

**PRODUCTION OF DIGITAL MAPS TO STUDY THE
IMPACT OF FLOODING ON THE RIVER FLOOD PLAIN
USING GIS AND MATHEMATICAL MODELS**

BY

Marwa Mamdouh Ahmed Ibrahim

B.Sc. Civil Engineering, Zagazig University, 2005

**A thesis Submitted for the Partial Fulfillment
of
The Requirements for the Master Degree
in
Environmental Sciences**

**Department of Engineering Science
Institute of Environmental Studies and Research
Ain Shams University**

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APPROVAL SHEET

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ABSTRACT

The Nile River 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. The fourth reach is located between Assuit Barrage (kilometer 544.500 D.S. the Aswan Dam) and the Delta Barrage (kilometer 954.500). Which experiences many river encroachments in the floodplains, bank erosion and many areas exposed to inundation during the past high flow release. This study is focused on Zamalek and Wareq El-Hader Islands which are located upstream Delta Barrage in the back water curve region. This region extends from 930 to 950 kilometer downstream Aswan Dam. This study aims to investigate the evolution of this region using historical records, to predict future characteristics and to determine morphological changes in case of passing the future discharge 350 million m^3/day . It may have more effect on river stability. The erosion and sedimentation processes in this region were computed using historical data from hydro-topographic maps and hydraulic characteristics. It was found that the maximum depth of sedimentation and erosion 3.31 m and -1.1 m respectively. Also, human interventions were monitored and evaluated. The numerical model (GSTAR3) was used for simulation of water and sediment transport in the study area. The model was calibrated and validated along the fourth reach with its length 410 km. Yang's 1973 formula was found the best equation to describe sediment transport in this reach. The model was applied to predict aggradation and degradation along the study reach with its length 20 km. The maximum aggradation and degradation were computed to be +0.75 m and -0.6 m respectively. Also, this research presented and evaluated human interventions and their encroachments around the study area.

Moreover the digital floodplain maps were developed by processing the output of flow model and terrain modeling into the ArcGIS. These maps can help the decision makers in possible floods management and can be put the appropriate instructions before, during and after periods of flooding.

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