

## DUBAI WATER QUALITY TOWARDS AMENITY SERVICES VALUATION EXECUTIVE SUMMARY





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### HABs as a proxy indicator for water quality maintenance

HABs are events that lead to a persistent step-change in the condition of the coastal and marine environment. They are therefore for the purposes of this project a useful focus or switch to understand the value of an asset that has otherwise been taken for granted. HABs are a proxy for a basket of other pollution and eutrophication effects that are similarly serious. It is selected because it is both highly visible and well publicized and thus allows survey respondents to relate to the issue and answer the research questions in an informed and credible way; this does not imply that other water quality issues are of lesser importance.

## Project Context

A prior study, the Abu Dhabi Contingent Valuation study estimated that the amenity supplied by the coastal and marine resources in Abu Dhabi was worth some US \$141million to only 15 Abu Dhabi hotels/year equaling a Net Present Value (NPV) of between US \$1.3 and US \$2.1billion over 13 years, the average period before major refurbishment is expected. In addition, the coastal and marine resources supplied a value of US \$683 million to beach users/year.

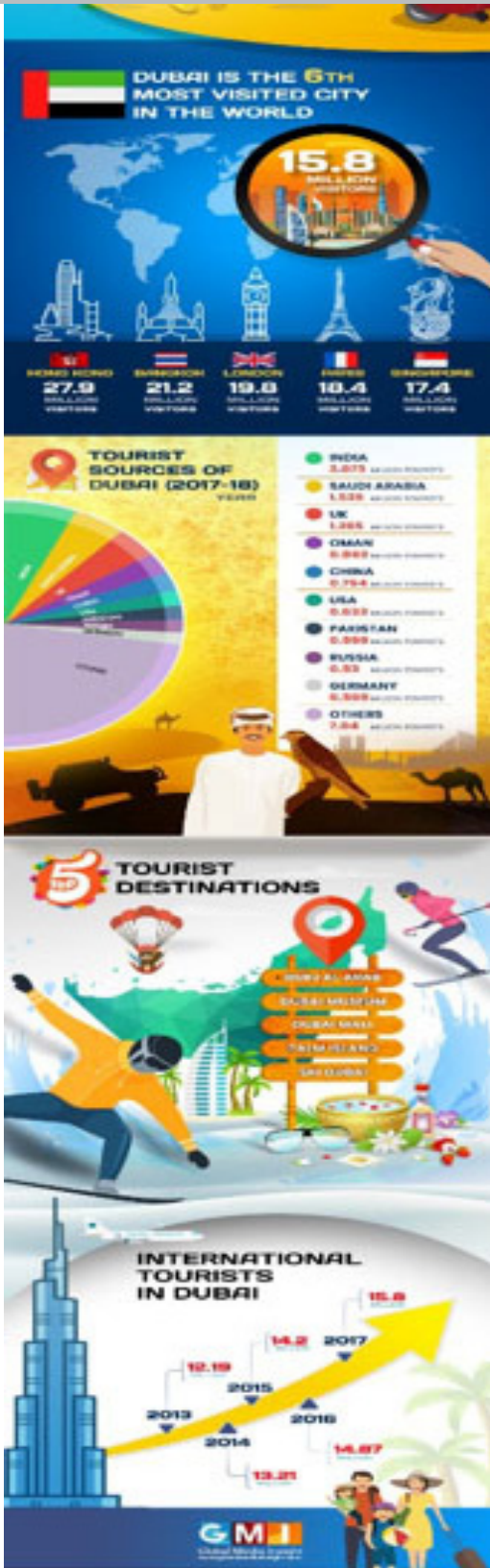
To estimate the economic value of Dubai's coastal amenities we will consider both the Willingness To Accept Compensation (WTAC) for a deterioration in quality of the coastal amenity values, and the Willingness To Pay (WTP) and/or contribute to a

hypothetical restoration fund to avoid a loss in the value of these amenities.

The priorities for valuation will be towards the increasing incidence of Harmful Algal Blooms (HAB), otherwise known as red tides, as a useful proxy for the declining water quality. This can therefore be a means to quantify the value of a pristine coastal water quality environment to key stakeholder groups that utilise the coast both commercially and for leisure purposes.

The project was carried out in partnership between Dubai Municipality (DM) and the Abu Dhabi Global Environmental Data Initiative (AGEDI).





