EFFORTS PERFORMED BY HOTELS IN BALI IN LOOKING AFTER THE ENVIRONMENT

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Abstract

A study on "Efforts perpormed by hotels in Bali in looking after the environment" was undertaken in 2009, by utilising data from July, 2008 until June, 2009. Objectives of the study was for collecting data on any efforts undertaken by hotels in looking after the environment especially related to minimising water consumption, garbage handling, the use of chemicals (especially cleaning chemicals), minimising energy consumption and ecosystem conservation (measured from the proportion of natural vegetation). Data were collected from interviews, document checkings and distributing questionaires.
Results of the study showed that in average water consumption of hotels in Bali was 115 litres / guest night. It was considered low, less than the benchmark of Green Globe/ Earthcheck which was 1,300 litres / guest night. The average of energy consumption was 0.322 MJ per guest night, which was still much below the baseline levels / standard of 340 MJ / guest night. In average garbage/waste produced by hotels was 0.0309 litre/guest night. This was also much below the baseline of 6 litres / guest night. The use of biodegradable cleaning chemicals in the hotel was averaged 35% which should be a minimum of 50%. There were 22% only of hotels which used cleaning chemicals that were biodegradable over 50% (over the standard). In average the proportion of natural vegetation in a hotel was 29%. There were 43% of sampled hotels of which their natural vegetation was over the baseline of 33%.
Thus, hotels in Bali should improved their performance in looking after the environment, especially dealing with cleaning chemicals and ecosystem conservation. In this regards, they should increase the proportion of the use of biodegradable cleaning chemicals and increase the proportion of land kept with their natural vegetation.

Key words: hotel, water, energy, garbage/waste, chemical, vegetation, environment

1. Introduction

Environmental problems, especially clean water, garbage, energy, pollution (chemicals) and destruction of ecosystems discussed more and more popular lately. In urban areas, such as Denpasar, it is often difficult to obtain clean water, especially in the morning at which the tap is not dripping water. Garbage becomes a problem in almost every area, ranging from rural to urban areas. Electricity might cut off due to lack of supply of the rotating-hour peak load. The use of chemicals especially for laundry or washing machine without wastewater treatment often leads to environmental pollution.

Conversion of green open areas for development purpose, accommodation facilities and others damaged ecosystems and reducing the availability of natural vegetation. Only 56% of the forest area in Bali is in a good condition, indicated by having a dense cover of vegetation or having natural vegetation. As much as 18.39% of the forest in this province has been in critical condition (Adnyana and Suarna, 2007).

For the Balinese, dominant society of whom their economy directly or indirectly depend on the tourism sectors, the above problems also affect the image of Bali island as a leading tourism destination. Thus, it is important to know the extent of the components of tourism, efforts of hotels in looking after the enviroment, at least from the environmental aspects.

The purpose and benefits of this research were as follows: (1) To obtain data on the types of activities carried out by hotels especially in maintaining the environment associated with the use of clean water, garbage treatment, use of chemicals (especially cleaning chemicals), energy consumption and conservation of ecosystems (viewed from the proportion of natural vegetation conserved); (2) Provide data on average energy consumption (MJ per guest night), consumption of water (litres / day), production of garbage/waste (kg / guest night or in litre / guest night), the use of chemicals (% biodegradable chemicals / year, especially for cleaning chemicals), the percentage of natural vegetation (% natural vegetation of the area); (3) Comparing the above data with standards (benchmarks) such as from international certification criteria for sustainable tourism "Green Globe/ Earthcheck", so it will revealed whether or not hotels in Bali are environmentally friendly seen from the criteria above; (4) Find out the constraints faced in protecting the environment on aspects mentioned above; (5) Provide recommendations to the constraints faced; (6) Provide the best practice in the field of environmental protection that can be used as an example to other tourism accommodation industries.

