ZERO CARBON RESORTS BEST PRACTICES: A CASE OF PALAWAN, PHILIPPINES

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Abstract
Building energy appropriate solutions for a cleaner environment is a desirable outcome for lesser fossil fuel dependence, thus the objective of "green technology" options. Green Technology is defined as technology that seeks to improve environmental performance, and is use interchangeably as climate-smart, climate-friendly, and low-carbon technology. This technology includes both process and product technologies that generate low or no waste and increase resource- and energy-efficiency. The 3R (Reduce-Replace-Redesign) concept of Zero Carbon Resorts (ZCR) - a European Union SWITCH-Asia Programme aims to promote cross country exchange of best practices through site learning observations coupled with strong policy dialogue for sustainable development and effective ecotourism in the Philippines.
This paper presents the best practices and learning's of the ZCR Programme in the province of Palawan. Review of available data and correspondence were utilized to gather valuable key information. With the adoption and application of the ZCR method, resorts have not only contributed in the natural resource conservation but also increase their business profitability. The utilization of solar energy, rainwater harvesting, waste recycling & management and use of LED lights have all lead in decreasing carbon footprints of the resorts for improved environmental condition and healthier population. The methods, practices, applications, and uses of green technology in the concept of 3R's in the province of Palawan is discussed and presented.

Key words: *green technology, Zero Carbon, ZCR Practices, ecotourism, sustainability*

JEL Classification: *O31, O38*

I. INTRODUCTION

Growth of human pollution has been a major problem globally. The use of fossil fuels is one of the contributory factors in deterioration of environment due to increase in the emission of greenhouse gases. Large amount of Carbons in the atmosphere would results to be not suitable for an individual's health. There are many ways that have been introduced in order to reduce the use of fossil fuels and the emission of carbon in our environment.

The Zero Carbon Resorts (ZCR) Project aims to contribute to sustainable development of the tourism sector and its value chain in the Philippines (and Thailand) with a focus on reduction of resource consumption and CO2 emissions. Its primary objective is to contribute to sustainable development of the tourism sector and its value chain in the Philippines and Thailand through the use of green technologies in hotels and resorts (ZCR, 2015).

With the fast growing tourism industry in the Philippines, the employment opportunities and economic strengthening are now at hand. This industry however, brings high demand for energy and is responsible for secondary contributor emitting carbon. Reduction in the use of fossil fuels and increase dependence in natural locally available energy sources have significantly reduced the carbon footprint of the tourism industry (ZCR, 2015). By establishing a framework that emphasizes in proper planning and monitoring, the impacts can be eliminated and be managed properly to a bare minimum (Blangy & Mehta, 2006).This is being done by enabling Small Medium Enterprise (SMEs) in Palawan to switch from fossil fuels to renewable energy. This initiative focuses on building the capacities of local tourism enterprises to become energy-autonomous and promoting local production of renewable materials and green technologies (ZCR, 2015).

Currently, there are total of 175 hotel and resort SME members in the province of Palawan that are being assisted by the Project. As benefit of being a member, the ZCR Technical Team conducted an energy audit and recommended the use of appropriate technologies that will promote a more energy efficient and less carbon emission facilities for the environment. Regular data gathering is being done to monitor their energy performance to ensure that the recommended practices are clearly understood and implemented.

This study will showcase best practices and experiences of ZCR SME members implementing ZCRs 3R methodologies in Palawan which aims to present the replicability of the adoption of ZCR practices to any other tourism related facilities in the Philippines. Increased in the replicability will reduce pollution and will promote the preservation of the environment, as well as in reducing the dependence on the use of fossil fuel which could

be translated into economic savings and ecological benefit.

II. METHODOLOGY

This study employed the use of correspondence and review of online publications where six (6) tourism-related establishments will serve as respondents. Reports in their success stories were compiled and reviewed for their different practices. Data derived from correspondence were compared and correlate in the basis of 3R's. These practices were then categorized on the 3R Strategy "Reduce-Replace-Redesign" in order to specifically present the result together with its impact on energy consumption and the use of green technologies.

III. CONCEPTUAL FRAMEWORK

The ZCR partner institutions and ZCR Member Respondents are present in the overlapping area while in the intersection composes the goal that these two entities must attain, which is the practice of the 3R program of ZCR.

