

Why Conserve Water?

Small hotels can achieve significant cost savings and environmental benefits through water conservation. Water is expensive in the Caribbean, and averages about 12.60 US\$/1000 Imperial Gallons (IG) for properties connected to a sewerage system, and 6.30 US\$/1000 IG for properties that treat their own wastewater. Furthermore, water is never “free”¹ even if it comes from a well or reverse osmosis (RO) plant because of energy costs (to heat and pump water), as well as equipment depreciation, maintenance, wastewater treatment costs, etc. By investing in practical, “no-cost/low-cost” water conservation strategies, a small hotel can:

Achieve significant cost savings. Many water conservation strategies have payback periods measured in months, weeks, or even days! Cost savings result from 1) direct water cost savings, 2) reduced energy costs for pumping, heating, and treating water, and 3) reduced size requirements, initial costs, and maintenance costs for water-related infrastructure such as pumps, tanks, grease traps, septic tanks, and wastewater treatment plants.

Conserve water and protect the environment. Water conservation improves the performance of wastewater treatment systems and increases the quality of treated effluent. It also reduces strain on local water resources, and reduces unnecessary government spending on additional water supply and treatment infrastructure.

Improve guest comfort. Water conservation is an easy way to reduce variability in a hotel’s water supply by reducing the likelihood of hot/cold water shortages, reducing pressure and temperature variations in guestrooms, and minimizing maintenance problems in guestroom fixtures.

¹ 1000 Imperial gallons = 1201 U.S. gallons = 4.55 cubic meters.

Case Study: Treasure Beach Hotel, Barbados

To reduce water use by 10%, the hotel adopted the following measures.

- Flow diverters and toilet dams.
- Low flow showerheads and faucet aerators.
- Sub meters for kitchen and irrigation.
- Daily meter readings.
- Water hoses fitted with control nozzles.
- Drip irrigation system controlled by a timer and a moisture probe.
- Towel and linen reuse program.



A toilet dam installed at Treasure Beach Hotel.

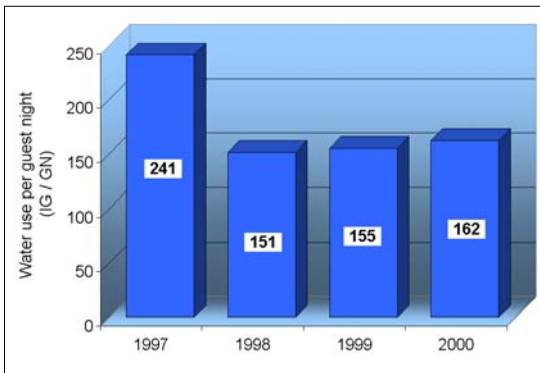
What Small Hoteliers Can Do

Water conservation involves changes to staff procedures and operations in addition to installation of water-efficient equipment and fixtures. Small hotel water conservation programs should include the following three basic steps.

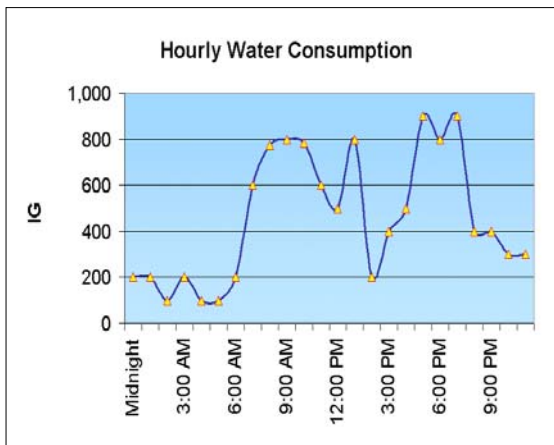
Step 1: Evaluate your property's water use.

Step 2: Set priorities and take immediate action.

Step 3: Monitor changes in water use.



Sea Splash Resort, a small property in Jamaica, conducted an environmental assessment in 1997 and reduced water consumption by 35% ever since.



Determining your property's "hourly water consumption curve" is a great way to determine whether your property has leaks. If consumption is high in the middle of the night, that probably indicates the presence of leaks.