2. Research Methods

To determine the types of environmentally friendly efforts that have been carried out by accommodation tourist industries in Bali (especially in Badung regency, Gianyar and Denpasar city), the data were collected from interviews, document examination, or circulation of questionaires. Efforts have been made by the manager of tourism accommodation facilities will be obtained from the interviews and examination of documents and the circulation of the questionnaires. In the meantime, for more detailed data, how much water consumption, energy, garbage/waste production, the use of environmentally friendly chemicals (cleaning chemicals), as well as aspects of ecosystem conservation can be described as follows.

Energy consumed per guest night was obtained from the collection of data as follows: the energy consumption in average per guest night was collected from data on the use of electricity, gas (LPG), gasoline, etc., as evidenced from the "electric bill", notes the purchase of gasoline, etc. If possible, the data were retrieved within one year period. These data were then divided by the total "guest night" in a year that will give the average. If found in kWh of energy will be converted into the MJ where 1 kWh = 3.6 MJ. If the energy is in the unit of BTU, it will be converted into MJ, where 1 BTU = 1055/106 joules (Earthcheck, 2004).

For garbage reduction efforts, it can be seen from garbage production whether was there any garbage separation process, R3 (reduced, reuse, recycle), and composting. Then the average production of garbage per guest night was calculated from the total garbage produced per year (ie., kg in weight or volume of litres) divided by the "guest night" in one year (Earthcheck, 2004).

For environmental friendly and the efforts to reduce pollution it was calculated from biodegradable cleaning chemicals divided by the total cleaning chemical (measured in weight, if any data in volume converted to weight) that was used per year, multiplied by 100%. Biodegradable criterias refer to Earthcheck criteria (2004).

Ecosystem conservation was determined by how much area of land with natural vegetation was still owned by the tourism accommodation facilities compared with the total land area and multiplied by 100%. The data were then compared with benchmark of 3/9 based on the concept of *sanga mandala* in Balinese life phylosophy of *Tri Hita Karana*.

For the water consumption, the data was obtained from the volume of water used for tourism accommodation facilities from source of taps and wells drilled. The average water usage will be calculated using the formula: The total water used a year divided by the total guest night in a year (Earthcheck, 2004).

3. Results and Discussion

The number of tourism accommodation in Bali in 2007 reached a total of 1973 with 42,334 rooms (Diparda Bali, 2007). Until the year 2020 the estimated

Table 1. Name code of the hotel, area hotel, the number of rooms, number of employees, number guest night per year

No	Facility Name of Tourism Accommodation (code)	Address Area Tourism Accommodation	Area Hotels (M^2)	Number of Rooms	Number of Employees (Person)	Number of Guest Night /Year
1	A	Denpasar City	1,300	61	88	31,796
2	B	Denpasar City	31,906	182	377	113,285
3	C	Denpasar City	4,200	189	239	59,301
4	D	Badung Regency	87,860	126	342	28,482
5	E	Badung Regency	86,448	381	570	210,576
6	F	Gianyar Regency	92,250	19	51	9,446
7	G	Badung Regency	16,000	418	938	236,561
8	H	Badung Regency	3,405	150	237	85,583
9	I	Badung Regency	95,000	342	626	190,569
10	J	Badung Regency	1,660	128	260	-
11	K	Gianyar Regency	-	17	86	5096
12	L	Badung Regency	10,500	494	623	319,314

needs of hotel rooms in Bali reached 43,447 (Wiranatha *et al.,* 2008: 36).

In the year 2007 Badung Regency, Gianyar Regency, and Denpasar City have 601, 547, and 256 tourist accommodation facilities, respectively (Diparda Bali, 2007). From 100 tourist accommodation facilities sampled in the that area, only 12 samples give the data. Some accommodation facilities industries refused to give the data, some said did not have data or not to respond for reasons that are unclear. It is important to realize that in order to obtain environmental data of hotels are not easy, and the data obtained from the 12 hotels were not all complete, so the analysis carried out from some sample data that were available for each parameter or aspect of the study.

Data of tourism accommodatio facilities in Bali were obtained from 12 accomodations in the area of Denpasar city, Badung regency and Gianyar Regency. These data were particularly associated with the name of the hotel, area of the hotel, the number of employees, the number of annual guest night can be seen in Table 1 (specific name of the hotel provided in a secret code of letters A - L).

