Tourism and energy use in lodges and camps in the Okavango Delta, Botswana

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Abstract: This paper examines energy use in lodges and camps in the Okavango Delta, Botswana. The paper draws from the concept of sustainable tourism. Both primary and secondary data were used. Secondary sources used include: management plans and policy documents on energy and tourism development in the Okavango Delta. Primary data collection included the use of informal interviews with key stakeholders of the energy and tourism industries. Results indicate that lodges and camps largely use fossil fuels than renewable energy sources. Fossil fuels used include petroleum products like diesel oil, petrol and paraffin. Diesel is used to generate power to meet energy demands in hotels and lodges. Renewable energy sources like solar is used minimally. Therefore, energy policy needs to address the lack of renewable energy in the Okavango Delta. That is, to achieve sustainable tourism, renewable energy like solar energy which is environmentally friendly should be promoted in policy development.

Keywords: renewable energy; solar energy; Okavango Delta; fossil fuels; Botswana.

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1 Introduction

Globally, tourism is a leading industry and an important source of foreign exchange, particularly in developing countries (Pratt et al., 2011). Game viewing and outdoor recreation in protected areas is making nature-based tourism one of the fastest growing worldwide (Goodwin, 1996; Mastny, 2001; Davenport et al., 2002; Balmford et al., 2009). Developing countries particularly those in Africa have become famous for wildlife-based tourism. For example, much of southern Africa’s tourism industry relies on national parks, game reserves and other protected areas containing world renowned wildlife, biological diversity and natural attractions (Poonyth et al., 2002). Nature-based tourism is a key revenue earner in developing countries such Kenya, Nepal, Tanzania, Costa Rica and Botswana (Eagles, 2003; Alaeddinoglu and Can, 2011). The tourism industry uses energy and there is need to ensure that energy use in this sector is sustainable and environmentally friendly.

There is a growing consumption of energy in the tourism sector particularly in the travel and accommodation sub-sector (Pratt et al., 2011). Andriots (2008, p.9), notes: “Integrated resorts use a large amount of energy for heating, ventilation, air conditioning, laundry, dry-cleaning, hot water, cooking, refrigeration, sport facilities and fuel for vehicles”. Most of the energy used in the tourism sector is derived from fossil fuels and this has implications for global greenhouse gas (GHG) emissions, climate change and future business growth (Pratt et al., 2011). According to Peeters et al. (2010), the growth rates in international tourist arrivals and domestic travel; and energy-intense transportation such as aircraft and car travel train and bus and flying first and business class instead of economy contribute to the increased energy consumption in the tourism sector.
Accommodation is the second most energy-intensive sector in the tourism industry (i.e., after transport). Accommodation consumes energy through its demand for heating or cooling, lighting, cooking (in restaurants), cleaning and use in pools (Pratt et al., 2011). Peeters et al. (2010) argue that the general rule of thumb is that the more luxurious the accommodation, the more the energy used. Studies (e.g., Peeters et al., 2010) indicate that energy use in hotels ranges between 25 and 284 MJ/guest/night. Tourism is estimated to create about 5% of total GHG emissions (1,302 Mt CO₂), primarily from tourist transport (75%) and accommodation (21 per cent, mainly from air-conditioning and heating systems) (UNWTO and UNEP, 2008). A globally-averaged tourist journey is estimated to generate 0.25 tonnes of CO₂ (UNWTO and UNEP, 2008). In 2005, global GHG emissions from tourism are estimated to be 13% higher than the 1,476 Mt CO₂ (WEF, 2009).

The Okavango Delta, located in north western Botswana is a key nature-based tourism destination in the country (Figure 1). From the 1980s, there has been an escalation of tourist facilities such as hotels, lodges and camps in the Okavango Delta (Mbaiwa et al., 2008; DEA, 2008). The Okavango Delta receives a total of about 150,000 tourists annually (Mbaiwa et al., 2008). The growth not only in tourist numbers but also in facilities, infrastructure, aircraft operations and tourism services has resulted in increased energy consumption. The increase in tourism development has raised concerns on the types and amounts of energy used in the country. Fossil fuels are largely used in tourism developments in the Okavango Delta.

Using the concept of sustainable tourism, the objective of this paper therefore, is to assess the types of energy used in lodges and camps in the Okavango Delta. The paper will also analyse policy initiatives meant to promote renewable energy within the tourism industry in the Okavango Delta. As noted earlier, Andriotis (2008) states that big resorts in Crete, Greece use a large amount of energy for heating, ventilation, air conditioning, laundry, dry-cleaning, hot water, cooking, refrigeration, sport facilities and fuel for vehicles. However, in this paper, energy use is limited to heating, air conditioning, laundry, hot water, cooking, refrigeration and fuel use in vehicles.