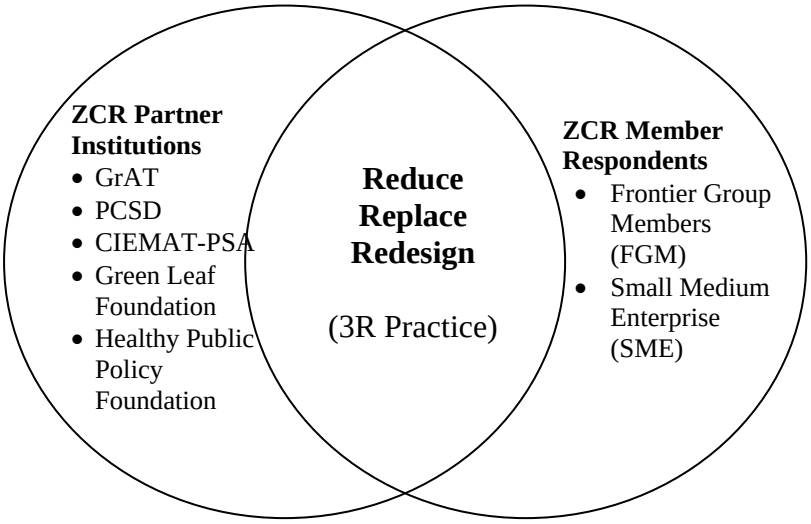

Figure 1 – Conceptual Framework

IV. RESULTS AND DISCUSSION

There were 175 participating members of the ZCR in Palawan, which comprises 149 small medium enterprises (SMEs) and 26 Frontier Group Members (FGM). Six respondents that have submitted their report on success stories of their practices (Reduce-Replace-Redesign) were selected as respondents.

Table 1. Profile of the Respondents

Name of Establishment	Address	Amenities and Facilities
Abad Santos Resort	Abad Santos Street, Puerto Princesa City	24 air-conditioned rooms Hot and cold shower rooms
Daluyon Beach and Mountain Resort	Sabang Beach, Puerto Princesa City Email: inquire@daluyonresort.com	12 modern Asian beach villas (2 rooms per villa) Solar hot water, mini-bars, wifi, satellite cable TV, dvd player Conference Pavillion Swimming Pool
Kokossnuss Resort	National Road, Barangay 6, Coron - Busuanga Road, Coron, Palawan Email: info@kokosnuss.info	18 cottages/bungalow and designer rooms Hot shower Al-Fresco Restaurant
Majika Island Resorts	Bintuan Marine Park, Coron, Palawan	seven rustic beachfront cottages five guest rooms

	Email: majikaislandresort@yahoo.com	Bars, garden, beachfront
Puerto Pension	35 Malvar Road, Puerto Princesa, 5300 Palawan	21 Air conditioned rooms Hot and cold shower Free Wifi Garden
Tropical Sun Inn	152 Manalo Street, Puerto Princesa City, Palawan Email: tropicalsuninn@yahoo.com / info@tropicalsuninn.com	24 Fully air-conditioned rooms Toilet bath with hot and cold shower Free wifi internet connection Standby Power generator

Implementation of the 3R's Program

The ZCR project is focused in making the tourism industry energy efficient in a sustainable and competitive way, through a progressive approach since 2009 in the province of Palawan. This project is engage in the implementation of the 3R methodology such as Reduce, Replace, and Redesign approach for green approach. This was further define as follows:

- *REDUCE* means: You can save energy through low or no cost measures like peak load management, good housekeeping practices, technical adaptations, guest involvement.
- *REPLACE* means: Old technologies will be replaced by new, more energy-efficient ones.
- *REDESIGN* means: The project team will showcase a flagship cottage that is carbon neutral and energy-self-sufficient as a model for future development.

Reduce

ZCR's FG Members in Palawan aim in reducing the consumption of water in their establishment. In Daluyon Mountain Resort and Puerto Pension, the installation of water meter was able to improve their understanding of water consumption. Water Meters were able to reduce water consumption by imposing price on use (Zetland & Weikard, 2011). Harvesting rainwater and filtration is practiced in Puerto Pension to reduce the consumption of ground water through deep wells. Both resort had an average saving on water consumptions of 2,315,618 L/yr. or an equivalent to about 6,361 L/day of operation.

