



## Zero Discharge of Water in Green Leaf Hotel Operation, Thailand

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### Abstract

The relationship between growth of tourism industry and wastewater has been the big issue in many important tourism destinations in Thailand. Ao-Nang area is in Krabi province in the southern of Thailand, the one of those destinations that has been faced with the big volume of wastewater and also waste water discharge problem. The main concern is the beaches and coastal area. Smelling of the un-well treated or untreated wastewater is the negative impacts to the tourism area such as Ao-Nang. Hotel businesses in the area have been blamed as one of the most important source of the wastewater. The green leaf hotel who are willing to avoid the long term impacts form wastewater a as a big issue in the tourism destinations and effects to the business both direct and indirect ways. In this paper, the example of this report is one of the top green operation hotels in country. This hotel is Pakasai Resort Krabi, one of the five leave hotel in the Green Leaf Certification System (GLCS) and one of the hotel who want to create zero discharge case of water, in Thailand.

**Keywords:** Green operations; Green leaf hotel; Wastewater; Zero discharge

### Introduction

In the last decade tourism industry has been playing an important role for Thai business. The Sea Sand Sun and coastal tourist attractions are the famous and get the high ranking in the tourism destination in country. This growth of tourism is created negative impacts on the Thai environmental on in many ways. Hospitality business is the one of an important element in Thai tourism aspect. The number of hospitality business running in Thailand in the last 10 years has been increasing from 2,547 properties in 2004 to 10,018 properties in 2014, while the natural resources are limited and there are several environmental problems within the country [1]. This number can be the source of water shortage in order to water consumption due to high demand of water in services. On the other hand, wastewater is generally high effects toward environmental impacts in the high density hotel and resort establishment in tourism area. Sustainable tourism criteria and program became leverage for those who want to solve the problem and who want to run the sustainability business. Green Leaf Foundation (GLF) has a long history back in 1991 worked together with a hotelier to minimize waste and increase resource efficiency in hotel. Several visits to different hotels were made in 1992 as well as meeting were organized to learn and understand what needed to be done to raise staff participation in greening the hotel business. In officially establishment of the green certification of the GLCS, the environmental standard certification was initiated in 1998 to institutionalize environmental best-practices for all hotels, as well as to promote the efforts of those who already contribute to the protection via efficient management of energy, environment and natural resources. This was also designed to help lower operational costs and pass those cost-savings on to the customers, too. Indeed, the program also encouraged participatory activities by customers in saving energy and natural resources. Participating hotels receive a rating of 1 to 5 "Green Leaves", based on the results of the audit, every two years. GLF provides ongoing training for hotel administrators and staff to learn and share comprehensive environmental strategies. That involves low or no capital investment and promotes collaboration among hotel staff, suppliers, guests, and the community in environmentally-friendly practice.

Data shows as water supply; sewerage, waste management and remediation activities rose by 9.0% accelerating from a 2.7% growth the previous year or equal as 55,354 million Baht in 2015. This was

attributable to the significant rise of water supply by 7.3%, in contrast to a fall of 0.5% in the previous year. Additionally, recycle of goods continually rose. Meanwhile, sewerage activities rose by 2.4%, slowing down from an expansion of 13.2% in the previous year [2].

The hotel business has challenges of water supplies. The tourist activities often have the water demand more than normal residents required. Water conservation in hotel is a normal operation for solving this problem, more over the creative solution of water shortage problem is how to reuse of used water more than once time. Wastewater treatment is the high operation cost for water management in hotel.

The short term effects on water resources main for degradation and disposal of dredge spoil, especially with regard to coastal tourism development such as in the reclamation of mangrove land for construction of marinas, which can cause sedimentation problem and degradation. The long term effects can be identified as:

- Run off form shore or delivery from streams increase siltation and sedimnets and causes water quality,
- Discharge of untreated sewage due to absence of or inadequate of non functional sewage treatment facilities,
- Discharge of wastewater from tourist activities such as discharge of wastewater from hotel [3].

