



# Tourists' perceptions of environmental impacts of tourism development on water resources in the Okavango Delta, Botswana

Owen Musora\*

Department of Tourism Studies  
University of Botswana  
Okavango Research Institute (ORI)  
P. Bag 285 Sexaxa Maun, Botswana  
[owenmusora@yahoo.com](mailto:owenmusora@yahoo.com)

Professor Joseph. E Mbaiwa  
University of Botswana (Okavango Research Institute (ORI))  
P. Bag 285 Maun. Botswana

Dr Mike Murray-Hudson  
University of Botswana (Okavango Research Institute)  
P. Bag 285 Maun. Botswana

Corresponding author\*

## Abstract

The Okavango Delta is a unique inland water system supporting tourism development in Botswana. While the ecological integrity of the wetland remains intact, there are signs that it is being slowly eroded by increasing anthropogenic pressures like tourism activities. This study describes tourists' perceptions of environmental impacts of tourism activities in the Okavango Delta in a way to enhance wetland resources management. Sustainable tourism framework informs the study with emphasis on environmental sustainability. Primary data were gathered through field-based research using participative observation, semi-structured questionnaires and key informant interviews. Secondary data were collected from intensive review of various studies, journals and reports. Results show that sampled tourists (70) neither agree nor disagree (mean of 3.17 and s.d of 0.926) that tourism activities may be causing environmental impacts in the Okavango Delta. 35.2% of tourists who agreed highlighted concerns like pollution (noise from boats, aircraft, tourism vehicles, generators), speeding of boats creates large waves which damages plants and disturbs animal and birds breeding grounds. There is potential for water contamination improper disposal of liquid and solid waste. The main determinants of environmental impacts may be poor enforcement of management strategies, lack of financial and human resources and incorporation of tourism accommodation facilities in conservation. The environmental condition of the Okavango Delta is relatively pristine but tourism growth is exerting pressure. This suggests that management strategies must be reinforced, monitored and implemented to achieve sustainable tourism development.

**Keywords:** Tourism development, environmental impacts, perceptions

## Introduction

Tourism is considered the world's most vital growing economic sectors accounting for 5% of global Gross Domestic Product (GDP), one in twelve jobs globally, 30% of the world's service exports and 9.5% of total capital investment worldwide (UNWTO, 2012). International tourist arrivals grew by 7% to 940 million

from 877 million between 2009 and 2010, with a positive growth reported in all world regions (UNWTO 2011). Tourism attractions such as beaches, coral reefs and wildlife viewing are highly preferred resulting in tourism strongly dependent on the natural environment (UNWTO 2011). The growing level of participation in nature based tourism has considerable economic benefits but carries with it environmental costs which might be irreversible.

Botswana's tourism has been growing steadily since 1990s and by 2007 it had become the second largest economic sector after diamond production with 9.7% contribution to gross domestic product (WTTC, 2007). The annual growth rate between 2006 and 2009 was 2.6%, with a total of 1,552,611 tourist arrivals and total expenditure of 2,943 billion pula (DOT 2009). Tourism growth has been evidenced by an increase in visitor numbers, the use of lodges and camps and rural urban migration as the sector employs approximately 34% of the working class (DOT 2010). In 2012, tourism arrivals were expected to grow by 6.6%, attracting 2,374,000 international tourist arrivals but this was exceeded. By 2022, international tourist arrivals are forecast to total 3,588,000, generating expenditure of BWP11,150,3mn, an increase of 4.9% pa.

AUNESCO World Heritage Site inscription (2014) states that "The Okavango Delta is a vast inland river delta in northern Botswana. It's known for its sprawling grassy plains, which flood seasonally, becoming a lush animal habitat. The Moremi Game Reserve occupies the east and central areas of the region. Here, dugout canoes are used to navigate past hippos, elephants and crocodiles. On dry land, wildlife includes lions, leopards, giraffes and rhinos".

The Okavango Delta is a unique inland alluvial fan characterized by large amounts of open water and grasslands which sustain human life, plant life, wildlife, birds, insects and various living organisms (WTTC, 2007). The wetland's natural environment may be vulnerable to tourism impacts. This study describes tourists' perceptions of environmental impacts of tourism activities in the Okavango Delta. This study is informed by the concept of Sustainable Tourism Development viewed by United Nations members as a move to global development and achieving Millennium Development Goals (MDGs). Sustainable tourism is the management of all resources in a way that economic, social and aesthetic needs can be fulfilled while maintaining cultural integrity, essential ecological processes, and biological diversity and life support systems (WTO 2004). The paper's main emphasis is on the environmental conservation of the wetland which entails tourism growth in a manner and scale that remains environmentally viable over an infinite period. The Government of Botswana uses the sustainable tourism framework for policy making. The Ministry of Environment, Wildlife and Tourism has the mandate to enforce policies through the Department of Tourism, Department of Environment Affairs and Department of Wildlife and National Parks.



