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FLOODS AND FLASHFLOODS IN EDIRNE (TURKEY)

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ABSTRACT

Edirne, which is one of the bigest city in western Turkey (Figure 1), has been damaged by floods and flashfloods with an increasing frequency and intensity over the years. This study was prepared as a preliminary investigation and aimed to research the floods and flooding in Edirne city (Turkey). For creating the topographic database in Geographic Information System (GIS), 1/25000 and 1/250000 scale topographic maps and satellite images was used. Subbasins areas of Meric River and flood area in Edirne city center was determined and analyzed depend on topographic database. The precipitation and stream flow analyses haven’t been realized because of plaining a new multidisciplinary and international project.

Keywords: Edirne, Meric river, floods, GIS, preliminary investigation.

INTRODUCTION

Edirne, which is one of the bigest city in western Turkey (Figure 1), has been damaged by floods and flashfloods with an increasing frequency and intensity over the years. Karaağaç, Sarayiçi, Bosnaköy, Gölmahalle, Kapıkule, İstasyon mahallesi, Edirne-Karaağaç-Pazarkule road and flood-plain settling along the Meriç River and its tributaries, wich have important functions, are the most harmed locations by floods and flashfloods. The damages are not only physical but also they give demages to economy, social and cultural life at local, regional and national dimensions. Floods in Edirne city center have frequently been witnessed for ages.The floods taking place in the years of 1571, 1657, 1673, 1747, 1845 are the biggest recorded floods in Edirne city center. Those floods have caused huge losses of life and property in the past.

This is a preliminary study before a research project to prevent and to mitigate of the floods, flashfloods harms in Edirne city and its vicinity. For this aim, Hydrographic, geomorphologic and landuse-landcover features of upstream Meriç River basin from Edirne city center have been detected. In this study, 1/25000 and 1/250000 scale topographic maps and satellite images were used with Geographic Information System and Remote Sensing technologies. The precipitation and stream flow analyses haven’t been realized because of plaining a new multidisciplinary project.



Figure 1: Location features of flood area in Edirne (Turkey).

Drainage system and slope analyses

When there is too much water flow in river channels, flooding occurs on flat or low slope lands. Flood is the natural hydrographic phenomenon that often comes true in Edirne city and its vicinity is flood. In general, floods are related to drainage system and geomorphological features of river basin [1, 2, 3, 4, 5]. Therefore, both drainage pattern of Meric River and slope feature of flood area were analysed by using Geographic Information System (GIS) Technologies [3, 4, 5].

Not only flow direction and flow accumulation of water and runoff but also drainage patterns depend on the slope conditions. Meric River basin consists of three major sub-basins coming from Bulgaria. They are named Tunca Basin, Arda Basin and Upstream Meriç Basin (Figure 2).

This drainage system has been collecting water from snow melt and rain. According to the size of the sub-basins, much of the water comes from the Upstream Meriç River Basin in Edirne City center (Fig. 2 and Table 1).

Table 1: The distribution of sub-basins according to the areas.

Sub_Basins	Area (m^2)	Rate (%)
Upsream Meriç Basin	20459600000	60,55
Tunca Basin	8202590000	24,27
Arda Basin	5128680000	15,18
Total	33790870000	100

