

# **Perceived Effects of Climate Change on the Tourism Business in the Okavango Delta, Botswana**

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## **Abstract**

Climate change is bound to have an impact on the tourism business in the Okavango Delta, Botswana. The objective of this survey was to determine the perceptions of lodge managers/tour operators on how their tourism operations and output (turnover) would be affected by changes in flooding patterns in the Okavango Delta, Botswana. The study was carried out in the Okavango Delta located in northwestern Botswana. A sample of 48 tour operators based in Maun or lodge managers based in parts of the delta were surveyed using a short face-to-face interview to determine managers' perceptions regarding the impacts on their own business in the face of different flooding scenarios in the delta. The study found that changes in flood patterns in the Okavango Delta were perceived to have positive and negative impacts on turnover in the various tourism businesses. Mainly managers whose businesses are located relatively far away from flowing channels reported positive impacts of high flooding.

## **Introduction**

Tourism is considered the world largest industry, contributing to significant growth of many countries' economies (Roe et al, 2004; Viner and Agnew, 1999). In most developing countries, tourism is increasingly becoming a significant contributor of gross domestic product (Roe and Khanya, 2001). In Botswana, for instance, tourism proved to be a potential engine for economic growth (Government of Botswana, 2000). It is a source of revenue, creates jobs, stimulates investment and powers sustainable growth around the world (Roe and Khanya, 2001). At the community level, tourism has contributed to the improvement of welfare of those communities that are situated in the proximities of natural resources such as wildlife, and hence its great potential for reducing rural poverty (Ijeomah and Aiyeloja 2009; Roe and Khanya, 2001).

Worldwide climate change is impacting negatively and positively on tourism (Hein et al, 2009; Hamilton et al, 2005; Wall, 1998; Bigano et al, 2007; UNWTO, 2008). The direct negative impacts include, for example, shortening of tourism-dependent seasons and rising sea levels that can cause flooding, while indirect impacts include changes in water availability, biodiversity loss and reduced landscape aesthetic (UNWTO, 2008; Wall, 1998; UNWTO, 2008; Agnew and Palutikof 2001; Braun et al, 2007). The positive impacts include the "push" and "pull" factors (Amelung et al, 2007). Push factors are mainly negative factors prevailing in tourist's origins that may induce them to leave their origin, while pull factors are those factors that exist in tourist destinations (mainly attractions) that may induce tourists to visit those destinations (Amelung et al, 2007). Climate change is among the various factors affecting tourism, especially, nature-based

tourism. The climate-change-related factors affecting tourism include temperature, precipitation, clouds, fog, wind and humidity (Nyaupane and Chhetri, 2009).

In Botswana, the impacts of these factors, especially flooding, have not been investigated. An investigation of perceptions on the impacts of flooding on the tourism turnover would give some insights into the changes in the contribution of tourism to Botswana's national GDP. The goal of this study therefore was to assess perceptions of tourism operators regarding the effects of climate change on output (turnover) of their own business in the face of changes of flooding in the Okavango Delta, Botswana. Specific objectives of this survey were as follows:

- a) To determine perceptions of lodge managers/tour operators on how their tourism operations and outputs would be affected by changes in flooding in the Okavango Delta, Botswana;
- b) To determine the most favorable flooding scenario for the lodge managers/tour operators using overall deviation averages for increase and decrease of turnover for each scenario overall; and
- c) To determine how lodge managers/tour operators are likely to adapt to the changing flooding patterns as a result of climate change.

### Study Area

This study was carried out in the Okavango Delta located in northwestern Botswana (Figure 1). The Okavango Delta is formed by the inflow of the Okavango River that originates from the Angolan Highlands. The river flows through Namibia and drains into northwestern Botswana to form the huge wetland known as the Okavango Delta. The Okavango Delta is characterized by large amounts of open water and grasslands that sustain human life, plant life, wildlife, birds, insects and various living organisms.