Step 1: Evaluate Your Property's Water Use

There are three ways that a small hotelier can evaluate water use:

- Conduct an environmental walkthrough to evaluate the property's water use patterns and identify the best ways to conserve water. An environmental walk-through takes from 4 to 8 hours to complete and costs US\$200 to \$600, depending on the size of the hotel and the complexity of its facilities and operations.
- If appropriate (e.g. if the property's water use is significantly higher than industry benchmarks) conduct a more comprehensive Small Hotel Environmental Assessment, which includes a detailed assessment of water use to establish past and current consumption levels and a wide range of identify opportunities for water conservation. The Small Hotel Environmental Assessment involves a team of two trained experts working on property for 2-3 days. The team reviews facilities, operations, and baseline performance² and evaluates the property against a comprehensive list of best practices. The team then delivers a report that lists the best opportunities and provides guidance on how to implement them.
- Another options is a self-assessment. A self assessment has the advantage that there is no cost involved, and it ensures that someone who is knowledgeable with the property is involved in the assessment process, but sometimes it helps to have an "outside pair of eyes" evaluate the property. Sometimes an outsider has an easier time spotting problems than someone who works at the property.

² Utility and product use during the 12-month period prior to the assessment.

Step 2: Set Priorities and Take Action

Because each property will find a range of opportunities for water conservation, it should evaluate the attractiveness of each proposed option, decide which ones are the most attractive, and develop an implementation schedule or “Action Plan”. The water conservation action plan may be part of a larger action plan that includes energy conservation and waste minimization. An example action plan for water conservation is below.

Example - 2002 Action Plan for Water Conservation		
Action	Staff Lead	Completion date
1. Train the staff to identify and report defective plumbing fixtures (e.g., toilets, faucets, showerheads).	Mr. Jones	February 1, 2002
2. Install 2.5 gpm tamper-proof aerators on kitchen work faucets and on all bar faucets.	Mr. Smith	February 15, 2002
3. Install 0.5 gpm tamper-proof aerators on kitchen hand wash faucets.	Mr. Smith	February 15, 2002
4. Install a pedal valve on bar faucet.	Mr. Clark	April 1, 2002
5. Devise a preventative maintenance schedule for fixtures installed in guestrooms, back-of-house and public areas.	Mr. Jones	April 1, 2002
6. Install water-efficient showerheads in guest rooms and staff changing rooms.	Mr. Smith	May 1, 2002
7.		
8.		

Step 3: Monitor Water Consumption

As the old saying goes, “you can’t manage what you don’t measure.” Effective water monitoring allows a property to promptly identify leaks and problems, track long-term progress, and evaluate the progress of water conservation efforts.



A water meter at Club Dominicus Palace, Dominican Republic

Water Conservation Self Assessment Checklist

Source of supply and metering methods

- Are there any leaks in the main supply line? Is there more than one supply to the property? Are there submeters for high-use areas?
- Is the utility’s meter working correctly or at all? Is the meter easily accessible and therefore always read by the utility personnel and not estimated?

Guest Rooms

- Are any toilets leaking? Any faucets or showerheads leaking?
- Do showerheads consume an excessive amount of water (greater than 2.5 USG/minute)?
- Are there aerators installed on all faucets?
- Are low-flush toilets or water dams in use?

Grounds and irrigation

- Is there a variety of drought resistant vegetation on the property allowing for less watering?
- Are plants with similar water needs grouped to avoid having to irrigate all of the grounds at the frequency required by the least drought resistant plant?
- Are grounds irrigated during the late evening, night or early morning? If system on automatic setting is it shut off when raining?
- Are any concrete areas receiving and thus wasting water?

Laundry

- Are water, temperatures, pressures and chemical usage as per Manufacturer’s recommendations?
- Is there a wash recycle program in place?
- Does the property reuse greywater?

Pools and Jacuzzis

- Is pool equipment and piping properly maintained?
- Is chlorine stored in a safe and environmentally conscious manner?
- Is excessive backwashing taking place?

