Original Research Article

Adaptive responses to Climate Change: Evaluating the Implementation and Effectiveness of Water Resource Management Strategies in Selected Hotels within the environs of Lake Naivasha

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ABSTRACT

Aims: This study sought to evaluate the adoption of water resource management strategies in hotels in an attempt to attain water sustainability. Specifically, the research sought to assess the current structural and non-structural water resource management strategies adopted by selected hotels in the environs of Lake Naivasha; establish the perceived effectiveness of both the structural and non-structural water resource management strategies adopted to enhance water sustainability; and compare the structural and non-structural water management strategies in terms of their effectiveness in promoting water sustainability in hotels within environs of Lake Naivasha.
Study design: The study adopted a case study design.
Place and Duration of Study: This study was conducted in hotels within the environs of Lake Naivasha between May and December 2010.
Methodology: A census of 30 Class (A) registered hotels was conducted, and purposive sampling was used to select 120 respondents from the management staff within the selected hotels. Convenience sampling was used to select 8 managers of water management bodies who acted as key informants during personal interviews. Primary data was collected from the hotel management staff using questionnaires and from managers of water management through personal interviews. Data from questionnaires were analysed using the Statistical Package for Social Science (SPSS) to derive descriptive statistics on the implementation of WRM strategies.
Results: Findings revealed that a majority of the sampled hotels had embraced water resource management strategies through the development of alternative water resources, use of water saving technology, treatment of recycled water and use of water saving manuals. Further, the structural water resource management strategies were perceived to be more effective as they impacted more on reducing the operating costs, promoted environmental conservation and were more preferred than the non- structural strategies despite being more expensive to implement.
Conclusion: It is concluded that water sustainability is however achievable through a combination of a variety of WRM strategies.

Keywords: ***Water sustainability, water resource management, structural and non-structural water management strategies***

1. INTRODUCTION

The United Nations Environment Program (UNEP) confirms that severe water shortage affects 400 million people today and is predicted to affect 4 billion people by 2050 [1]. Researchers assert the tourism sector is one of the major users of fresh water in the world. Indeed, statistics reveal that water accounts for up to 15% of utility bills and that up to 95% of fresh water leaves hotels as waste [2].

A Welfare monitoring survey by Republic of Kenya [3] indicates that Kenya is mainly an agricultural country with an expanding economy whose basic element for development is water. The annual quantity of renewable freshwater resources is estimated at 20.2 billion m^3 comprising 19.59 m^3 of surface water and 0.62 billion m^3 of groundwater. The amount of water actually available for utilization in any one year (among other factors) depends on the rate of run-off, the aridity of the catchment area and the methods of interception at various points in the hydrological cycle. Precipitation across parts of Kenya is exceptionally variable and unpredictable, and runoff is exceptionally low (varying from near zero in the north-eastern part of the country to over 1600 mm/yr in the western part of the country). The consequence of these two features is an endemic drought in large parts of the country. Throughout Kenya, even within the same districts, there can be enormous variance in available water volumes. Because of pronounced differences in average annual rainfall, evapotranspiration, and hydrogeology, there is high variability within the same season, between different seasons i.e. twelve-month period, and over several years

Like many other highly visited areas worldwide, Lake Naivasha is a tourism destination of international importance and biodiversity value and as such in 1995 it became Kenya's second Ramsar wetland site. This shallow freshwater lake supports a high but uneven biodiversity which is rich in birds and plants [4]. Like many of the great East African lakes, Lake Naivasha is an area of interest as it has a high economic value for Kenya since it provides a wide range of opportunities for various economic activities in the area. Today, the fertile soil around the lake is used for agriculture, particularly for the production of fruits, flowers, vegetables and vineyards.

Besides, Lake Naivasha is renowned for its cool climate, peaceful surrounds and tranquil waters thus an excellent holidaying spot for both international and local tourists. However, over the years, the water levels in the lake have significantly declined which is attributed to the rapid increase in the demand for lake and river water and clearance of catchment area for human settlement. Similarly, the area covered by the papyrus, which has been an important part of the lake's ecosystem, has declined in acreage from 1200 ha to 200 ha over the last four decades [5].