## Dubai's beaches worth billions

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### Introduction and Research Methods

What is the perceived value of Dubai's beaches? We used a contingent valuation (CV) assessment to determine residents and tourists' appreciation of Dubai's famous beaches. A CV assessment is a technique used to ascertain the value of ecosystem goods and services, such as Dubai's coastal and marine ecosystems. While the beaches' existence is of value to people not making use of it, such as those abroad, here we focus on the stated value of people directly benefitting from the beaches. One of the strengths of a CV assessment is that it asks people questions using a structured questionnaire. In so-doing primary information of the value of the ecosystem to beneficiaries is obtained. Respondents could either be asked about their willingness to pay (WTP) for a service, or their willingness to accept (WTA) compensation in the case that the service is lost.

The WTP option is more popular as it renders a more conservative value. Here, however, we use the WTA measure. This is since tourists and residents consider themselves entitled to the services offered by virtue of the way in which the coastal and marine ecosystem, notably the beaches, is being marketed.



We thus asked respondents two main questions based on the following scenario:

There are two beaches, beach A and beach B; they are identical in terms of size and in terms of amenity services. Beach A is the beach you are at now. Because of on-going local and regional economic development and a change in environmental conditions this beach becomes covered with algae and experiences a red tide that are often associated with dis-amenities, such as being unattractive, toxic and odorous, which necessitates the complete avoidance. Your only alternative is an algae-free beach, Beach B, situated an hour away.

The two questions asked are as follows:

1. Would they visit Beach B, and if so, what offset payment would they require to compensate them for the loss in the services of Beach A and the trouble caused by having to visit Beach B? We call this the offset cost value herein.
2. What compensation would they require if Beach B was also inaccessible due to red tide? We call this the total cost of algal bloom option herein.

It should be noted that while reference is made to red tide, the responses received are not applicable to red tide only. Red tide was used as a proxy, albeit a realistic one given the degree of development, to ascertain the responses from the respondents if they do not have access to the beaches. Their responses are a good reflection of the perceived value of the natural resource.







### Profile of respondents

The profile of the respondents is provided in Figure 1. To make a distinction between residents and tourists it is assumed that respondents residing in the country less than 2 years are tourists and those residing more than 2 years are residents. Sixty (60) residents originating from 21 countries and 92 tourists from 34 countries were surveyed, thus a total of 152 questionnaires were completed. The dominant age group of the respondents was between 20 and 30 years of age. The dominant income category is respondents earning between AED 3,000 and AED 20,000 per month. They are followed by respondents earning between AED 20,000 and AED 40,000 per month.

Dubai markets itself as a destination of choice for families to enjoy its coastal and marine ecosystem services, which includes its beaches. These are thus subsequently also intensively used (see Table 1). Residents and tourists alike visit them frequently. On average, residents visit the beaches between 22 and 148 times per year and tourists between 8 and 35 times per year. This high intensity of use is aided

by the fact that the time it takes to travel to any one of the beaches is very short, namely, between 16 and 36 minutes on average. This ease of access allows for a high number of annual visits and it adds to the value people are deriving from the resource. There is therefore a substantial appetite as well as uptake of the amenity services offered by the coastal and marine ecosystem. Dubai thus markets a resource that is in high demand and that enjoys a high level of international patronage.



Dubai: Marketed as a destination of choice for families to enjoy its coastal and marine ecosystems