3.1 Water Consumption

Clean water is a vital requirement in hotel operations. Hotels use several sources of water, such as: taps, under ground water or artesian wells. Use of clean water by the hotel is strongly related to the number of employees, number of guest night, the use for the swimming pool, kitchen, dining and other activities. The average amount of water usage by 10 hotels that provide data about water are presented in Table 2.

In Table 2 can be seen that the use of average water per guest night of tourism accommodation facilities in Bali ranges between 1.2-1,120.1 litres / guest night with an average of 115 litres / guest night. If the above data compared with the standard (benchmark) that exist, especially from the certification criteria for sustainable tourism "Green Globe" which refers to the criteria of Earthcheck, it was known that the use or water consumption was

Table 2. Use of clean water per guest night in some hotel sample

No	Name Hotel / Home Stay***	Use of water (litre / guest night) **	Standard Reference (litre/guest night)	Description
1	A	8.1	1300	Below standard
2	B	1.3	1300	Below standard
3	C	5.2	1300	Below standard
4	D	5.1	1300	Below standard
5	E	1.8	1300	Below standard
6	F	1.2*	1300	Below standard
7	G	2.5	1300	Below standard
8	H	2.5	1300	Below standard
9	I	2.5	1300	Below standard
10	J	1,120.1	1300	Below standard

* Best practice; ** average data, taken in the last period of 1 year. ***Code of the name of hotels, such as A, here does not necessarily the same as the name of A mentioned on other aspects.

still relatively low, ie. below 1,300 litres / guest night. From the data in the table also seems that the "best practices" in the field of clean water consumption amounted to 1.2 litres / guest night.

The efforts made in minimising water consumption, among others: the slow-flow faucets use, use a double flush toilet and use of treated sewage for watering the garden. Other effort undertaken by hotels for saving water was to use the water from the treated wastewater to irrigate the fish ponds around the hotel.

Constraints encountered in the use of clean water among others were how to minimize water consumption as low as possible. Recommendations for that were encouraging campaigning to minimize water consumption and watering the garden at night time, thus reducing evaporation of water. The campaign to minimize water also should continue to be encouraged not only for hotel employees, but also for tourists who stay or conducting activities at the hotel.

3.2 Energy Consumption

The main energy source for hotel activity is "PLN" (town electricity), genzet (diesel) for backup and LPG for kitchen use. PLN energy source was used most for operational lighting and electronic goods, while LPG was generally for the kitchen and restaurant activities. Backup energy source was genzet that consume diesel fuel. The average use of energy sources were presented in Table 3.

Of the 10 samples obtained turns out that the energy consumption of tourism accommodation facilities in Bali ranges between 0.002-1.627 MJ / guest night, with an average of 0.322 MJ per guest night. Energy consumption is far below the baseline / standard of 340 MJ / guest night as internationally defined by the Green Globe / Earthcheck. Thus in general the energy consumption of hotels in Bali was quite efficient.

From the data in Table 3, it appears that the energy consumption of hotels in Bali could be reduced to 0.002 MJ / guest night. It is the best practice for hotels in connection with energy consumption.

The energy consumed by hotels in Bali was very efficient due to several things, among others: there was an effort on some hotel managements to use energy efficient lighting, using "solar cells" at the peak load for heating water, used a grouping system with a timer, reduced the use of machines in operation at peak load with a timer, put spuyer on boyler machine to minimize the use of solar, avoided the use of laundry equipment and kitchen during peak hours, used and played termostate switches in guest room, set the timer on the pump and the lights

Table 3. The average usage / energy consumption in the sampled hotels in Bali

No.	Name of Hotel**	Total Energy Consumption / Year (MJ)	Total Energy Consumption (MJ / Guest Night)	Standar Reference or Benchmark (MJ / Guest Night)	Description
1	A	7,234,406.487	0.181	340	Below standard
2	B	40,124,619.901	0.278	340	Below standard
3	C	1,691,424	0.298	340	Below standard
4	D	41,611,934.631	1.627	340	Below standard
5	E	132,465.6	0.002*	340	Below standard
6	F	1,722,340.8	0.111	340	Below standard
7	G	47,946,204.896	0.375	340	Below standard
8	H	691,786.8	0.121	340	Below standard
9	I	5,704,463.381	0.177	340	Below standard
10	J	5,158,823.786	0.051	340	Below standard

*Best practice; ** Code name of the hotel (eg. A) here does not necessarily the same as the name (eg. A) on the other aspects of the discussion.