Within the sustainable tourism debate, the hotel sector has come under close scrutiny, not only as pivotal to tourism growth but also as a sector with significant implications for both development and environmental conservation. In fact, there is increasing acceptance that hotels, large or small, must adopt an environmental management or "Greening" approach to their operations so that they positively contribute to the sustainability of tourism (Holden, 2000). In spite of a wide range of literature on environmental issues in the hospitality industry as well as the factors affecting the hotels' responses to environmental issues; little research has been done to establish the effectiveness of water resource management strategies on water sustainability in the hospitality industry. It is in this connection that the current study endeavoured to assess the effectiveness of water management strategies on water sustainability in the selected hotels around Lake Naivasha.

2. METHODOLOGY

2.1 Research design

A case study research design was used in this study since it is suitable for gathering and the analysis of both qualitative and quantitative data and involves a careful and complete observation of a social unit be it a person, a family, an institution, a cultural group or even an entire community [6]. The case study as a research strategy and an empirical inquiry enabled the researcher to investigate the water resource management strategies within the real-life context.

2.2 Target Population

Hotels in Lake Naivasha region represents tourism stakeholders operating under situations of water scarcity hence provides a focal point for assessing the effectiveness of water resource management strategies on water sustainability in hotels. In this study, the target population comprised of the 30 class A registered hotels with 120 management staff and 24 managers of 8 water management bodies, namely the Lake Naivasha WRMA (Water Resource Management Action) regional office, World Water Foundation (WWF), National Water Conservation and Pipeline Corporation, Catchment Area Advisory Committee (CAAC), Lake Naivasha Water Users Association (LANA WRUA) and Naivasha Water and Sanitation Services Company (NAWASSCO).

2.3 Sampling techniques and sample size

In this research, as shown in Table 1 the following sampling techniques were used:

Table 1: Target population and sampling techniques

Target population	Sampling technique	Target population	Sample size	Percentage
Hotel management staff	Purposive sampling	120	40	30%
Managers of water management bodies	Convenience sampling	24	8	30%

Source: Author (Pilot survey, 2009)

2.4 Instrumentation and data collection methods

The researcher used both primary and secondary data sources to generate primary and secondary data respectively.

In this study, primary data was obtained through the use of questionnaires and scheduled interviews which constituted of open and closed-ended questions, that solicited respondents' views on use of water by hotels, water resource management strategies put in place in the sampled hotels, the perceived effectiveness of these strategies, the constraints faced and other issues. With the use of observation sheets, the researcher recorded data on the various structural measures put in place for water conservation.

Secondary data was obtained from Lake Naivasha Water and Sanitation Services Company (NAWASSCO) records and reports on the hotels' water consumption records and expenditure. Additional information was obtained from WRMA sub-regional office in Naivasha, World Water Foundation (WWF), National Water Conservation and Pipeline Corporation, Catchment Area Advisory Committee (CAAC), Lake Naivasha Water Users Association (LANA WRUA). These sources provided information on the role and level of participation of the hotel sector in the stakeholders' meetings and initiatives for water resource management.

Document analysis provided information on documented water consumption, expenditure and the subsequent implementation of structural and non- structural water resource management strategies as a tool towards sustainable use of water resources in the selected hotels in the environs of Lake Naivasha.

2.5 Reliability and validity tests

Before embarking on data collection, the questionnaires and the interview schedules were first piloted by using a sample of 4 hotels in Lake Naivasha region. After piloting, the questionnaire was restructured and refined to suit the study. The Coefficient of Stability was used to determine the reliability of the questionnaires through the test and retest method where two administrations of the same questionnaire were done, separated by a one week delay and the scores between the two tests were then correlated. Methodological triangulation was adopted to verify the validity of the data given in the questionnaires on water resource management strategies in the selected hotels, by cross-checking the information through direct observation and from analysis of secondary sources such as hotel bookings, receipts, water bills and others.

