

Water Efficiency Control in Hospitality Hotel



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Abstract

This work represents the summary of a recently completed dissertation by author keeping in view the following objectives:

1. Source and demand of waste and water generation in hospitality hotels.
2. To study and analyze the potential of water conservation.
3. To study and analyze the potential, recycle and recycle and reuse of water.
4. To study and analyze the potential of Water Harvesting.

To answer the research question and to explain the objectives above, the following methodologies are adopted.

In order to view the water efficiency in different hotels were studied. Main aim was to study hotels in Gurgaon, where the site exists. It was not only the survey of hotels building to understand the use of water through the past but also its consumption in future.

The elements of water control were studied under the heading viz:

1. Water Conservation in Hospitality Industry.
2. Source and demand of waste and water generation in hospitality hotel buildings
3. Sustainable water solutions for hotels
4. Waste water recycle
5. Water Harvesting

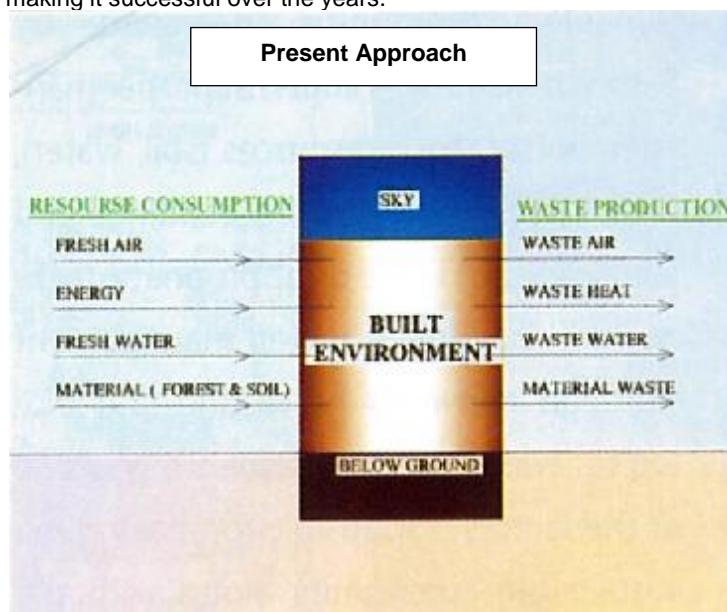
Finally on the basis of these elements conclusions are made so that the water in the future can be saved for our next generation.

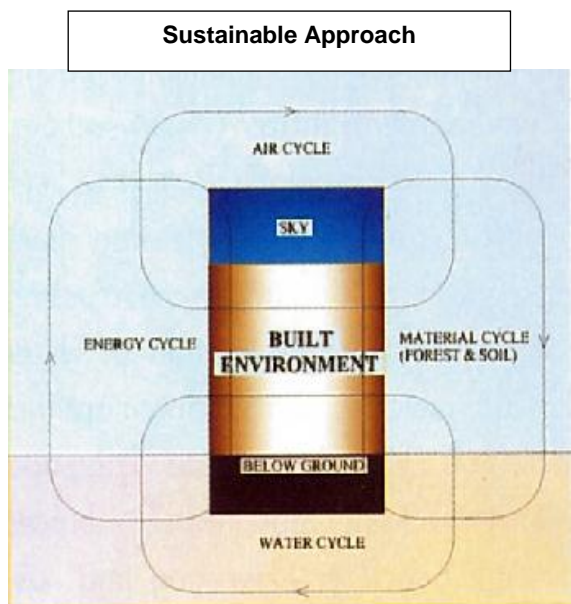
Keywords: Water, Efficiency, Hospitality

Introduction

The sustainable is based on reusing the natural resources unlike the present approach which include consumption of natural resources like energy,air,forest,land,soil which results in production of waste.

Water efficiency is the minimum amount of water used in a function, task or process. Water efficiency in the hotels is the most serious matter which can save money and the prestige of a hotel and help it making it successful over the years.



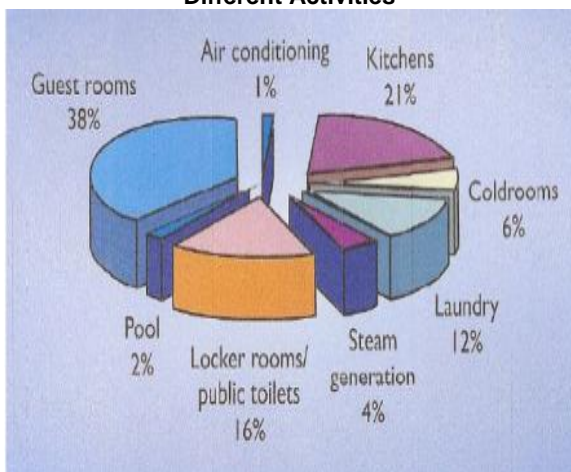


Need of this study is proper management of surface and subsurface sources which include water conservation, reducing water consumption, water efficient landscape, rain water harvesting, waste water recycling and sustainable drainage system along with awareness in architects and public relating the matter.