Table 4. The average of garbage or waste production per guest night

No	Name of hotel / tourism accommodation facilities**	Garbage production (litre/guest night)	Reference Standard (litre/guest night)	Description
1	A	0.0009*	6	Below standard
2	B	0.0376	6	Below standard
3	C	0.0472	6	Below standard
4	D	0.0791	6	Below standard
5	E	0.0328	6	Below standard
6	F	0.0280	6	Below standard
7	G	0.0065	6	Below standard
8	H	0.0148	6	Below standard

* Best practice. ** Listing the name of the hotel (eg A) here are not necessarily the same as the name (A) on the other aspects of the discussion.

and there were many more efforts for energy-saving options.

It seems that not all tourist accommodation businesses have a good record of energy consumption. If the data were not owned, they would find difficulties in monitoring the energy consumption, so the results of minimization energy could not be monitored properly. It is recommended that hotels take records of energy consumption every day so that monitoring can be done better.

Minimization of Garbage or Waste Production

Garbage produced by hotels in Bali were presented in Table 4.

From Table 4 it seems that the hotel produced garbage or waste ranged between 0.0009 and 0.0791

Table 5. Sorting of garbage produced by each hotel/accomodation tourism in Bali

No.	Hotel **	Is the garbage sorted
1.	A	Yes, into 3 parts (wet, dry, plastic)
2.	B	Yes, into 4 parts (wet, dry, organic, inorganic)
3.	C	Yes, into 3 parts (organic, inorganic, plastic packaging)
4.	D	Yes, into 4 parts (plastic, recycling, kitchen waste oil)
5.	E	Yes, into 3 parts (plastic, non-plastic, glass)
6.	F	Yes, into 4 parts (wet, dry, plastic, glass)
7.	G	Yes, into 3 parts (wet, dry, plastic)
8.	H	Yes, into 2 parts (organic, inorganic)
9.	I	Yes, into 2 parts (wet, dry)
10.	J	Yes, into 2 parts (organic, inorganic)
11.	K	No (done by external service)
12.	L	Yes, into 3 parts (wet, dry, glass)

** Listing the name of the hotel (eg. A) here does not necessarily the same as the name (eg. A) on the other aspects of the discussion.

Table 6. Hotel efforts in garbage management

No.	Name of Hotel **	Doing 3R activities	Garbage for Composting
1.	A	Yes	Yes
2.	B	Yes	Yes
3.	C	Yes	Yes
4.	D	Yes	Yes
5	E	No (using external service)	Yes
6.	F	Yes	Yes
7.	G	Yes	Yes
8.	H	Yes	Yes
9.	I	Yes	No
10.	J	Yes	No
11.	K	No	No
12.	L	Yes	Yes

** Listing the name of the hotel (eg. A) here does not necessarily the same as the name (eg. A) on the other aspects of the discussion.

litres / guest night (average 0.0309 litres / guest night), with the best practices of 0.0009 litres per guest night. Garbage production of these hotels was still far below the standards of Green Globe / Earthcheck at 6 litres / guest night. Thus the general tourist accommodation facilities in Bali quite a little to produce garbage. Although the garbage produced was still below the standar or benchmark, if not managed properly, it will cause problems to the environment, among others, can produce bad smell, and may act as disease vectors. Almost all hotels in the handling of garbage have sorted the garbage before discharged into Final Disposal Area.

Besides separating the garbage by 92% of sampled hotels, the hotels have tried to process the garbage, especially the organic one for compost (75% of the sample hotels; Table 6). Other things undertaken for minimising the garbage production, such as R3 (reduce, reuse and recycle) (by 83% sampled hotel) (Table 6). There were hotels in the handling of garbage in cooperation with local community groups, so the local could have the job out of this activity.