2.6 Data analysis and interpretation

Data analysis was done using both descriptive and inferential statistics facilitated by the use of SPSS (Statistical Package for Social Science) Computer package. The descriptive analysis involved computing frequencies and percentages (proportions) based on respondents' responses to diverse questions on the use of structural and non- structural water resource management strategies

3. RESULTS AND DISCUSSION

3.1 Background information about hotels

The purpose of this study was to evaluate the implementation of structural and non-structural water resource management strategies in hotels within the environs of Lake Naivasha, establish the perceived effectiveness of the structural and non- structural strategies and compare the two options in terms of their effect on water sustainability in the hospitality industry.

Hotels constitute one of the main pillars in the tourism sector which is highly unique on issues related to the use of water resources and water resource management. However, the water use intensity and management practices are dependent on the hotel characteristics. In this study, the 3-star hotels constituted the highest percentage of the respondent hotels (37.0%). At this level, hotels provide significantly greater quality and range of facilities than at the lower star classifications. All bedrooms will have fully en suite bath and shower rooms and offer a high standard of comfort and equipment. Further, 18.5% constituted both 1 star and 2-star hotels. In the 1-star classification hotels, there may be a limited range of facilities and meals may be fairly simple and some bedrooms may not have en- suite bath/shower rooms. In the two star hotels are typically small to medium sized and offer more extensive facilities than at the one-star level. Some business hotels come into the two-star classification and guests can expect comfortable, well equipped, overnight accommodation, usually with an en-suite bath/shower room. Reception and other staff will aim for a more professional presentation than at the one-star level, and offer a wider range of straightforward services, including food and drink.

3.2 Structural and non-structural Water Resource Management strategies adopted

Water resource management requires the adoption of a variety of strategies both structural and non-structural so as to maximize the benefits. Singh and Cloude [8] reported that by adopting such modern water resource management methods, hotels in Barbados and St. Lucia could reduce water consumption by an amount sufficient to accommodate anticipated rates of growth in the industry over the next 20 years, without a net increase in water consumption.

From the interview sessions with the staff of water management bodies hotels within the environs of Lake Naivasha complied in the effort to sustainably manage water. Key informant 3 indicated that practising rainwater harvesting is a widely recommended structural WRM strategy to hotels to promote water sustainability. From the study results, it was evident that the main structural water resource management strategies adopted by the hotels within the study area were the development of alternative water resources like harvesting of rainwater and drilling of boreholes (66.7%) and installation water saving gadgets (59.9%).

According to Rainwater Connection [9], rainwater harvesting is an effective method of building freshwater. This involves collecting rainwater from roof and gutter system, transporting it via downspouts and piping to cistern tanks, filtering and then storage. Rainwater tanks collect rainwater directly or surface runoff so that no water is lost. A report for International Centre for Responsible Tourism ICRT by Goodwin [10] indicates that Hilton hotel, Madagascar and Marriott Hotel, India have rainwater storage tanks for monsoon rainwater collection which has been successfully used directly for irrigation, flushing toilets, within air conditioning systems or treated for drinking.

In tourism, water is an important commodity that ensures the successful operations within the hotels and other hospitality facilities especially in the catering and accommodation sectors. Any accommodation facility that aims at any success has to develop alternative water resource and manage them. Literature reviews, coupled with field observation, revealed that the two main alternative water sources that could be developed and used include harvested rainwater and water from sunken boreholes. Having an alternative source of water for a hotel or restaurant would ensure that if the main source of water is interrupted, water would still be available in the hotel and disruption and inconvenience due to lack of water avoided. Rainwater tanks which collect rain directly and as surface runoff ensures that no water is lost.