2 Sustainable tourism and energy

This paper is informed by the concept of sustainable tourism. The concept of sustainable tourism speaks to that of sustainable mobility (Høyer, 2000), which makes tourism to be one of the industries which make a contribution to change and global warming. Sustainable tourism therefore calls for the use of environmentally-friendly energy products, regulation of emissions and use of appropriate technology that promotes sustainability in the industry.

Sustainable tourism can contribute to energy and water efficiency, climate-change mitigation, waste reduction, biodiversity and cultural heritage conservation and the strengthening of linkages with local communities (Pratt et al., 2011). As a result, making tourism businesses more sustainable will foster the industry’s growth, create more and better jobs, consolidate higher investment returns, benefit local development and contribute to poverty reduction, while raising awareness and support for the sustainable use of natural resources (Pratt et al., 2011).
For tourism development to be sustainable, government policies, practices and strategies should take into account the expectations of tourists and the conservation of natural resources and the needs of local communities that maybe affected by tourism projects (ILO, 2010). Sustainable tourism, therefore promotes energy efficiency by using renewable energy. In this regard, tourism facilities should consume less water; minimise waste; conserve biodiversity, promote cultural heritage and traditional values; support intercultural understanding and tolerance; and generate local income and integrate local communities with a view to improving livelihoods and reducing poverty (Pratt et al., 2011). Wall (1997) argues that if tourism is to become sustainable, it should be economically viable, socio-culturally sensitive and environmentally friendly in destination areas. Environmental friendliness in the tourism industry includes the use of energy types which does not degrade the environment but ensure that natural ecosystems such as the Okavango Delta to be used by future generations.

Sustainability in tourism can be achieved if tourism stakeholders collaborate and share knowledge and tools and share a common definition of environmental and socio-cultural impacts of tourism activities at destinations (Pratt et al., 2011). The tourism industry, government and private sector should collaborate with each other to achieve sustainability. This collaboration is particularly important between the tourism sector and government ministries of environment, energy, agriculture, transport, health, finance, security and with local governments (Pratt et al., 2011). Sustainable tourism policy development means government should motivate and influence tourism stakeholders (i.e., public and private sectors) to engage in behaviour that bolsters a destination’s sustainability (Pratt et al., 2011). In relation to energy development, sustainability means tourism operators should focus on the use of renewable energies especially in fragile ecosystems like the Okavango Delta. It is from this perspective that energy uses particularly energy types and amounts as well as effects of these in tourism development in destination areas such as the Okavango Delta should be studied. The assumption is that the results of this paper will provide insights into how sustainable energy in the tourism industry can be achieved in the Okavango Delta.

3 Study site and methods

3.1 Study site

This research was carried out in tourism camps and lodges in the Okavango Delta, located in north-western Botswana (Figure 1). The Okavango River and its Delta is characterised by large amounts of open water and grasslands, which sustain human life and a variety of flora and fauna. The Okavango Delta was named a Wetland of International Importance and Ramsar Site in 1997 and UNESCO’s 1,000th World Heritage Site in 2014. Due to its rich wildlife diversity, wilderness nature, permanent water resources, rich grasslands and forests, the Okavango Delta has become a key international tourism destination in Botswana.

The tourism industry, especially lodges and camps in the Okavango Delta largely use fossil fuels for its energy supply (Aqualogic, 2008). However, the use of fossil fuels can be one of the environmental threats to this wetland. The Okavango Delta, therefore, is a suitable site to analyse energy use in tourism camps and lodges so as to achieve conservation and environmental sustainability of the wetland or have fossil-free wetlands.
3.2 Methods

This paper used several methods for data collection and analysis: firstly: secondary data were collected from different published and unpublished sources on tourism development and energy demand and supply in tourism lodges and camps in the Okavango Delta. Secondary data sources consisted of articles and reports on tourism development, energy demand and supply in Botswana particularly those about Okavango Delta. This includes government policy documents, consultancy reports, management plans of various camps and lodges in the Okavango Delta, community-based tourism and related wildlife-based tourism reports. Specific documents used include: Botswana’s Tourism Policy of 1990, Wildlife Conservation Policy of 1986, Botswana Tourism Master Plan of 2000, Community-Based Natural Resource Management (CBNRM) Policy of 2007, Okavango Delta Management Plan (ODMP) of 2008 and various management plans of lodges and camps in the Okavango Delta, documents from Statistics Botswana on energy production and distribution in the Okavango. Data on tourism statistics and tourism facilities in the Okavango Delta was also collected from the Statistics Botswana. This study also relied on the use of information collected from annual reports from the Botswana Power Corporation and the Energy Affairs Division in the Ministry of Mineral Resources, Energy & Water Affairs.