Obstacles encountered in the minimization of garbage production, appealed to all parties. Recommendations for these constraints include: Co-operation and awareness conducted continuously so that people realize the importance of good personal hygiene, minimizing garbage production and to R3 to produce minimal garbage. Garbage can be a factor of disease transmission.

3.4 Use of Cleaning Chemicals

Hotels in operation often use chemicals. One of the chemicals which was quite commonly used in the hotels was cleaning chemical. These include chemicals for cleaning the tables, floors, laundry, etc.

There were chemicals that are biodegradable, which could be degraded by organism naturally, and non-biodegradable which cannot be biologically degraded naturally. Presented in Table 7 the percentage of amount of biodegradable chemicals that are used in each hotel.

Table 7. Percentage of use of biodegradable chemicals in a year

No.	Name of Hotel**	Biodegradable Cleaning Chemicals July 2008-June 2009 (kg/year)	Total consumption of Cleaning Chemicals (kg/year)	Per cent age	Standard or Benchmark (in %)	Descripti-on
1.	A	2698	8406	32	50	Below standard
2.	B	60	760	8	50	Below standard
3.	C	345	990	35	50	Below standard
4.	D	2175	10950	20	50	Below standard
5.	E	190	8587	2	50	Below standard
6.	F	1831	1831	100	50	Above the standard
7.	G	655	775	85	50	Above the standard
8.	H	50	165	30	50	Below standard
9.	I	0	19700	0	50	Below standard

** Listing the name of the hotel (eg. A) here does not necessarily the same as the name (eg. A) on the other aspects of the discussion.

From Table 7 it appears that the use of biodegradable chemicals varied between 0% - 100% (average 35%). The standard or benchmark set by Green Globe / Earthcheck was the minimum of 50% of cleaning chemicals used by the hotels should be biodegradable. There were 22% of hotels which used cleaning chemicals that were biodegradable over 50%, mean while 78% of hotels did not use cleaning chemicals which was biodegradable over 50%. From the data in Table 7, it can be seen that there was a hotel which has been using 100% biodegradable cleaning chemicals. This is a best practice, and it is highly recommended.

Efforts to conserve the environment associated with chemicals were by maximizing the use of biodegradable chemicals instead of non-biodegradable ones.

Constraints faced in increasing the proportion of the use of biodegradable chemicals, among others: sometimes employees found difficulties recognizing chemicals which were biodegradable. This requires adequate scientific study by inviting experts. Although Earthcheck provide enough information to find out which chemicals are not biodegradable but still need special skills to use this knowledge in analyzing which chemicals are bidegradable and which ones are not. There are generally no many staffs who have the skill in this field in hotels.

3.5 Ecosystem Conservation

Ecosystem conservation is calculated based on the proportion of the remaining land to garden with natural vegetation. In *sanga mandala*, according to Balinese belief, this proportion reached at least 3 / 9, or 33% that are recognized as *nista mandala* such as for green open space, composting sites, and others. The maximum for the building sites, or the major part of the construction site of hotel facilities is 5 / 9 or 56%, while others at least 1 / 9 or 11% are used for *parhyangan,* or zone for the spiritual and religious activities, such as the holy place.

From the results of data analysis (Table 8) it appears that the proportion of natural vegetation on each hotel varied between 10-47% (on average of 29%). There were 57 % of sampled hotels which their natural vegetation less than benchmaks of 33%, mean while there were 43% of sampled hotels of which their natural vegetation over the baseline of 33%.

Best practice for natural vegetation in hotels was 47%. The natural vegetation and diverse environments found in the hotel can be used as a package called "garden tour". This will provide additional economic benefits.