To complement the use of rainwater, installation of low flow facilities can be valuable cost-effective methods of substantially reducing water consumption. Study findings also revealed that having water saving gadgets is much preferred as a structural water resource management strategy where 59.2% of the respondents indicated to have implemented in their respective hotels. A study by Environment Canada [11] indicated that the top three facilities that consume the largest volume of water in a hotel are showers (35%), toilets (30%), cleaning and laundry (25%). These gadgets include depressible sink taps, low water volume flush toilet and low-pressure showers that use less water and among others. All these gadgets are designed to at least reduce the normal water consumption by a great percentage if implemented and well maintained. Installing efficient toilets and showerheads can reduce water consumption by 35% [12]. A report on hotels in Barbados and St. Lucia indicated that guest rooms are fitted with water conservation devices and as such showerheads have flow aerators, and there are low flush toilets in. Water conservation devices were fitted two and one-half years earlier and there were dramatic reductions in the water consumption when the devices were installed. Changes totalled about 10,000 gallons in one month [8].

Treatment of wastewater and later recycling were the other structural water management strategies where 18.5% and 11.1% respectively of the sampled hotels had adopted to lower costs in implementation. Many hotels use less than 5% for cleaning food and drinking. Water that has been treated and recycled is viable for the majority of other uses. Reuse of water for other areas such as irrigation makes water useful twice. Findings by Goodwin [10] revealed that Le Sport Hotel in St Lucia wastewater recycles system saved 1 million gallons per year. This, therefore, guarantees clean and consumable water in the taps of the residents in these

countries and tourist destinations. However, the current study established that a majority of hotels in Kenya are yet to embrace the technology of converting the wastewater from sewers back to the taps to be drunk by humans. The main water resource that the country depends on is rivers and when they dry up, a water crisis of often looms. Other sources are boreholes, lakes and others that can be threatened especially in these times of severe climate change.

Reusing of wastewater for irrigation and cleaning was mentioned as a structural strategy of water resource management by 14.5% of the respondents. Recycled water is a valuable resource. Instead of being thrown away, appropriately treated water can be recycled and used a second time to reduce the demand on high-quality freshwater sources and improve environmental water quality. Water recycling increases the available supply of water and enables greater human benefit to be achieved with less freshwater. Therefore, water recycling can make a substantial contribution to meeting the world's water needs and to lessening mankind's impact on the world's water environment [13]
This strategy in the study area and in Kenya as a whole is still at its introductory stage although reusing of wastewater has made a contribution in drastically reducing operating costs and improved the environment by ensuring the vegetation is well watered and facilities are clean. Within the study area, results indicated that 81.5% of the sampled hotels registered a reduction of the water bill while 66.6% indicated an overall increase in the water supply.

3.3 Perceived effectiveness of the structural water resource management strategies

From the study results, 40.7% of the respondents perceived the structural water resource management strategies as being very effective while a further 29.6% rated the strategies as being fairly effective as indicated by the reduced water bill. Indeed, 81.5% of the sampled hotels reported having reduced their water bill by between 25-50%. Any business or enterprise has an inbuilt mandate of reducing its general operating cost. In the wake of the global economic crisis, every business enterprise always seems to reduce operating costs. Goodwin [9] reveals the applicability of such measures where for example Hyatt Regency Sanctuary Cove installed low flow showerheads in guestrooms, reducing consumption from 27 litres to nine litres per minute and the Renaissance Reading Hotel in the UK adopted the waterless urinals which saved hotel 81,440 litres per urinal per annum. This is very applicable to the hotels in Naivasha because it would reduce pressure on the diminishing water reserves thus ensure the sustainability of water in the region would be ensured.

Studies performed globally on factors that influence the quest to manage water resources more sustainably include cost rationalization due to the increasing cost of utilities [14] This fact is further confirmed by key informants interviewed who indicated that cost reduction is the main reason that drives hotels to participate in water resource management. The larger the operating cost, the lesser the profit and vice versa. This assertion is supported by the sentiments of one key respondent who remarked that ……. *In this era of global economic hardship, every business venture and enterprise makes every effort to reduce cost and increase profit*. The structural water management strategies according to the key informants may have a longer payback period but are most effective in reducing operating cost, thereby increasing the profitability of the hotels.