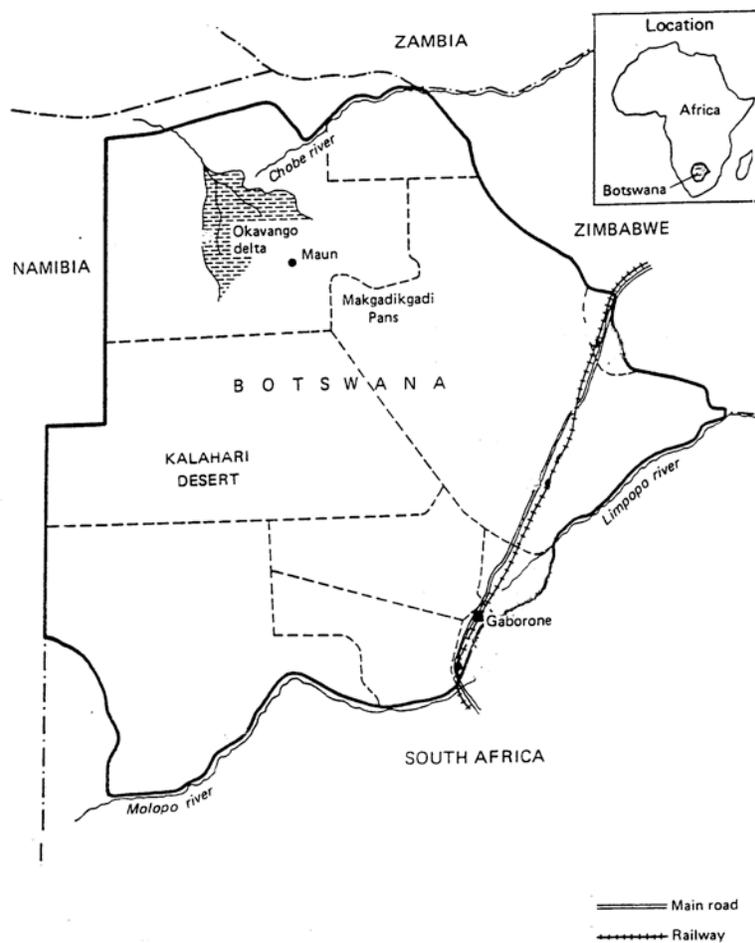


Figure 1. Map of Botswana showing the Okavango Delta.

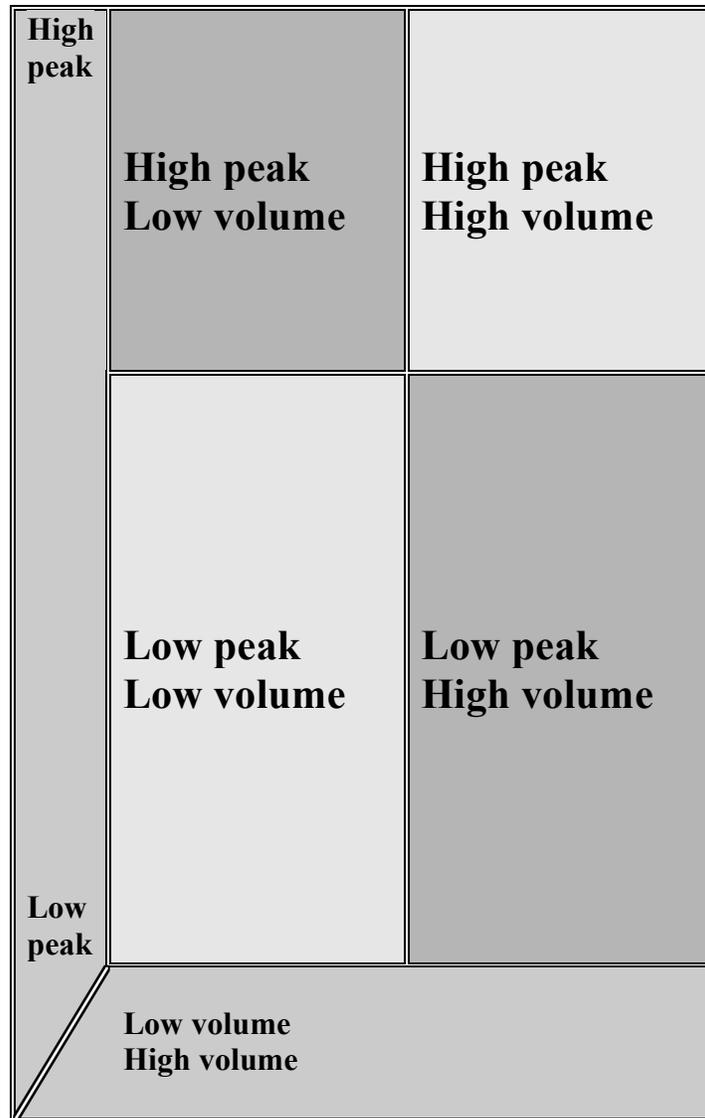
The Okavango Delta also sustains the livelihoods of local communities. Livelihood activities include collection of various plant products for different uses, fishing and flood-recession farming (Kgathi et al, 2004). Due to its rich wildlife diversity, permanent water resources, rich grasslands and forests and scenic landscapes, the Okavango Delta has become one of the key international tourism destinations in Botswana. Tourists come from all over the world but mainly from South Africa and other African countries, North America, Australasia (Australia and New Zealand, the Caribbean and Europe (Mmopelwa et al, 2007).