Kitchen

- Are there set procedures for washing pots?
- Are obviously water intensive kitchen practices carried out under running water?
- Are there leaking taps escaping the chef’s notice?
- Are there drain stoppers leaking?

Bars and Ice Machines

- Are there leaking taps at sinks? Are aerators installed?
- Are ice machines under lock and key and controlled by chefs or bar supervisors?
- Are rollaway tubs used to distribute ice to guest floors?

Example: How to calculate a water use index

The occupancy and utility consumption data of a 31-room hotel audited by the EAST project was as follows:

- ▶ Monthly guest-night occupancy = 551 GN
- ▶ Monthly water consumption = 267,500 USG

Given this data, the hotel's water use index can be calculated as follows:

- ▶ Monthly water use index
- = (267,500 USG) / (551 GN)
 = 485 USG/GN

The monthly water use index is calculated by dividing the monthly water consumption by the monthly guest-night occupancy. It therefore represents the average amount of water that was used by the property per guest night during that particular month.

Use the daily meter and fuel tank readings to calculate the amount of water, electricity or fuel consumed during the last 24 hours. Compare these daily consumption figures with those calculated for the preceding days to check for unusual or unexplainable changes in consumption, which

may be indicative of leaks or operational / equipment problems. At the end of each month, use the utility consumption and occupancy data to calculate the monthly water and energy use indices for the whole property. Compare these indices with those calculated for the preceding months or for the same month of the previous year. Check for and investigate unusual shifts in water or energy consumption.

At the end of each year, use the year's occupancy data to calculate the property's annual water use index. Comparisons with previous year's indices will show the long-term trends in the property's water use. For example, a gradual increase in a property's annual water use index may indicate a decline in the effectiveness of maintenance operations or in the staff's participation in the hotel's water conservation efforts.

Periodically check the accuracy of the data calculated by the water-monitoring program by comparing it with the meter readings and the consumption figures presented in the water bills. Use this comparison to investigate and correct significant or chronic discrepancies. Compare the water use index to established benchmarks for water use at small hotels, such as the benchmarks developed by the International Hotel Environment Initiative, as illustrated in the table below.

Example Monitoring Form				
Water - Monitoring form, Meter number: 34,524,356				
Month and year: December 2002 Reading units: 1000 imperial gallons				
Day	By	Meter reading	Consumption	Comments or corrective action
		15,234.600	← Insert here the last meter reading of the previous month	
1	CM	15,256.700	22.100	
2	CM	15,278.300	21.600	
3	CM	15,302.500	24.200	
26	CM	15,791.600	22.900	
27	CM	15,880.900	89.300	
28	CM	15,976.400	95.500	Discovered leak in main. Fixed at 8 PM.
29	CM	16,006.200	29.800	
30	CM	16,027.500	21.300	
31	CM	16,050.300	22.800	
Total monthly consumption			16,050.300 - 15,234.600 = 815.700 thousand imperial gallons	

Water Use Benchmarks for Small Hotels

Hotel with 4 to 50 rooms, without laundry, pool and gardens

	Good	Fair	Poor	Very poor
	Less than	From To	From To	More than
Liters	330	330 380	380 440	440
US gallons	87	87 101	101 116	116
Imp. gallons	73	73 84	84 97	97

Hotel with 5 to 50 rooms, with laundry, pool and gardens

	Good	Fair	Poor	Very poor
	Less than	From To	From To	More than
Liters	440	440 507	507 587	587
US gallons	116	116 134	134 155	155
Imp. gallons	97	97 111	111 129	129

15 % of total water consumption is used by garden and pool (estimate)

10 % of total water consumption is used by laundry (estimate)

Source: International Hotel Environment Initiative.

The Best No-Cost Water Conservation Opportunities

Educate, train, and motivate staff to practice water conservation. Educate staff to be aware about the consequences of wasting water and the benefits of conservation. Train them in methods and procedures for conserving water during their day-to-day activities. Motivate them by rewarding employees who participate.

Leak detection: Institute a comprehensive leak detection and correction program by implementing daily and monthly utility monitoring (see above), and staff training for leak detection (especially housekeepers).

Kitchen practices: Discourage practices such as food thawing and washing vegetables under running water.