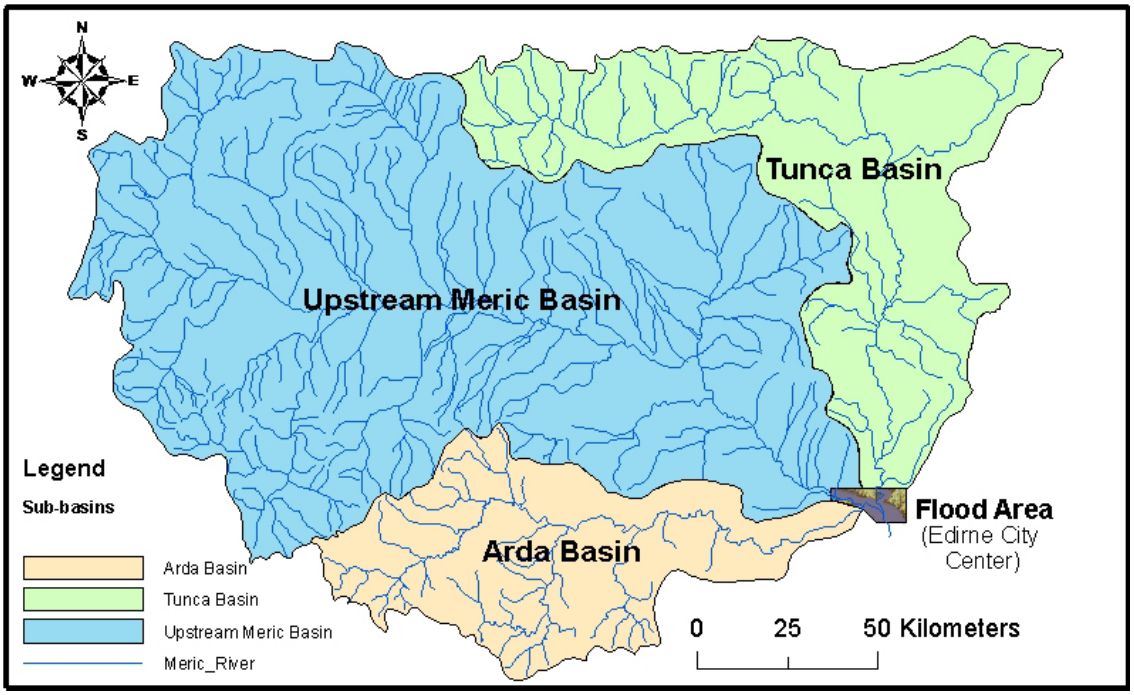


Figure 2: Meric River sub-basins from Edirne City center to upstream Meriç River.

It is the most important problem related to the drainage system that three major sub-basins of Meriç River turns into a river in a distastance of 6 km which is the flood plain of Meriç River (Figure 3, 4, 5). The water of three major sub-basins of Meriç River come together in such a short distance and 1% in sloping terrain (Figure 3, 4, 5). For this reason, a very large amount of water comes into in Meric River flood plain at the same time. When the amount of collected water exceed the water carrying capacity of the Meric River drainage channels, water is not only spread but also inundate on the flood plains of the Meriç River in Edirne city center. River banks partly prevents flooding. When river banks are destroyed by flashfloods, human life is affected seriously by flood waters. The risk areas of flooding were analysed and calculated as 74890837 m^2 (Figure 6). The river banks were ignored while calculating the flood risk areas. Also climatik features, landuse features, vegetation, soil, etc. features of region were not taken into consideration. In three major sub-basins of Meriç River, especially Upsream Meriç Basin, there are numerous small and big dams. Building dams are man-made measures taken to provent flooding in the region. Dams usually, play a positive role when only rainfall or melting snow ocur in sub-basins of upstream Meriç River. When melting snow and precipitation occur in sub-basin, dams are not sufficient to store the accumulated water and a large amount of water comes into Meriç flood plain in Edirne city.