Besides water, electricity is also one of the major concerns. The utilization of Current Cost (CC) Meter with Power on delay as energy saving devices of KokosNuss Resort and Puerto Pension respectively have significantly reduced their electric consumption which leads to an average peso saving per annum of 41.77%. The use of Current Cost (CC) Meter revealed many sources of wasted energy. Generally this device monitored a real-time energy consumption which allows 15% or more of energy saving. After the installation of the energy monitoring system, the Abad Santos Court had gained 18% to 24% of savings in their monthly electric bill. Heat pump is also used as an alternative to heat water during colder days. The practice of using solar energy such as the application of solar water heater (SWH), thermal heating is evident in the resorts for heating water in bathrooms. This method is non-detrimental to the environment which comes with financial savings of about 50% to 100% on utility bill that helps system to recover the original investment in 3-5 years (www.homepower.com). There were remarkable reductions in the consumption of water and electricity of Puerto Pension to about 40% of running costs due to the implemented measures (ZCR, 2015b).

Respondents encountered problems in ventilation in their establishments to ensure that guests are comfortable. Puerto Pension's roof ventilation at the power house and kitchen allowed natural light and air to pass through on the other hand. Tropical Sun Inn added trellis for shading as well as installation of natural ventilation by adding eaves resulting comfort to the guests. Using natural ventilation reduces the cost of energy and preserves the environment. The proper utilization of natural light would spend a lot less on utility energy bills (Fehrenbacher, 2014).

The recycling of waste is done by KokosNuss Resort and Abad Santos Court to reduce their production of garbage. KokosNuss Resort and Abad Santos Court's left-over bath soaps are made into detergent for laundry use it as an alternative cleaning agent in their place which is proven effective in removing stains. It saves the cost of buying additional cleaning materials, yet preventing the use of harmful chemicals for cleaning. The used cooking oils are made into oil lamps which reduce the purchase of tea candles, this practice is evident in KokosNuss Resort and Puerto Pension

Waste management is essential for a resort or hotel in order to maintain its cleanliness. Policies were implemented for waste management. Majika Island Resort has a policy of "Bring in waste, take out waste" that are appreciated by guests making them more proactive in waste management on their own (ZCR, 2015e).

Replace

Respondents replaced the use of compact fluorescent lamp (CFL) with Light Emitting Diodes (LED) to further lessen their consumption of electricity. Television set that has cathode ray tube (CRT) was likewise substituted by LED TV's as practiced in Tropical Sun Inn and Puerto Pension. The Kokosnuss Resort, Puerto Pension, and Majika Resort are presently using LED lights and light ropes for their resorts aesthetic effects. Continuation of this method enabled the resorts to regain the cost of their new lights in less than three months (ZCR, 2015d). LED lighting systems were able to improve both the quality of the environment and lesser electricity usage (Philips Corp, 2010).

The practice of finding alternative methods for the reduction of water consumption was also monitored through changing conventional urinal system with waterless urinal and upgraded their old faucets. Daluyon Resorts also switched to waterless urinals. Waterless urinals are able to save at least 1-5 gallons of water for each use (Bristow et. al., 2004). When Tropical Sun Inn replaced their faucets with aerators, they were able to lessen their water consumption to almost 50%. Adding an aerator is simple and very low cost as well as saving hundreds of gallons of water (MWC, 2015).

SMEs collect solar energy as an alternative source. These collection techniques include the installation of solar for lights and replacement of individual electric water heaters with solar water heaters. Daluyon Resorts and Puerto Pension installed solar tubes in their administrative office which enabled them to take advantage of daylight and reduce energy use. This enables the resort to save 2800W everyday (ZCR, 2015a).Centralized heating will help heat hotels more efficiently and reduces energy consumption (CSE, 2014).

Redesign

The practice of redesigning electrical components promotes safety among others. Organizing electrical panels, wirings, public switches, and proper labeling of these switches are also present. The owner of KokosNuss Resort is satisfied with a safer and improved electrical system in their place while Tropical Sun Inn were able to avoid confusion and redundant use of lights by labeling its switches.

Respondents are practicing for other methods to save energy, promote natural cooling, and shading techniques by redesigning structures. Processes such as additional insulation, installation of dormer or monitor roofs, and reorientation of Photovoltaics (PV's) solar panels, using trees as natural shading, and repainting of roofs with light colored paint were evident. In Majika Resort, solar panels were reoriented for improved energy supply. The ceiling insulation in Tropical Sun Inn reduced heat and helps air conditioning units to cool a room more efficiently. Painting of white color in the roofs and used of bougainvillea in KokosNuss Resorts aids in cooling and additional shade.

