The Hydrogeomorphological Hazards in the Governorate of Beni Suef , Using Geographic Information Systems

Abstract

Hydrogeomorphological hazards exist in the study area including geomorphological hazards associated with the River Nile, the geomorphological hazards of flash floods, and geomorphological hazards associated with the groundwater. Several factors have contributed to the presence of these hazards and their growth (e.g.increasing population density, poor planning, and unplanned growth) thereby threatening human life and property, and even elements of the natural environment.

This study has addressed the study of these hazards in five chapters preceded by an introduction and followed by a conclusion. The introduction includes identification of the study area, previous studies, the reasons for choosing this topic, objectives of the study, data sources and stages of preparation, the difficulties that faced the student, and finally the content of the study. The first chapter deals with studying the natural environment features of the study area, through the study of natural features of the study area and includes the study of geological and climatic characteristics, landforms, soil, and water resources. It also includes the study of the human features of the study area in terms of population, urbanization, and land use. Chapter II deals with the geomorphological hazards associated with River Nile stream. It contains the morphological characteristics of the stream, the hazards associated with stream erosion, the hazards associated with sedimentation in the stream, and finally the human role in exaggerating these hazards.

Chapter III involves studying the geomorphological hazards of flash floods, through the study of geographical distribution of drainage basins, the characteristics of basins and drainage networks, hydrologic factors and hydrological budget of the basins, and the role of human beings in a flash flood hazards and increasing their effects. Chapter IV deals with the geomorphological hazards associated with groundwater. It contains the characteristics of aquifers, chemical characteristics of groundwater, and the hazards resulting from water table rise, and then studies the human role in exaggerating these hazards.Chapter V deals with the study of the geomorphological assessment for the water hazards in the study area, by studying the hazard degrees, methods of protection and hydrogeomorphological hazard reduction. This chapter ends with the economic development of the study area. The conclusion shows the results of this study, as stated by a set of recommendations, that could contribute to avoiding the hydrogeomorphological hazards in the study

area, and developing it agriculturally and industrially. These are followed by the appendices, and list of Arabic and foreign references.

The most important results of the study are:

Surface sediments and geologic structural conditions play an important role in influencing the runoff through their impact on the infiltration. In addition, geologic structural conditions affect the form of drainage basins, their surface slopes, the form of streams and their junction with the main valley.The rainfall in the study has direct impact on shaping of the earth's surface, such as cavities and has an indirect impact on the activity of chemical weathering.The ground elevation in the study area ranges between zero and about 800 meters above sea level. In general, ground elevation increases towards the east and west of the Nile.

The study found that the medium slopes (less than 19°) are dominate in the study area, and represent more than 54% of the total of the study area.The study area is characterized by simple landforms, where Plateau lands are more than half area 54.7% of the total area, followed by plateaus (22.3%) the flood plain (12%) the pediment (6.7%) alluvial fans (2.1%) sand dunes (1.1%) and finally the isolated hills (1.1%).The study of the characteristics of the River Nile sinuosityes before and after the construction of the High Dam shows an increase in the number of sinuosityes from four sinuosityes in 1952 to ten sinuosityes in 2004.

Elongated islands dominate in the stream, as there are 33 islands of the total number of the islands in 2004 (63.46%). A number of river islands increased in the area of study from 23 islands in 1952 to 52 islands in 2004.The construction of the High Dam led to a number of changes in the river. The most important is erosion of the river bed and the sides of the river, the phenomenon of scour holes, decline in the banks of the stream, change in the morphology of islands (some islands docked easily flood plain, other islands show collapse of large parts of their sides).Sedimentation in the main stream is one of the geomorphological hazards that affect the River Nile, causing consequent problems related to deep draft navigation and bottlenecks, which requires the need for frequent detailed mapping of the bathymetry of the bottom to determine the paths for river vessels. The most important aspects of deposition reach the sedimentation in the bottom and sides of the River Nile, and change the morphology of the islands (increasing the area of the islands and the emergence of new islands).The stream of the River Nile within the study area was modified by humans activities through the establishment of the stone heads, the distribution of sediment resulting from clearing the Nile course, and adjusting the position of the island lying northeast of the Kurimat Island. The study area Contains 124 drainage basins of different sizes dimensions, and the geomorphometric characteristics. They have the

same base level (the River Nile). Humans helped to increase the destructive power of flash floods and exaggerated their effects through the infringement of storm water drains and turning them into agricultural areas, urban communities, industrial installations, and following wrong ways in the face of the hazards of flash floods, leaving the waste resulting from mining operations without treatment.According to the hydrogeological study of the area, there are three aquifers: Pleistocene aquifer, Plio-Pleistocene aquifer, and Eocene aquifer. The groundwater levels rise in the reclamation areas west El-Fashn, the Wasta city on the western side of the Nile, and West of Al-Qbabat, Kafr El-Waslen, and Al-Bermpel on the eastern side of the Nile.The movement of groundwater on the western side of the Nile follows through two directions, one of which is from south to north, and the second is from west to east. As for the movement of groundwater on the eastern side of the Nile it is from the east towards the west. Therefore the River Nile has become the drainage area receiving large amounts of groundwater from the aquifer each year due to, the movement of water from the aquifer towards the river. The absence of balanced management between the uses of surface water and groundwater resources led to rise in the groundwater level, which resulted in a lot of geomorphological hazards which are difficult to treat at no cost. These hazards are water logging, soil salinization, degraded groundwater quality, groundwater pollution, and erosion of the foundations of many buildings of architectural buildings, archaeological areas, and roads. The study of geomorphological hazards associated with groundwater indicated that they resulted from human intervention without specialized studies. The continuation of this intervention led recently to develop some projects, which would have a negative impact on the national development processes that affect the national economy. These projects are digging the New Canal that relies on the surplus waters of the lakes of Wadi El Rayan (agricultural drainage water and sewage), and building a desert surrounded villages on the limestone cavernous.

The study of erosion and rates of retreat in the banks of the River Nile and the river islands showed that the total length of the safe areas of the stream and islands is up to 353.4 km (88.35% of the total length of the stream and the islands), which is the most appropriate areas for development. On the other hand, the total length of hazard-prone areas of islands and the stream is 46.6 km (11.65% of the total length of the stream and the islands). The degree of risk on both sides of the Nile River and islands could be dividing into: banks of low-risk, (with a total length of 9 km), banks of moderate-risk (16.4 km), and banks of high-risk (about 21.2 km). The basins in the area of study have been divided into low-risk basins (seven basins; 5.65% of the total basins), and moderate-risk basins (117 basins; 94.35% of the total basins).