

# Environmental Impact Assessment (EIA) of Nile River Bed Level Variation at El Menia Reach (Case Study)

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**Abstract**— The Nile river bed level was varied along the years as a result of sedimentation and erosion processes This phenomena was carried out along the Nile river bed and along its banks as a result of water level variations which led to the changes of river cross section velocity profile. This changes in Nile river cross sectional area affected on the surrounding environmental by negatively attitude especially at El Menia Reach our case of study. This effects appeared in the form of shortage of cultivated lands along river bank at some parts, Also the rising of Nile river bed affected on different fish species and led to the migration of this species from this area to some deeper warmer area along the stream course. Water plant stations intakes were effected too and the pipe intakes were clogged by sediments and forced the government to find another less sedimentary places for this intakes. Navigational course along the Nile river was affected too and some zones through the Nile stream were forbidden to ships to pass through it due to the shallowness of water depth. Environmental impact assessment was needed for this area to reach practical solutions to overcome the negative effects of this phenomena at El Menia Reach of the River Nile.

**Index Terms**— *Environmental impact assessment, sedimentation process, Nile river, bed level variation.*

## 1 INTRODUCTION

The main aim of the study was to detect The environmental impact of Nile river bed level variation on water quality, aquatic life and river navigation. The study was achieved to reach the best solution for the negative impact of this phenomenon in order to overcome its side effect.

The study was held from Km 679.65 to Km 680.65 at El Menia reach of the Nile river and the distance was measured from Aswan dam as shown in fig (1).

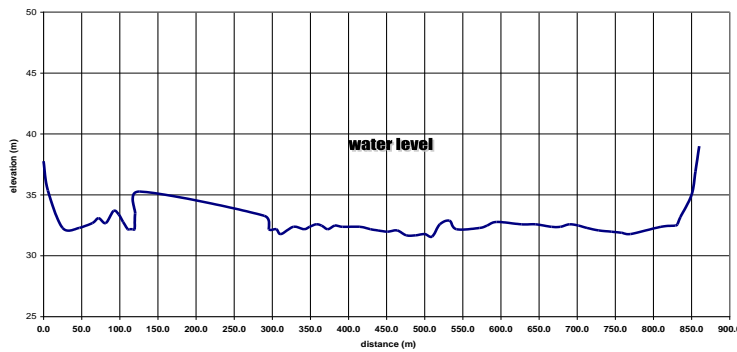
Many data were collected in study region such as bed level, river bed coordinates, water depth, water discharge, bed particle size and sediment discharge.

The study region was divided into 10 different sections in order to find the bed level variation of each section under the effect of the different variables along different years as shown in fig (2). The data of bed level variation along the years was taken from previous study [1].





“Fig 1. Egypt Nile river”



## 2 DATA ANALYSIS

The water sections profiles (1), (5) and (10) at year 2001 are shown from fig (3) to fig(5) as a sample of water sections profiles data as mentioned in [1].



“Fig 3. The water section (1) profile at year 2001”

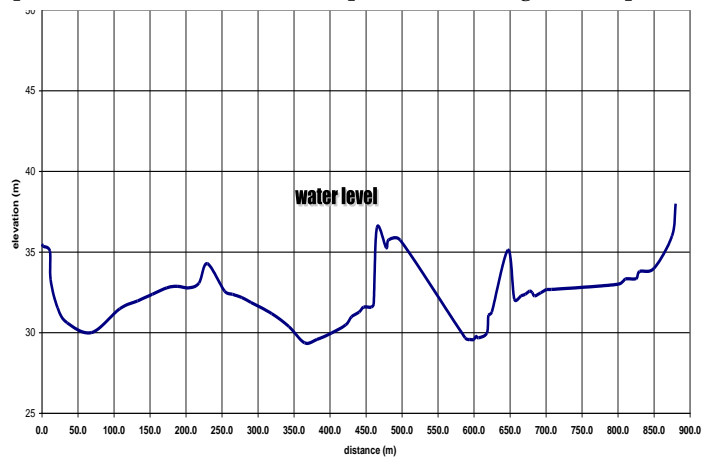


“Fig 4. The water section (5) profile at year 2001”



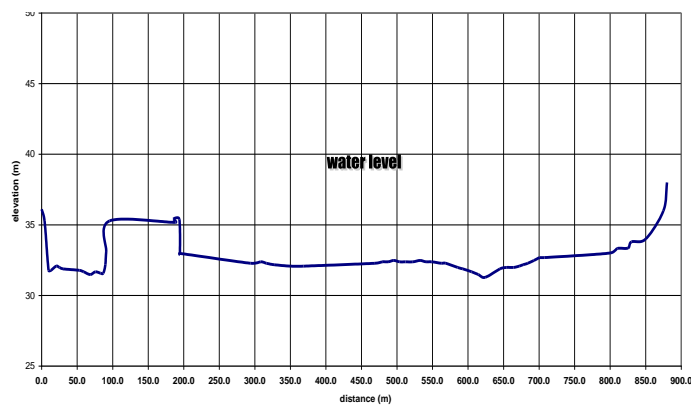
“Fig 5. The water section (10) profile at year 2001”

It was clear from the previous data which mentioned before in[1] that the bed level is increasing along the years in some part of the river reach and is decreasing in other different parts which will lead to both positive and negative impact.