Secondly, primary data collection was in the form of informal interviews with government officials at the Energy Affairs Division (Ministry of Mineral Resources, Energy and Water Affairs), Department of Electrical and Mechanical Services (Ministry of Works, Transport and Communications) and the Botswana Power Corporation in
Gaborone, Botswana’s capital city. Informal interviews also involve officials from the following sectors: Okavango Wilderness Safaris (OWS), Chobe Game Lodge, Botswana Tourism Organization, Department of Tourism and Department of Environmental Affairs in 2015. In total, seven informal interviews were conducted with key informants namely: tourism operators, energy officials and environmental managers. In-depth interviews with key informants were important for gaining knowledge on energy development in the tourism industry and the potential to shift from fossil fuels to renewable energy in the Okavango Delta. These in-depth interviews were meant to substantiate the findings of the secondary research conducted in this study. There were also meant to get perceptions of government and tourism sector toward renewable energy development in the Okavango Delta. The study also used synthesised data from a number studies on tourism development carried out by these authors in the Okavango Delta between 1998 and 2015. Information derived from these sources includes the use of energy supply in the Okavango Delta. Although data collection using the above methods was sufficient, it is however having limitations because of the lack of a bigger sample of lodges and hotels in the Okavango Delta. However, informal interviews and existing secondary data provide a picture of renewable energy in the tourism industry.

Thirdly, content or thematic analysis was used to analyse data collected from informal interviews from informants. Theme and patterns reported about energy supply and demand in tourism camps and lodges in the Okavango Delta were made. The themes that emerge from key informants stories provided insights of the perceptions towards the use of fossil fuels and renewable energy in tourism lodges and hotels in the Okavango Delta. That is, qualitative data collected from secondary sources about energy supply and demand in the Okavango Delta were summarised into specific themes and patterns. This provided an analysis about the sustainability of energy development in tourism camps and lodges. Quantitative data collected was analysed and it involved the production and interpretation of frequencies and tables that describe ecotourism in Botswana.

4 Results and discussion

4.1 Energy supply in lodges in the Panhandle area

Lodges and hotels located in the inlet of the Okavango Delta also known as the panhandle area such as Drowsky Cabins and Shakawe River Lodge are connected to the national grid which is burning fossil fuels in the production of electricity. Lodges and camps in the panhandle or upper parts of the Delta are located along the river. Many villages in the panhandle such as Shakawe, Gumare and Seronga are located along the river. These villages are connected to national electric grid and use electricity generated from the burning of fossil fuels. That lodges and camps have opted for connection to the national grid and that use fossil fuels means that these lodges are having a contribution to the carbon emissions, climate change and global warming.

The case of lodges and camps in the panhandle being connected to the national electric grid and using electricity generated from fossil fuels is an example of the failure to implement the Botswana Energy Polic of 1997 which aimed at rural electrification through photovoltaic (PV) electrification. Botswana’s energy policy notes that solar energy mainly for water heating and remote area electricity generation has promise for application in Botswana with its good isolation and long sunshine (MFDP, 1997). As a
result, government aims at encouraging sustainable PV electrification programs of which attention is given to the enforcement of standards, increased technical training, effective maintenance arrangements, sustainable financing mechanisms, as well as information dissemination to relevant groups.

The PV rural electrification program is expected to compliment the grid system especially in rural areas where renewable energy offers the best opportunity (Zhou et al., 1999). That is, the PV system is expected to be the main source of energy in areas where it is not considered economically viable to provide electricity through the grid system. Shakawe, Gumare and Seronga are remote villages which could easily benefit from PV electrification. However, the grid and the PV rural electrification systems appear to be competing rather than complementing each other (UNICO International Corporation Electric Power Development Company, 2001). The results of this situation have been the low rate of rural electrification by both programs. In addition, government policy appear to be narrow in the promotion of renewable energy in that it concentrates on solar energy without particular attention to other potential renewable energy sources such as wind and biogas which also have potential in Botswana especially in rural areas. The rural villages of Shakawe, Gumare and Seronga are therefore not connected to PV electrification and this has resulted in lodges and camps located along the Okavango River in this area using electricity generated from fossil fuels.

4.2 Fossil fuels in lodges and camps

Lodges and camps in the Okavango Delta are often not connected to the national electricity grid hence rely on fossil fuels to meet their energy demands. Fossil fuels which lodges and camps use in the Delta include petroleum products such as diesel, oil, paraffin, paint and aeroplane gasoline (Mbaiwa et al., 2016). The majority of lodges and camps in the Okavango Delta use diesel for various purposes. For example, diesel is burnt down in diesel generators to produce electricity. Electricity from diesel generators is used for cooling, water heating and lighting and for storage of food in deep freezers and fridges. In addition, GISPlan (2013) notes that most of the fuel, especially diesel is used for heavy machinery for maintenance of airstrips, trial system and for the game drives. Lodges and camps in the Okavango Delta are located in isolated and scattered locations where accessibility by roads is generally difficult. In this regard, air transport is mostly used. As a result, a great deal of jet fuel is also used for air transfers of tourist form Maun Airport to various parts of the Okavango Delta due to the accessibility issues.

