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Some Characteristics Of The Beyşehir Lake Basin

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Abstract – **Abstract-The Beyşehir Lake basin (BLB), which is the study area, is the second largest sub-basin within the Konya province closed basin in terms of surface area with an area of 7.308 m^2. BLB is a provincial border among Konya, Isparta and Antalya at southern part of Turkey. The location is getting importance of the basin.**

Some basin characteristics such as slope, elevation classes, land use, aspect groups, land capability class, erosion status were determined by Geographic Information System (*GIS*). Results of the study showed that BLB has 32% of flat and 25% of low slope in the basin. They emphasized the basin could be considered as a flat area. The altitude of the BLB ranged from 947 m to 2985 m, while 33.8% of the field had below 1091 m. BLB showed continental climate characteristics. The average of annual total precipitation in the basin was varied between 450 and 500 mm. Eastern and southern aspects were dominant in the basin.

The natural resource potential in the basin was estimated by digital map showed specific conditions according to the specific characteristics and the present conditions. They have been recorded and the necessary measures taken for present to prevent future changes. Therefore, it was important for principles of watershed management.

Keywords – Basin, characteristics, GIS, slope.

I. INTRODUCTION

Watershed is one of the most important units in planning and estimation of natural resources, while basin is called the parts of the earth with a topographic structure, which is limited by the water branch line passing through the valleys and where the surface waters on which the rainwater accumulates can reach a point. The activities of human beings in the basins reveal the size and quality of soil and water resources [1;2].

Geography plays an important role in practices of basin planning. The fact that geographers work on the physical, human and economic environment conditions in the basins to support this situation. After the evaluation of the physical environmental conditions of a basin, planning should be carried out by considering the physical factors and socio-economic environment [3].

Integrated watershed management is the management with all sectors and parties that manage the social, ecological and economic components of all ecosystems where the water flows from the upstream to the downstream where it flows.

Geographic Information Systems, which serves to decide people in various fields from numerical preparation of simple maps to making complex decisions, has been greatly increased in forestry with the ability to link data to spatial data [4]. It is also cheap and easy application for different purposes. Prior to this time, morphometric parameters were measured using mathematical concepts, but Geographic Information System modules provide flexible environment and powerful tools for integrating, manipulating and analyzing spatial information [5].

Some basin characteristics (e.g., slope characteristics, elevation classes, land use, aspect groups, land capability class, erosion status) of Beyşehir Lake basin by GIS and Arc Info software were determined in the study to contribute development and management practices of the basin.

II. MATERIAL AND METHOD

2.1. Material

The Beyşehir Lake basin (BLB), which was the second largest sub-basin within the Konya province by 7.308 m^2. The BLB located on the western flank of the Konya Closed basin at southern part of Turkey. BLB were provincial borders among Konya, Isparta and Antalya provinces [6].

2.2. Method

The main documents and data of the field were obtained from the competent authorities. The study included two stages by evaluating data obtained in the field and evaluation in the office. Documents and data from authorities were used in the field stage. In addition, a review of the literature on similar topics was performed to discussion and comparison results of the study. Topographic, settlement, geology and soil maps of the study area were fully digitalized at ArcGIS 10.2 software. To obtain a map of the study area, basic data of public agencies and organizations (forest management board, agricultural district board of directors, state hydraulic bureau, local government, etc.) were used. Some of the physical features of the river basin such as land use status, slope, elevation scale, land capacity type, and facet groups of the BLB have been created at the Geographic Information System (*GIS*) environment.

III. RESULTS

3.1. The slope characteristics of the basin:

The basin was divided into 6 slope groups as flat (32.3% of the basin), low (25.8%), medium (16.5%), and high slopes (12.2%), while 13.2% was steep (Figure1). The slope decreased from the Taurus Mountains at southern part to the inner parts of the region (Fig. 1).