Constraints faced in maintaining the natural vegetation within the hotel / tourist accommodation facilities, among others: lack of understanding of

Table 8. Comparison of building sites, gardens, and natural vegetation in the environment area of hotels in Bali

No	Name of Hotel**	Extent of the land utilized	Ratio of building area with land (%)	Standard or expectations of building area according to *sanga mandala*, maksimum (%)*	Ratio of garden area to land area (%)	Ratio of the building area and garden area to land area (%)	Ratio of natural vegetation area to land area (%)	Standard or expectations of natural vegetation according to *sanga mandala,* minimal (%)**
1	A	31,906 sq.m	37	56	63	100	47	33
2	B	4.2 Ha	64	56	36	100	36	33
3	C	13 Ha	54	56	46	100	23	33
4	D	3,405 sq.m	40	56	60	100	10	33
5	E	86448 sq.m	40	56	60	100	23	33
6	F	92.25	47	56	53	100	28	33
7	G	107 000 sq.m	20	56	80	100	34	33
	Average		40	56	60	100	29	33

* equivalent to a maximum of 5 / 9 in *madya mandala*; ** equivalent to at least 3 / 9 in *nista mandala;* *** code name of the hotel (eg A) here does not necessarily the same as the name of (eg. A) on other aspects of the discussion.

understanding to whether the vegetation were natural vegetation or not, and because of maximum land use — because there was no enough land for the development. Thus it was forced to use the land as maximum as possible. In addition, it seems hotels tried to make a garden look more beautiful, by planting many kinds of "new plants" from outside the hotel which was not necessarily fit with the hotel environment. This causes the natural vegetation displaced from the hotel environment.

It is recommended that the hotel actively recognize the natural vegetation, and preserve it. It is expected that at least 33% of each area of hotels to be maintained as natural vegetation, so there is a genetic resource and reserve for another use that has not been known yet.

4. Conclusions and Suggestions

4.1 Conclusions

Water consumption of tourist accommodation facilities in Bali ranges between 1.2-1,120.1 litres / guest night with an average of 115 litres / guest night. If the above data compared with the standard (benchmark) of the criteria for international certification of sustainable tourism "Green Globe" which refers to the criteria of Earthcheck, it is known that the use or consumption of water was still relatively low, ie below 1,300 litres / guest night. From the data collected the "best practices" in the field of clean water consumption amounted to 1.2 litres / guest night. The efforts made in saving water consumption, among others: the slow-flow faucets use, use a double flush toilet and no longer use the clean water but using treated sewage to water the plants / garden. Other efforts undertaken by the hotel for saving water was to use the water from the treated wastewater to irrigate the fish ponds around the hotel.

Consumption of energy by tourism accommodation in Bali ranges between 0.002-1.627 MJ / guest night, with an average of 0.322 MJ per guest night. The best practice was 0.002 MJ / guest night. Energy consumption was far below the baseline / standard of 340 MJ / guest night as internationally defined by the Green Globe/ Earthcheck. Thus, in general, hotels in Bali have been quite efficient in energy consumption. The use of energy sources that was very efficient by tourism accommodations / hotels in Bali was due to several things, among others: there was an effort on the part of the hotel management to use energy efficient lighting, used a "solar cell" at the peak load for heating water, used a grouping system with a timer, reduced the use of machines in operation at peak load with a timer, put spuyer on boyler machine to minimize the use of diesel, avoided the use of laundry equipment and kitchen during peak hours, used of a termostate and main switches in guest room, set the timer on the pump and the lights and there were many more efforts for energy-saving options.

Hotel produced garbage ranged from 0.0009 to 0.0791 litres / guest night (average 0.0309 litres / guest night), with the best practices of 0.0009 litres per guest night. Hotel garbage production still far below the standards of Green Globe / Earthcheck at 6 litres / guest night. Thus, in general, hotels in Bali were quite a little to produce garbage. Almost all hotels in the handling of garbage have done sorting the garbage before discharged into FDA. Beside separating the garbage by 92% of sampled hotels, the hotels have tried to processed the garbage especially the organic one for compost (75% of the sample the hotel). While others do the R3 (reduce, reuse and recycle) (by 83% sample hotel) to reduce the garbage production.

The use of biodegradable cleaning chemicals in each hotel varies between 0-100% (average 35%). The standard set by Green Globe/ Earthcheck was at least 50% ingredients of cleaning chemicals used by hotels was biodegradable. There were 22% of hotels which used cleaning chemicals that were biodegradable over 50%, mean while 78% of hotels does not used cleaning chemicals which was biodegradable over 50%. Efforts for looking after environment related to cleaning chmicals was that as much as possible the use of biodegradable cleaning chemicals compared to those which were non-biodegradable.