### Case Presentation

Most recently the hotel has issued a policy to eliminate the usage of chemicals to for the cleaning system throughout hotel. Harsh is one of the most problem water contamination. Graywater and blackwater

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are the two kind of wastewater produced in all building of hotel. Most hotels pay for the water they consume twice – first by purchasing fresh water and then by disposing of it as waste water [4]. Graywater comes from baths, sinks, showers and kitchens and can be recycled and reused for watering the garden and flushing toilets. Black water comes from toilets, and contamination from other sources in hotel such as kitchen, spa must be properly treated before being discharge or reused [5].

Pakasai is located in Krabi province which plays an important role for tourism decision in the Andaman coastal line in Thailand. “Krabi Grow Green” is the recent environmental project after series of attempt in conserving Krabi’s natural beauty and biodiversity for sustainable tourism by complying with the Green Leaf Standard. Pakasai Resort has 104 rooms in chalets style. This hotel is classified as 4 stars hotel and has recently get 5 leave from the GLCS. Hotel has been implemented several things that related to GLCS. Water and wastewater management is one of the issue that is implemented. Table 1 show the figure of water consumption in the buildings 1, 2 and 3 of the hotel which are implemented by installing water meters and reused water system as shows Figure 1.

Approximately 70% of water consumption will be turned to wastewater in the hotel operation. In this hotel 75.42% of water consumption in building 1, 2 and 3 turned to wastewater. 55.71% of wastewater was overflow to the wastewater treatment in hotel. 20.43% of wastewater passed the re-used water system used in the flush system and 17.20% used for garden activities [6].

The Figure 1 show how gray water comes from baths, sinks, showers and kitchens flow in the recycled and reused system flushing toilets in building 1, 2 and 3 and the rest of water that pass the system will use for watering the garden. There are two times of carbon filter before feed water into flush system. According to this system there are 3 measure water meters, 2 meters are using for monitoring water that will be using for flush system and 1 meter is using for monitoring water that will be using in the garden [7-9].

### Discussion

Aiming to water zero discharge of the Pakasai resort can be achieved by succession of the demonstration system. The water analysis can be explained as an average of water consumption per room-night during running completely system in November, 2015 to March 2016. The hotel used the re-used water from the system 22% and used normal water in for services in room 78%.

This Figure 2 can be applied for the whole property and has potential to be zero discharge in the hotel operation in Thailand. This case can also be modified to a success story and encourage neighboring hotel and resorts throughout country.

Avoiding things for wastewater treatment is using non chemical matter into the water system such as hazardous or chemical in the

| Detail  | Cubic meter | %     |
|---|-------------|-------|
| Water consumption from Building 1, 2, 3             | 530         | 100   |
| Wastewater and overflow water in the re-used system |             |       |
| Water run to filter system                          | 400         | 75.42 |
| Using in flush system                               | 108         | 20.43 |
| Using for garden from system                        | 69          | 17.20 |
| Water over flow to treatment system                 | 223         | 55.71 |

Table 1: Water consumption and water pass the measure meters of the demonstration site on June-November 2016.