Water Conservation in Hospitality Industry

Maximum percentage of water used in hotels for different activities in ascending order are from Guest rooms (38%), Kitchen (21%), Locker rooms/public toilets (16%), Laundry (12%), Coldrooms (6%), Steam generation (4%) and Air-conditioning (1%).

Fig. Percentage of Water Used in Hotels for Different Activities



Source: www.ech2o.co.uk

This percentage of water can be minimized by adopting Water efficient solutions like Dual flush WCs, Flow regulation at taps and shower heads, Automatic tape, Sub meters, Urinal control or waterless urinals, Efficient dishwashers, Identify and fix leaks, Signage for guests and staff, Swimming pool cover and Water smart landscape.

There are two types of water created in a building- as grey water and black water. Black water has been mixed with waste from toilets and requires

biological treatment which is not used outdoors. Grey water requires less treatment than black water. Various water efficient solutions in detail are explained below:-

Water Smart Landscape

Xeriscape or Water Smart Landscape is landscaped areas in building that can reduce the use of water.

Various areas in a site are divided into 3 zones depending upon the water requirement of plants preventing over watering. By reducing land area we can reduce the water. Lawn areas should be replaced with porous paving, pebbles or drought tolerant ground covers.

Ecological Goals (Reduce Heat Island Effect and Aid Storm Water Management)

To reduce heat island effect permeable paving, infiltration bed and Bio filtration beds are used. Tree pits and tree grades, planting strip with biowales, suggested Sustainable "Green" Materials like recycled Asphalt, Concrete with Cement and Aggregate Substitutes, High albedo materials. Edge Courses and Accent Material can also reduce heat Island effect.

Sustained Drainage Systems (SUDS)

SUDS controls storm water run off and are easiest to retrofit in grounds of larger hotels.

Grey Water Recycling (Main Issue for Hotel Sector)

Hotels produce large amount of grey water, systems like Pontos Aqua Cycle can be installed in hotels for such purpose.

Source and Demand of Waste and Water Generation in Hospitality Hotel Buildings

Estimate reveals that by 2020 India's demand for water will exceed and India would fall into water-stressed category by 2025. Water is an important sustainable indicator. The proportion of water used for various functions in a building is shown in figure below.

The objective of any planned development is to provide and ensure adequate, good quantity and reliable potable water to its inhabitants.

Various aspects of water management:-

1. Minimizing the demand of water within buildings, landscape process and construction.
2. Minimizing the load on municipal supply.
3. Best practice and techniques for waste water recycling
4. Techniques for rain water
5. Measures for quality control of various water sources as underground water, fresh water, municipal, tankers, rain water and recycled

Water Conservation within Buildings

It is the first and foremost step to minimize the water buildings. Conservation also saves energy indirectly which is needed to treat, process and transport and in case of areas having cold climate to heat water.

Water Usage within Buildings

In India average domestic water consumption is 4.1 percent of the total water use. In hotels, hotel (up to 4 star), hotel (5star and above)

liter per day is 135 per head, 180 per head, 320 per head respectively.

Table: Water Requirements for Different Types of Buildings

S. No.	Type of Building	Consumption (litres/day)
1.	Factories with bath rooms	45 per head
2.	Factories without bath rooms	30 per head
3.	Hospital (including laundry) a. Number of beds not exceeding 100 b. Number of beds exceeding 100	340 per head 450 per head
4.	Nurses' homes and medical quarters	135 per head
5.	Hostels	135 per head
6.	Hotel (up to 4 star)	180 per head
7.	Hotel (5 star and above)	320 per head
8.	Offices	45 per head
9.	Restaurants	70 per seat
10.	Cinemas, concert halls and theaters	15 per seat
11.	Schools a. Day schools b. Boarding schools	45 per head 135 per head

Quantification of Water Demand in Building

The amount of water demand can be calculated as according to BIS in per capita consumption.

Total quantity of water used = Occupancy x Quantity (LPCD)

Water Conservation

Water conservation in building is related to judicious consumption building within the building and landscaped area (parks, road side plantation, play grounds, space between the buildings) in neighborhood.

Toilet, kitchen, guest room and laundry are the key areas where water consumption is more in a hotel. This can be reduced by reticulated water supplies and reduce water bills.

