

## Magnify Nile Cruise Activities through Nile River

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### Abstract

According to the Floating Hotel Association of Egypt, a total of 310 floating hotels were in operation in the Nile River between Luxor and Aswan in the year 2006. This 223 km length cruise route is suffering high traffic densities, vulnerability to hazard accidents, and thus threatening the ability to secure safe journeys. Also the current insufficient berthing lengths led to the concentration of floating hotels in several parallel docking rows. Consequently, several hazardous accidents at different locations were recently documented during the top tourist season of year 2017. On the other hand, the number of floating hotels was linearly enlarged at a rate of 10 units a year, which will make the projected number of tourist hotels in 2025 around 499 units. With such rate of increase, the number of expected accidents and aground coincidences will be doubled, while parallel docking for several rows despoils the privacy of tourists as the berthing units would be very close to each other. To face such circumstances, the number of expected cruising programs was hypothetically increased in the present study by adding various possible tourist routs along the Nile River. Accordingly, the average route length would be indirectly increased and the tourist vessels would be dispersed along a lengthier stretch of the river. The objective of the current study is to examine the impact of increasing the number of cruising programs on improving the safety and working efficiency of floating hotels navigation.

The present study proposed five additional cruising programs that would take place between Aswan and Cairo with a minimum and maximum cruising route of 118 km and 928 km respectively. A significant reduction in docking shortage between Aswan and Luxor was achieved relative to the present cruising program. The study revealed that applying the innovated scheme by year 2025 will significantly reduce the number of docking units and consequently the docking lengths in Aswan and Luxor to 63.5 % and 82.8 % of the existing condition respectively. Also the proposed scheme will lead to reduce the needed berthing length between Aswan and Luxor in the year 2025 to 27.8 % of the existing condition. Our findings show that the floating hotel cruises should be extended to cover several attractive sites distributed along the Nile River between Aswan and Cairo.

**Key Words:** Nile River, Inland Navigation, Floating Hotels, Tourist Trips and Docking Length

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### 1. INTRODUCTION

The main Nile River stream between Aswan and Luxor is 223 Km long and mainly used as a navigation path by touristic floating hotels, with heavy traffic density during daylight, as well as other types of navigation units for cargo transportation. While the inland navigation path through the reach between Luxor and Cairo is mainly used for cargo units such as self-propelled barges and pusher barge with pushed dump barge units to transport goods, liquid bulk, finished products and row materials. For this reason the navigation waterway between Cairo and Aswan was designed as a three ways traffic cross section by applying modern techniques (PIANC – IAPH, 1997; "NRI" 2004) which led to a waterway dimension of 100 m width. While the available dimensions of the registered floating hotels in 2006 were classified ("NRI" 2007) which resulted in the representative floating hotel of 75 m length, 15 m width and 1.8 m draft. Furthermore, due to several terrorist attacks and safety requirements in the year 1997, the long tourist cruise between Luxor and Cairo was urged to stop. Consequently, the 705 Km long reach between Luxor and Cairo became mainly used by cargo ships with heavy traffic density. This means that the traffic density of tourist floating hotels along the reach between Aswan and Luxor is much more than that downstream towards Cairo.

The concentration of berthed floating hotels at the tourist sites – which reached more than 10 parallel rows at Aswan and Luxor cities especially during winter season – led to dangerous situations and deterioration of the tourist environment at both sites. Such situations endangered the top tourist season of the year 2017, especially where a number of floating hotels a grounded at several sites. As the present Egyptian diplomatic and touristic strategies are permitting long cruises between Aswan and Cairo, an innovative arrangement should be considered.

For this reason five more attractive tourist cruises could be hypothetically proposed along Nile River between Aswan and Cairo. The main objectives of such new tourist program are to dissipate the distribution of the existing high traffic intensity between Aswan and Luxor, to cover more tourist sites that are located along Nile River from Luxor to Cairo, to avoid the deterioration in surrounding environment at different tourist sites, and to enhance the national foreign currency income.

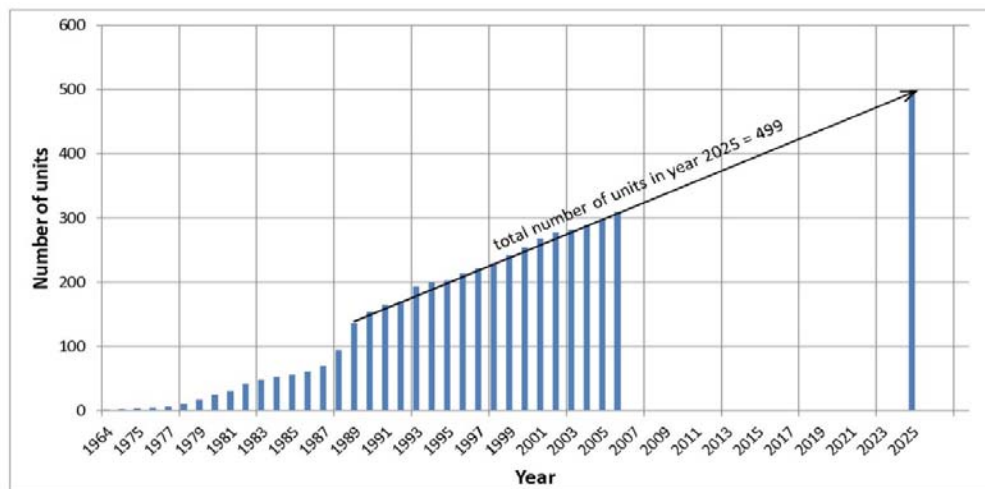
**2. CURRENT SITUATION**

Since tourism is becoming increasingly essential in Egypt, Nile cruises using tourism vessels "Floating Hotels" are considered as the most economic activities of great concern to Ministry of Tourism (Sabit, A.S. 2000). This activity started in 1964 and has substantially grown up after 1980 to cover the reach between Aswan and Cairo. The local design and building of floating hotels started in 1978 and has grown up in size and dimensions which can be classified as listed in Table (1) (Sabit, A.S. 2000 and NRI<sup>2</sup> 2004).