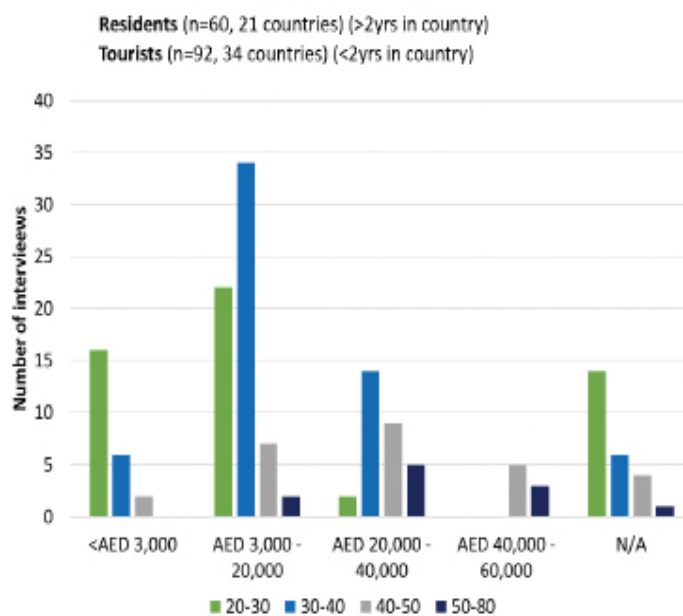


Figure 1: Distribution of the age and income of the respondents



## Results: WTA

### Willingness to Accept Compensation

As expected, the WTA compensation with respect to the offset cost, i.e. to compensate those willing to go to Beach B, is much lower than the WTA for a total algal bloom (see Figure 2). The offset costs range between AED 25 and AED 722 for tourists and AED 48 and AED 509 for residents per beach visit. With respect to total algal bloom the range varies between AED 25 and AED1,777 for tourists and AED 50 and AED 708 for residents per beach visit. With respect to residents, lower income households require higher levels of compensation to mitigate the impact of the inaccessibility of the beaches. Higher income tourists, on the other hand, require higher levels of compensation under both conditions.

Given the fact that low-income residential households require higher levels of compensation does imply a disproportionately negative impact on them if the resource is not accessible. Conversely it also implies that, relative to their income level, they enjoy a higher degree of benefit, or derived value, from the resource. This is probably since they have fewer alternative options for recreation available to them (see Figure 3).

	Age	Beach visits per year			Travel time to beach (in minutes)		
		Min	Max	Avg	Min	Max	Avg
<b>Tourists</b>	20-30	1	100	23,4	2	120	31,3
	30-40	1	365	35,6	1	60	24,0
	40-50	1	50	8,4	10	30	18,4
	50-80	5	24	12,3	10	45	22,8
<b>Residents</b>	20-30	3	365	22,1	10	60	23,8
	30-40	3	360	39,8	2	120	30,2
	40-50	10	365	74,6	5	90	36,5
	50-80	20	365	148,3	5	30	16,7

Table 1: The intensity of use of Dubai's beaches as observed by the respondent

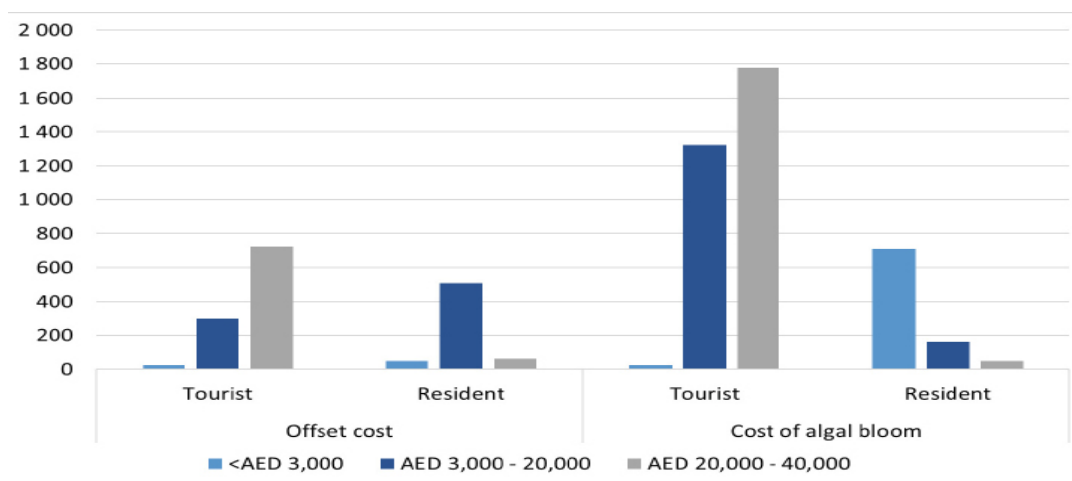


Figure 2: Respondents' stated ranges of willingness to accept compensation in terms of income level

