INTERNATIONAL FORESTRY SYMPOSIUM
IFS 2016

ABSTRACT BOOK



DECEMBER 7-10, 2016 KASTAMONU UNIVERSITY, FACULTY of FORESTRY, KASTAMONU, TURKEY

INTERNATIONAL FORESTRY SYMPOSIUM

7-10 December 2016

Kastamonu/TURKEY

KASTAMONU UNIVERSITY

Faculty of Forestry

ABSTRACTS

INTERNATIONAL FORESTRY SYMPOSIUM

THE COMMITTEE

Honorary Chair

Prof. Dr. Seyit AYDIN (Rector)

Symposium Chair

Prof. Dr. Ömer KÜÇÜK (Dean)

Symposium Secretariat

Dr. Oytun Emre SAKICI
Dr. Arif Oğuz ALTUNEL
Dr. Mahmut GÜR
Dr. Alperen KAYMAKCI
Dr. Hüseyin Barış TECİMEN

Organizing Committee

Dr. Erol AKKUZU
Dr. Hakan AKYILDIZ
Dr. Burak ARICAK
Dr. Arif Oğuz ALTUNEL
Dr. Tayyibe ALTUNEL
Dr. Burak ARICAK
Dr. Bahadır Çağrı BAYRAM
Dr. Seda ERKAN BUĞDAY
Dr. Korhan ENEZ
Dr. Mahmut GÜR
Dr. Alperen KAYMAKCI
Dr. Hacı İsmail KESİK
Dr. İnci Sevinç KRAVKAZ KUŞCU
Dr. Oytun Emre SAKICI
Dr. Temel SARIYILDIZ
Dr. Orhan SEVGİ
Dr. Ahmet SIVACIOĞLU
Dr. Gökhan ŞEN
Dr. Orhan SEVGİ

Dr. Ahmet SIVACIOĞLU
Dr. Gökhan ŞEN
Dr. Sabri ÜNAL
Dr. Nurcan Demircioğlu YİĞİT
Dr. Gonca Ece ÖZCAN
Dr. Hüseyin Barış TECİMEN
Dr. Osman TOPAÇOĞLU
Dr. Önder TOR
Dr. Ferhat KARA
MSc. Hakan AYDOĞAN
MSc. Alper BULUT
MSc. Ekrem DURMAZ
MSc. Özkan EVCİN
MSc. Çağrı OLGUN
MSc. Mustafa ÖNCEL
MSc. Osman Emre ÖZKAN
MSc. Mehmet SEKİ
MSc. Tutku ÜÇÜNCÜ
MSc. Esra Nurten YER