Laundry practices/towel/linen re-use: Implement linen and towel reuse policy (see Housekeeping Toolkit). Ensure that only full loads are washed.

Irrigation: Monitor grounds irrigation system if on a timer – ensure that they are turned off when it is raining. Do not irrigate during the middle of the day, and make sure that irrigation method only delivers water to plants that need it.

Preventative maintenance for toilets: Leaky toilets are a major source of water waste. On average, hotels have leaks and other water-related maintenance problems in more than 40% of their toilets. Although sometimes these problems are not high priorities for maintenance staff, they can easily increase the total water consumption of a hotel by more than 20%.

- Make sure the toilets flush properly. Sometimes there is not enough water in the toilet tank or in the bowl, the flapper valve closes too soon, or toilet flush mechanisms jam or get hung up.
- Ensure that all flapper valves are in good condition and properly seal the outlet of the water tank.
- Ensure there is no scale build-up that prevents the flapper valves or mechanisms from sealing properly.

Don't backwash pool filters more than necessary: Avoid backwashing sand filters more often than indicated by the pressure buildup in the filter (this why most pool filters come equipped with a pressure gauge). In most cases, pool filters should be backwashed when the pressure at the inlet of the filter increases by 10 psi (69 kPa) over the clean filter pressure (i.e., the inlet pressure measured when the pump is turned on right after the filter has been backwashed). In pools with light to medium use, the pressure in the sand filters generally increases by about 2 to 3 psi each day, meaning that these filters should be backwashed every 3 to 5 days.

Water leaks waste tremendous amounts of money! Examples from Small Hotels

Property 1

Leaking toilets accounted for 40% of the daily water use in a 35-room hotel (cost of leaks = US\$7000/year)

Property 2

Defective drain valve on a washing machine increased one hotel's laundry water use by more than 1,000,000 IG/year; equivalent to US\$6000/year.

Property 3

A large underground water leak wasted 24,000 USG/day. Since this property did not monitor its daily water consumption, the leak went undetected for a week and cost more than US\$ 1 700



Linen re-use and towel re-use cards at Oualie Beach Hotel, St. Kitts.

Impact of poor toilet maintenance on water consumption

Auditors of the EAST project found three malfunctioning toilets in a 35-room hotel, which combined wasted 3,900 USG or US\$ 41 worth of water per day. Given that the hotel used on average 9,200 USG/day, these three toilets alone accounted for more than 40% of its total water consumption.

These toilet leaks were fixed by adjusting the position of two of the floats and replacing a damaged flapper valve. This effort required less than 15 minutes of labor and US\$ 5 worth of spare parts.

Impact of inefficient backwashing practices

An environmental assessment at a 25-room hotel revealed that it could save 190,000 USG or US\$ 2,000 of water per year by backwashing its sand filters based on need rather than on a fixed daily schedule. Putting in place this practice required no capital investment and only a minimum amount of training for the pool operator.

The Best Low Cost/Quick Return Water Conserving Practices

Impact of using efficient faucet aerators in guestrooms

An assessment of a 30-room hotel revealed that 67% of its guestroom faucet aerators were either damaged or missing, and allowed the faucets to produce flows of up to 5.5 USG/min. By installing 1.5 USG/min aerators in all guestrooms, the property could have reduced its water consumption by more than 225,000 USG/year and saved 2,400 US\$/year. Since this measure required a US\$ 200 investment, it offered a payback period of only 5 weeks.

Impact of using inefficient showerheads in guestrooms

A 50-room hotel with 70% occupancy and guestroom showerheads that consume 4 USG/min can waste approximately 665,000 USG of water and 65,100 kWh of energy per year.¹ For an average water cost of 10.5 US\$/1,000 IG and an average electricity cost of 0.10 US\$/kWh, these inefficient showerheads would add 13,500 US\$ to the property's annual utility costs. If this hotel decided to replace its inefficient showerheads with new low-flow showerheads (with an estimated cost of US\$ 30 each), it would spend US\$ 1,500 and recover this investment in less than 2 months.