Key informants further indicated that improving water quality was a major reason for hotels to be involved in WRM. It was also clear that declining water quality was a challenge experienced by hotels in the study area. Therefore, an effort to improve water quality is what motivates most hotels in the study area to engage in WRM. Another reason was compliance with the laid down laws which relate to water and its management. NEMA was the body

charged with the responsibility of ensuring that the environment is properly managed has the mandate of overseeing the implementation of some of these laws.

Reuse and recycling of wastewater for irrigation and cleaning was however adopted by less than 15% of the sampled hotels despite other studies showing cases of success. For example in the water recycling and reuse scheme that was installed at Homebush Bay in Sydney, Australia where the Sydney Olympic Games were staged up to 7,000 m^3 per day of recycled water from stormwater and treated wastewater sources, was re-used for toilet flushing in sporting venues, irrigation of open space areas, and was also supplied to 2,000 residential houses for gardens and toilet flushing. Through the adoption of microfiltration and reverse osmosis treatment processes which were used to achieve the required water quality, the scheme reduced demands on Sydney's freshwater supplies by about 850,000 m^3 per year [15].

Perceived effectiveness of the non-structural water resource management strategies

Information in the hospitality industry is a key factor in ensuring sustainable management of water resources. This can be done by launching a responsible business programme to staff and solicit feedback. maintain staff awareness of the programme through regular meetings, posters and information on notice-boards encourage motivation through competitions, suggestion boxes and reward staff for successes each month [16].

In this study, the results indicate that provision of water saving manuals to guests and employees was adopted by 85.2% of the sampled hotels. This strategy involves educating guests and employees about saving water through provision of printed literature and awareness meetings to explain what the hotel is doing to reduce water use and how they can participate in the effort to save water resources. A study at Yokohama Grand Intercontinental Hotel Japan between 1992–1996 reduced water uses by 28% despite a 26% higher occupancy through setting up green teams among the workers which would meet and discuss issues and progress and ensure implementation of water resource management strategies as part of the green measures within the hotel [10]

The effectiveness of this strategy is confirmed by 85.2% of the respondents who reported a reduction of the water bill by a range below 25%. The key informants within the water management bodies interviewed support this view that hotel guests should always be reminded of water conservation through awareness creation since this approach is cost effective and customer friendly.

Raising the awareness of proper waste disposal was also cited in the research as the second most preferred non-structural strategy of water resource management by 48.1% of the respondents. Proper waste disposal ensures that the environment which is important in the tourism industry is not adversely impacted. Improper waste disposal will lead to environmental and ecological degradation. In order for environmental sustainability to be ensured, proper waste disposal methods have to be utilized in the tourism industry. Other non-structural strategies considered in water resource management included conducting preventive water loss maintenance (26.0%), setting water use targets (18.5%) and water use monitoring and audit (14.8%) which the study established were not widely implemented.

The non-structural WRM strategies are generally cheaper and easier to implement when compared to the structural strategies but can be instrumental in ensuring that the sustainability of water is ensured in the tourism and hospitality industry. The importance of water in the tourism industry cannot be over-emphasized and every effort to conserve it is highly appreciated. When a water resource is properly managed, the operation costs of the tourism and hospitality establishment will be reduced. A proportion of 59.3 % of the respondents in the study area contended that the non-structural strategies (such as

management) reduced water bills while 40.7% of the respondents had not experienced any change. Therefore it is evident from that non- structural strategies are not very effective since 85.2% of the respondents registered a change in the water bill below 25%. The key informant 1 interviewed argued that this could be due to the fact that such strategies are based on a conscious human effort which may not be very attractive to guests who have booked the hotels to enjoy the comfort that their money can buy and the workers who lack awareness may not be committed to water-related issues. Schahn and Holzer [16] agree that a number of personal attributes which would appear to be linked to environmental actions and behaviour which includes gender, age and educational level which may limit the adoption of such strategies.