Each of the lodges and camps in the Okavango Delta transports a significant amount of petroleum products into the Okavango Delta on monthly basis. Table 1 show that a total of 1,316 litres of oil, 9,600 litres of petrol and 21,400 litres of diesel are transported on monthly basis into the Okavango Delta (Aqualogic, 2008). The diesel is burnt to produce electricity and provide energy for their tourism facilities. Paraffin, paint and wood preservatives (wood guard, timber varnish) are used in relatively small quantities.

The main modes of transporting these substances into the delta are road, air and boat. A total of 78% of the tourism establishments use professional transport companies particularly a company known as Pony transport to transport the substances into the sites. The remaining 22% transport fuel on their own into the delta. Pony transport can transport at most 8,000 litres of fuel in one trip. As such, the likely quantity of fuel spill is 8,000 litres (Aqualogic, 2008). Table 2 shows the amount of petroleum products brought
into the Okavango Delta each month to meet energy demands of various tourism lodges and camps. The main modes of transporting these substances into the delta are road, air and boat. A large quantity of fuel (80%) is transported by road (Aqualogic, 2008).

### Table 1

<table>
<thead>
<tr>
<th>Usage rate</th>
<th>Oil (L/month)</th>
<th>Petrol (L/month)</th>
<th>Diesel (L/month)</th>
<th>Paraffin (L/month)</th>
<th>Paint (L/year)</th>
<th>Wood preservatives (L/year)</th>
<th>Used oil (L/month)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>1,316</td>
<td>9,600</td>
<td>21,400</td>
<td>300</td>
<td>180</td>
<td>300</td>
<td>1,356</td>
</tr>
<tr>
<td>Average per establishment</td>
<td>73</td>
<td>738</td>
<td>1,338</td>
<td>50</td>
<td>20</td>
<td>50</td>
<td>75</td>
</tr>
</tbody>
</table>

*Source: Aqualogic (2008)*

### Table 2

<table>
<thead>
<tr>
<th>Mode of transportation</th>
<th>Oil (L/month)</th>
<th>Petrol (L/month)</th>
<th>Diesel (L/month)</th>
<th>Total (L/month)</th>
<th>Proportion (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road</td>
<td>1,052.8</td>
<td>7,680</td>
<td>17,120</td>
<td>25,852.8</td>
<td>80</td>
</tr>
<tr>
<td>Air</td>
<td>1,579.92</td>
<td>1,152</td>
<td>2,568</td>
<td>38,779.22</td>
<td>12</td>
</tr>
<tr>
<td>Boat</td>
<td>105.28</td>
<td>768</td>
<td>1,712</td>
<td>25,852.8</td>
<td>8</td>
</tr>
<tr>
<td>Totals</td>
<td>1316</td>
<td>9,600</td>
<td>21,400</td>
<td>32,316</td>
<td>100</td>
</tr>
</tbody>
</table>

*Source: Aqualogic (2008)*

There are various containment methods used to bring the oil, petrol and diesel to different sites in the Okavango Delta. For example, 23,267.52 litres/month (78.26%) is transported in drums and 6,463.2 litres/month (21.74%) transported in partitioned tanks (Aqualogic, 2008). Aqualogic (2008) notes that paraffin, paints, wood preservatives and some oil are usually brought into establishments in original containers of various volumes. Oil is usually stored in drums and original containers. A total of approximately 19,840 litres/month (64%) of petrol and diesel are stored in drums, 8,990 litres/month (29%) in underground tanks with pumps and 2,170 litres/month (7%) in elevated fuel tanks. Paraffin, paints and wood preservatives are usually stored in original containers. Some tourism establishments use underground storage with pump while others use elevated tanks. Storage of petroleum products in most of the lodges and camps in the Okavango Delta is not done to the recommended storage standards (DEA, 2008; GISPlan, 2013). Aqualogic (2008) notes that a total of about 19,840 litres/month (64%) of petrol and diesel are stored in drums, 8,990 litres/month (29%) in underground tanks with pumps and 2,170 litres/month (7%) in elevated fuel tanks. Paraffin, paints and wood preservatives are usually stored in original containers. About 70% of permanent lodges/camps service their vehicles on site, hence generating used oil. This therefore provides insights into the amount of petroleum products which are transported into the Okavango Delta in a month and how such fossil fuels are stored.

