to reduce inefficient water use.
- ❑ Support government action for water efficiency and resource protection.



FOR MORE INFORMATION

Water Sources and Supplies

What is Groundwater? and *Groundwater Contamination* are bulletins by Lyle Raymond (1988). Center for Environmental Research, Cornell University, Ithaca, NY 14853.

Groundwater and Contamination: From the Watershed into the Well (1984). Massachusetts Audubon Society, South Great Road, Lincoln, MA 01773.

From the River to the Tap, available in slidetape or video format. Publications Services, Virginia Water Resources Commission, 617 N. Main St., Blacksburg, VA 24060.

Private Water Systems Handbook (1979). Midwest Plan Service (MWPS-14), Iowa State University, Central Campus, Ames, IA 50011.

Water Supplier Actions

Water Conservation by William O. Maddaus (1987). American Water Works Association, 6666 Quincy Avenue, Denver, CO 80235.

Water Conservation Manual for Development of a Model Water Conservation Plan by Bill Nechamen (1989). New York State Department of Environmental Conservation, 50 Wolf Rd., Albany, NY 12233.

Government Actions

The Office of Water Conservation in the California Department of Water Resources has produced a series of free water conservation guidebooks, including: *How to Do a Residential Retrofit Program, #1* (Nov. 1981); *Designing a Public Information Program for Water Conservation, #3* (Oct. 1984); and *Guidebook on Conservation – Oriented Water Rates, #9* (Oct. 1988). Department of Water Resources, Office of Water Conservation, Publications Unit, P.O. Box 942836, Sacramento, CA 94236-0001.

Water Conservation in Residential Development: Land Use Techniques by W. Sanders & C. Thurow (1983). American Planning Association Book Store, 1313 East 60th Street, Chicago, IL 60637 ($16).

Large Water Users

Water Conservation: Money in the Bank (A Case Study of Industrial Water Conservation) (1983). Senator Carol C. Amick, Chair, Special Legislative Commission on Water Supply, Room 413E State House, Boston, MA 02133.

Conservation at Home

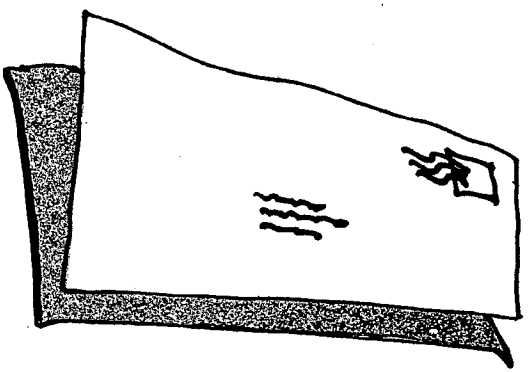
Home Water Conservation Guide by Massachusetts Water Resources Authority (1988). MWRA, Water Works Division, Charlestown Navy Yard, 100 First Ave., Boston, MA 02129.

Easy Ways to Save Water, Money and Energy at Home by Ed Wesley (1987). Niagara Products, 4 Gold Mine Road, Flanders, NJ 07836.

Gray Water Use in the Landscape by Robert Kourik (1988). Metamorphic Press, P.O. Box 1841, Santa Rosa, CA 95402.

Landscaping for Water Conservation. Publications Center, Cook College, Rutgers University, New Brunswick, NJ 08903.

The National Xeriscape Council can provide a wealth of information on water-efficient landscape design. NXC, 8080 S. Holly, Littleton, CO 80122.



ABOUT THE NATIONAL WILDLIFE FEDERATION

The National Wildlife Federation is the nation's largest conservation education organization, with more than 5.8 million members and supporters and 51 affiliate organizations nationwide. A private, not-for-profit organization founded in 1936, the Federation advocates the wise use of our earth's resources.

Working for the Nature of Tomorrow®

NATIONAL WILDLIFE FEDERATION

ABOUT THE WATER RESOURCES PROGRAM

The NWF Water Resources Program promotes the improved management and protection of our water resources. Program staff accomplish this through efforts to improve planning and evaluation of Federal water resources projects, review development proposals and management plans, secure the protection of riparian habitat, and promote water conservation.

To find out more about NWF's Water Resources Program, or to obtain more copies of this booklet, contact:

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