## **Methods**

This study sampled 48 lodge managers/tour operators operating in the Okavango Delta. Lodge managers/tour operators were surveyed using a short face-to-face interview to determine their perceptions regarding the effects of the output (turnover) of their own business in the face of changes in flooding patterns in the Delta. We interviewed lodge managers and tour operators because they are the main information channels through which customer preferences can be determined and they know the levels and trends of supply and demand for their products (Budeanu, 2005).

Respondents were asked to assume (that all other things being equal) changes in flooding were as a result of climate change or variability. We asked them to assume this because there are several other factors involved, such as the current economic recession, political unrest or terrorism in other countries, prices of parks fees, etc. Systematic sampling was used. An attempt was made to ensure that the sample covered lodges/camps that offer mostly water-based experiences; those that offer mostly land-based activities; and those that offer more or less of both. Each respondent was asked questions relating to possible flooding patterns and expected changes in business or economic output in their resort.

The respondents were asked to assume that the current annual turnover at that site is 100% and to suggest how turnover might change with each of the following long-term scenarios reflecting changes to the flooding patterns in their area, e.g., would it increase from 100% by 25% to 125%? Or decrease by 40% to 60%? Their estimates of likely change in annual turnover output were made for each of the following scenarios shown in Figure 2.



**Figure 2.** Characterization of flood categories according to flood height and flood volume.

**Results**

**HIGH-LEVEL/HIGH-VOLUME FLOODING**

Respondents were asked to state how their business turnover would be affected by flooding in the event that the frequently flooded parts of their area where their lodge happen to be located became permanently flooded; the occasionally flooded parts became frequently flooded; and the rarely flooded parts became occasionally flooded. Results on how turnover would be affected by high floods are shown in Table 1 below.

**Table 1.** Effect of high-level/high-volume flooding on location of business.

<b>Location of business</b>	<b>Description of turnover</b>			<b>Total</b>
	<i>Increase</i>	<i>Decrease</i>	<i>No change</i>	
Panhandle	2 (4)	3 (6)	0	<b>5 (10)</b>
Middle of Delta	2 (4)	14 (29)	8 (17)	<b>24 (50)</b>
Lower area of Delta	4 (8)	10 (21)	5 (10)	<b>19 (40)</b>
<b>Total</b>	<b>8 (17)</b>	<b>27 (56)</b>	<b>13 (27)</b>	<b>48 (100)</b>