### 4.3 Solar energy in lodges/camps in the Okavango Delta

Renewable energy used in the Okavango Delta include fuelwood and solar. Fuelwood discussed in the next section of this paper is used in many lodges and camps for bonfires.
Tourism and energy use in lodges and camps

and at times for heating water. Solar energy is becoming prominent with some of the lodges and camps in the Okavango Delta. It is suitable for cooking, lighting, water heating, space heating and ironing. However, the intake and use of solar energy is very low as the majority (over 80%) of the tourism facilities rely on the use of fossil fuels.

Although the use of solar energy is low in the Okavango Delta and in Botswana as a whole, the country has abundant solar energy resources with more than 3,200 sunshine hours and average radiation of 21 MJ/M² per day (Mosimanyana et al., 1995). This means solar energy is an available natural resource which is not efficiently used in the Botswana. However, some of the tourism is responding to the global call for promoting green tourism, this is a tourism industry which use and promotes renewable energy sources and it is environmentally friendly. The use of renewable energy or going green in tourism has become a marketing strategy which companies use to sell their tourism products. The Okavango Delta being a natural ecosystem has become an appropriate destination for some companies to market themselves and introduce solar energy as well. Some of the solar initiatives from selected tourism companies are discussed below:

4.3.1 Solar energy use in lodges/camps owned by OWS

The OWS owns and operates 22 lodges/hotels in the Okavango Delta. OWS has adopted a shift in its policy to move away from the use of fossil fuels to solar energy in all it lodges and camps. The company is doing this in phases over the next few years. Informal interviews with the environmental officer at OWS indicate that a total of ten lodges already use 100% solar to meet their energy demands. The company acknowledges that its lodges are situated in remote areas and generally off-grid hence required generating electricity for their lodges and camps (Wilderness Holdings, 2015). Wilderness Holdings (2015) further notes that historically, electricity was provided to the lodges through diesel-fuelled generators. OWS notes that its main goal is to reduce dependence on fossil fuels with the aim of eventually being carbon neutral in the tourism business. Wilderness Holdings (2015) notes that it’s currently converting camps to alternate energy sources such as solar power. Wilderness Holdings (2015, p.14) notes:

“In 2015, our solar power investment grew to the point where we can generate 517 kW from plants in 16 camps, of which nine are 100% solar powered and four have hybrid systems which use a combination of solar power and generators. A further 12 camps operate off smaller solar systems that power each guest unit independently, leaving the generator to power only the main area.... 22 camps make use of inverter-battery systems that enable them to reduce generator running times from 24 hours to an average of just nine hours daily. The result is that we consumed 214 239 GJ of energy, a 12% decrease from the 244 614 GJ consumed in 2012. Over the same period, our carbon emissions have reduced by 13% from 17 412 tonnes CO₂e to 15 135 tonnes CO₂e.”

The use of solar energy in the Okavango Delta has proved to have environmental protection of some carbon emissions for companies that use this technology. For example, Wilderness Holdings (2015) notes that between 2012 and 2015, it managed to reduce carbon emissions by 16% from 0.097 to 0.081 tonnes CO₂e per bednight. Wilderness Holdings (2015) provides a case study upon which petroleum products can be reduced or replaced in lodges and camps in the Okavango Delta. In addition, there are also financial savings which companies make when using solar energy. For example,
OWS notes that its energy budget made financial servings amounting to a total of P3,875,842 (USD 387,584) in a year in five camps which shifted from the use of fossil fuels to solar energy (Wilderness Holdings, 2015). This therefore shows that the use of solar energy is not only an environmental friendly strategy for tourism development but also a financial sustainability approach for tourism companies operating in the Okavango Delta.

4.3.2 Solar energy use in lodges/camps in concession area NG/31

The use of solar energy has been adopted by two tourism companies operating in a tourism concession area known NG/31. This concession area covers a total area of 225 square kilometres. In this concession area, there are two accommodation facilities known as Sandibe safari lodge and Chitabe camps. Sandibe safari lodge uses a diesel generator for almost 80% of time and an inverter system for the rest of the time. On the other hand, in Chitabe main and Chitabe Lediba camps currently use solar energy for two thirds of the day hours in their facility and their generator provides energy for the rest of 7 hours per day. The ultimate goal of Chitabe camps is to have solar energy running for 24 hours in their facilities. The management plan for controlled hunting area NG/31 indicates that at least 70% of the energy requirements for all lodges and camps would be using renewable energy (mainly solar energy) by 2017 (GISPlan, 2012). The case of N/31 demonstrates the fact that energy supply in the Okavango Delta is mostly from petroleum products such as diesel and petrol. However, the use of solar energy is possible and can serve as an alternative in these remote parts of the country.