**Image 1.** The Okavango Delta. Source: <http://sublimesafaris.com/destinations/okavango-delta/>



**Figure 1.** The Okavango Delta, Botswana. Source: [http://lodgesofbotswana.com/about/botswana\\_map](http://lodgesofbotswana.com/about/botswana_map)

## Methodology

### Data collection and techniques

A descriptive research design was used to assess tourists' perceptions of environmental impacts of tourism activities in the Okavango Delta. Both qualitative and quantitative methods were used in data collection. Primary data were collected through face to face interviews with key informants, participative observation and tourist questionnaires. The study variables were informed by sustainable tourism indicators by the World Tourism Organisation and pollution, cleanliness of the destination, use level and stress on the destination were selected.

Purposive Sampling was used in the selection of five tourism accommodation facilities in the Okavango Delta. The five lodges in different Ngamiland concessions (Maun lodge, Island Safari Lodge and Crocodile Camp- NG36, Drotsky Cabins – NG01, Xakanaxa Camp - NG28) were chosen. The study purposively chose lodges that have over twenty years in operations and are situated along the shores of the Okavango Delta. Data were collected from a total of 71 tourists between April and November 2011. Face to face interviews were conducted in long serving employees on tourism accommodation facilities, North West District Council environmental health officers, land board officer, tribal chiefs, and DOT, DEA and DWNP officials. Secondary data were used to identify documented environmental impacts in the Okavango Delta.

Descriptive statistics was used for data analysis leading to the results and findings of this study. Data were analysed using thematic analysis whereby similar data were categorised into themes like perceptions of noise, air, water quality, and cleanliness. Other themes included perception on tourist vehicles and tourism activities. Data were presented in frequency tables, pie charts and bar graphs with the aim of giving a condensed picture, interpreting or giving a theoretical meaning. Open ended questions, for example, "Comment of noise pollution in the Okavango Delta"; responses were coded into similar categories and themes, for example, "too noisy" then analyzed.



## Results and Discussion

Approximately 100,000 tourists visit the Okavango Delta yearly (Magole, 2009). Data from (DWNP 1991) indicates that tourist volumes have been increasing since 1971 accounting for 4,500 tourists visiting Moremi Game Reserve. By 2010, Moremi Game Reserve accounted for 37,082 tourists (DWNP 2010), an increase of 724% in four decades. The increase in tourist volumes may be associated with increase in participation of tourism activities and increase in intensity of environmental impacts in the Okavango Delta.

### Tourism activities in the Okavango Delta.

A total of 54 out of 71 tourists responded to a question on tourism activities participated during their stay. The results indicate that the dominant tourism activities participated was game drive 92.6% (50), photographing 90.7% (49), camping 74.1% (40) and both boating and nature walk showed 61.1% (33). Tourism activities participated in by less than 50% of tourists sampled were avitourism (bird-watching), safari hunting, fishing, scenic flights and night drives. All tourism activities participated in by the sampled tourists have a direct interaction with the wetland ecological environment. The main land use form in the Okavango Delta is wildlife based tourism (Mbaiwa, 2009).

### Tourists perception towards tourism activities

Participation in tourism activities may increase the intensity of environmental impacts in the Okavango Delta. A number of 71 tourists responded to a question on perception towards environmental impacts of tourism activities. Results showed that 32.4% (23) of tourists perceive that tourism activities may cause environmental impacts on the Okavango Delta. A further 42.3% (30) of tourists neither agree nor disagree and 25.3% (18) of tourists perceive that tourism activities may not cause any environmental impacts on the wetland.

Table 1.

PERCEPTION OF ENVIRONMENTAL IMPACTS OF TOURISM ACTIVITIES.					
Values represent the number of tourists who rated the impact according to their own judgement. 1, Strongly Disagree; 3, Neutral; 4, Agree; and 5, Strongly Agree.					
	1	2	3	4	5
Tourists Response	2.8%	19.7%	42.3%	28.2%	7.0%

### Noise pollution

Some 70 tourists responded to a question on tourists perceptions towards noise pollution in the Okavango Delta. Results showed that 37.1% (26) of tourists perceived that there is noise pollution, 44.3% (31) of tourists perceived noise as being at a minimal level, whilst 18.6% (13) of the tourists perceived noise levels as being average. According to data from open ended questions, the main source of noise is boat engines, small aircraft and tourists' vehicles especially along highways and tracks. The uncontrolled speeding of boats creates not only noise but also produces large waves which may damages plants, disturbs animal and even birds breeding grounds. Roodt (1998) suggested that noise pollution may have resulted in the decline in the hippo population in Xakanaxa lagoon. (Mbaiwa, 2003), suggested that, noise pollution causes annoyance, stress, and even hearing loss to humans and distress to wildlife, especially in protected areas like Moremi Game Reserve. Other suggested effects of noise



pollution in ecological sensitive areas are changes in species composition by death, migration and declines in population of some animal species (Dilys Roe, 1997).