INTERNATIONAL FORESTRY SYMPOSIUM

Scientific Committee

Dr. Sefa AKBULUT	Karadeniz Technical University
Dr. Süleyman AKBULUT	Duzce University
Dr. Erol AKKUZU	Kastamonu University
Dr. M. Hakan AKYILDIZ	Kastamonu University
Dr. A. Oğuz ALTUNEL	Kastamonu University
Dr. Tayyibe ALTUNEL	Kastamonu University
Dr. Burak ARICAK	Kastamonu University
Dr. Saim ATEŞ	Kastamonu University
Dr. Sezgin AYAN	Kastamonu University
Dr. Miraç AYDIN	Kastamonu University
Dr. Emin Zeki BAŞKENT	Karadeniz Technical University
Dr. İbrahim BEKTAŞ	Kahramanmaraş Sütçü İmam University
Dr. Seda ERKAN BUĞDAY	Kastamonu University
Dr. Serdar CARUS	Süleyman Demirel University
Dr. Nihat Sami ÇETİN	İzmir Kâtip Çelebi University
Dr. Rudolf DERZENI	Transilvania University of Brasov
Dr. Elizabeth DODSON	Univesity of Montana
Dr. Korhan ENEZ	Kastamonu University
Dr. İlker ERCANLI	Çankırı Karatekin University
Dr. Sabit ERŞAHİN	Çankırı Karatekin University
Dr. Paoul M. FERNANDES	The University of Aberdeen
Dr. Yavuz GÜLOĞLU	Kastamonu University
Dr. Kerim GÜNEY	Kastamonu University
Dr. Alkan GÜNLÜ	Çankırı Karatekin University
Dr. Mahmut GÜR	Kastamonu University
Dr. Ümmü KARAGÖZ İŞLEYEN	Kastamonu University
Dr. Ferhat KARA	Kastamonu University
Dr. Selman KARAYILMAZLAR	Bartın University
Dr. Alperen KAYMAKCI	Kastamonu University
Dr. Hacı İsmail KESİK	Kastamonu University
Dr. Ramazan KURT	Bursa Technical University
Dr. İnci Sevinç KUŞCU	Kastamonu University
Dr. Ömer KÜÇÜK	Kastamonu University
Dr. Gonca Ece ÖZCAN	Kastamonu University
Dr. Ayhan ÖZÇİFTÇİ	Karabük University
Dr. Renato S. PACALDO	Mindanao State University
Dr. Oytun Emre SAKICI	Kastamonu University
Dr. Lubomír ŠÁLEK	Czech University of Life Sciences Prague
Dr. Temel SARIYILDIZ	Kastamonu University
Dr. Orhan SEVGİ	İstanbul University
Dr. Ahmet SIVACIOĞLU	Kastamonu University
Dr. Gökhan ŞEN	Kastamonu University
Dr. H. Barış TECİMEN	İstanbul University

Determining Watershed Geomorphology of Solaklı Stream in Trabzon Provinence, Turkey

***Necla KORALAY[1], Ömer KARA[1], Uğur KEZİK[1]**

[1]Karadeniz Technical University, Faculty of Forestry, Trabzon / TURKEY
*Corresponding Author: nkoralay@ktu.edu.tr

Abstract

Land use and geomorphology of the watershed refers to physical characteristics which affect quantity and qulity of water and also aquatic ecosystems, is one of the factors that play an important role in the watershed planning process. In this study, watershed characteristics such as area, the perimeter, form factor, circularity ratio, elongation ratio, average slope, slope and aspect, slope of the main stream, the number of streams, the frequency of the stream, drainage density and time of concentration of watershed were determined. As well as actual land use condition that agriculture, forest, pasture and settlement area have been identified by using 1/25.000 scale topographic maps and forest management plans within the ArcGIS 10.0 software.

Consequently, the total watershed area is 758,822km^2, the perimeter 180,479 km, form factor 0.379, circularity ratio 0.3, elongation ratio 0.65 and average slope 52.94%, average elevation 1592.34 m, slope of the main stream 3.26%, the number of streams 959, the frequency of the stream 1.27, drainage density 1,34 km km^{-2} and time of concentration 126.55 minute, respectively. The actual land use ratio in watershed: forest 70%, agriculture 17%, pasture 11%, residential area 2% are covered seriatim. The obtained data will provide guidance to practitioners during the watershed planning process.

Keywords: Watershed physical characteristics, Watershed planning, Land use

Geomorphological Characterization of Solaklı Watershed in Eastern Black Sea region of Turkey

Necla KORALAY[1]*, Ömer KARA[1], Uğur KEZIK[1]