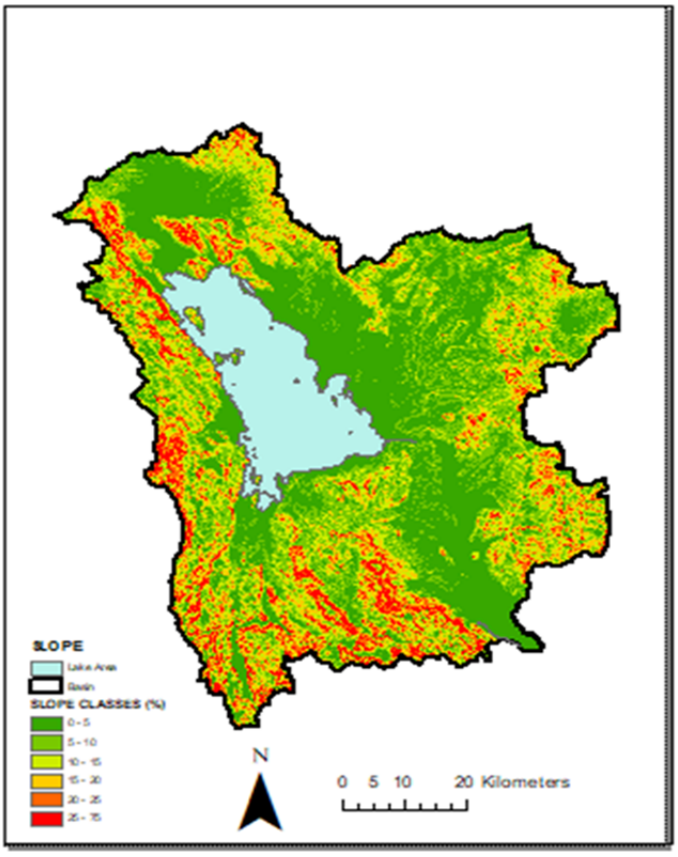

Fig. 1. Slope classes map of the basin

3.2. Elevation characteristics:

Elevational ranges of BLB were determined as seven elevation groups in the ArcGIS environment. They were below 1091 m. covered the largest area (33.8), between 1091 and 1400m (24.2%), between 1401 and 1600m (12.7%), between 1601 and 1800m (16.4%), between 1801 and 2000m (6.3%), and higher than 2000m (4.2%) (Figure 2). 2.4% of the BLB were between 2501 and 2985 m. The highest elevation of the BLB was 2985m. The map of elevation groups of the basin was given in Fig.2.

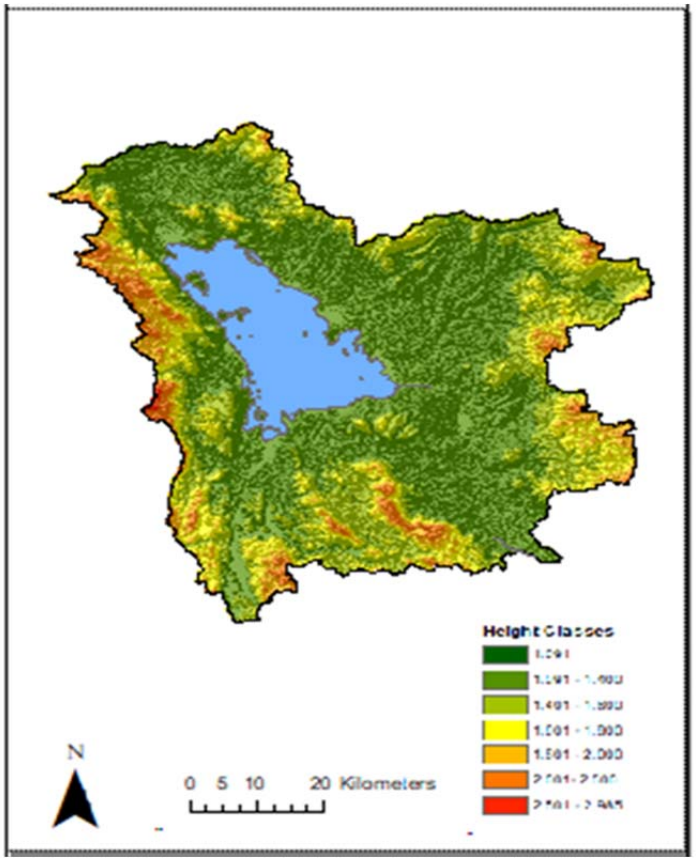

Fig. 2. Elevation classes map of the basin

3.3. Aspects:

Aspects of the basin were flat (-1), North (0-22.5), Northeast (22.5-67.5), East (67.5-112.5), Southeast (112.5-157.5), South (157.5-202.5), Southwest (202.5-247.5), West (147.5-292.5), Northwest (292.5-337.5), Northeast (337.5-400) according to ArcGIS environment The results showed that east and south aspects were dominant in the basin (Fig. 3).