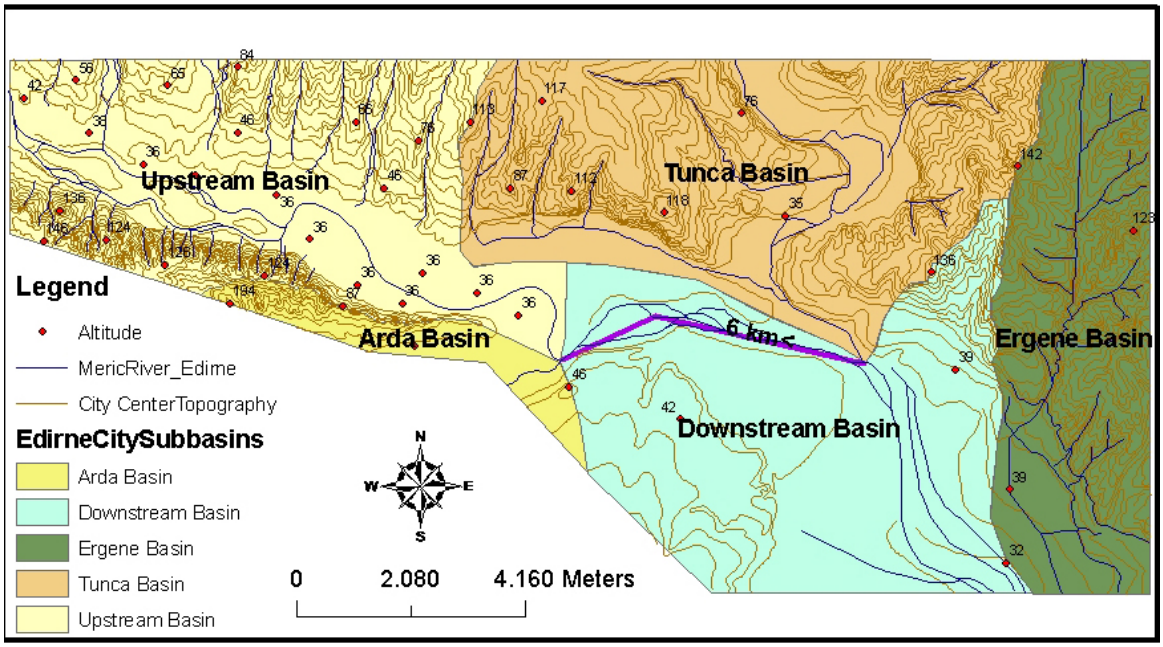


Figure 3: Meriç River Sub-basins and the connection distance of the sub-basins in the Edirne floodplain.

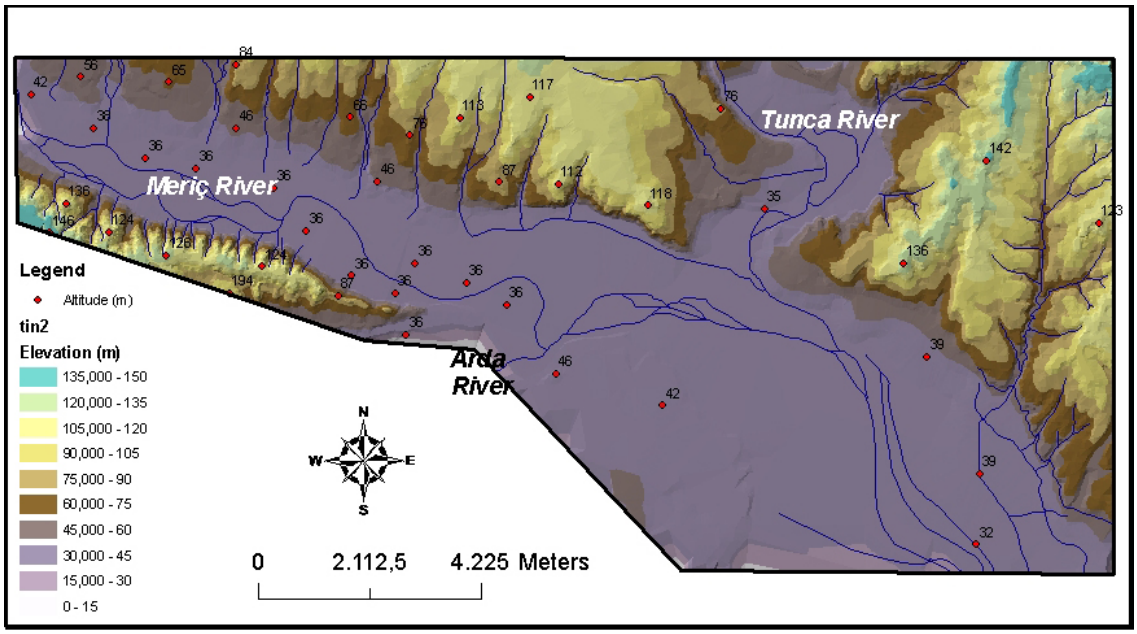


Figure 4: The Digital Elevation Model (DEM) of flood area in The Edirne city center.