4.3.3 Solar energy use in concession area NG/21

In another concession area known as NG/21 which covers a total of 230.54 square kilometres there are three lodges located within 8 km of each other. These lodges are: Camp Okavango, Xugana Lodge and Shinde Camps. All lodges and camps in NG/21 are using the following forms of energy: fuelwood used for bonfires, diesel generators to produce electricity for lighting and refrigeration; battery charging for lighting especially at night when the generator is not in switched on; and propane gas for cooking in kitchens. Solar energy is currently being used to heat water at Xugana lodge (for guests) and at Shinde camps (at staff village). At Camp Okavango, energy or generator power (AC 220V) is available during the day and evening. Video batteries can be recharged. Rooms are equipped with a 220 volt AC plug for hairdryers and 12 volt DC lighting for night time use, after the generator has been switched off. At Xugana camp, generator power (AC 220V) is available during the day and evening. 12 volt DC lighting is supplied for night time use, after the generator has been switched off. Video batteries can be recharged – AC 220 volts. The same amount of energy is generated at Xugana and footsteps across the Delta to provide the camps with the necessary energy. Given the ‘ever growing’ demand to reduce carbon emissions (even by this, small-scale facilities), there will be a need to substitute the existing diesel, generator-based power supply with solar solution. This therefore suggests that much needs to be done in order to introduce renewable energy resources for a fossil free Okavango Delta.

The case of NG/31 and NG/21 demonstrates that the uptake of solar energy is currently still very low in the Okavango Delta. For instance, in controlled hunting area NG/21, solar energy was only used to heat water at the two camps of Xugana and Shinde,
Tourism and energy use in lodges and camps

in 2013, whereas other lodges and camps used diesel generated electricity for lighting and refrigeration, firewood for bonfires and batteries for lighting when generators were off late at night. Similarly, in 2012, only two lodges of Moremi Crossing and Gunn’s Bush Camp used solar energy in controlled hunting area NG/27 (GIS Plan, 2012). The used of solar energy suggests that solar energy might be a feasible renewable energy source in camps and lodges in the Okavango Delta.

4.4 The use of fuelwood in lodges and camps

The use of fuelwood is common in almost all the tourism camps and lodges in the Okavango Delta. Fuelwood is used mainly for bonfires for tourists (GIS Plan, 2013). In addition, fuelwood is used for warming water in ablution blocks especially in campsites by as some of the companies. For example, GIS Plan (2013, p.203) notes: “an appraisal of the existing situation revealed that all lodges and camps in NG/25 are predominantly using the following forms of energy: fuelwood used for bonfires”. The use of fuelwood for bonfires is a common phenomenon in all the camps in the Okavango Delta. Bonfires are a tourist attraction in the wilderness of the Okavango Delta.

4.5 Environmental threats caused by type of energy used

4.5.1 Environmental threats of using fuelwood

The collection of fuelwood has environmental impacts which have become a concern to environmental conservation groups and to the Botswana Government. Studies (e.g., Sekhwela, 1997; Kgathi and Mlotshwa, 1997) have shown that the dependence on woody biomass as an energy source often results in fuelwood scarcity and pressure on wood resources especially around settlements. In the Okavango Delta, the use of fuelwood is a major concern to park managers and forestry managers since they are interested in seeing nature taking its course in natural environment than having the depletion of forest reserves. Zhou (2001) also notes that rural fuelwood consumers mainly depend on collecting dead wood but fuelwood scarcity may cause consumers to resort to cutting live trees, a scenario that Sekhwela (1997) confirms to be the case in areas around rural settlements in Botswana. Much has not been researched on the availability and scarcity of fuelwood in and around lodges and camps in the Okavango Delta. The assumption is that, scarcity of fuelwood around tourism facilities might be a possibility. The cutting down of live trees for fuelwood has contributed to deforestation even though it is acknowledged that the major cause of deforestation (95%) is the result of the extension of agricultural activities into wooded areas in Botswana (Sekhwela, 1997). The depletion of wood resources in Botswana is one of the major environmental concerns in the country (Barnhoorn et al., 1994). The collection of fuelwood for bonfires and related uses like heating of water for tourists is likely to have negative environmental impacts on forests resources of the Okavango Delta.

4.5.2 Environmental threats of using fossil fuels

Fossil fuels have the potential of being an environmental hazard if not handled appropriately using appropriate storage and transportation facilities. For example, a large quantity of fuel (80%) is transported by road, with the probability of a large land spillage
in case of an accident (Aqualogic, 2008). Generally, different surface routes are used to transport the substances to sites in the Okavango Delta. The routes have a wide coverage, reaching into the centre of the delta. This means that any substantive spillage of hazardous substances could have a significant impact on the delta environment. Transportation of fuel, particularly in difficult roads such as the ones in the Okavango delta, has the potential to result in leakages and spills. Apart from transportation, vehicle service areas and/or leaking storage facilities have the potential to contaminate the surrounding environment. In order to minimise potential environmental harm, it is important that spills are contained and areas affected be treated (Aqualogic, 2008).