**Table (1): Floating Hotels Classifications**

No.	Generation	Length (m)	Width (m)	No. of Cabins
1	Fist	50 to 60	8.5 to 9.5	40 to 55
2	Second	60 to 70	9.0 to 10.5	60 to 70
3	Third	70 to 72	11.0 to 13.0	70 to 80
4	Fourth	More than 72	13.0 to 15.0	80 to 110

On the other hand, according to the Floating Hotel Association (April, 2007) and due to restricting tourism cruises between Luxor and Cairo for safety reasons, a total number of 310 tourism vessels were concentrated in operation between Aswan and Luxor cities during the year 2006 and remained as much till now (NRI 2007), despite several (unfortunately unsuccessful) attempts since then to encourage long cruises between Cairo and Aswan. To enable the set-up of a hypothetical program for more tourist cruises between Aswan and Cairo, a simplistic attempt is made to develop a hypothetical number of expected tourist vessels in the year 2025 as shown in Figure (1). It is evident from Figure (1) that the gradual increase in number of units between the year 1989 and year 2006 was almost uniform, this due to the steadiness in touristic and political conditions. On the other hand due to lack of data and the political thus touristic instability conditions in Egypt, particularly after the year 2011, the current study would depend on the available data from the stable period from the year 1989 to 2006. To evaluate this condition, the available dimensions and details of the registered floating hotels in 2006 were classified which revealed that the representative floating hotel length, width and draft are 75 m, 15 m and 1.8 m respectively. To determine the expected number of floating hotels by the year 2025, a linear regression was applied to extrapolate the anticipated working number by year 2025. The regression shows that the number of tourist vessels will be 499 units as shown in Figure (1).



**Figure (1): Growing Sum of Floating Hotels and the Expected Number in year 2025**

According to the Floating Hotel Association "FHA", 10 % of the registered floating hotels would be at any time under maintenance, therefore the rest of working units would be either cruising (sailing) or docking at any of the tourist sites. Knowing the cruising distance and average unit speed, the expected total number of docking and sailing units could be worked out at any time. Bearing in mind that the reach between Aswan and Luxor is suffering of high traffic intensities and vulnerability to hazard accidents, which are not suitable to secure safe tours, some other solutions should be introduced. The floating hotels cruises could be stretched to cover the other most attractive tourist sites along Nile River from Aswan till Cairo. This can be hypothetically carried out by establishing some other cruising programs between different tourist sites along the river between Aswan and Cairo.

### 3. SIDE EFFECTS

Parallel docking for several rows can potentially have severe side effects on the river stream and navigation waterway. This arrangement can retain aquatic weeds and possibly reduce river flow velocity within the docked area which consequently enlarges flow velocity within the remaining part of the channel. Another major side effect is spoiling the tourist privacy due to docking the floating hotels very close to each other for several rows. Assuming docking of 10 parallel rows of floating hotels at Aswan, the following exemplified study was carried out. The existing hydraulic condition and bed configurations at one of Aswan docking ports which is located at the east Nile River bank at km 9.520 downstream of the Old Aswan Dam "OAD" was considered. Arrangement of 10 parallel rows of the representative floating hotels with 4 m spacing – as shown in Figure (2) - was calculated at the assigned Nile River cross section in the case of minimum and maximum passing flow discharges as shown in Figures (3 and 4) respectively. The layout of the real parallel docking arrangement is presented in Figures (3 and 4).