[1]Karadeniz Technical University, Faculty of Forestry, Trabzon / TURKEY

*nkoralay@ktu.edu.tr

INTERNATIONAL FORESTRY SYMPOSIUM

07-10 December 2016 Kastamonu / TURKEY

1.Introduction

- Today, extensive field knowledge is needed for basin/watershed planning and spatial analysis. Having a accurate knowledge of the environment and being able to make more accurate decisions about the regulation of the basin depends on the knowledge of all aspects of the basin.
- Creating of data and storage in digital media is important for spatial analysis of watershed planning phase (Bağdat and Öztürk, 2014).
- Land use and geomorphology of the watershed refer to physical characteristics such as area, perimeter, form factor, slope, relief of watershed, which affect quantity and quality of water including aquatic ecosystems, is one of the factors that play an important role in the watershed planning process and especially in determining hydropower plant potential (Figure 2).
- One of the morphometric properties that affect the current character is the shape of land in a waterhed. And differences in the shape characteristics of the basin cause differentiation of the flow charts of the rivers. Therefore, it is important that the basin has a circular or longitudinal shape (Figure 1).
- In addition, when basins' data are inadequate, the basin form factor has an important place in terms of estimating the flow of these branches (Ecer and Yenigun, 2007)
- In this study, some watershed characteristics and land use form were determined;
  - Watershed area
  - The perimeter
  - Form factor
  - Circularity ratio
  - Elongation ratio
  - Average slope
  - Avarage elevation
  - Terrain aspect
  - Slope of the main stream
  - The number of streams
  - The frequency of the stream
  - Drainage density
  - Concentration time

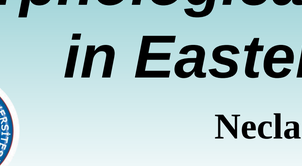


Figure 1. Diversity of watershed forms

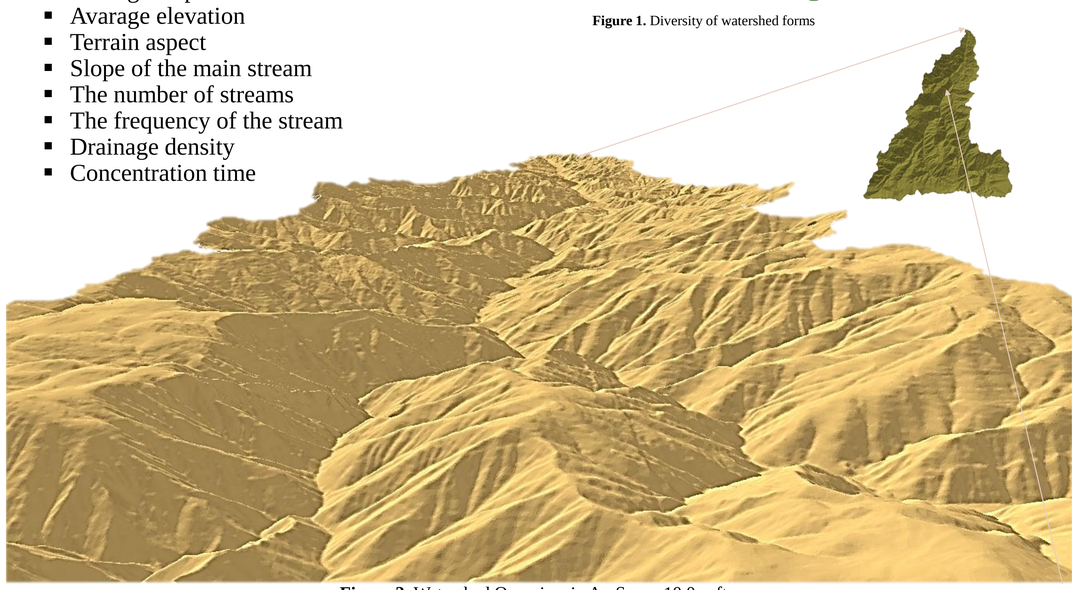


Figure 2. Watershed Overview in ArcScene 10.0 software

2. Material & Methods

- Solaklı Watershed is the most important area in terms of recreation, tourism, wildlife, fish fauna, biodiversity and the ecological aspects (Figure 3) (Terzioğlu, 1998).
- Morever, Solaklı stream which is planned to make on most construction river type hydropower plants in Turkey is significant watershed (Koralay, 2015). And total 36 River Type HEPPs are planned to make in this watershed.
- Watershed characteristics were determined by using topographical maps (Figure 4) and ArcGis and ArcScene 10.0 software (Figure 5) and Mathematical Equations (Figure 6)



