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ADAPTING TO CLIMATE CHANGE: EVALUATING THE IMPLEMENTATION OF WATER RESOURCE MANAGEMENT STRATEGIES IN HOTELS WITHIN LAKE NAIVASHA ENVIRONS

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Citation:

Kinyanjui, D. N., Kieti, D., Ipara, H. and Kariuki, J. M. (2015). Adapting to Climate Change: Evaluating The Implementation of Water Resource Management Strategies in Hotels Within Lake Naivasha Environs. In: Isutsa, D. K. (Ed.). *Proceedings of the First International Research Conference held from 29th to 31st October, 2014 in Chuka University, Chuka, Kenya*, 101-109 pp.

ABSTRACT

Sustainability is complicated by the threat of climate change which presents tourism industry with considerable negative effects, creating an urgent need to manage and use such resources responsibly. Water Resource Management (WRM) has become critical in the tourism industry. Consequently, hotels have a unique responsibility in lessening the real and potential negative impacts on the water and promote sustainable water management and use. This study evaluated adoption of WRM strategies in hotels to attain water sustainability, the current structural and non-structural WRM strategies adopted by selected hotels in the environs of Lake Naivasha, perceived effectiveness of both the structural and non-structural WRM strategies adopted to enhance water sustainability, and structural and non-structural water management strategies in terms of sustainability in hotels within environs of Lake Naivasha. A census of 30 Class (A) registered hotels was conducted, and purposive sampling was used to select respondents. Convenience sampling was used to select managers for interviews. Primary data collection used questionnaires and interviews, while secondary data was synthesized from journals, text books, theses and other works and analysed using the SPSS program. Hotels had embraced WRM strategies through development of alternative water resources, water saving technologies, manuals and treatment of recycled water. Structural WRM strategies were perceived to be more effective as they impacted more on reducing operating costs, promoted environmental conservation and were more preferred than the non-structural strategies despite being more expensive to implement. Water sustainability is achievable through a combination of WRM strategies. Better water management policies should be formulated and complemented with technological utilization, stiffer penalties on pollution, community involvement, inclusion of donor funding and provision of incentives.

Key words: *Water sustainability, structural and non-structural water management strategies*

INTRODUCTION

The United Nations Environment Programme (UNEP) confirms that severe water shortage affects 400 million people today and is predicted to affect 4 billion people by 2050 (Thomas and Durham, 2003). Researchers assert the tourism sector which is one of the major users of fresh water in the world. Indeed, statistics by The International Business Leaders Forum's Tourism Partnership and World Water Foundation-UK (IBLF, WWF-UK, 2005) and the Environmental Benchmarking guide reveal that water accounts for up to 15% of utility bills and that up to 95% of fresh water leave hotels as waste.

A welfare monitoring survey by Republic of Kenya (1996) indicates that Kenya is mainly an agricultural country with an expanding economy whose basic element for development is water. The annual quantity of renewable fresh water resources is estimated at 20.2 billion m³ comprising 19.59 m³ of surface water and 0.62 billion m³ of ground water. 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 endemic drought in large parts of the country. Throughout Kenya, even within the same districts, there is an enormous variance in water amounts. Because of pronounced differences in average annual rainfall, evapo-transpiration, 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 includes rich in birds and plants (Harper *et al.*, 1990). 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 rapid increase in the demand for lake and river water and clearance of catchment area for human settlement. Similarly, 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 (Lake Naivasha Water Resource Users Association, 2008).

Within 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 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 endeavored to assess the effectiveness of water management strategies on water sustainability in the selected hotels around Lake Naivasha.

Statement of the Problem

Water exploitation for tourism growth and leisure activities has been playing an increasingly important role in the water budget where it accounts for 15 per cent of the total utility bill of many hotels. Luxury hotels and resorts with their extensive laundry, swimming pools and irrigated gardens and golf courses are obvious examples. In many countries tourism represents an important income source but at the same time the exploitation of water for such purposes, under conditions of water scarcity, poses priority questions and contributes to the competition over scarce water resources.

Despite the presence of Lake Naivasha and other water resources that are available in the study area, the water status in the region has been dwindling as a result of climate change. According to the Naivasha Management Plan (2004) the water budget of the Naivasha watershed is water surplus and deficit of 415.8m³ and 117.2m³ million during wet and dry season respectively. Future increase in water demand will heighten water deficit with serious ramification on the sustainability of the lake and thus calls for urgent measures to manage the existing water resources

This study thus evaluated the implementation of water resource management strategies in response to the consequences of climate change in hotels within Lake Naivasha environs. The research primarily examined the water resource management strategies the hotels have implemented, determined and compared the perceived effectiveness of the water resource management practices in the hotel operations, established the existing constraints and suggested solutions.