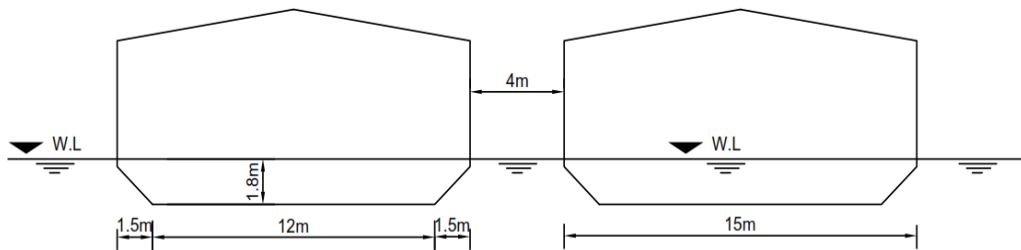


Figure (2): Layout of Parallel Berthing Arrangement

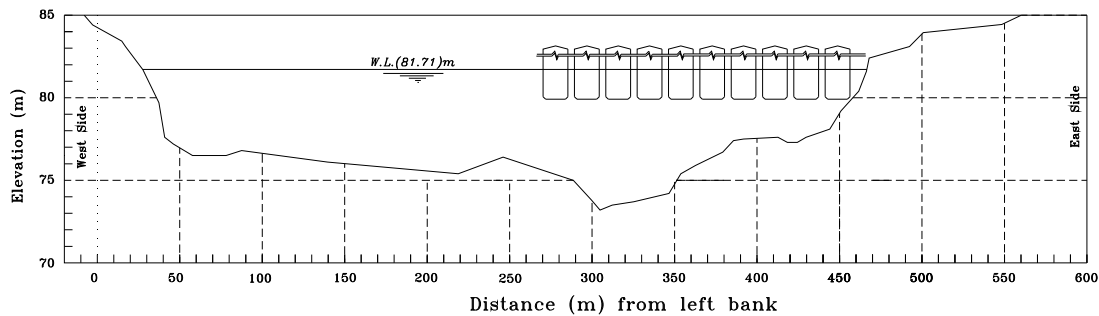
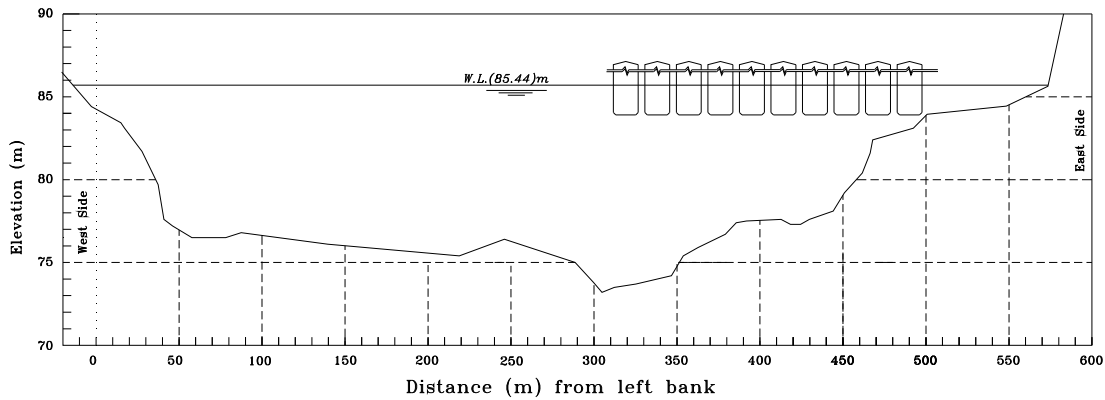


Figure (3): Berthing Arrangement at Minimum Flow Discharge



**Figure (4): Berthing Arrangement at Maximum flow Discharge**

Different hydraulic parameters at the assigned cross section for the case of minimum and maximum flow discharges were worked out as listed in Table (2). This revealed an increase in average flow velocity from 0.29 m/s and 0.71 m/s to 0.33 m/s and 0.76 m/s for the case of minimum and maximum flow discharge respectively. However, such increase in average flow velocity can be considered insignificant and would not cause materialized bed load transport for morphological changes in the bed materials.

**Table (2): Side Effects of Parallel Docking**

No.	Hydraulic parameter	Minimum flow case	Maximum flow case
1	Water surface level (m)	81.71	85.70
2	Flow discharge ( $10^6$ m <sup>3</sup> /day)	60	270
3	Flow Discharge (m <sup>3</sup> /s)	694.4	3125
4	Total cross section area (m <sup>2</sup> )	2381.6	4393.1
5	Average flow velocity (m/s)	0.29	0.71
6	Submerged area for one vessel (m <sup>2</sup> )	27.0	27.0
7	Submerged area for 10 vessels (m <sup>2</sup> )	270.0	270.0
8	Cross section water area (m <sup>2</sup> )	2111.6	4123.1
9	Percentage of submerged area (%)	11.3 %	6.1 %
10	Average velocity during berthing (m/s)	0.33	0.76
11	Percentage of velocity increase (%)	13.8 %	7.0 %

For this reason, several inquiries concerning the existing conditions at various docking sites in Aswan city were collected. Moreover, some floating hotels owners, tourist company's representatives and some national professionals of the inland navigation were advised to judge the current docking condition for more than 10 parallel rows especially in Aswan and Luxor cities. This exposure resulted in the reasoning that such docking system would lead to dangerous situations and deterioration of the tourist environment due to high aquatic weed infestation underneath the docked units which would generate many hydraulic and environmental difficulties. This because such emergent weeds have their roots under water or in saturated soil and appear for a part above the water surface. Therefore, high infestation densities underneath and upstream the docked floating hotels can block a considerable part of the river cross section area which consequently causes high increase in flow velocities through the other part of the river. In other words, docking of floating hotels in several parallel rows would not only deplete tourist privacy and water environment but also additional morphological problems would be anticipated.

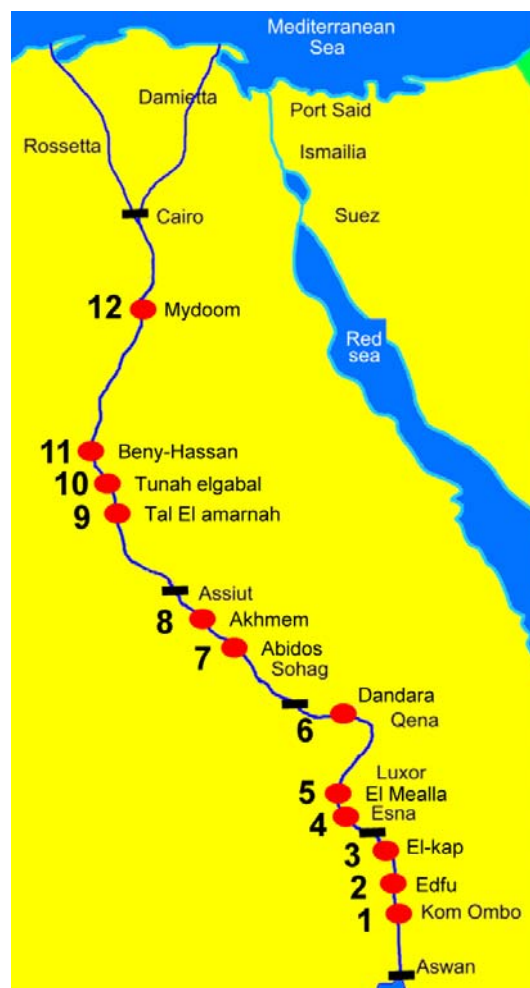
#### 4. PROPOSED NILE CRUISES

The reach between Aswan and Luxor is suffering high traffic intensity and vulnerability to hazard accidents which are not suitable to secure safe trips. Hence, some other inventive solutions could be hypothetically introduced. This can be carried out by launching some other Nile cruise programs between different tourist sites along the

river between Aswan and Cairo. Accordingly, locations of the most interesting and attractive tourist sites that would be covered during the proposed tourist programs are illustrated as shown in Table (3) and Figure (5).