High water pressure = wasted water

Reducing water pressure from 70 to 50 psi could lower the total water consumption of a property by 10 to 20%. In a typical 50-room hotel, this water conservation measure could save from 500,000 to 1,000,000 USG/year.

Install Faucet Aerators: Install faucet aerators in all kitchen and bathroom basins to further reduce flow. In addition to conserving water, aerators also save energy by reducing the amount of hot water that is drawn from faucets. Aerators must be periodically cleaned and de-scaled to remain effective. Aerators flow rates should be matched to the type of faucet. .5-1.0 gpm aerators should be used for staff handwash sinks, 1.5-2.0 gpm aerators should be used in guestrooms, and 2.2 – 2.5 gpm tamper-proof aerators should be used in kitchens bars, and laundries. Tamper-proof aerators should be used if staff routinely dismantle the aerators.

Install water-efficient showerheads: Install 2.5 gpm showerheads in guest bathrooms and tamper-proof 2.5 gpm showerheads in staff bathrooms. Well-designed low-flow showerheads generate a satisfying shower flow while using 2.0 to 2.5 USG/minute. Low-flow showerheads generally cost from US\$5 to 30, a tamper-proof low-flow showerhead generally ranges from US\$5 to 15. The average payback period for replacing an inefficient showerhead with a low-flow model ranges from 1 to 6 months.

Reduce the pressure carried by the property's water distribution system: A property that is supplied by a water utility can control its water pressure by installing a pressure-reducing valve on its connection to the water main. This measure requires only a modest investment: in the US, the cost of a 2 to 3-inch pressure-reducing valve ranges from US\$ 500 to 700 depending on size, brand and features. A hotel should operate at the lowest acceptable water pressure; that is, the lowest water pressure that still allows its equipment and plumbing fixtures to perform properly (e.g., laundry washers, dishwashers, pressurized-flush toilets, guestroom showerheads).

Install foot pedal valves in kitchen sinks: Install foot-operated taps to kitchen sinks, improving sanitation and reducing food-borne cross-contamination by allowing hands-free faucet operation while saving water. The cost of pedal valves ranges from US\$ 100 to 500 depending on brand, quality and design. The average payback period for these fixtures varies from 3 to 12 months when installed on frequently used kitchen and bar sinks.

Longer Term Investments Which Help Conserve Water

Harvest rainwater and use for laundry water, irrigation or other suitable applications. For many hotels, rainwater harvesting is a relatively simple and low-cost process. Although the best time to think about rainwater harvesting is before the construction of the hotel, many existing buildings in hotels can be transformed fairly easily into effective rainwater collection surfaces. The volume of rainwater that can be harvested varies widely depending on local rainfall and the size of the hotel's roofs. There is plenty of useful information on how to design, build, operate and maintain a rainwater harvesting system on the Internet.

Irrigate the grounds with graywater or treated wastewater. The volume of water discarded as graywater or wastewater by an average hotel is generally sufficient to meet all its irrigation needs. However, if these waste flows are to be reused for irrigation they must be collected, treated and handled properly to avoid endangering the health of the staff and guests, especially that of the children who will invariably explore every corner of a hotel's gardens. The degree to which the wastewater flows must be treated prior to use for irrigation depends on whether the hotel employs surface or subsurface irrigation.

Surface irrigation using graywater or treated wastewater requires a sophisticated wastewater treatment system and tight quality control. Therefore, the use of treated graywater or wastewater for sprinkler irrigation should be considered only by hotels that already have an effective wastewater treatment plant. Furthermore, even if the waste flows are properly treated and disinfected, hotels should still take a few basic precautions when using these flows for irrigation. For example:

- Irrigation should ideally be carried out at night to minimize the likelihood that guests and staff members will come into contact with the irrigation water.
- Sprinkler systems should not be used to apply treated wastewater/graywater during periods of high winds.

Convert to Low-Flush Toilets: Since water-saving toilets use 50 to 75% less water than their older and inefficient counterparts, installing effective water-saving toilets can significantly reduce the total water consumption of a hotel. Water savings toilets include gravity flush which typically cost from US\$ 100 to 400, and pressurized-flush toilets that typically cost US\$ 100 more than a gravity-flush toilet of comparable quality and design.