Oil spillages into water and the soil in the Okavango Delta occur during the servicing of vehicles. Aqualogic (2008) notes that a total of 70% of permanent lodges/camps indicated that they service their vehicles on site, thereby generating used oil. Houseboats are serviced on site because of their big size and there are no precautions undertaken to safeguard possible spillage of oil. Servicing of vehicles also generates solid waste in the form of oil filters. The amount of used lubricating oil (engine and gearbox) generated on a monthly basis in lodges and camps varied from approximately 5 litres to 800 litres. The used oil was stored onsite in 20 litres or 200 litres containers or large overhead tanks until transport was available to take it to Maun for bulk storage and transportation to South Africa for recycling. It also established that, while there appears to be some control in storing the used oil, sand containment areas where used oil was stored, appeared saturated and substantial areas of ground at these sites was contaminated with oil and fuel spillage (Aqualogic, 2008). Studies (e.g., DEA, 2008; GISPlan, 2012) have shown that the management of these petroleum products in some of the lodges and camps is poor in that spillages are reported to be common. Oil spillages to the ground possess serious environmental challenges to the fragile Okavango Delta wetland ecosystem. This therefore shows that fossil fuels are a threat to the environment in the Okavango Delta.

4.6 Policy and energy use in remote locations

The tourism industry is a significant contributor to greenhouse gas emissions (Gössling et al., 2007). As a result, there is need for policy change that aim at the reduction of greenhouse gases and climate change to promote the use of renewable energy. This paper has shown that tourist camps and lodges in the Okavango Delta mostly use fossil fuels than renewable energy. However, the Botswana Government has adopted the Energy Policy of 2015 which aims at promoting the use of renewable energy in the country. The Energy Policy objectives of the energy policy are spelt out and one of them indicate commitment to energy sources which are environmentally friendly, it notes: “minimize energy related impacts on environment” [MMEWR, (2015), pp.2–3]: district-level policies also determine the adoption of renewable energy technologies at the local level. For instance, the Ngamiland District Development Plan 7 (2009–2016), which covers the Okavango Delta, states that the utilisation of renewable energy sources will be promoted in the plan period. The technologies mentioned include solar PV electrification systems for lighting and solar thermal energy systems for water heating. Although the plan does not mention its vision for the provision of energy in remote areas of the Okavango Delta, where there are tourist camps and lodges, the understanding is that renewable energy in the district is promoted for adoption.

To achieve sustainability in energy use in the tourism industry and promote green tourism, there is need for policy to make provision for a code of conduct for tourists and
hosts and this code should encourage use of renewable energies and reduced negative impacts on the environment (Marunda et al., 2013). Green tourism which in essence is a form of sustainable tourism which calls for a clean healthy environment to put the tourism and hospitality industry on the path to sustainability (Marunda et al., 2013). In Botswana, the Botswana Tourism Organisation (BTO) adopted the Botswana Ecotourism Certification Standards in 2010. These Standards promotes the use of renewable energy in lodges and camps in the Okavango Delta. The BTO encourages ecotourism operators to use energy efficiently in their camps and lodges. The BTO manual on ecotourism best practices requires ecotourism operators in the Okavango Delta to prepare energy conservation plans. These conservation plans are supposed to state the conservation measures to be adopted, including the installation of compact florescent lights and use low energy appliances (Botswana Tourism Board, 2010). The environmental officer at BTO, Mr Richard Malesu during an informal interview indicated that the Botswana Government supports a shift from the use of fossil fuels to renewable energy. Mr. Malesu noted:

“Botswana Tourism Organisation encourages the use of renewable energy in tourism lodges and camps in the Okavango Delta as illustrated as a component of Botswana Ecotourism Certification Standards for Accommodations and Ecotours. It has also became a requirement for lease renewal for concession areas to illustrate commitment towards introduction and implementing of use of renewable energy to promote environmental best management practices and to eliminate pollution and soil contamination from fuel/oil or fossil fuel at large and emission of carbon through the carbon offset or carbon sequestration on the sensitive ecosystem of the Okavango Delta as a Ramsar Site and World Heritage Site.”