**Table (3): Location of Attractive Tourist Sites along the Nile**

No.	Tourist Site	Location D/S of "OAD" (Km)	Side	No.	Tourist site	Location D.S. of "OAD" (Km)	Side
1	Kom Embo	49.500	East	7	Apidous	381.700	West
2	Edfu	114.000	West	8	Akhmeem	434.000	East
3	El-Kap	132.300	East	9	El-Amarna	621.800	East
4	Esna	166.000	West	10	Tunah	641.800	West
5	El-Mealla	187.000	East	11	Beny-Hasan	662.300	East
6	Dandara	290.800	West	12	Mydoun	849.300	West



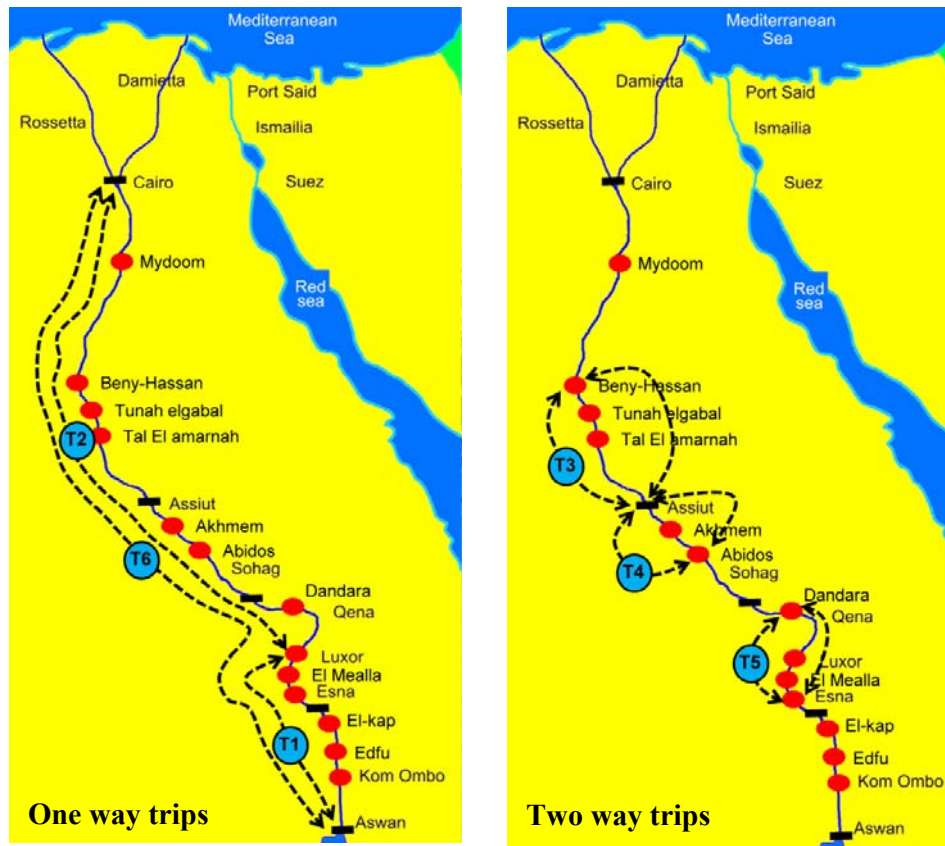
**Figure (5): Location of the Tourist sites**

Accordingly, different design parameters for inland navigation and technical influences for operating the floating hotels were analyzed (Boogaard 1992; PIANC - IAPH 1997). Also several floating hotel owners, tourist company's representatives and some national proficiency were referred to plan five more Nile cruise programs towards the future in year 2025 which are detailed in Table (4) and Figures (6). In this Table and Figures, the trip is considered one way when the tour starts at the first site and ends at the last berthing site, and all tourist sites would be covered during sailing in both directions. While the trip is considered two ways when the tour starts and

ends at the same docking site and the tourist sites could be covered during sailing in either upstream or downstream direction.

**Table (4): General Details of Proposed Nile Cruises**

Trip No.	Between		Destination (km)	Trip type	Trip period													
	(1)	(2)			(day)	(Hours)												
T <sub>1</sub>	Aswan	Luxor	223.0	One way	3.5	84.0												
T <sub>2</sub>	Luxor	Cairo	705.0	One way	8.0	192.0												
T <sub>3</sub>	Assuit	B. Hasan	118.3	Two ways	1.25	30.0												
T <sub>4</sub>	Abidos	Assuit	162.3	Two ways </tr <tr> <td>T<sub>5</sub></td> <td>Esna</td> <td>Dandara</td> <td>124.8</td> <td>Two ways</td> <td>1.5</td> <td>36.0</td> </tr> <tr> <td>T<sub>6</sub></td> <td>Aswan</td> <td>Cairo</td> <td>928.0</td> <td>One way</td> <td>14.0</td> <td>336.0</td> </tr>	T <sub>5</sub>	Esna	Dandara	124.8	Two ways	1.5	36.0	T <sub>6</sub>	Aswan	Cairo	928.0	One way	14.0	336.0
T <sub>5</sub>	Esna	Dandara	124.8	Two ways	1.5	36.0												
T <sub>6</sub>	Aswan	Cairo	928.0	One way	14.0	336.0												



**Figure (6): proposed one and two way trips**

Those programs were chosen in such a way as to cover the most interesting and attractive tourist sites on the river and to ease the accessibility for tourist groups through airports as simplified in Tables (5 and 6). In this case, each of Naga-Hamady and Assuit sites has been included within docking locations as arrival and departure points.