Harvesting Rainwater

Rainwater is naturally soft and virtually free of iron and total dissolved solids (TDS). Because of this, using rainwater instead of tap water in laundry operations can significantly reduce the consumption of detergents and other laundry chemicals. For example, in some types of laundry chemicals, a 1 grain/gallon (17 mg/liter) reduction in the hardness of the water used in the washers can reduce the consumption of detergent by up to 2 oz/ 100 lb of linen. Rainwater thus makes an ideal source of water for the laundry, irrigation and other operations that do not require potable water.



Above left: Rainwater guttering at Papillote Wilderness Retreat, Dominica.

Above Right: Rainwater collection at Young Island Hotel, St. Vincent

Small Hotels Making Use of Gray Water



Oualie Beach Hotel, St. Kitts: Gray water treatment system, designed in Nevis, and masked by vegetation. Water from the laundry and other areas is sent through this area and subsequently used for the gardens.

Impact of water-saving toilets on water consumption

- Replacing a single inefficient guestroom toilet with a water-saving toilet can save 4,400 USG/year if the inefficient toilet consumes 3.5 USG/flush.
- Replacing a single inefficient toilet in a public or staff bathroom with a water-saving toilet can save 27,700 USG/year if the inefficient toilet consumes 3.5 USG/flush.

Where Do I Get More Information and Assistance?

About the Small Hotels Toolkit Series

This toolkit is one of a series of booklets designed to help small hoteliers improve their business operations, marketing and environmental performance. They are available in both printed and electronic format (STEP Resource Centre or www.caribbeaninnkeeper.com). Toolkits emphasize proven “best practices” appropriate to the Caribbean region, and include numerous case studies and real examples. Toolkits are supported by STEP Coordinators and experienced “coaches” to help hoteliers solve problems, implement desired actions, and secure additional expertise and information.

About STEP

The Small Tourism Enterprises Project (STEP) for the Caribbean provides support and assistance related to marketing, better business management, effective technology adoption, and improved environmental performance. Major funding comes from the Organization of American States, the United States Agency for International Development, and the governments of participating Caribbean countries.

STEP Walk-in Resource Centres

Walk-in Resource Centres include publications, videos, and other materials related to small hotels and the environment. They also have a computer work station and internet access. Each centre has a trained STEP Coordinator to help you find what you need. STEP will also be making available experienced professionals to provide “coaching” assistance on a number of topics. Contact your STEP Coordinator for information on coaching currently available.

Contact CAST:

The Caribbean Alliance for Sustainable Tourism (CAST) offers technical services (walk-throughs, environmental assessments), lists of products and services, as well as videos and publications. CAST is located in San Juan, Puerto Rico and may be contacted by phone (787) 725-9139, fax (787-725-9108, e-mail:

hcrawford@caribbeanhotels.org, or visit their web site by clicking on the CAST link at www.caribbeanhotels.org.

The following materials are available from CAST:

- *Environmental Technologies in Caribbean Hotels: Buying Specifications and Lessons of Experience*
- *Case Studies: Water, Energy and Solid Waste Management in the Hotel Industry*
- *Various publications from The Green Bookshelf*
- *Environmental Management Toolkit for Caribbean Hoteliers*

Have an Environmental Walk-through Completed:

To schedule an environmental walk-through (which will look at energy, water, solid waste and purchasing practices) contact your country STEP Coordinator or CAST.

Visit Your Virtual Walk-in Resource Centre:

The [caribbeaninnkeeper](http://www.caribbeaninnkeeper.com) website (www.caribbeaninnkeeper.com) is a virtual walk-in assistance centre, with copies of most of the materials available walk-in centres, as well as additional services and resources.

Other Useful Websites and Resources:

www.eng.warwick.ac.uk/DTU/rainwaterharvesting/index.html

www.dep.state.pa.us/dep/subject/hotopics/drought/facts/hotels.htm - Water Conservation Ideas for Hotels and Motels

www.paconsulting.com/sust_tourism/resources.html - PA Consulting, Water Efficiency