The proportion of natural vegetation of each hotel ranged between 10-47% (average 29%). There were 57% sample hotel results under standard / benchmark (33%) while 43% sample hotel reach the natural vegetation standard (33%). Best practice for natural vegetation in the hotel environment reached 47%.

4.2 Suggestions

From this research can be provided suggestions as follows.

- To minimize water consumption it is recomended to improve campaign of water efficiency and watering the garden at night, thus reducing evaporation of water. The campaign to minimize water consumption should also be continued to encourage not only hotel employees, but also tourists who stay or conducting activities at the hotel.
- In relation to energy efficiency, it is recommended that every effort of hotels to keep records of energy consumption every day so that monitoring can be done better
- Although Earthcheck provide enough information on chemicals, which chemicals are not biodegradable, but still need special skills to use this knowledge in analyzing wether chemicals were bidegradable. There are generally few, not many, staffs who have skills in this field. Therefore, training related to the cleaning chemicals is recommended.
- It is recommended that the hotel staffs actively recognize the natural vegetation, and preserve it. It is expected that at least 33% of each area of the hotels maintain natural vegetation, so there is a genetic resource and reserve for the future need that has not been known yet.
- It is recommended that further research on other environmental aspects need to be carried out.
- It is recommended that this research need to be carried out on other times to see the development of achievement

References

Adnyana, I W. S. And I W. Suarna. 2007. *Permasalahan dan Kerusakan Lingkungan Hidup*. Pp. 3-25. *In* "Kearifan Lokal dalam Pengelolaan Lingkungan Hidup". Ed. by A. A. G. Raka Dalem, I N. Wardi, I W. Suarna and I W. S. Adnyana. UPT. Penerbit Universitas Udayana and PPLH Unud: Denpasar.

Dalem, A. A. G. R. 2007a. *Mengimplementasikan THK dalam bidang pariwisata: menentukan Indikator Bidang palemahan*. Jurnal Dinamika Kebudayaan 2007(1): 74-86.

Dalem, A. A. G. R. 2007b. *Implementasi Tri Hita Karana dalam Bidang Pariwisata Menuju Pembangunan Berkelanjutan*. Jurnal Lingkungan Hidup Bumi Lestari 7(1): 78-84. PPLH-UNUD: Denpasar.

Dalem, A. A. G. R. 2008. *Sistem Manajemen Lingkungan, Tri Hita Karana dan Implementasinya di Lingkungan Hotel*. Jurnal Lingkungan Hidup Bumi Lestari 8(1): 58-62.

Dinas Pariwisata Provinsi Bali. 2007. *Direktori 2007.*

Green Globe 21. 2003. Green Globe: The path to sustainable travel and tourism. Green Globe 21 1-day benchmarking course, Saturday, 12 April 2003: Bali-Indonesia.

Earthcheck. 2004. Enterprise benchmarking methodologies. Version 2.1. www.earthcheck.org

Green Globe. 2008. Green Globe Company Standard Auditor Training Workshop. February 5-8, 2008. Brisbane, Australia.

ISO 14001. 1996. Environmental Management Systems - Specification with guidance for use. ISO: Switzerland.

Suryawan Wiranatha, A. A. P. A, A. A. G. R. Dalem, and I N. Simpen. 2008. Performance of the Oberoi Bali Hotel evaluated from the Characteristics of Cleaning Chemicals Used. Manuscript (6 pp).

Team THK Awards. 2002. *Buku panduan (Hand Book) Tri Hita Karana Tourism Awards and Accreditations.* Bali Travel News: Denpasar.

Wiranatha, A.S., P. Preantjaya, I.B.G. Pujaastawa, K. Satriawan, dan A.A.G. Raka Dalem. 2008. *Analisis kebutuhan akomodasi dan transportasi pariwisata di Bali.* Puslit Kebudayaan dan Kepariwisataan Unud dan Disparda Bali.