**Table (5): Locations of the Berthing Sites for Various Trips**

Site No.	Docking site	Nile trip number						Total No.
		T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	T <sub>5</sub>	T <sub>6</sub>	
1	Aswan	***	-	-	-	-	***	2
2	Kom-Empo	***	-	-	-	-	***	2
3	Edfu	***	-	-	-	-	***	2
4	El-Kab	***	-	-	-	-	***	2
5	Esna	***	-	-	-	***	***	3
6	El-Mealla	***	-	-	-	***	***	3
7	Luxor	***	***	-	-	***	***	4
8	Dandara	-	***	-	-	***	***	3
9	N. Hammadi	-	***	-	-	-	***	2
10	Abidous	-	***	-	***	-	***	3
11	Ackmeem	-	***	-	***	-	***	3
12	Assuit	-	***	***	***	-	***	4
13	El-Amarna	-	***	***	-	-	***	3
14	Tuna	-	***	***	-	-	***	3
15	B. Hasan	-	***	***	-	-	***	3
16	Mydoun	-	***	-	-	-	***	2
17	Cairo	-	***	-	-	-	***	2
No. of tourist sites		7	11	4	3	4	17	46

The sign (\*\*\*) is the location of berthing point

**Table (6): Involved Berthing Sites**

Site No.	Tourist Site	Location D.S. of "OAD" (km)	Tourist site	Airports	Barrages and passing locks
1	Aswan	7.0	***	***	-
2	Kom-Empo	49.50	***	-	-
3	Edfu	114.0	***	-	-
4	El-Kab	132.3	***	-	-
5	Esna	166.0	***	-	***
6	El-Mealla	187.0	***	-	-
7	Luxor	230.0	***	***	-
8	Dandara	290.8	***	-	-
9	N. Hammadi	332.0	-	-	***
10	Abidous	381.7	***	-	-
11	Ackmeem	434.0	***	-	-
12	Assuit	544.0	-	***	***
13	El-Amarna	621.8	***	-	-
14	Tuna	642.0	***	-	-
15	B. Hasan	662.3	***	-	-
16	Mydoun	849.3	***	-	-
17	Cairo	935.0	***	***	-

The signs (\*\*\*) are the tourist arrival, departure and visiting locations

The main feature of the hypothetical tourist program can be briefed as follows:

- According to Floating Hotel Association "FHA", 10 % of the registered floating hotels would be under

maintenance condition at any time. Then 90 % of the registered units in the year 2025 would be in operation. As the total number in year 2025 would be approximately 499 units, the working units in the proposed program would be 449 units.

- The number of working units within each Nile cruise trip was set – after consulting with some tourist organizations - as 299 units for the first cruise trip between Aswan and Luxor and the other five trips are 40 units each. This distribution was initially approved by FHA and can be easily improved according to the conditions in future. Considering that 10% of the total number of floating units would be in maintenance the distribution would be 269 units in the first cruise trip T<sub>1</sub> and 36 units for every cruise trip from T<sub>2</sub> to T<sub>6</sub> as listed in Table (7).
- According to the reported data (Thabet and El-Desouky 2006) and consulted practices for the existing Nile cruises, an average speed of 13 km / hour was adopted in the calculations. Knowing the distance to the destination and total trip period for each tour program, the consumed period for either of sailing and docking could be determined. Thus the determined ratio is set equal to the ratio of sailing and berthing vessels. Therefore, the percentage of sailing and docking units can be consequently and separately determined for each tour program in the year 2025 as listed in Table (7).
- The minimum required period for visiting each site within every proposed tour program was set by consulting different tourist organizations and the Floating Hotels Division (FHD) of the Egyptian Hotel Association (EHA). These berthing periods for the various sites are listed in Table (8) by considering the total number of working units mentioned in Table (7).
- The devoted periods to visit each tourist site for all proposed programs were worked out as listed in Tables (from 9 to 14). Those periods were also assigned in cooperation with some tourist organizations and the Floating Hotel Association. Ignoring possible (complicating) effects of planning of individual trips, the number of docked units at each site at any time was determined as the percentage of the total docking period for each site within every tourist program.
- As the adopted length for the representative floating hotel is 75 m which should be increased by 15 m as a gap between each unit and that behind or in front in case of single row docking (Thabet and El-Desouky 2006), the required docking length at each tour site could be worked out as double rows docking of 45 m for one unit as listed in Tables (from 9 to 14) and shown in Figure (7).