### Solid waste management

In assessing tourists` perception of solid waste in the Okavango Delta, 69 out of 71 tourists responded to a question on cleanliness on the destination and land pollution. Results show that 58% (40) of tourists perceive the Delta as a clean environment and land pollution being at a minimal. Some 20.1% (14) of tourists perceived that there is land pollution whilst 21.7% (15) of tourists perceived that land pollution is average. Accommodation facilities collect, store and transport all solid waste to a landfill situated in Maun. According to observation in selected accommodation facilities, solid waste is being managed by burning, compositing and by locking it in a cage then later transporting it to dumping sites. Solid waste generated is 18,305 tones/year (BioKavango, 2008). Mbaiwa (2002) highlighted that much of the sewage generated from the lodges and camps in the Okavango Delta is directly discharged into the soils while solid waste, particularly litter, is often burnt in dug pits.

### Liquid waste management

Table 2.

<b>Tourists` perceptions of water quality in the Okavango Delta.</b>					
Values represent the number of tourists who rated the impact according to their judgement. 1, least; 2, Below average; 3, A					
	1	2	3	4	5
Tourists Responses N=55	43.6%	18.2%	25.5%	10.9%	1.8%

The majority of accommodation facilities are located along the Okavango Delta and draw water from the Delta. Sampled tourists responded to a question on perception towards water pollution in the Okavango Delta. Results show that 61.6% (34) of tourists are satisfied by water quality of the Okavango Delta and view it as being pristine. Only 12.7% (7) of tourists perceive that water is polluted.

### **Possibility of water contamination**

Tourism growth is evidenced by increasing in both tourists and local populations which put pressure on the natural environment. It is obvious that as population increase is associated with increase in demand for water and therefore waste production. The majority of the accommodation facilities draws water and is located along the Okavango Delta. The disposal for waste water therefore becomes a challenge which needs continuous assessment.

In-depth interviews with employees from one accommodation facility selected, indicated that a waste disposal pipe is suspected to be connected from the kitchen and dug underground depositing waste water directly into the delta. This practice is contrary to the Waste Management Act of 1998 which stipulates that all waste water should be treated before disposal.

The challenge with the accommodation facilities is a general lack of an Environmental Management Plan (EMP). Though an EMP is a prerequisite for every tourism accommodation facility in the Okavango Delta, 45.5% (5) of managers interviewed indicated that their accommodation facilities had no EMP. This



implies that EIA, EMP and other documents required for licensing of tourism accommodation facilities are theoretically submitted to DEA and DOT to enable license processing, however in practice they are not adhered to. Other facilities have the expected document for proving to environmental officials that they are above board and yet practically they are not implementing what they are sanctioned to.

A study by BioKavango, (2008) indicated that there are no specific guidelines followed by tourism establishments to set out wastewater management systems in the ODRS. All selected accommodation facilities in this study had no employed environmentalist or environmental officer to enforce the EMP. The managers had the mandate by which their main objective is on profiteering rather than environmental conservation. Some directors start up a business due to opportunities or/and interest in nature but lack basic principles of environmental conservation. All tourism facilities visited and where interviews took place had general managers, food and beverage managers, HRM, housekeepers and other administration positions required for the day to day provision of required services. However, this might be because of their sizes, but the importance of the ecological resources in the Okavango Delta should be safeguarded by every tourism business benefiting from it in what should be a triple-bottom-line approach.

An in-depth interview with the Department of Environmental Affairs (DEA) officials indicated that most tourism facilities are indeed operating without Environmental Impact Assessment's (EIA) and Environmental Management Plans (EMP) as they were established years before the introduction of the EIA Act (2005). The EIA Act of 2005 will be effective in these facilities on the renewal of their licenses. These results are supported by studies like those of Mbaiwa, (2002) who indicated that tourism facilities are being established without proper Environmental Impact Assessments (EIA), and without carrying capacities and limits of acceptable change being determined. Some tourism facilities operate based on improper EIA and no further audits are conducted during operations and in other cases environmental conservation laws are either neither observed, nor implemented (Mbaiwa, 2003). Policies, laws and plans have provided a framework for tourism development but practical implementation and monitoring thereof need to be effectively enforced.