3.4 Comparison of the effectiveness of structural and non-structural Water Resource Management strategies

Structural strategies are optional technologies that enable recycling, reuse, conservation, and treatment of water which is aimed at reducing usage and water loss and wastage among water users. Structural measures follow a particular structure stipulated by the organization and in comparison are more expensive to implement when compared to non-structural measures. Water conservation is crucial and important to a tourism establishment, for example, a hotel because water is an essential commodity. The availability of water to a hotel or a restaurant is important because it ensures the operations in catering, hygiene, entertainment and others are successful. Treating wastewater reduces the need for requiring new freshwater thereby reducing the operating cost in the long run.

Non-structural measures, on the other hand, refers to policies, awareness, knowledge development, public commitment, and methods and operating practices, including participatory mechanisms and the provision of information, which can reduce water use. The non-structural strategies adopted according to the findings of the study shows that the most widely implemented strategies included the provision of water saving manuals to guests and employees, awareness on proper waste disposal, conducting preventive water loss maintenance, setting water use targets and water use monitoring and audits.
In this study, the researcher sought to establish how the respondents compared the two options on their effectiveness in addressing the challenges related to water resources. The results obtained from the comparative views shows that 70.4% of the respondents viewed the structural strategies as being more effective compared to a 29.6% who indicated rating the non- structural strategies as being more effective. This is further supported by the outcome of the two options on the percentage reduction in the water bill where 81.5% of the sampled hotels achieved a reduction of between 25-50% contrary to the 85.5% of the sampled hotels which attained below 25% reduction in the water bill through the use of non-structural strategies.

The non-structural measures or strategies do not possess a particular structure and are much easier and less expensive to implement when compared to structural measures. Making the public to commit themselves to water resource management is an uphill task as some people are generally wasteful of water. This is made possible by constant enlightenment of the general public on issues of water and the dangers of the crisis related to the same. Having proper policies that are water-related is an important non-structural measure of WRM. Increasing awareness of the importance of WRM is probably cheaper compared to recycling waste water. According to the study, the structural strategies of WRM were having water saving gadgets, recycling wastewater after treatment, reusing wastewater for irrigation and cleaning, developing alternative water resources and treatment of wastewater.

4. CONCLUSION

The study revealed that the major structural water resource management strategy preferred in the area was the development of alternative water resources. This is appropriate because overdependence on a single water resource may be jeopardized if it becomes unsustainable. Other structural measures either adopted or recommended included having water saving gadgets, recycling wastewater after treatment, reusing wastewater for irrigation and cleaning and treatment of wastewater.

The study also revealed that structural measures of water resource management are more expensive to implement compared to the non-structural ones. The results revealed that the main perceived effectiveness of the structural water resource management strategies adopted have been that they reduce operating costs thereby increasing profitability. Other reasons cited included reduction of negative environmental impacts, resolution of conflicts with other water users and guest satisfaction. These strategies are important to the success of the hotel and hospitality industry in relation to water resource management.
The non-structural measures included the provision of water saving manuals to guests and employees, awareness on proper waste disposal, conducting preventive water loss maintenance, setting water use targets and water use monitoring and audits. Results on the effectiveness of non- structural water resource management strategies indicate a minimal impact on the water bill compared to the structural strategies. However, they are cost-effective since they are cheaper to adopt but are more dependent on the guest, customer or tourist for their effective implementation.

In conclusion, study results indicate that a lack of finances and manpower are the main setbacks to the implementation of structural and non- structural water resource management strategies. This, however, can be addressed if cheaper water-saving technology is made available and finances can be sourced from donors. Other strategies would include water imports from areas with surplus and legal redress where illegal water abstractors are penalized. Formulation of better water resource management policies and increased involvement of other stakeholder was also realized to an amicable solution to the setbacks

COMPETING INTERESTS

"Author declares that no competing interests exist.".

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