**Table (7): Design Parameters of the Proposed Nile Cruises**

Design parameter	Nile trip number					
	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	T <sub>5</sub>	T <sub>6</sub>
<b>Starting Destination</b>	<b>Aswan</b>	<b>Cairo</b>	<b>Assuit</b>	<b>Assuit</b>	<b>Dandara</b>	<b>Cairo</b>
<b>Final destination</b>	<b>Luxor</b>	<b>Luxor</b>	<b>Assuit</b>	<b>Assuit</b>	<b>Dandara</b>	<b>Aswan</b>
<b>Cruise type</b>	<b>1way</b>	<b>1 way</b>	<b>2 ways</b>	<b>2 ways</b>	<b>2 ways</b>	<b>1 way</b>
<b>Trip Period (Day)</b>	3.5	8.0	2.5	2.0	3.0	14.0
<b>Trip Period (Hour)</b>	84	192	60	48	72	336.0
<b>Cruise destination (km)</b>	223	705	118.3	162.3	123.8	928.0
<b>Sailing distance (km)</b>	223	705	236.6	324.6	247.6	928.0
<b>Average speed (Km/ h)</b>	13	13	13	13	13	13
<b>Total program units</b>	299	40	40	40	40	40
<b>Actual working units (90%)</b>	269	36	36	36	36	36
<b>Sailing period (hour)</b>	17.15	54.23	18.20	24.97	19.0	71.38
<b>Bearthing period (hour)</b>	67	138	42	23	53	264
<b>Cruising units</b>	20.4 %	28.2 %	30.3%	52.1%	26.5 %	21.2 %
<b>Berthing units</b>	79.6 %	71.8 %	69.7%	47.9%	73.5 %	78.8 %
<b>Sailing units</b>	55	10	11	19	10	8
<b>Berthing units</b>	214	26	25	17	26	28
<b>Total program units</b>	269	36	36	36	36	36



Table (8): Berthing Period at Various Sites

Site No.	Tourist site	Nile trip number					
		T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	T <sub>5</sub>	T <sub>6</sub>
1	Aswan	18	-	-	-	-	36
2	Kom-Empo	4	-	-	-	-	9
3	Edfu	11	-	-	-	-	20
4	El-Kab	-	-	-	-	-	8
5	Esna	10	-	-	-	7	8
6	El-Mealla	-	-	-	-	7	8
7	Luxor	24	36	-	-	32	48
8	Dandara	-	6	-	-	7	8
9	N. Hammadi	-	5	-	-	-	7
10	Abidous	-	8	-	8	-	10
11	Ackmeem	-	7	-	7	-	8
12	Assuit	-	5	9	8	-	7
13	El-Amarna	-	7	9	-	-	8
14	Tuna	-	12	14	-	-	13
15	B. Hasan	-	9	10	-	-	10
16	Mydoun	-	7	-	-	-	8
17	Cairo	-	36	-	-	-	48
<b>Total docking period (hours)</b>		67	138	42	23	53	264

Table (9): Berthing Lengths for Nile Cruise No. T<sub>1</sub>

No.	Tourist site	Docking period (Hour)	Percentage (%)	Number of docking units	Docking length (m)
1	Aswan	18	26.9 %	57	2565
2	Kom-Empo	4	6.0 %	13	585
3	Edfu	11	16.4 %	35	1575
4	Esna	10	14.9 %	32	1440
5	Luxor	24	35.8 %	77	3465
<b>Total</b>		67	100%	214	9630

Table (10): Berthing Lengths for Nile Cruise No. T<sub>2</sub>

No.	Tourist site	Docking period (Hour)	Percentage (%)	Number of docking units	Docking length (m)
1	Luxor	36	26.2%	7	315
2	Dandara	6	3.7%	1	45
3	N. Hammadi	5	3.6%	1	45
4	Abidous	8	5.8%	2	90
5	Ackmeem	7	5.2%	1	45
6	Assuit	5	3.6%	1	45
7	El-Amarna	7	5.1%	1	45
8	Tuna	12	8.8%	2	90
9	B. Hasan	9	6.6%	2	90
10	Mydoun	7	5.2%	1	45
11	Cairo	36	26.2%	7	315
<b>Total</b>		138	100%	26	1170

**Table (11): Berthing Lengths for Nile Cruise No. T<sub>3</sub>**

No.	Tourist site	Docking period (Hour)	Percentage (%)	Number of docking units	Docking length (m)
1	Assuit	9	21.4 %	5	225
2	El-Amarna	9	21.4 %	5	225
3	Tuna	14	33.3 %	9	405
4	B. Hasan	10	23.9 %	6	270
<b>Total</b>		42	100 %	25	1125

**Table (12): Docking Lengths for Nile Cruise No. T<sub>4</sub>**

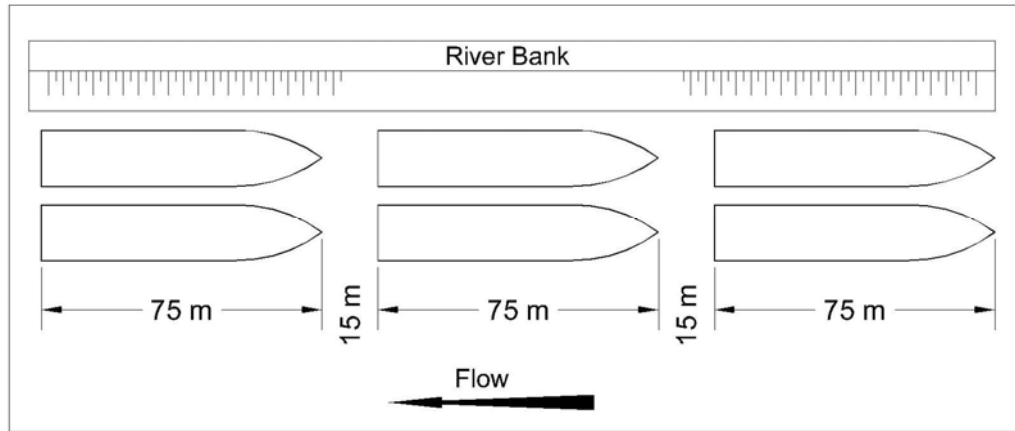
No.	Tourist site	Docking period (Hour)	Percentage (%)	Number of docking units	Docking length (m)
1	Abidous	8	34.8 %	6	315
2	Ackmeem	7	30.4 %	5	270
3	Assuit	8	34.8 %	6	180
<b>Total</b>		23	100 %	17	765