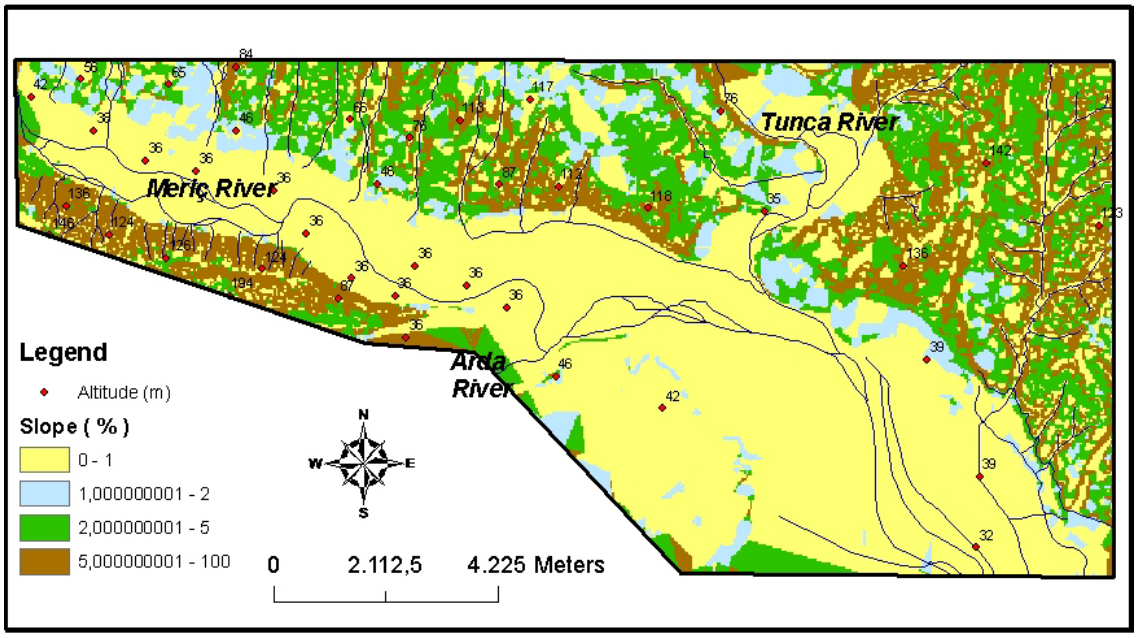


Figure 5: Slope features in the Edirne city center and floodplain of the Meriç River.

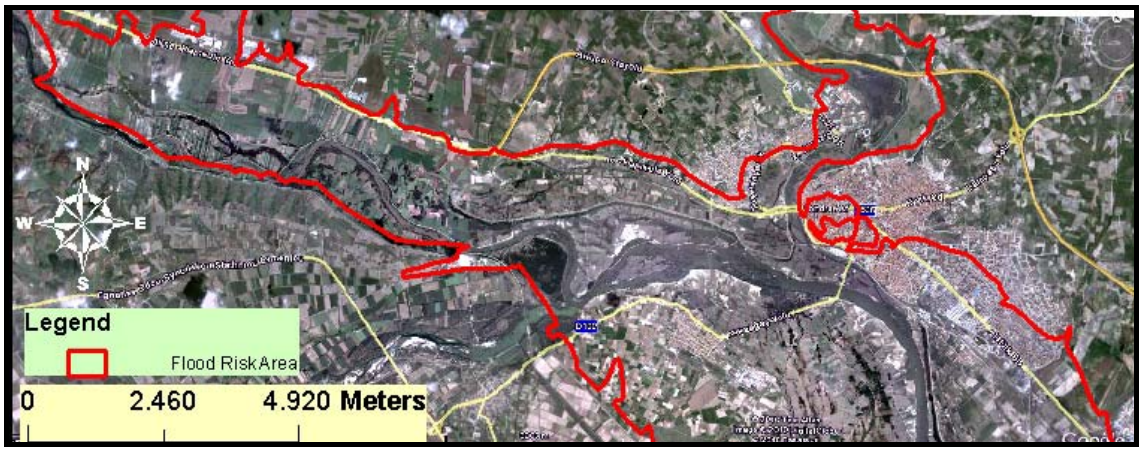


Figure 6: The flood risk areas in Edirne city center.

Conclusion

It is clear that carrying capasity of drainage system and channels are not sufficent enough to prevent floods in Edirne. Hydrographic, geomorphologic and landuse features of the Edirne city and its close vicinity show that geographic conditions cause floods to take place and encourage floods in Edirne city center.

One of the geographic conditions is the feature of drainage system. Because three major sub-basins of Meriç River combine in a very short distance, a large amount of water exceeds the river and induces floods in the region. The Slope features of flood area is the other geographic conditions. The slope characteristics of Edirne city center and its vicinity help floods to happen

Floods in Edirne City center are under the control of many factors. But, only two of these factors have been researched In this preliminary study. The results of this study belong to only these approachs.

The findings of this study could be developed with a broad perspective by a international research group.

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