Figure 3. Location of study area

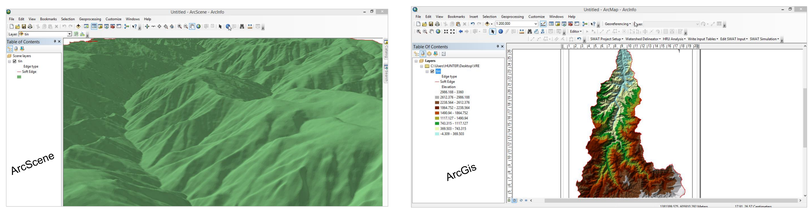


Figure 5. Determination of Watershed Characteristics in Arc GIS and Arc Scene 10.0 Software

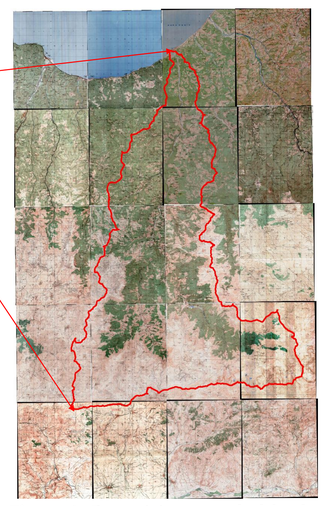


Figure 4. Determining watershed border and characteristics by using topograhcial maps

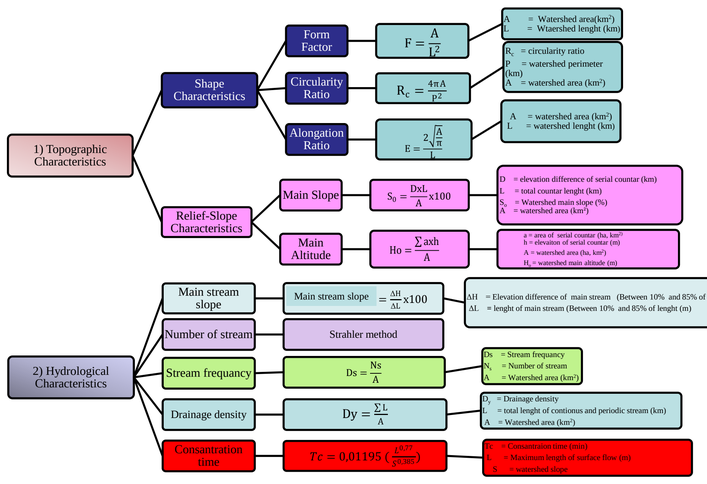
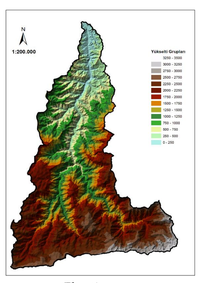


Figure 6. Methodological equations in determining watershed characteristics

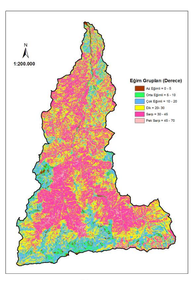
- Study area named Solaklı Watershed is founded in Trabzon where Eastern Black Sea region in Turkey.
- The Solaklı watershed consists of topographic maps Trabzon G44-H44. The total area of solaklı watershed is 758.822 km^2 (Figure 1).
- Solaklı watershed has Alluvial Soils, Red-Yellow Podzolic Soils, Grey-Brown Podzolic Soils, Brown Forest Soils, High Mountain-Meadow Lands and Colluvial soil. Generally, Trabzon has mild maritime climate type.
- According to thornthwaite climate diagram, Solaklı watershed has *"Damp, medium temperature (mesothermal), with little or no water deficiency and ocean (sea) climate type"*

3. Results

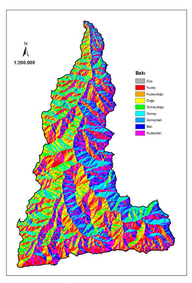
- The actual land use ratio of watershed:forest 70%, agriculture 17%, pasture 11%, residential area 2% are covered seriatim.
- The total forest area of Solaklı Watershed consists of broad-leaved forest 16.98%, coniferous forest 27.65% and mixed forest 54.90% (Koralay, 2015).



