



Introduction

Effective wastewater management is a continuing challenge for small Caribbean hotels. If you do it correctly, no one will notice, but if you don't, it can cause huge problems.

Unfortunately, inadequate standards and a lack of monitoring and regulations have led to ineffective wastewater treatment throughout the region. Poorly functioning or non-functioning wastewater treatment plants cause pollution of coastal waters, damage fragile coastal resources such as coral reefs and endanger the health and safety of the region's inhabitants and visitors. Wastewater also contains nutrients, which can stimulate the growth of aquatic plants and algae. This reduces the clarity of the water, limits oxygen which threatens marine life, and causes once healthy reefs to be covered with seaweed and algae.

What is Wastewater?

Wastewater is liquid or water-carried waste removed from residences, institutions, commercial and industrial establishments, together with groundwater, surface and storm water. Every community produces both solid and liquid waste and the liquid portion is essentially the water supply after it has been fouled (contaminated) by the various uses to which it has been exposed. Wastewater may be classified into four categories:

1. Domestic – wastewater discharged from residences and commercial, institution and similar facilities;
2. Industrial - wastewater in which industrial waste predominates;
3. Infiltration/Inflow – extraneous water that enters the sewer system through indirect and direct means, such as through leaking joints, cracks, or porous walls. Inflow is storm water that enters the sewer system from storm drain connections, roof headers, foundation and basement drains or through manhole covers;
4. Storm water – runoff resulting from flooding due to rainfall.

Wastewater and the Natural Environment

A study in 1991 revealed that as many as 75% of wastewater treatment plants in the Caribbean produced unacceptable effluent and that in 60% of cases effluent is disposed of in aquatic environments (either salt water or fresh water). The potential health risks of improperly treated effluent are enormous. Although wastewater is made up of mostly water it contains 0.1% impurities that can jeopardize the health of humans and animal life. In addition, improperly treated wastewater is damaging coral reefs throughout the region. A recent study showed that land based pollution (including poorly treated wastewater and agricultural runoff) is directly causing seaweed and algae to colonize and smother coral reefs in the Caribbean.



Seaweed and algae covering a coral reef.

Role and Responsibility of the Treatment Plant Operator

Wastewater treatment plants fall in the category of “factory”, which makes necessary the provision of certain amenities such as rest rooms, first aid, protective clothing, adequate ventilation and lighting etc. The safety of all persons on the plant is of paramount importance and employees must ensure that they to make their contribution to a safe work environment. Likewise, owners should create the prerequisites for effective safety prevention regulations for the personnel and should provide protective gear, safety equipment, first-aid kits and fire extinguishers.

Effective Monitoring is Critical

Basic testing and monitoring can greatly improve effluent quality, reduce health hazards & operating costs. A basic portable ww laboratory is inexpensive and easy to operate Key parameters include:

- dissolved oxygen
- pH
- sludge volume fraction in the aeration tank
- sludge settleability
- residual chlorine
- others (BOD, suspended solids, fecal coliforms)

Preventive Maintenance

A preventive maintenance checklist for the treatment plant should be developed whether or not the hotel has a comprehensive preventive maintenance system in place. This checklist ensures periodic checking of the plant and that necessary corrective action is taken. Most importantly the owner/manager must have recorded the results of these inspections, which should be analyzed, discussed and disseminated to relevant personnel. More detailed information on plant operation and monitoring is included in a separate Toolkit: Operating Small Hotel Wastewater Treatment Plants.

System Components and Management

Wastewater treatment effects purification of used water and sewage so it can be returned safely to the environment without damaging downstream ecosystems. On average, each individual in the hotel may be assumed to produce some 40-100 US gallons of wastewater each day, which must be reused or treated to reduce the impact of pollution on the environment.

A wastewater treatment system includes all components from the bar screens and wastewater pumps to the outflow devices of the plant and must be designed to include:

- Trash removal,
- Grit removal,
- Removal of settleable solids, and
- Storm water control diversion.

Some of the reasons for improper management of wastewater treatment facilities include:

- Exclusive focus on guest satisfaction and not behind-the-scenes operations,
- The tendency to consider wastewater treatment a menial task to be delegated to lower-level staff,
- A lack of understanding of the wastewater treatment process and possible problems, and
- A belief that once expensive equipment is installed it will work indefinitely without maintenance or upkeep.

Typical Wastewater Treatment Methods

Methods most commonly employed in small hotels would include:

- Sand Filters,
- Primary Treatment,
- Septic Tanks,
- Waste Stabilization Ponds.