**Table (13): Berthing Lengths for Nile Cruise No. T<sub>5</sub>**

No.	Tourist site	Docking period (Hour)	Percentage (%)	Number of docking units	Docking length (m)
1	Esna	7	13.2 %	3	135
2	El-Mealla	7	13.2 %	3	135
3	Luxor	32	60.4 %	17	765
4	Dandara	7	13.2 %	3	135
<b>Total</b>		53	100 %	26	1170

**Table (14): Berthing Lengths for Nile Cruise No. T<sub>6</sub>**

No.	Tourist site	Docking period (Hour)	Percentage (%)	Number of docking units (unit)	Docking length (m)
1	Aswan	36	13.7%	4	180
2	Kom-Empo	9	3.4 %	1	45
3	Edfu	20	7.6 %	2	90
4	El-Kab	8	3.0 %	1	45
5	Esna	8	3.0 %	1	45
6	El-Mealla	8	3.0 %	1	45
7	Luxor	48	18.2 %	5	225
8	Dandara	8	3.0 %	1	45
9	N. Hammadi	7	2.7 %	1	45
10	Abidous	10	3.8%	1	45
11	Ackmeem	8	3.0 %	1	45
12	Assuit	7	2.7 %	1	45
13	El-Amarna	8	3.0 %	1	45
14	Tuna	13	4.9 %	1	45
15	B. Hasan	10	3.8 %	1	45
16	Mydoun	8	3.0 %	1	45
17	Cairo	48	18.2 %	4	180
<b>Total</b>		264	100 %	28	1260



**Figure (7): Double Rows Berthing Length**

To figure out the number of docking units at every tourist site, the corresponding number for all proposed programs were calculated as listed in Table (15). This revealed that the maximum number of berthing units at Aswan and Luxor will be 61 and 106 units respectively. On the other hand, Table (16) lists the conditions if all tourist units by year 2025 (i.e. 90% of 499 = 449 units) would be only working between Aswan and Luxor. In this case, as can be seen from Table (7), 20.4 % and 79.6 % of the total working vessels would be in sailing and berthing respectively. Therefore, the total number of sailing and docking units between Aswan and Luxor would be 92 and 357 respectively. This reveals that applying the proposed scheme in year 2025 will remarkably reduce the number of berthing units at Aswan and Luxor from 96 and 128 units to 61 and 106 units respectively as illustrated in Tables (15 and 16). This in other words exposes that the required berthing length at Aswan and Luxor in year 2025 would be reduced to 63.5% and 82.8% respectively when applying the proposed scheme.

**Table (15): Number of Berthed Vessels for Various Nile Cruises**

Site No.	Tourist site	Nile trip number						Total No.
		T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	T <sub>5</sub>	T <sub>6</sub>	
1	Aswan	57	-	-	-	-	4	61
2	Kom-Empo	13	-	-	-	-	1	14
3	Edfu	35	-	-	-	-	2	37
4	El-Kab	-	-	-	-	-	1	1
5	Esna	32	-	-	-	3	1	36
6	El-Mealla	-	-	-	-	3	1	4
7	Luxor	77	7	-	-	17	5	106
8	Dandara	-	1	-	-	3	1	5
9	N. Hammadi	-	1	-	-	-	1	2
10	Abidous	-	2	-	6	-	1	9
11	Ackmeem	-	1	-	5	-	1	7
12	Assuit	-	1	5	6	-	1	13
13	El-Amarna	-	1	5	-	-	1	7
14	Tuna	-	2	9	-	-	1	12
15	B. Hasan	-	2	6	-	-	1	9
16	Mydoun	-	1	-	-	-	1	2
17	Cairo	-	7	-	-	-	4	11
<b>Docking units</b>		214	26	25	17	26	28	336
<b>Sailing units</b>		55	10	11	19	10	8	113
<b>Total working units</b>		269	36	36	36	36	36	449

**Table (16): Number of Berthed Vessels when Applying the Existing Trip Program**

No.	Tourist site	Berthing period (Hour)	Percentage (%)	Berthing units
1	Aswan	18	26.9 %	96
2	Kom-Empo	4	6.0 %	21
3	Edfu	11	16.4 %	59
4	Esna	10	14.9 %	53
5	Luxor	24	35.8 %	128
<b>Total</b>		<b>67</b>	<b>100%</b>	<b>357</b>

## 5. REQUIRED BERTHING LENGTHS

The number of docking units at every site for various proposed Nile cruises in the year 2025 - which are listed in Table (15) – was employed to work out the total required docking length of 90m for each two units docking side by side at each site as listed in Table (17). Then the available records for the existing docking lengths at various sites in the year 2006 – which were obtained from "NRI" and "FHA" – were compared with the required lengths as listed in Table (17). This showed a shortage length of 300 m, 636 m and 423 m at Edfu, Esna and Tuna respectively with a total berthing length of 1359 m in the year 2025 as listed in Table (18). To evaluate this hypothetically proposed Nile cruise programs, a comparison is made with the expected shortage in docking lengths by year 2025 in case of the existing cruise program for the reach between Aswan and Luxor as listed in Table (16) and shown in Table (19). The sign (+) in Table (19) means that the available berthing length is greater than the required length in the year 2025 while the sign (-) means that the available berthing length would be less than the required. This shows 670 m, 1290 m and 1401 m dock length shortage in Aswan, Edfu and Esna respectively in the case of the existing cruising program in the year 2025, while applying the adopted Nile cruise programs would limit the shortage to only 300 m and 636 m at Edfu and Esna respectively as listed in Table (19). This reveals that the proposed scheme will lead to reduce the needed berthing length between Aswan and Luxor in the year 2025 to 27.8 % of the existing condition.