Table 1 shows that 56% of the respondents noted that their turnover would decrease in the event of flooding levels going high. The majority (29%) of these had business located in the middle of the Delta. Asked about the extent at which turnover would decrease, 29.2% of the respondents indicated it would decrease by 25%, 21% said it would decrease by 50%, while 4% said it would decrease by 100%. Respondents mentioned that as a result of high flooding, roads would be damaged making access to tourism facilities more difficult. As a result of damaged roads, the number of tourist visitors would be significantly reduced, leading to low turnover. Secondly, respondents mentioned that high flooding would make game viewing and bird watching difficult because of a lack of suitable points (due to damaged roads) for viewing wildlife. Thirdly, respondents mentioned that as all areas would be flooded, there would be no water concentration points for animals or birds (as is the case when there is no flooding). Tourists usually target these water concentration points for viewing wildlife. Lastly, respondents mentioned that during high floods, tourists often cancel their bookings because of the fear of increased incidence of diseases such as malaria and the risk associated with being killed by floods.

On a similar note, tourism facilities like hotels in Maun and those situated far away from channels seemed to have a lower probability of being affected by high-flooding levels in the Okavango Delta. In fact, 45.8% of the respondents noted that turnover in their establishments would not be affected.

The effect of flooding on specialization of business is presented in Table 2. According to Table 2, the majority (23%) of respondents who indicated that there would be a reduction in tourism turnover were those with both water and land activities, followed by those who were with land-based tourism activities (21%). The main reason these respondents gave for the reduction in turnover was that when their areas are flooded, tourists cancel their bookings.

**Table 2.** Effect of high-level/high-volume flooding on specialization of business.

<b>Specialization of business</b>	<b>Description of turnover</b>			<b>Total</b>
	<i>Increase</i>	<i>Decrease</i>	<i>No change</i>	
Water-based tourism activities	2 (4)	3 (6)	2 (4)	<b>7 (15)</b>
Land-based tourism activities	2 (4)	10 (21)	6 (13)	<b>13 (27)</b>
Both water- and land-tourism activities	4 (8)	11(23)	4 (8)	<b>19 (40)</b>
Accommodation to everyone	0	3 (6)	1 (2)	<b>4 (8)</b>
<b>Total</b>	<b>8 (17)</b>	<b>27 (56)</b>	<b>13 (27)</b>	<b>48 (100)</b>

### **LOW-LEVEL/LOW-VOLUME FLOODING**

*(main channels and lagoons remain permanently flooded)*

Respondents were also asked to project their turnover changes, if any, in the event that flooding levels were low (low-level/low-volume flooding). They were specifically asked to indicate the extent to which their business turnover would change in the event that the permanently flooded parts of their area became only frequently flooded; the frequently flooded parts of their area became only occasionally flooded; and the occasionally flooded parts of their area became only rarely flooded and main channels and lagoons remained permanent.

Results on the extent at which turnover would be affected by low-flooding patterns in the Okavango Delta are shown in Table 3. Results in Table 4 show that the majority (42%) of respondents noted that the turnover would increase. Understandably, when the main channels and lagoons (which are located in the middle of the Delta) remain permanently flooded, the likely impact would be that the number of tourists visiting businesses in these areas would increase while there would be less numbers of tourists visiting drier sites. Of those who noted that their turnover would increase, 31% said it would increase by 25%; 4% said it would increase by 50%; while 6.2% said it would increase 100%.

Nineteen percent (19%) of the respondents said the turnover would decrease. The majority of these were from the lower area of the Delta (with no main channels and lagoons). About 40% of respondents indicated that there would be no change in turnover. Most of these respondents had businesses located in the middle of the Delta and the reasons given for the increase in turnover might also apply here.

**Table 3.** Effect of low-level/low-volume flooding (main channels and lagoons remain permanently flooded) on location of business.