Basic Treatment Steps in Wastewater Treatment

Preliminary Treatment:

Preliminary or pretreatment aims at removing coarse solids, via bar screens and non-aerated or aerated grit chambers. Grease traps are also part of pretreatment.

Primary Treatment: Preceding biological treatment, this aims at removing settleable solids, floating material, oil and grease reducing the organic load on the subsequent treatment units. Typically primary sedimentation can remove 50% of the influent suspended solids and 30% of the biochemical oxygen demand.

Issues to Consider

Irrigation with treated wastewater. If treated wastewater or graywater are to be reused for irrigation they must be collected, treated and handled properly to avoid endangering the health of the staff and guests. The degree to which the waste flows must be treated prior to use for irrigation depends largely on the manner in which the irrigation water is applied to the grounds. Surface irrigation (e.g. sprinklers) of improperly treated and disinfected wastewater/graywater poses a serious health hazard. The high pressure at the sprinkler's nozzle produces mist that can easily travel and carry disease-causing organisms (pathogens) for hundreds of yards, especially in strong winds. Thus if wastewater or graywater is to be used in sprinkler irrigation it must first be treated, filtered and chlorinated in order to reduce its content of organic material, suspended solids and pathogens.

Harsh Chemical Use. Bleaches and harsh chemical cleaners will slow the natural process of degradation within the tank by killing off naturally occurring bacteria that feed on the sludge. Biodegradable cleaning products and only small amounts of other chemicals should be allowed (see Housekeeping Toolkit).

Sludge Disposal. Proper disposal of sludge created by the hotel's treatment plant is critical to the protection of the environment and public health. This sludge usually contains bacteria, viruses, household chemicals and nutrients that can be harmful to the environment in large doses. Properly digested and stabilized sludge can be safely disposed of in agricultural areas or government designated disposal sites but definitely not via ocean dumping. Digesting and drying the sludge and using on the grounds as fertilizer is practiced by the Sandals Group. However, this should be done only if the sludge has been properly digested and stabilized and it is applied in areas not accessible to staff or guests.

Laundry Wastewater. Laundry water should not be sent through the wastewater treatment process for the following reasons:

- 1) This water contains no biological matter and does not require full treatment,
- 2) The extremely hot temperature of wash water restricts good bacterial growth in the treatment process, and
- 3) The large volumes of water suddenly introduced from washers would create system "surges". Directing this water to a soakage pit or preferably a laundry water reuse system is far more appropriate.

Training: Proper training of the plant operators is critical as these operators must know how the system works, how to maximize its efficiency, and how to spot and diagnose problems early. Suppliers and designers of wastewater treatment facilities as well as actual manufacturers all provide proper training in plant operation and maintenance and this must be insisted upon on an ongoing basis, particularly in the case of out-sourced maintenance contracts.

Grease Trap Treatments

Small hotels, which produce copious amounts of grease from kitchens and a myriad of items from housekeeping, need to ensure the proper maintenance and usage of grease traps. Grease traps are designed to prevent grease (especially from kitchens) from entering the wastewater system, which impairs system performance. Hotels with septic systems must ensure proper design and maintenance of these traps to eliminate the clogging that grease can cause in a leaching field.

Grease traps should be cleaned out once per week for maximum efficiency assuming that no grease trap treatments are used. The common practice of cleaning the trap by dissolving the grease with sulfuric acid is not advisable for two main reasons:

- Acids will reduce the effectiveness of any septic system,
- The grease will eventually re-harden, most likely in the leaching field.

Instead, hotels should manually scoop out the contents of smaller grease traps, have larger ones regularly pumped out by a professional or use a product that will automatically keep the grease traps clean.

The variety of products available to keep traps clean without the trouble and expense of regular pumping all utilize a process called bioaugmentation which introduces cultures of certain bacteria, enzymes and other organisms to grease traps, manually or by a drip system. The organisms feed on grease within the traps and pipes and then reproduce, perpetuating the process.



Grease trap at Young Island Resort, St. Vincent

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: cast@caribbeanhotels.org, or visit their web site www.cha-cast.com
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.

Visit Other Useful Websites

Hotel Benchmarking Tool:

www.benchmarkhotel.com/dsp_wastewater_information.cfm

Wastewater Treatment Technologies:

www.oas.org/usde/publications/Unit/oea59e/ch25.htm

An Introduction to Septic Tank Sewage Systems:

www.johnstonsmith.co.uk/fact4.html

Septic Tank Page:

www.gecities.com/RainForest/Vines/5240/Septic_Tanks.html

Septic System Technology: www.uvm.edu/~vlrs/doc/septics.htm