Calculated Demand Reduction as Compared to The BIS Per Capita Water Consumption

Table:- Estimation of Water Use

Category	Consumption (lpcd)	Reduced Consumption (lpcd)	Reduction (%)
Human consumption	7	7	
Bathing	20	20	
Flushing	45	21	53%
Washing	40	15	62%
Miscellaneous	23	23	
Total	135	86	36%

Water Conservation in Landscape

Landscape forms an important part of our building. This includes vegetation, paving and various

other landscape features such as water bodies along with lawns, shrubs, herbs and trees. The water demand for lawns and shrubs are higher as compare to trees. Native species also require less water.

Water Conservation in Process (Air-Conditioning)

In Industrial and Commercial buildings cooling towers are the largest consumer of portal water.

Water Use during Construction

- Parameters for water quality.
- Measures for reducing water demand during construction

Waste Water Recycle

There is lack of sewer system in many cities. In some cities existing sewerage and centralized sewerage treatment plant is not adequate.

Recycled wastewater is an alternative source of water, reducing the consumption of potable water in a building by using it in toilets flushing, carwash, and gardening.

A benefit of waste water recycling includes lower fresh water.

Estimation of Waste Water Generated

Waste water generation = 80 percent of water used

Mitigation Options

- Measures for reducing waste water generation
- Treatment techniques
 - Aerobic treatment system
 - Anaerobic treatment system
 - Root zone treatment system
 - Dewats
 - Soil Biotechnology (SBT)
 - INDION Membrane Bio-Reactor
 - INDION Package sewerage treatment plant.

Water Harvesting

Rainwater harvesting is the age old concept which holds potential in the current times in reducing water logging problems, controlling run off besides assuring an alternative source of water.

Rainwater use has frequently been rejected due to its limited capacity or due to water quality concerns.

Global warming, greater frequency of droughts and floods make the role of rainwater harvesting possible in many areas even more important as a source of supplementary, back up or emergency water supply. There are several methods by which rainwater can be stored, used and conserved. Each system depends on the amount of precipitation, the period of rainfall in a year and physical infrastructure. Artificial ground water recharge and roof top rainwater harvesting are the two methods ideal for urban and semi urban developed areas.

Artificial Recharge Structure

In urban areas rainfall is limited to monsoon period (usually from 15-90 days), rooftop rainwater cannot be stored for which artificial recharge structure are best. Artificial recharge to ground water is the augmentation of ground water reservoir by modifying the natural movement of surface water.

The main objectives are as follows

- Enhancement where there is depletion of the aquifers and over development.

2. Improving the quality of existing ground water.
3. Removal of suspended and bacteriological impurities during discharge of surface water.
4. Storage and conservation of excess surface water in the aquifers.

The areas where artificial recharge of ground water is recommended:-

1. Ground water is declining
2. Aquifers have already been desaturated.
3. Inadequate availability of ground water in lean months.

Basic Requirement for Artificial Recharge

In planning and designing of above structure following points should be taken into consideration:

1. Annual rainfall.
2. Duration of each storm and intensity.
3. Types of soils.
4. Location of recharge structures.

Types of Recharge Structures

1. Recharge pits
2. Recharge trenches
3. Recharge shafts
4. Trench with recharge well.
5. Shaft with recharge well
6. Recharge through abandoned hand pumps
7. Recharge well
8. Injection well
9. Percolation tank
10. Checkdam
11. Gabion bund
12. Rooftop rainwater harvesting

Roof Top Rain Water Harvesting

Rain water is bacteriologically pure, free from organic matter, soft in nature and hence ideal for use. The area receiving rainfall of considerable intensity is the best option. The water is collected through gutters and down take pipes. In case of storage structures such as tanks, the size of tank should be enough to supply water in shortage. For designing a storage structure demand, catchment area, available rainfall and duration of dry spell are taken into consideration.

The volume of tank can be calculated by following formula

$$V = (T \times N \times Q) + E_t$$

Where,

V= volume of tank (liters)

T= length of dry season (days)

N= number of people using tank

Q=consumption per capita per day(liters)

E_t=evaporation loss during dry period

The five main site conditions to be assessed in case of (surface/subsurface) storage structures are,

1. Foundation characteristics of soil near house
2. Location of trees.
3. Availability of suitable catchment
4. Availability of construction materials.

Conclusion

1. We should make our hotels keeping in view the sustainable approach based on reusing the natural resources like energy, air, forest ,soil.
2. If we are able to save at least 30 percent of water our hotel in terms of water efficiency control will be successful one.
3. We have to use fixtures consuming less water inside kitchen, guest rooms and laundry of hotel and use native plant to consume less water, grey water for car wash, rain water harvesting to irrigate the plants outdoor.
4. The load on municipal supply should be reduced as far as possible.
5. Artificial recharge structures should be used where the rainfall is minimum.

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