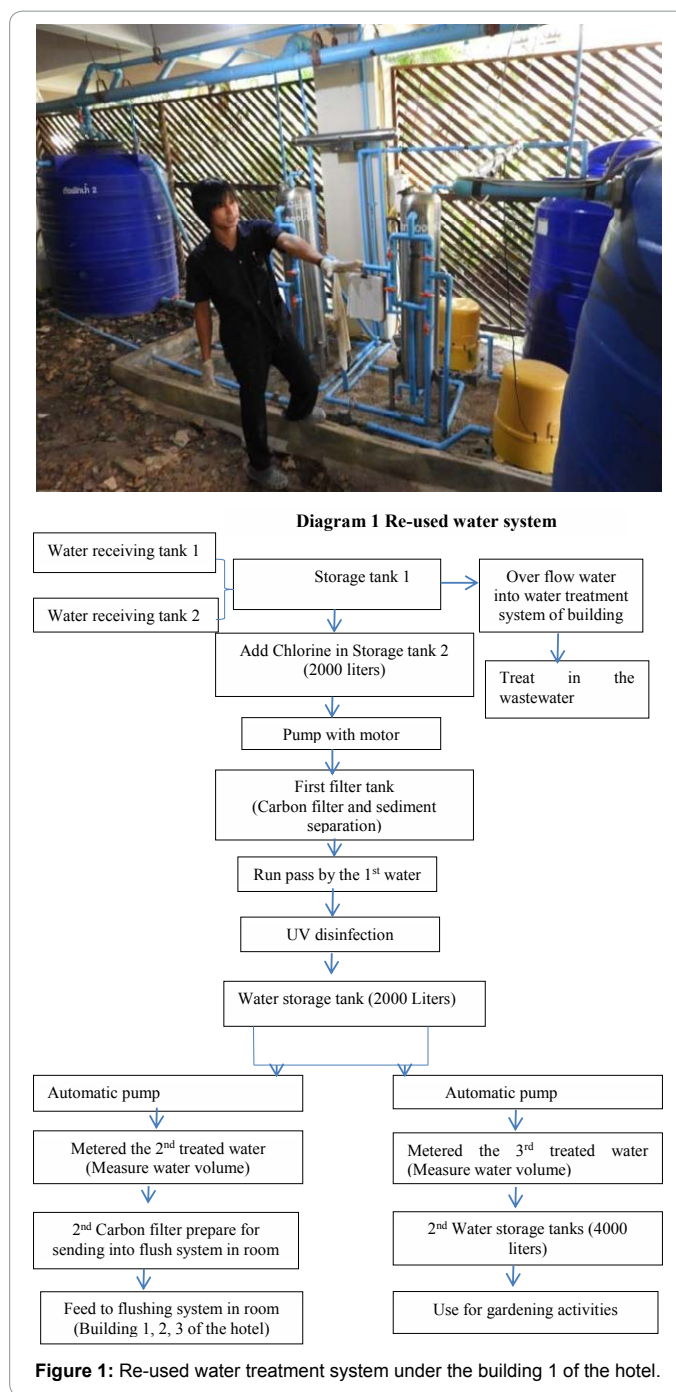


Figure 1: Re-used water treatment system under the building 1 of the hotel.

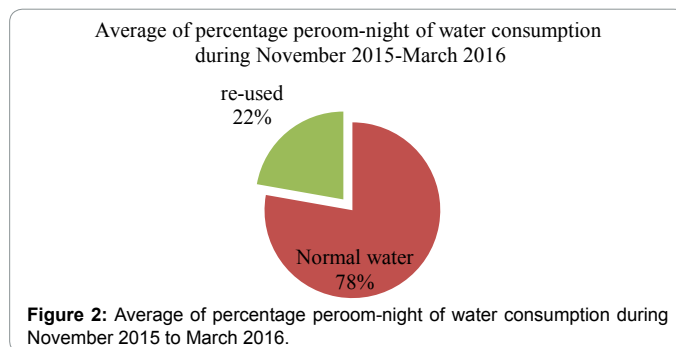


Figure 2: Average of percentage per room-night of water consumption during November 2015 to March 2016.

shower room. Using environmentally friendly cleaning liquid is the helpful for treating water.

Moreover, hotel can consider treating water from the overflow water into the wastewater treatment system and can use that water in the hotel operations. This is the solution for water shortage time and reduces cost for water consumption in the hotel.

## Conclusion

Water is very important to run hospitality business. Increasing amount of re-used water in the hotel is not the reduction of discharge water but also reduction in hospitality operation consumption. Water zero discharge which implemented in this case study can be shown as a success story. The full operation of this hotel would be interesting case in the water zero discharge in the future.

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