Location of business	Description of turnover			Total
	<i>Increase</i>	<i>Decrease</i>	<i>No change</i>	
Panhandle	1 (2)	2 (4)	2 (4)	<b>5 (10)</b>
Middle of Delta	13 (27)	1 (2)	10 (21)	<b>24 (50)</b>
Lower area of Delta	6 (13)	6 (13)	7 (15)	<b>19 (40)</b>
<b>Total</b>	<b>20 (42)</b>	<b>9 (19)</b>	<b>19 (40)</b>	<b>48 (100)</b>

The effect of low-level/low-volume flooding on specialization of business is shown in Table 4. The positive impact of low-level/low-volume flooding (increased turnover) would be felt by those with both water and land activities because main channels would provide increased boat experience as well as concentration water points for better wildlife viewing.

About 19% with both water- and land-based tourism activities did not think that their business would be affected. This was because the majority of these facilities were located in seasonal flooding areas. As such, there is likelihood of less flooding in these areas when compared to permanent flooded areas.

**Table 4.** Effect of low-level/low-volume flooding (main channels and lagoons remain permanently flooded) of specialization of business.

Specialization of business	Description of turnover			Total
	<i>Increase</i>	<i>Decrease</i>	<i>No change</i>	
Water-based tourism activities	2 (4)	3 (6)	2 (4)	<b>7 (15)</b>
Land-based tourism activities	7 (15)	3 (6)	9 (19)	<b>18 (38)</b>
Both water- and land-tourism activities	10 (21)	2 (4)	6 (13)	<b>19 (40)</b>
Accommodation to everyone	1 (2)	1 (2)	2 (4)	<b>4 (8)</b>
<b>Total</b>	<b>20 (42)</b>	<b>9 (19)</b>	<b>19 (40)</b>	<b>48 (100)</b>

### **LOW-LEVEL/LOW-VOLUME FLOODING**

*(only deeper channels and lagoons remain flooded)*

Under this scenario, respondents were asked to assume that flooding patterns in the Delta became low such that only deeper main channels and lagoons remain permanently flooded while the rest of the areas became seasonally flooded. Specifically, respondents were asked to indicate the extent of the change in business turnover under the low level of flooding where the permanently flooded parts of their area became only occasionally flooded; the frequently flooded parts of their area became only rarely flooded; and the

rarely flooded parts of their area became never flooded. In this scenario, only the deeper main channels and lagoons remained permanent while the rest became seasonal only.

As shown in the Table 5, an equal number of respondents (29.2%) said that the turnover would increase and decrease, respectively. For respondents who noted that their turnover increased, 25% noted that their turnover would go up by 25%, while only 4.2% said it would increase by 100%. A majority (23%) of those who indicated an increased turnover had businesses located in the middle of the Delta, while the majority (17%) of those who indicated a decrease had businesses in the lower area of the Delta. Again, as the water level decreased, it would likely become easier to view wildlife in concentration points, although 18% and 19% of respondents with businesses in the middle Delta and lower areas of the Delta, respectively, indicated that there would be no change in tourism business.

**Table 5.** Effect of low-level/low-volume flooding (only deeper channels and lagoons remain flooded) on location of business.

<b>Location of business</b>	<b>Description of turnover</b>			<b>Total</b>
	<i>Increase</i>	<i>Decrease</i>	<i>No change</i>	
Panhandle	1 (2)	1 (2)	3 (6)	<b>5 (10)</b>
Middle of Delta	11 (23)	5 (10)	8 (18)	<b>24 (50)</b>
Lower area of Delta	2 (4)	8 (17)	9 (19)	<b>19 (40)</b>
<b>Total</b>	<b>14 (29)</b>	<b>14 (29)</b>	<b>20 (42)</b>	<b>48 (100)</b>

Low-level/low-volume flooding would also have positive and negative impacts in terms of specialization of tourism businesses. The majority of those who indicated an increase in turnover had both water- and land-based tourism activities, while those who indicated a decrease had water-based tourism activities only (6%), and land-based tourism activities only 6% (Table 6). A higher percentage of respondents indicated that there would be no change in turnover.

According to respondents, the reduction of floods would lead to a reduction in water-based tourism activities because without water some channels would not be accessible; it would be hard to find game or wildlife for viewing since it would migrate to areas distant from their lodge. Some camps might become seasonal in operation.

