Chapter 1: INTRODUCTION

1-1 General

The River Nile is the main source of water and life to Egypt and the Egyptians so all of man activities are located on its banks, the River Nile is a natural river, thus it has many islands dividing its flow into two branches and it also has many bends and meanders along its course from Aswan to the Mediterranean Sea. Therefore the river is subjected to natural simultaneous processes of erosion and sedimentation due to these meanders and islands. These processes affect the river bed levels and are reflected on the stability of navigation along the river. Moreover, these processes also affect the stability of the river banks which affect the farmers of the surrounding agriculture lands.

In spite of the importance of the Nile to the Egyptians, many man activities harmed the river. Backfilling parts of the river to increase land area for agriculture and fishing farms, dredging for improving navigation through the river, and also massive bank protection are examples of manmade interventions.

The hydraulic characteristics of the river are affected by these activities which reflected in morphological changes and simultaneous processes of erosion and sedimentation. So it’s very important to predict the side effect of man intervention on river Nile.

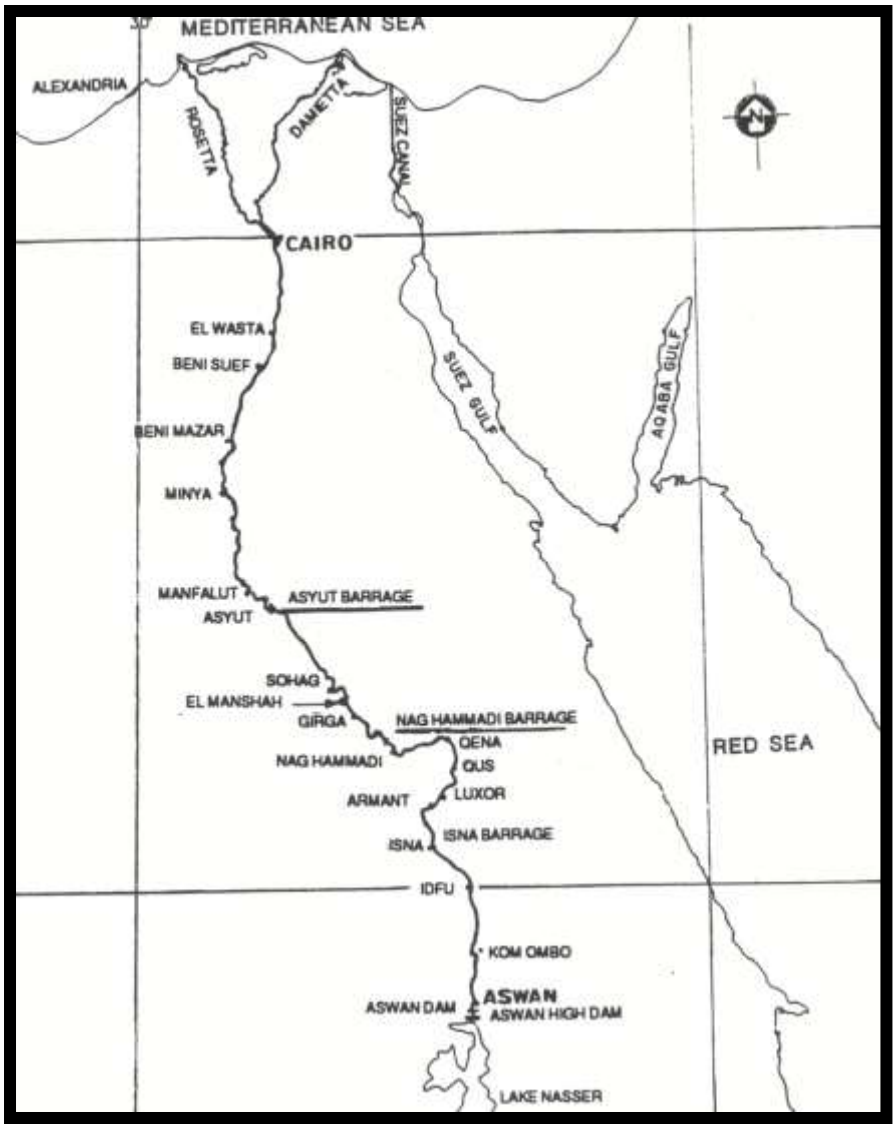

Figure 1 - 1 Layout of River Nile through Egypt

1-2 Problem Definition

The morphology of River Nile is undergoing continuous changes, such as bank failure, bed degradation and deposition, and new island formation. These changes resulted from the man made interventions which affect River hydraulic characteristics. A man made intervention occurred at the study area where the local people constructed a 400m road to a ferry boat across the river located at study area at El-Rayramoun district. Figure (1-2) and shows the satellite photo of El-Rayramoun study area. Also figure (1-3) to figure (1-6) show some photos of the study area.

Figure 1 - 2 Satallite photos of the study area

Figure 1 - 3 Photo of study area

Figure 1 - 4 Photo of study area

Figure 1 - 5 Photo of study area

Figure 1 - 6 Photo of study area

As a result of this intervention several morphological changes occurred at the area. This research aims to study this problem and suggested the suitable solutions needed to be studied and to be analyzed.

1-3 Main objectives

1- Detect changes in velocity distribution and current direction and resulting change in bed elevation.
2- Prediction of future changes using a mathematical model which has been verified on similar cases.
3- Suggest and discuss the possible solutions.

1-4 Research plan

1- Compiling of previously published material relevant to the topic of research. All sources will be summarized and listed.
2- A two dimensional mathematical model will be applied to the study case.
3- Verifying the models with measured data at the study area.
4- Predict of future changes in river characteristics due to current manmade intervention along the study reach.
5-Discuss the required solutions to minimize the negative impacts.

1-5 Thesis content

In order to study the changes in river characteristics in the study area, this thesis is divided into seven chapters as:

Chapter one (INTRODUCTION) describes the problem, the objectives, the procedure and methodology used in this study.

Chapter two (LITERATURE REVIEW) contains a comprehensive literature review of channel morphological parameters, factors affecting river characteristics, and scour .Types of manmade structures to control the river flow. Also, dredging and revetment concept are presented.

Chapter three (DATA COLLECTION AND SITE DESCRIPTION) contains description of Field Measurements, and data collection by different techniques. Measurements and analysis of different hydraulic parameters (Velocities, suspended sediment and bed material samples) are presented.

Chapter Four (MATHEMATICAL MODEL PREPARATION) contains the theoretical background of the used two dimensional model, the initial boundary conditions, calibration and verification of the model.

Chapter Five (WORK PLAN FOR MODELING) contains work plan and the steps of study and the parameters which is defined as model input and also what the expected to outcome of this study

Chapter six (TESTING RESULTS AND ANALYSIS) presents the analysis of measured data and model prediction, comparison between cross sections and discussions of morphological changes. Effect of different scenarios of discharge are presented.

Chapter seven (SUMMARY CONCLUSIONS AND RECOMMENDATIONS) presents discussion of proposed solutions of the study and illustration of its main findings as well as suggestion solutions and summary of recommendations.