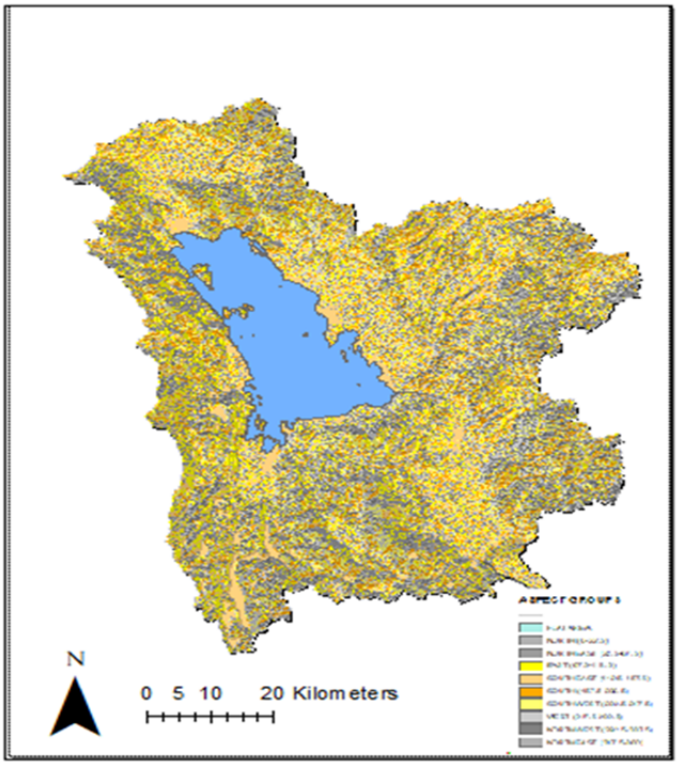

Fig. 3. Aspects groups map of the basin

3.4. Erosion risk:

According to ArcGIS environment, the erosion risk status characteristics of the basin were high risk area (32.6%), severe risk area (16.2%), of medium risk area (14.8%), and 12.5% of no or little risk area (12.5%), while 23.9% were water surface and risk-free area. It could be said that the basin had mainly erosion risk. High rates of wind and water erosion were also observed in the basin. Some of the biggest factors observed in the high rates of erosion were unplanned urbanization, unsuitable practices in agriculture and livestock. The erosion risk map of the BLB is given in Fig. 4.

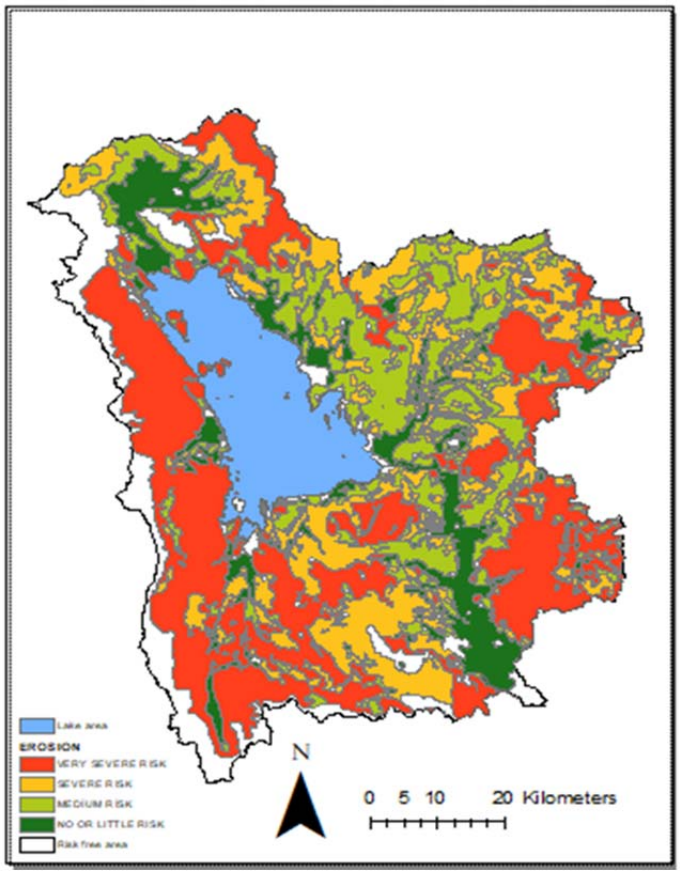

Fig. 4. Erosion risk map of the basin

3.5. Land use:

The land use characteristics of the basin were divided into 7 classes according to ArcGIS environment. Results of the ArcGIS environment showed 12.8% forest area, 5% meadow area, 14.2% residential area, 22.3% agricultural land, 31.6% dry agricultural land, 2.4% bare area, and 11.5% water area (Fig. 5). Considering the land use distribution of the residential areas of the basin was 51270.6 hectares which was forest areas. It was 71.5% of the total area, while agricultural areas were 19243.1 hectares (26.8%) in the total area of the basin.