**Table (17): Required Berthing Lengths for Various Trips**

Site No.	Tourist site	Nile trip number						Total No.
		T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	T <sub>5</sub>	T <sub>6</sub>	
1	Aswan	2565	-	-	-	-	180	2745
2	Kom-Empo	585	-	-	-	-	45	630
3	Edfu	1575	-	-	-	-	90	1665
4	El-Kab	-	-	-	-	-	45	45
5	Esna	1440	-	-	-	135	45	1620
6	El-Mealla	-	-	-	-	135	45	180
7	Luxor	3465	315	-	-	765	225	4770
8	Dandara	-	45	-	-	135	45	225
9	N. Hammadi	-	45	-	-	-	45	90
10	Abidous	-	90	-	270	-	45	405
11	Ackmeem	-	45	-	225	-	45	315
12	Assuit	-	45	225	270	-	45	585
13	El-Amarna	-	45	225	-	-	45	315
14	Tuna	-	90	405	-	-	45	540
15	B. Hasan	-	90	270	-	-	45	405
16	Mydoun	-	45	-	-	-	45	90
17	Cairo	-	315	-	-	-	180	495
<b>Total docking length</b>		<b>9630</b>	<b>1170</b>	<b>1125</b>	<b>765</b>	<b>1170</b>	<b>1260</b>	<b>15120</b>

Table (18): Shortage in Berthing Lengths at Various Sites

Site No.	Tourist site	Docking units	Required length (m)	Available length (m)	Shortage (m)
1	Aswan	61	2745	3650	-
2	Kom-Empo	14	630	1097	-
3	Edfu	37	1665	1365	300
4	El-Kab	1	45	90	-
5	Esna	36	1620	984	636
6	El-Mealla	4	180	360	-
7	Luxor	106	4770	7550	-
8	Dandara	5	225	450	-
9	N. Hammadi	2	90	180	-
10	Abidous	9	405	630	-
11	Ackmeem	7	315	630	-
12	Assuit	13	585	1260	-
13	El-Amarna	7	315	630	-
14	Tuna	12	540	117	423
15	B. Hasan	9	405	630	-
16	Mydoun	2	90	180	-
17	Cairo	11	495	990	-
<b>Total</b>		336	15120	27257	1359

Table (19): Comparison between Existing and Proposed Programs

Site No.	Tourist Site	Existing Nile cruise program (one trip)				Proposed Nile cruise program (six trips)			
		Berthing units	Available length (m)	Required length (m)	Shortage (m)	Docked units	Available length (m)	Required length (m)	Shortage (m)
1	Aswan	96	3650	4320	- 670	61	3650	2745	+ 905
2	Kom-Empo	21	1097	945	+ 152	14	1097	630	+ 467
3	Edfu	59	1365	2655	-1290	37	1365	1665	- 300
4	Esna	53	984	2385	-1401	36	984	1620	-636
5	Luxor	128	7550	5760	+ 1790	106	7550	4770	+ 2780
<b>Total</b>		357	14646	16065		254	14646	11430	

This reveals that applying the adopted five Nile cruises programs would significantly relieve the berthing capacity between Aswan and Luxor in the year 2025 compared to the condition for the current Nile cruises. The shortage in docking capacity for the current cruises between Aswan and Luxor would be significantly reduced – as listed in Table (19) – from 3361 m to only 936 which is equivalent to 27.8 % when applying the proposed Nile cruise program. Moreover, permitting long cruises between Aswan and Cairo and the recommended five more Nile cruise trips would reduce the existing high traffic intensity between Aswan and Luxor, and contribute to improve the environmental and live condition at various tourist sites that are located along Nile River from Aswan to Cairo.

## 6. CONCLUSIONS

- Limiting Nile cruise trips to the stretch between Aswan and Luxor would lead in long term to dangerous situations and environmental deteriorations.
- Approving Long Nile Cruises through the reach between Aswan and Cairo would be a great step forward to reduce the high traffic intensity between Aswan and Luxor, enrich the social activities at the tourist sites and enhance the national foreign currency income through increasing tourism activities.

- Apply the proposed scheme in the year 2025 will significantly reduce the number of berthed units and consequently the required docking lengths in Aswan and Luxor to 63.5% and 82.8% respectively when applying the proposed scheme.
- As the adopted length for the representative floating hotels is 75 m plus 15 m as a gap to the advanced or behind one, berthing in two rows would be preferable as it reduces the required terminal length to only 45 m per one vessel.

## 7. RECOMMENDATIONS

- Increasing Nile cruising programs within the reach between Aswan and Cairo would allow extra tourism capacity for visiting various other attractive sites and would be a great step to reduce the existing high traffic intensity.
- To allow day and night safe inland navigation, priority should be directed to the installation of lighted buoys along the navigation path between Aswan and Cairo.
- To achieve the optimum use of river transportation, the existing design of inland vessel dimensions and the provided navigation lock chambers at various barrages should be standardized by involving different concerned associations.
- Integrated management and development for the entire inland navigation waterway system is strongly required and a high standard master plan should be developed.
- High level commissions and concerned organizations including representatives of the various users and involved agencies should be highlighted and managed in cooperation with the Egyptian River Transport Authority "RTA".

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