The challenge with Botswana Ecotourism Certification Standards is that they are voluntary and companies may opt not to use those (Mbaiwa et al., 2011). This information was also collaborated the Environmental Office at BTO during informal interviews. The BTO officer noted that renewable energy is: “illustrated as a component of Botswana Ecotourism Certification Standards for Accommodations and Ecotours. Even if this is a voluntary exercise, there has been a significant growth of tourism facilities which participates in this noble exercise” (Richard Malesu, personal communication, November 2015). The challenge is that if standards which prescribe how renewable energy is to be adopted in the tourism industry are voluntary, some of the companies might opt to continue to use fossil fuels which are in reality not environmentally friendly but harmful to fragile ecosystems like the Okavango Delta. Mbaiwa et al. (2011) note that during the consultation workshops in the precertification stage with tourism stakeholders, representatives of companies operating lodges in environmental sensitive areas argued that standards should be made compulsory instead of voluntary as is the case at present. Despite the limitations posed by standards and a specific policy on renewable energy, results indicate that government is partially committed to the fact that the tourism industry in the Okavango Delta should embrace a shift from fossil fuels to renewable energy sources. In addition to energy policy and the various management plans for the various concession areas in the Okavango Delta, the tourism industry is thus obliged to use renewable energy in their tourism facilities.

The Botswana Government has regulations governing the use of hazardous substances in the Okavango Delta. For example, Botswana’s waste management strategy (WMS) of 2006 notes that the amount of lubricating oil (engine and gearbox) generated
on a monthly basis in lodges and camps in the Okavango Delta varies from approximately 5 litres to 800 litres. Accordingly to WMS requirements, used oil or petroleum products should be stored on site in 20 litre or 200 litre containers or large overhead tanks until transport is available to take them to Maun for bulk storage and transportation to South Africa for recycling. In all the lodges and camps in various concession areas in the Okavango Delta, petroleum products like used oil from the camps is transported to Maun through hired companies. In this regard, much of the petroleum waste and hazardous materials are disposed in Maun.

Fuel storage facilities in all camps/lodges in the Okavango Delta have bund walls to ensure that spills and leaks are contained. The storage facilities have plastic ground sheets covered with sand so that spills can be collected and shipped out if necessary. There is, however, poor handling of some of the petroleum products in some of the camps and lodges such as Xugana island lodge in NG/21. The concrete floors under the oil tanks are not constructed to the required standards, thus posing a risk for oil spillages on the ground (a phenomenon that is not desirable for difficult sites or environmental sensitive sites). With regard to this, proper oil and fuel storage management standards will also need to be recognised and enforced especially by tourism operators. Results in this research indicate that even though there are regulations on how fossil fuels are to be handled in the Okavango Delta to avoid environmental effects, most of the operators do not observe these regulations, making it necessary to adopt a policy approach which aim at shifting from the use of fossil fuels to renewable energy sources such as solar which are generally clean and environmental friendly.

5 Conclusions

This paper has shown that there are four main types of energy sources used in lodges and camps in the Okavango Delta, these are:

a) fossil fuels made from burning of coal –these are used by lodges and camps in the panhandle which are connected to the national electric grid

b) fossil fuels especially petroleum products

c) fuelwood mostly used for born fires

d) solar energy which is relatively new in the Okavango Delta.

However, the proliferation of lodges and camps in the inner parts of the Okavango Delta introduced and increased use fossil fuels particularly petroleum products for energy supply. Over 80% of the lodges and camps in the Okavango Delta use fossil fuels for their energy supply (Aqualogic, 2008). Petroleum products like diesel are used to produce electricity. Electricity from diesel generators is used for cooling, water heating, lighting and for storage of food in deep freezers and fridges. The use of fossil fuels has proved not to be environmentally friendly and contribute to climate change and environmental degradation in the Okavango Delta. Therefore, there is need to shift from the use of fossil fuels to renewable energy in order to create sustainability and a fossil free wetland in the Okavango Delta.

Solar and fuelwood are the only renewable energy sources used in tourist camps and lodges in the Okavango Delta largely used fossil fuels. However, the use of renewable
energy sources such as fuelwood and solar is limited. It is from this perspective that efforts research should be carried out in order to provide insights into how renewable energy sources can be made the main source of energy in tourist camps and lodges in the Okavango Delta. There is therefore need for policy which encourages a shift from fossil fuels to renewable energy especially solar energy is a feasible option for the Okavango Delta. The use of solar energy is environmentally friendly and promotes the ideals of sustainable tourism development in the Okavango Delta. In addition, tourism operators and companies opting for the use of solar energy save financial costs since running costs of solar energy are far cheaper than used fossil fuels. This approach has the potential of achieving sustainability in the Okavango Delta and a fossil free wetland.

Finally, in the tourism sector, policies that promote renewable energy should aim at reducing the removal of biodiversity; policies should ensure the use of renewable energy and promote the preservation and protection of the environment (Marunda et al., 2013). Marunda et al. (2013) note that such policies should aim at promoting the development and dissemination of renewable energy tools and materials within the tourism sector. In addition, tourism operations and hotels management actions and investment decisions should include the use of energy; and, that policy should raise awareness of tour operators, transport providers and hotel managers, decision-makers, staff and consumers of the benefits of using renewable energies. Policy changes that promote a sustainable tourism industry will also require changes in technological innovation and behavioural changes especially travel patterns of human beings.

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