**Table 6.** Effect of low-level/low-volume flooding (only deeper channels and lagoons remain flooded) on specialization of business.

Specialization of business	Description of turnover			Total
	<i>Increase</i>	<i>Decrease</i>	<i>No change</i>	
Water-based tourism activities	2 (4)	3 (6)	2 (4)	<b>7 (15)</b>
Land-based tourism activities	7 (15)	3 (6)	9 (19)	<b>18 (38)</b>
Both water- and land-tourism activities	10 (21)	2 (4)	6 (13)	<b>19 (40)</b>
Accommodation to everyone	1 (2)	1 (2)	2 (4)	<b>4 (8)</b>
<b>Total</b>	<b>20 (42)</b>	<b>9 (19)</b>	<b>19 (40)</b>	<b>48 (100)</b>

### **LOW-LEVEL/LOW-VOLUME FLOODING**

*(main channels and lagoons are seasonal and dry)*

Respondents were asked to state how their turnover would change if flooding levels become low such that the main channels and lagoons become seasonal and dry.

Respondents were specifically asked to assume that flooding levels were low to the extent that the permanently flooded parts of their area became only rarely flooded; frequently, occasionally or rarely flooded parts of their area became never flooded; and the main channels and lagoons became seasonal and dry for much of the year. Responses based on this scenario are shown in Table 7.

Results in Table 7 show that 33.3% of the respondents noted that turnover would increase. The majority of those who said that turnover would increase had businesses located in the middle of the Delta. Thirty-eight percent (38%) of the respondents indicated that there would be an increase in tourism turnover, and the majority of these had business located in the lower areas of the Delta. For those who said turnover would decrease, 10.4% said it would decrease by 25%, 25.0% said it would decrease by 50%, while 4.2% said it would decrease by 100%. Twenty-nine percent (29%) of respondents said there would be no change in the turnover. Respondents noted that turnover would decrease because game would migrate to water-fed points, water and land activities would become inaccessible, the environment would become dusty and clients might resort to other options. Camps would be run seasonally or closed down.

**Table 7.** Effect of low-level/low-volume flooding (main channels and lagoons are seasonal and dry) on location of business.

Location of business	Description of turnover			Total
	<i>Increase</i>	<i>Decrease</i>	<i>No change</i>	
Panhandle	2 (4)	2 (4)	1 (2)	<b>5 (10)</b>
Middle of Delta	11 (23)	4 (8)	9 (19)	<b>24 (50)</b>
Lower area of Delta	3 (6)	12 (25)	4 (8)	<b>19 (40)</b>
<b>Total</b>	<b>16 (33)</b>	<b>18 (38)</b>	<b>14 (29)</b>	<b>48 (100)</b>

The impact of low-level/low-volume flooding on specialization of business is shown in Table 8. According to the table, a majority of those who indicated an increase in turnover had both water- and land-based tourism activities, while a majority of those who indicated a turnover decrease had land-based tourism activities only. Different levels of flooding in particular areas of the Okavango Delta caused these differences.

**Table 8.** Effect of low-level/low-volume flooding (main channels and lagoons are seasonal and dry) on specialization of business.

Specialization of business	Description of turnover			Total
	<i>Increase</i>	<i>Decrease</i>	<i>No change</i>	
Water-based tourism activities	2 (4)	4 (8)	1 (2)	<b>7 (15)</b>
Land-based tourism activities	5 (10)	6 (13)	7 (15)	<b>18 (38)</b>
Both water- and land-tourism activities	8 (17)	5 (10)	6 (13)	<b>19 (40)</b>
Accommodation to everyone	1 (2)	3 (6)	0	<b>4 (8)</b>
<b>Total</b>	<b>16 (33)</b>	<b>18 (38)</b>	<b>14 (29)</b>	<b>48 (100)</b>

## **LOW-LEVEL/LOW-VOLUME FLOODING**

*(no flooding at all, boreholes drilled)*

Finally, respondents were asked to state how their turnover would change in the event that there was no flooding such that boreholes would have to be drilled for the supply of water. That is, low-volume flooding to the extent that no flooding took place in their area, and groundwater had to be tapped to provide water points for game and to supply the camp. Results on how turnover was perceived to change under low-volume flooding are shown in Table 9.