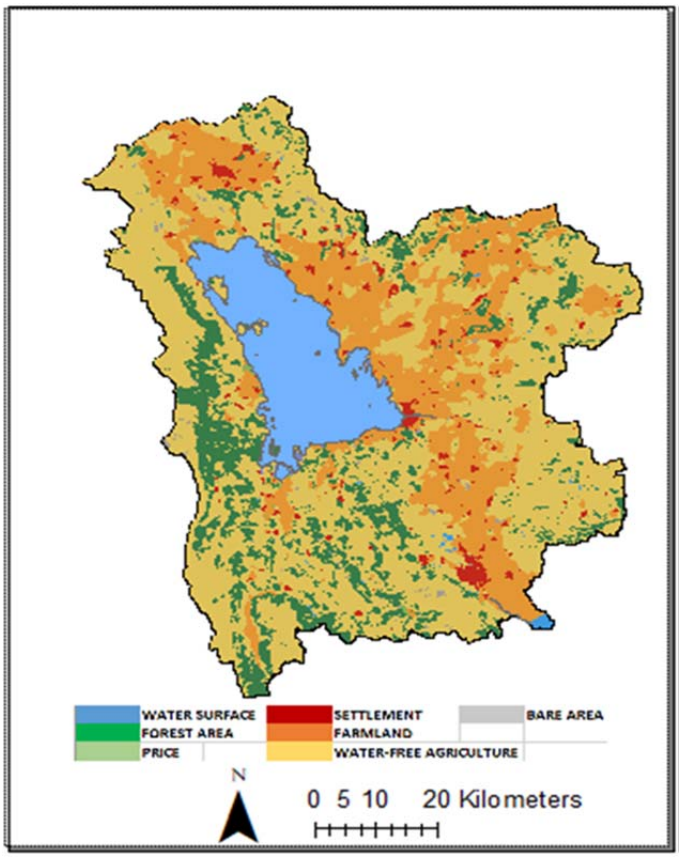

Fig. 5. Land use status map of the basin

3.6. Land capability characteristics:

The land capability classes of the BLB were divided into 8 groups by ArcGIS environment. They were class-I (13.5%), class-II (7.7%), class-III (6.5%), class-IV (3.9%), class-V (4.7%), class-VI (5.2), class-VII (43.2%), and 15.3% class-VIII (15.3%) (Fig. 6).

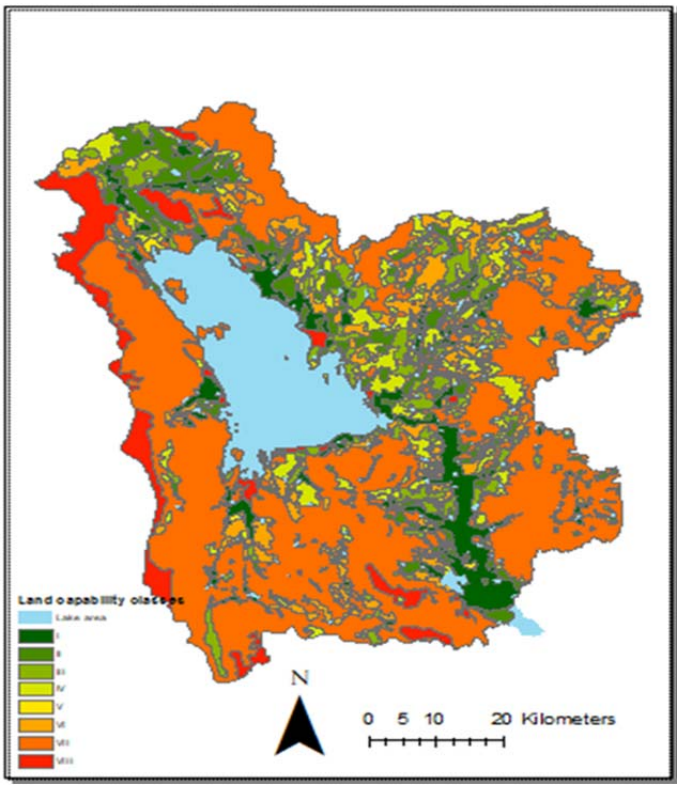

Fig. 6. Land capability classification map of the basin

IV. Conclusions

The watershed characteristics of the Beyşehir Lake watershed were determined by Geographical Information Systems (GIS) which were easy, short, more accurate and cheaper in the evaluation of the watershed characteristics.

As a result of the study, in terms of slope, the BLB had the characteristics of flat with a rate of 32% and a low slope with a rate of 25%. Considering these slope rates, the study area could be considered as a flat area. In terms of altitude, the highest altitude was of 2985 m. in the basin. The altitude of the study area varied between 947 and 2985 m., while 33.8% of the field was located below 1091 m. BLB showed continental climate characteristics. The annual average precipitation in the basin was between 450-500 mm, East and south aspects were dominant in the basin.

High rates of wind and water erosion were also observed in the basin. The area requiring soil protection in the area was 188.8 ha and the forest area to be rehabilitated was 292.3 ha. The agricultural lands of the field were 19243.1 hectares, constituting 26.8% of the total basin. Waterless agricultural practices firstly could be suggested for the basin based on considering the land use status.

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