METHODOLOGY

Research design

A case study research design was used in this study since it is suitable for gathering and 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 (Yin,1989). The case study as a research strategy and an empirical inquiry that enabled the researcher to investigate the water resource management strategies within the real-life context.

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 98 registered hotels as documented by Naivasha Municipal Council (2009), whereby 30 hotels are categorized as class A, 40 hotels in class B and 28 hotels under class C, and water management bodies such as the Lake Naivasha WRMA 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).The target respondents during the study were in two categories:

- a) The hotel management staff in the 30 class A hotel establishments located in the environs of Lake Naivasha which comprised of 120 persons in charge of the general and departmental managers.
- b) Managers of the water management bodies within Lake Naivasha and its environs, e.g. regional managers.

Sampling techniques and ample 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 pop.	Sample size	Percentage
Hotels	Census	98	30	30.6%
Hotel management staff	Purposive sampling	360	120	33.3%
Managers of water management bodies	Convenience sampling	24	8	30%

Source: Author (Pilot survey, 2009)

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 ended questions and close ended questions, that solicited for 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.

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 reliability of the questionnaires through 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.

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. 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.

RESULTS AND DISCUSSION

Background information of 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 effectiveness 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 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 a 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.

Structural and non-structural Water Resource Management strategies adopted

Water resource management requires adoption of a variety of strategies both structural and non-structural so as to maximize the benefits. Singh and Cloude (1999) 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 revealed that hotels within the environs of Lake Naivasha complied in the effort to sustainably manage water. Key informant 3 indicated that practicing 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 was 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 (2006) 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 rain water directly or surface run off so that no water is lost. A report for International Centre for Responsible Tourism ICRT by Goodwin (2007) indicates that Hilton hotel, Madagascar and Marriott Hotel, India have rain water storage tanks for monsoon rainwater collection which has been successfully used directly for irrigation, flushing toilets, within air con 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 rain water 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 such as taps are interrupted, water would still be available in the hotel and

common embarrassment due to lack of water avoided. Rainwater tanks which collect rain directly and as surface run off 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 preferred much 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 (2008) indicted 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 shower heads can reduce water consumption by 35% (Brandes *et al.*, 2006). A report on hotels in Barbados and St. Lucia indicted that guest rooms are fitted with water conservation devices and as such showerheads have flow aerators, and there are low flush toilets in. These devices were fitted two and one-half years earlier and there were dramatic reductions in the water consumption when the devices were installed. Changes totaled about 10,000 gallons in one month (Singh and Cloude, 1999).

Treatment of waste water and later recycling were the other structural water management strategies where 18.5% and 11.1% respectively of the sampled hotels had adopted do 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 (2007; 23) revealed that Le Sport Hotel in St Lucia wastewater recycle 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 waste water 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 waste water 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 (Anderson, 2001a; Anderson, 2001b).

This strategy in the study area and in Kenya as a whole is still at its introductory stage although reusing of waste water 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 as shown on Table 4.7 while 66.6% indicated an overall increase in water supply.

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 to have 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 global economic crisis, every business enterprise always seems to reduce operating costs. Goodwin (2007;22) reveals the applicability of such measures where for example Hyatt Regency Sanctuary Cove installed low 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 suitable to the hotels in Naivasha because it would reduce pressure on the diminishing water reserves thus ensure sustainability of water in the region would be ensured.

Studies performed globally on factors that influence the quest to sustainably manage water resources more sustainably is cost rationalization due to increasing cost of utilities (Warnken et al, 2005; Paper III, Paper IV). 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 the declining water quality was a challenge experienced by hotels in the study area. Therefore, an effort to improve the 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 waste water 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 re-use scheme that was installed at Homebush Bay in Sydney, Australia where the Sydney Olympic Games were staged up to 7,000 m³ per day of recycled water from storm water 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 was used to achieve the required water quality, the scheme reduced demands on Sydney's freshwater supplies by about 850,000 m³ per year (Cooney, 2001).

Perceived effectiveness of the non-structural water resource management strategies

According to International Tourism Partnership (ITAP) (n.d) information in the hospitality industry is a key factor in ensuring sustainable management of water resources. This can be done through 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.

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 (Goodwin, 2007).