The DEA environmental officer indicated that both liquid and solid waste is being disposed of in the Okavango Delta without proper prior treatment. This practice is due to the high cost of waste transportation from the Okavango Delta to the only main waste disposal and landfill site located in Maun. Safari companies can either transport the waste for themselves or pay the local government sanitation office to collect the waste for them, but neither the local government nor the tour operators have implemented this regulation (Mbaiwa & Stronza, 2010). Much of the sewage generated from the lodges and camps in the Okavango Delta is directly discharged into the soils while solid waste, particularly litter, is often burn in dug pits in the Okavango Delta (Mbaiwa, 2003).

This paper indicates that all tourists accommodation facilities sampled use convectional septic tanks with soak-away. Close to 80% of the camps/lodges in the Okavango Delta use septic tank and-soak away waste water treatment system (BioKavango, 2008). A study by McCarthy, Ellery and Cieste, (1994) indicates that many safari lodges in the Okavango Delta obtain their water supply from boreholes in near surface aquifers while disposing off their wastewater via soak-away, thus creating the potential risk of contamination of their water supply. This waste water treatment system does not achieve the necessary degree of treatment to meet the BOS93:2004 standards. The system has also been found to lead to contamination and pollution of the Okavango Delta's low nutrient water (Mbaiwa 2008). The Okavango Delta's fresh water is therefore vulnerable to contamination. The water table is usually less than one metre below the surface during flood seasons and, as such, discharge of effluent into the ground makes contamination of the ground water unavoidable. Considering the 2008 to 2012 high flood levels, it is most



likely that most waste disposed in pits, trunks, soak-away and even septic tanks has been carried into the water channel.

In addition to contamination, the fresh waters of the Okavango delta can be at risk of eutrophication (McCarthy et al., 2004). This is the enrichment of bodies of fresh water by inorganic plant nutrients (e.g. nitrates and phosphates). Wastewater especially from sewage, is rich in nutrients and its escape into the environment could lead to local eutrophication of surface water (Wall & Webber, 1970). It may occur naturally but can also be the result of human activity (cultural eutrophication from fertilizer runoff and sewage discharge) and is particularly evident in slow-moving rivers and shallow lakes. According to an in-depth interview with a DOT officer, the Okavango Delta currently has approximately 116 accommodation facilities. In 1989, there were 32 accommodation facilities in the Okavango Delta (Mpotokwane, 1990) which increased to 63 accommodation facilities in 2001 which represents an increase of 49.2% in the 13-year period (Mbaiwa, 2002). Currently, accommodation facilities in the Okavango Delta are estimated to be above 116 (DOT, 2011) which is a 45.7% increase within a period of a decade. The increase in accommodation facilities may have implications on waste management in the Okavango Delta, considering that the average per capita waste water generated from each camp/lodge in the Okavango Delta is 200 liters per person per day (BioKavango, 2008) which is disposed through convectional septic tanks which soak away and in some cases, go directly into the delta.

## Conclusion

Tourism in the Okavango Delta is dependent on wildlife and water resources. This study describes tourists' perceptions of environmental impacts of tourism activities in the Okavango Delta. A sustainable tourism framework informed the study with much emphasis placed on environmental conservation. It is defined more broadly in a triangular model of social equity, economic equity and environmental conservation. Tourists are attracted to the ecological scenic beauty and wildlife based activities which include *inter-alia* camping, game drives, photography and boating. Sampled tourists neither agree nor disagree that tourism activities may be causing environmental impacts in the Okavango Delta. Concerns like pollution (noise from boats, aircraft, tourism vehicles, generators), speeding of boats creates large waves which damages plants and disturbs animal and birds' breeding grounds and all of these aspects were highlighted as being prominent in the Okavango Delta. There is also the potential for water contamination from improper solid and liquid waste disposal methods. The main determinants of environmental impacts may be poor enforcement of management strategies, lack of financial and human resources and the incorporation of tourism accommodation facilities in conservation. The environmental condition of the Okavango Delta is relatively pristine but tourism growth is exerting huge pressure. This paper suggests that management strategies must be reinforced, monitored and implemented to achieve sustainable tourism development. Continuous environmental monitoring and assessments of the Okavango Delta are a prudent necessity for environmental conservation and will mitigate destruction of pristine natural settings. The Government of Botswana should collaborate with all carefully assessed tourism stakeholders in efforts to achieve sustainable tourism development in the Okavango Delta. And in preserving this beautiful environment so that future generations can benefit from its many wonders.

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