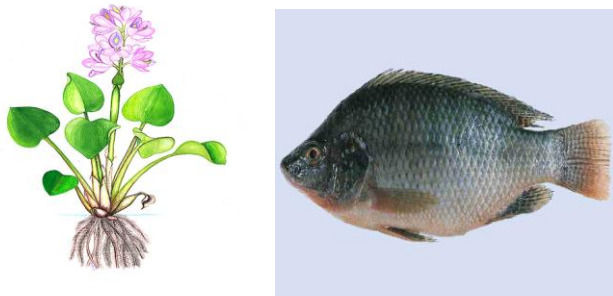


## 3 AQUATIC LIFE

Nile river contains a lot of aquatic lives such as Eichhornia crassipes (water Hyacinth). This plant rise 1 m above water surface level and has long sponge stem, free roots and 8-10 purple flowers as shown in fig(6). This kind of plant will grow up easily in shallow water depth which will obstruct ships navigational course. Nile river contains also many kinds of fish species such as Nile Tilapia which feeds on the bottom river grass as shown in fig(7). The shallowness of water will increase the water temperature which will provide a suitable atmosphere for fish egg incubation. Also shallowness of water permit sunlight to penetrate all the way to the bottom, allowing photosynthesis to occur throughout the water column and on the bottom allow grass to grow faster which will be available for fish to feed on it.

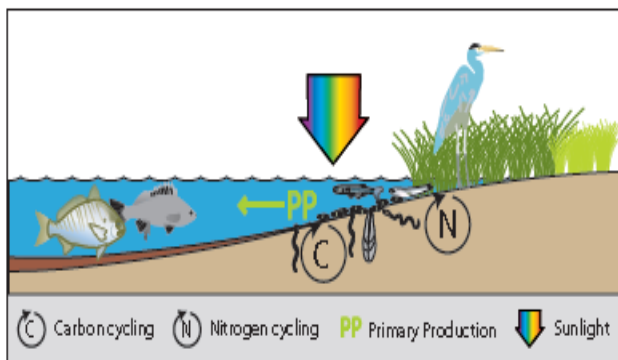


“Fig 2. The plan of the different sections at El Menia reach”



“Fig 6. Water Hyacinth” “Fig 7. Nile Tilapia”

Food webs in shallow water [2] can be complex. Small fish may feed on terrestrial insects, benthic (bottom dwelling) invertebrates, and benthic and mudflat algae. These small fish, in turn, serve as food for both larger fish (contributing to the aquatic food web) and shore or marsh birds (contributing to the upland food web). In addition, nutrients from groundwater, overlying estuarine water and exported marsh detritus are processed by benthic microbes and invertebrates as shown in fig(8).



“Fig 7. Food webs in shallow water”

#### 4 WATER QUALITY

The main channel of the river between Aswan and Cairo has been ranked in the past as class A (high quality water suitable for drinking and lesser uses subject to conventional treatment). The classification was based on the presence of dissolved oxygen DO close to saturation level in most reaches of the river (8-10 mg/l), low organic load as measured by BOD (2-4 mg/l), low concentration of TDS (175 mg/l in Aswan increasing gradually to about 210 mg/l in Cairo). The following table(1) shows water quality of El Menia reach from year 2002 to year 2007 [3].

“Table 1. Water quality of El Menia reach ”

Year	DO	BOD	T.D.S
2002	8	2	210
2007	8.2	2.9	216

The BOD has increased from an average value recorded at year 2002 Of 2 mg/l which increased to 2.9 mg/l at year 2007.

Continued discharge of heavy loads of organic wastes and the increasing of stream shallowness has resulted in steady increase of BOD. For healthy fresh water streams, the BOD should be less than the maximum permissible level MPL of 4 mg/l. If the shallowness of water increased the BOD in most will reach the MPL for fresh water bodies such as fish and algae.

The TDS had an average value of 210 mg/l during the year 2002 which increased to 210 mg/l in year 2007 as a result of water shallowness in addition to changes in water characteristics induced by the HAD.

#### 5 NAVIGATION

The first class waterway navigation in Egypt is the pusher barge, pushed dump barge and tourist-floating hotels are the majority. The obtained classification of the total navigation vessels in Egypt is given in Table (2).

“Table 2. Navigation Units in Egypt”

No	Division	Total Number
1	River Transport Company	240
2	Water Transport Company	216
3	Sugar Refining Factory	191
4	Private Sector	4418
5	Public Sector	256
6	Governmental Units	325
	Total Number	5646

The overall transported cargo is reduced from 3% of total transported goods in Egypt in 1990 to only 1% in 2001 due to:  
1-The shallowness of water cause that the river depth in some areas less than the minimum required of ships draft.

2-Lack of marking system and positioning or navigation maps along both sides of the River.

#### 6 CONCLUSIONS AND RECOMMENDATIONS

-Get the benefit of the increasing of Nile river fish number due to the shallowness of water depth as a natural source of foods of urban areas on banks sides.

-Dredging the shallowness spots in some places of The Nile river course which affect on navigation course.

-Recommended the east bank of the Nile river at El Menia reach as a suitable place for water station intake because in this side erosion processes is greater than sedimentation and that will prevent the intake pipes from clogging by sediments.

-Eliminate water Hyacinth from Nile river which obstruct ships navigation by using friendly environmental system to get rid of it without any biological effect.

-Providing the total length of waterway channel, from Aswan to Cairo, by the necessary traffic control aids required for safe navigation.

-Producing navigation charts to cover the total length of the River Nile from Aswan to Cairo.

## 7 ACKNOWLEDGEMENTS

I dedicate this paper to all my Egyptian citizens.

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