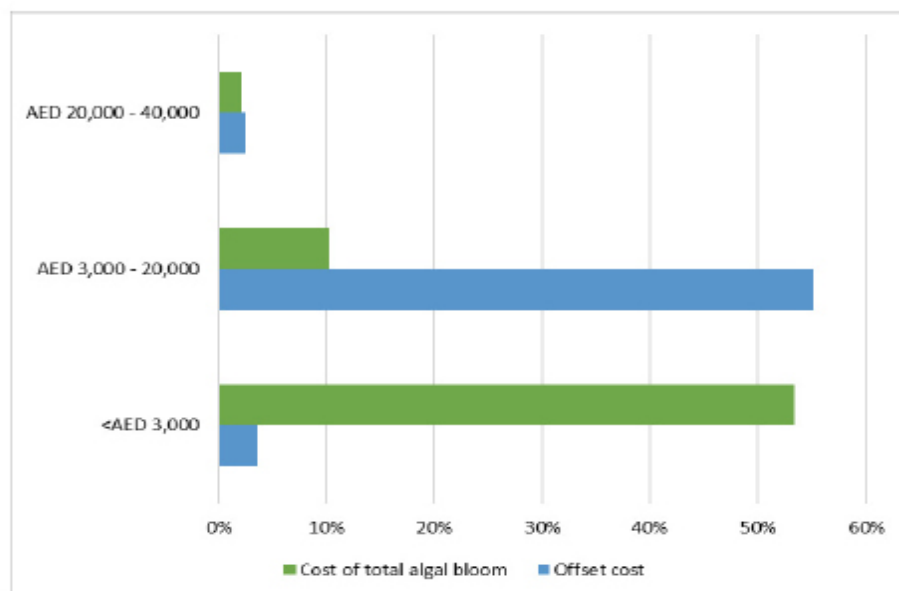


Figure 3: Compensation required by residents as a percentage of monthly household income

### The value of Dubai's coastal and marine ecosystem services

It is possible to estimate the value of Dubai's coastal and marine ecosystem services by up-scaling the values reported by the respondents. This is done based on the following assumptions (see also Government of Dubai 2018):

- Residents:

Number of residents: 3 million

Proportion of residents visiting the beaches:

Low scenario: 20%

High scenario: 50%

Number of beach visits a year: 20,1 visits per year

- Tourists:

Number of visitors: 14,3 million

Proportion of residents visiting the beaches:

Low scenario: 30%

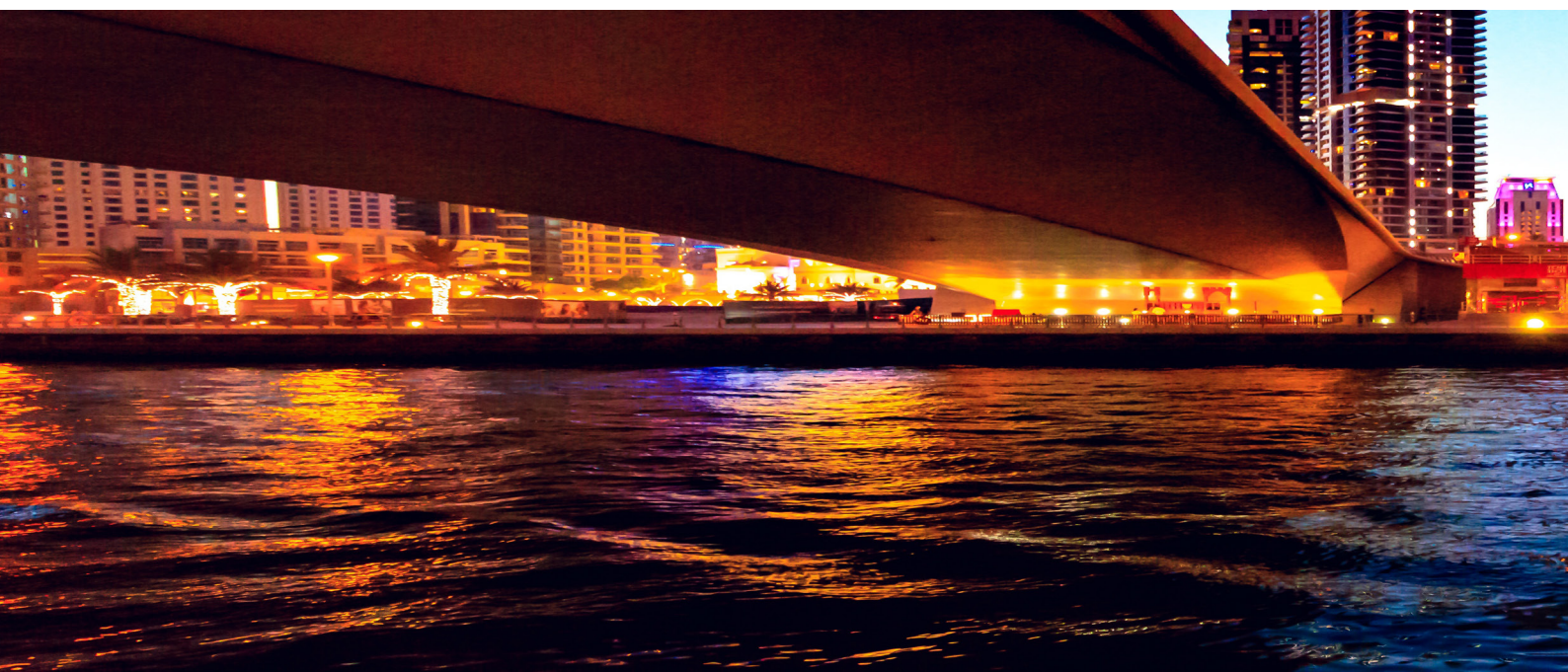
High scenario: 50%

Number of beach visits a year: 2,6 visits per year

Based on the assumptions provided above and the stated values as per Figure 2 it is possible to estimate the total value of Dubai's marine and coastal ecosystem services. That is provided in Figure 4 and summarised in Table 2.



Dubai: Where the world works and plays





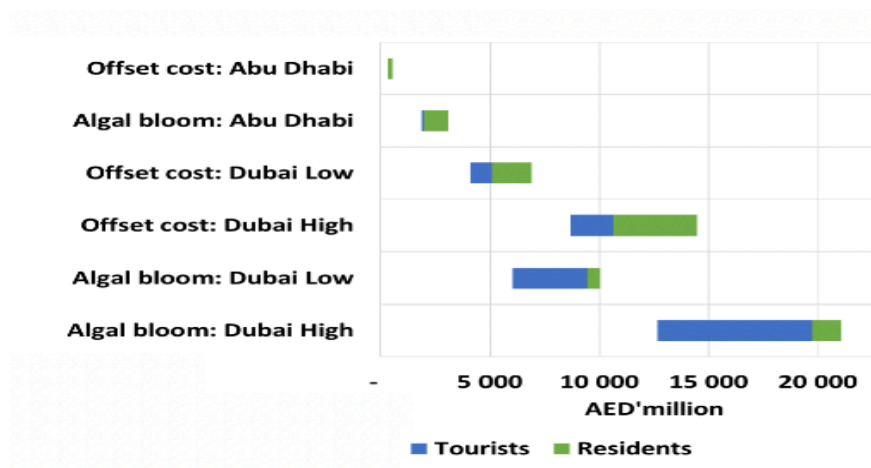


Figure 4: The distribution of the offset cost and the cost of algal bloom in Dubai for residents and tourists and compared with that of Abu Dhabi. The blue area refers to the tourists' portion and green to that of the residents.





From Figure 4 and Table 2 the value of Dubai's coastal and marine ecosystem services ranges between AED6 billion and AED 21billion per year in the case of total algal bloom; the tourists' value comprises 85% thereof.

In case an offset is available, then the value ranges between AED 4 billion and AED 14 billion with the residents' portion being 66% thereof.

These values are much higher than that of Abu Dhabi which ranges between AED 1,8 billion and AED 3,1 billion for total algal bloom and between AED 348 million and AED 578 million when an offset is possible.

Given the fact that Dubai's coastline is 18,7 km long and assuming a coastal zone of 1 km wide, the coastal and marine area of Dubai is 1 870 ha. That implies that the plausible range of the unit value of the resource is between AED 3,2 million/ha and AED 11,3 million/ha, or US\$0,87 million/ha and US\$3 million/ha.

**This is among the highest and most valued ecosystems in the world (Blignaut et al. 2016 & 2017).**





	Offset costs			Total algal bloom		
	Abu Dhabi	Dubai Lower scenario	Dubai Higher scenario	Abu Dhabi	Dubai Lower scenario	Dubai Higher scenario
Residents (In AED*Million)						
-25%	339	2 734	5 731	1 694	933	1 956
Estimated value	453	3 646	7 641	2 259	1 245	2 609
+25%	566	4 557	9 551	2 824	1 556	3 261
Tourists (In AED*Million)						
-25%	8	1 406	2 946	185	5 099	10 608
Estimated value	10	1 874	3 928	247	6 799	14 250
+25%	13	2 343	4 910	309	8 499	17 813
Total (In AED*Million)						
-25%	347	4 140	8 677	1 880	6 033	12 644
Estimated value	463	5 520	11 569	2 507	8 044	16 859
+25%	578	6 900	14 461	3 133	10 055	21 073
Total (In USD*Million)						
-25%	95	1 118	2 343	512	1 629	3 414
Estimated value	126	1 490	3 124	683	2 172	4 552
+25%	158	1 863	3 905	854	2 715	5 690

Table 2: The value of Dubai's coastal and marine ecosystem services compared to that of Abu Dhabi





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