**Table 9.** Effect of low-level/low-volume flooding (no flooding at all, boreholes drilled) on location of business.

Location of business	Description of turnover			Total
	<i>Increase</i>	<i>Decrease</i>	<i>No change</i>	
Panhandle	1 (2)	4 (8)	0	<b>5 (10)</b>
Middle of Delta	13 (17)	9 (19)	2 (4)	<b>24 (50)</b>
Lower area of Delta	2 (4)	15 (31)	2 (4)	<b>19 (40)</b>
<b>Total</b>	<b>16 (33)</b>	<b>28 (58)</b>	<b>4 (8)</b>	<b>48 (100)</b>

Results in Table 10 show that the majority (58%) of respondents noted that turnover would decrease. The majority of those indicating a decrease in turnover had their business located in the lower area of the Delta. For those who said the turnover would decrease, 2.1% said it would decrease by 25%, about 25% said it would decrease by 50% and 10.4% said it would decrease by 100%. Respondents noted that turnover would decrease because a lack of water would affect water-based activities; game would migrate to other areas; and most water- and land-based activities could not be carried out if there was no water.

The effect of low-level/low-volume flooding on specialization of business is shown in Table 10. According to the table, the majority (17%) of those with both land- and water-based tourism activities thought that tourism turnover would increase, while those with land-based tourism activities only thought that tourism activities would decrease.

**Table 10.** Effect of low-level/low-volume flooding (no flooding at all, boreholes drilled) on specialization of business.

Specialization of business	Description of turnover			Total
	<i>Increase</i>	<i>Decrease</i>	<i>No change</i>	
Water-based tourism activities	2 (4)	5 (10)	0	<b>7 (15)</b>
Land-based tourism activities	5 (10)	11 (23)	2 (4)	<b>18 (38)</b>
Both water- and land-tourism activities	8 (17)	9 (19)	2 (4)	<b>19 (40)</b>
Accommodation to everyone	1 (2)	3 (6)	0	<b>4 (8)</b>
<b>Total</b>	<b>16 (33)</b>	<b>28 (58)</b>	<b>4 (8)</b>	<b>48 (100)</b>

Table 11 shows the overall deviation averages for the “increase” and “decrease” scenarios. The smaller the overall deviation to the benchmark (100%) the more favorable the scenario is. As Table 11 shows, the scenarios can be ranked in the following order, starting with the most favorable: 2. Low-level/low-volume flooding (main channels and lagoons remain permanently flooded); 3. Low-level/low-volume flooding (only the

deeper main channels and lagoons remain permanent while the rest become seasonal only); 4. Low-level/low-volume flooding (the main channels and lagoons become seasonal and dry for much of the year). 1. High-level/high-volume flooding and 5. Low-level/low-volume flooding (no flooding takes place in their area)

**Table 11.** Overall deviation averages for the for the “increase” and “decrease” scenarios.

<b>Scenario</b>	<b>Deviation Averages (%): Increase</b>	<b>Deviation Averages (%): Decrease</b>	<b>Overall Deviation (%)</b>
1. High-level/high-volume flooding	125	59.6	84.38
2. Low-level/low-volume flooding (main channels and lagoons remain permanently flooded)	113	55.5	99.47
3. Low-level/low-volume flooding (only the deeper main channels and lagoons remain permanent while the rest become seasonal only)	121.43	69.23	95.83
4. Low-level/low-volume flooding (the main channels and lagoons become seasonal and dry for much of the year)	115	51.32	84.42
5. Low-level/low-volume flooding (no flooding takes place in their area)	119.23	58.93	75

### **Discussion and Conclusion**

This survey indicates that the majority of the accommodation facilities that would be affected by change in flooding patterns are located in the middle parts of the Okavango Delta. Most of these facilities offer both land- and water-based tourism activities. Results indicate that high-level/high-volume flooding, where the frequently flooded parts of their area become permanently flooded; the occasionally flooded parts in their area become frequently flooded; and the rarely flooded parts in their area become occasionally flooded, would negatively affect the tourism turnover in the Okavango Delta.