Impact on energy consumption

Out of the six respondents, there were four resorts that are able to reduced electricity in terms of Philippine peso (Php). There was a total saving of Php 4,257,093.11 from their baseline expenditures of 15,014,259.00 annually (Table 2).The KokussNuss Resorts and Tropical Sun Inn was recorded to have a large amount of savings from electricity consumption. All of the respondents were able to reduce their water consumption (in terms of Php) with an overall savings of Php 286,908.75 from their baseline of 354,308.00 annually. The Puerto Pension and Daluyon Mountain Beach and Resort has obtained the biggest savings. Others that do not use electricity were able to save their fuel consumption to a total of Php 4,716,924.20 from their baseline of 11,952,872.64 yearly. There were a total savings of 35.01% or amounting to Php 9.94M, after the implementation of the ZCR's 3R programme. Resort owners have express their best practices as part of their daily operations. They considered their scheme a "Zero Carbon Emission" through their strong commitment in developing ZCR or green home.

Hotel Name	Electricity (Php)	Water (Php)	Fuel (Php)	Total (Php)	Savings (%)
Abad Santos Resort	309,700.31	5,475.00	N/A	315,175.31	28.93%
Daluyon Beach and Mountain Resort	N/A	60,962.19	3,931,333.87	4,672,917.69	44.77%
Kokossnuss Garden Resort & Restaurant	1,620,224.68	1,589.01	323,287.63	1,945,101.32	42.06%
Majika Island Resorts	N/A	5,963.92	462,302.70	468,266.62	30.50%
Puerto Pension Bed and Breakfast	952,900.93	189,450.24	N/A	1,142,351.17	45.97%
Tropical Sun Inn	1,374,267.19	23,468.39	N/A	1,397,735.58	17.85%
Total Savings in Peso (Php)	**4,257,093.11**	**286,908.75**	**4,716,924.20**	**9,941,547.69**	**35.01%**

There were a total savings of 35.01% or amounting to Php 9.94M, after the implementation of the ZCR's 3R programme.

Resort owners have express their best practices as part of their daily operations. They considered their scheme a "Zero Carbon Emission" through their strong commitment in developing ZCR or green home.

"Mr. Butch Tan quickly implements measures that improve energy efficiency when he is aware of their benefit, such as the solar tube for natural lighting." – Daluyon Beach and Mountain Resort

"These simple do it yourself methods can help both your hotel's budget and lead to an environment which can be saved for years to come, generations to follow." – Abad Santos Resort

"The inn has promisingly proved itself in assuring that saving money and doing something for the environment can be done without compromising the services provided to the customers." – Tropical Sun Inn

"Engr. Rudolf M. Weih was pleased to collaborate with the ZCR team to develop his resort into a more eco-friendly haven." – KokosNuss Garden Resort & Restaurant

"With the additional knowledge gained from attending frequent trainings and seminars conducted by the ZCR, Mr. Butch Tan's staff acquired a better understanding in implementing the technical recommendations which contributed a lot to the overall success of this hotel." – Puerto Pension Bed and Breakfast

"The combined coordination of LGUs in the area and involvement of host community strengthened and stabilized Majika's undying efforts toward green practices." – Majika Island Resorts

An improved practice has paved the way of ZCR member resort owners in their search for energy saving, making their own contribution in reducing environmental and anthropogenic pressures.

V. CONCLUSION AND RECOMMENDATIONS

The Zero Carbon Resorts (ZCR) 3R Strategies were able to demonstrate its role for a more sustainable ecotourism in the case of Palawan which have contributed to the preservation of the environment, not only they were able to save energy but also have increased business profitability. Their best practices were reflected in harvesting solar energy, rainwater collection, waste recycling and management, and use of green technologies. The savings with regards to electricity, water, and even fuel concluded that the ZCR 3R strategies are effective practices for sustainable use of resources that would enable tourism community to replicate in different areas in the country.

This further recommends that:

- Natural lighting (i.e. using solar tubes) and natural ventilation should be utilized to help reduce energy consumption
- CFL lights must be replaced with LED lights in combination with the use of natural lighting.
- Installation of waterless urinals, dual flush toilets, and other water efficient plumbing fixtures was highly recommended for enhanced water conservation.
- Electrical installations must be redesigned for improving energy efficiency and mandatory safety.
- PV solar panels must be installed properly to maximize its harvesting capacity
- Popular media mileage must be enhanced for an increased knowledge platform of ZCR practices.
- There should be the development of more affordable replacement and redesign concepts for easy application and increase popularity to target users.

Inter-agency and institutions collaboration should be institutionalized for long- promotion and implementation of the ZCR practices.

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