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 on 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 destroyed. 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. In Table 4.8, a proportion of 59.3 % of the respondents in the study area contended

that the non-structural strategies 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 to be committed to water related issues. Schahn and Holzer (1990) agree that a number of personal attributes which would appear to be linked to environmental actions and behavior which includes gender, age and educational level which may limit the adoption of such strategies.

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 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 of waste water reduces the need of requiring new fresh water 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 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 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 waste water after treatment, reusing waster water for irrigation and cleaning, developing alternative water resources and treatment of waste water.

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 waste water after treatment, reusing waste water for irrigation and cleaning and treatment of waste water.

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 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 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.

RECOMMENDATION

Structural Water Resource Management strategies

The study results indicate that the sampled hotels within Lake Naivasha had fully embraced the use of structural water resource management strategies such as development of alternative water sources, use of water saving gadgets, water recycle and reuse and had made milestone achievements on reduction of water related challenges. However more achievements can be made if the following essential technology is adopted especially in the area of water conservation. The 21st century has been caught up in the technological advancement of literally all sectors including water. The hotels in the study area of Naivasha should embrace the use of technology as this would reduce their operating cost by a huge margin which includes;

- a) Use of water saving devices including flow restrictors and aerators
- b) Use waterless urinals fitted and toilets fitted with infrared flush sensors.
- c) Reducing water consumption through placing ‘bottles’ and ‘hippos’ into cisterns
- d) Use of irrigation systems, moisture sensors and timers to reduce waste and evaporation loss
- e) Use of ozone treated purified water

Non-structural Water Resource Management strategies

The study results show minimal adoption of these behavioral related strategies in the sampled hotels within the environs of Lake Naivasha despite the fact that adoption of these strategies is quite cost effective though it is based on the guests’ or the hotel workers’ attitude towards the environment and other demographic characteristics.

Adoption of the following other non structural strategies is recommended;

- a) Encouraging guests to reuse towels and bed linen to reduce water consumption and chemical discharge.
- b) Taking a shower instead of a bath, the shorter the shower the better.
- c) Be aware of and follow water conservation rules or guidelines.
- d) Conserve water because it makes sense, don’t waste water just because someone else is footing the bill in the end we will all be paying for it as water is a finite global resource.
- e) Remember that every drop counts especially in a region where competition for water resources is high.

Other strategies

- a) **Better policies** – There should be a concerted effort from the various relevant stakeholders to ensure that better and applicable policies are drafted that would benefit the water industry and the study area as a whole.
- b) **Stiffer penalty on pollution** – Pollution of water resources has been a threat to the tourism industry especially in the accommodation and catering sectors. Water pollution leads to diseases and can even lead to death, so NEMA as the relevant environment manager has to ensure stiff penalties and fines for those who pollute water in order to distract existing and potential polluters of water and its resources.
- c) **Implement the Polluter Pay Principal** – This would be a deterrent measure to prevent any future pollution in the study area.
- d) **Community involvement** – Involving the local community and other stakeholders in important efforts for example water conservation, planting of trees and others can guarantee the sustainability of water in a region. The local community is the backbone of a region and when local people are neglected or ignored, efforts towards water resource management could be threatened. The local communities are important stakeholders in the tourism and hospitality industry. When local communities are involved in WRM, the sustainability of water resources can be ensured.

- e) **Developmental incentives** – The government should give incentives to both domestic and foreign investors who seek to invest in the development of the water industry. Among the incentives that can be given include soft loans, duty-free importation of technological gadgets related to water conservation and government subsidies. These developmental initiatives geared towards water resource management can impact positively in the tourism sector and ensure its sustainability.

Areas for further research

The following are areas for further research.

- a) **Non-structural WRM strategies** – More research should be conducted on non-structural water resource management strategies since currently emphasis is placed mainly on the structural ones.
- b) **Recycling of waste water** – More research should be conducted on the issue of water recycling and how this would benefit regions especially in the developing countries. These countries usually encounter a water crisis and local communities characterized by men and women walking for long distances daily in search of water. When waste water is recycled, this could be minimized.
- c) **Desalination** – According to the researcher, desalination is an area of research that can be explored so as deal with the water crisis especially along the Kenyan coast. As previously indicated, desalination is an artificial process by which saline water generally from the sea or ocean, is converted to fresh water. Since ocean and sea water constitutes 97% of the worlds' water reserves, fresh water can obtained through this process and supplied to areas experiencing water stress which would drastically reduce the global water crisis.

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