Factors that operators noted contributing to a downturn in turnover include:

- When floods are high, roads become damaged and access to tourism facilities becomes difficult;
- Game viewing and bird watching becomes poor due to road conditions;
- Game also becomes scarce due to the lack of concentration of these species in particular areas as is the case when flooding is not a problem; and
- Tourists cancel their bookings for fear of diseases and/or being injured or killed by the floods.

Survey results indicate that most of the facilities located in the middle and upper parts of the Okavango Delta are mostly those that would have a low turnover due high floods.

Based on the perceptions of tourism operators, high-level/high-volume flooding is not a desirable phenomenon for the tourism industry. The issue of turnover going down can be illustrated by flooding patterns that took place in the Okavango Delta in 2000. Flooding in the Okavango Delta in 2000 resulted in the closure of Moremi Game Reserve (located within the inner parts of the Delta) for eight months because roads were impassable (Mbaiwa, 2005).

During this period, there was a decline in self-drive tourists in the Okavango Delta and tourism revenue went down. The results of flooding in the Okavango Delta at this time resulted in retrenchments of workers in the Okavango Delta since turnover was low in most accommodation establishments. A similar scenario is likely to happen in the event of high-flooding patterns in the Okavango Delta. Retrenchments suggest that income and livelihoods for most people working in tourism businesses in the Okavango Delta would suffer.

Results in this survey also indicate that turnover would also go down drastically in the low-level/low-volume flooding scenario where it would be so dry that boreholes would be needed to supply water. This scenario indicates a very dry period where groundwater has to be tapped to provide water points for game and to supply lodges and camps. In fact, operators noted that turnover would be reduced much more greatly than in the high-level/high-volume flood scenario.

Operators indicated that turnover would go down because:

- The lack of water would affect water-based activities;
- Game would migrate to other areas; and
- Most land-based activities cannot be carried out when there is no water.

Again this was not a favorable scenario for tourism operators. As with the high-level/high-volume flooding scenario, low tourism turnover would lead to layoff of workers and negative impacts on livelihoods.

Studies in desiccation of the western parts of the Okavango Delta (i.e. by Kgathi et al, 2004) have shown that dryness affects many economic activities of which tourism is one. Tourists visiting the Okavango Delta come mainly to enjoy the wilderness nature and scenic beauty of the wetland (see Mmopelwa et al, 2007), and a very dry environment is likely to be unattractive to tourists. Under such situations the tourism industry could conceivably collapse.

The favored scenario appears to be the low-level/low-volume flooding. This is a scenario where the permanently flooded parts of the Delta become only frequently flooded; the frequently flooded parts of their area become only occasionally flooded; the occasionally flooded parts of the area become only rarely flooded; and main channels and lagoons remain permanent.

It is in this scenario that most operators noted a likely increase in tourism turnover. In particular, under this scenario:

- Birds return to their areas of concentration;
- Fishing becomes more prolific;
- Hippos and crocodiles become visible all year round; and
- These all contribute to a more desirable tourism experience.

This study therefore shows that tourism in the Okavango Delta would do well where there is permanent water in channels and lagoons to allow for both water-based and land-based activities. It is in this scenario where income generation and employment opportunities are likely to be high. In this regard, local communities engaged in the tourism industry are likely to benefit more in terms of revenue generation and employment opportunities.

This study suggests that adaptation strategies in the event of high-level/high-volume flooding or low-level/low-volume flooding patterns, which seem to negatively affect turnover in the tourism industry, should be the subject of future tourism research.

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