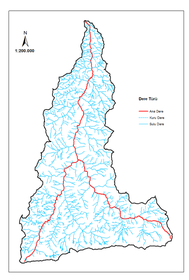
Elevation map



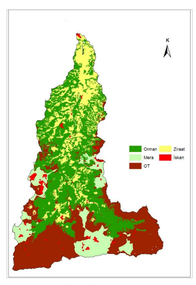
Slope map



Aspect map

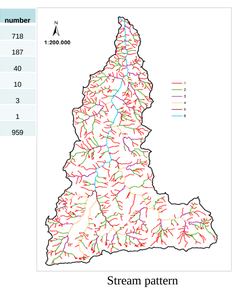


Drainage pattern

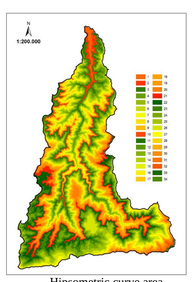


Land use map

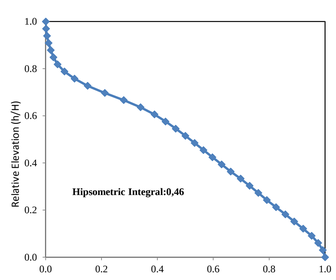
Stream	number
1	718
2	187
3	40
4	10
5	3
6	1
Total	959



Stream pattern



Hipsometric curve area



- **Watershed area and perimeter :** Area is **758,8 km^2** and perimeter is calculated as **180,5 km**.
- **Form Factor:** The form factor is found to be **0,33** and this value is less than 1.0 watershed indicates a narrow and long Structure.
- **Circularity ratio :** Circularity rate is important to give an idea of the homogeneity of basin Geology (Özhan, 2004). This value is found as **0,3** that indicates the watershed has a long and heterogeneous Structure. Circularity ratio is usually less than 1,0.
- **Elongation ratio:** The elongation rate is **0,65** and the range of longevity ratio ranges from 0,6 to 0,8. This value shows that the watershed has a steep and sheery structure .
- **Average altitude:** The mean elevation of the basin was found according to a hipsometric curve. The average elevation of the watershed was found **1592 meters.**
- **Average slope:** The average slope of the watershed was **52.54%.** The slope factor is included in the morphometric properties of the basin.
- **The number of stream:** Stream sorting is done by following the Strahler method (Özhan,2004). In watershed, total number of stream was found **959.**
- **Main stream slope:** The main stream slope of the basin was found to be **3.26%**. The stream has a direct effect on the flow rate of the stream., the flow rate of water incerase depend on main stream slope (Özhan,2004)
- **The frequancy of stream:**Stream frequancy was found as **1,27**.
- **Drainage density:** This value was found to be **1,34**.
- **Consantration time:** Consantration time was found **127,6** minutes. Size of basin, drainage characteristics, basin shape, topographical structure of basin affect the consantration time (Özhan,2004).

4.Conclusions

- By doing a real definition of the watershed area, many data on the characteristics of the watershed can be reached quickly and precisely.
- In watersheds with homogeneous geological structure, the circularity ratio varies between 0,6-0,7. However, this value is about 0,4-0,5 in relatively heterogeneous watersheds and it reals that the basin has a long and heterogeneous geological structure.
- Especially in the formation of floods and landslides, it has a very important effect. In addition, the average slope of the watershed is particularly important for water erosion and the formation of superficial flow. Hence, the hydrograph shape of the stream flow is an important influence on the formation of peak inflow. Provided that all conditions are the same, it is relatively less in areas where there is less inclination of the water coming from the precipitation to the soil. As a result, the rainwater is added directly to the stream, which increases the current value.
- Generally, the number of total stream was low and this indicates that land is permeable and The high number of streams suggests that the ground is not permeable and that the vegetation cover may be sparse.Furthermore, If this value is low, it means that the lithological structure is permeable. It is considered very high that the creek frequency is greater than 3,5 (Özhan, 2004) .
- High drainage density is also observed in impervious ground conditions, vegetation cover in weak areas and generally mountainous reliefs. his value, which affects the stream length of the climate conditions in the region, generally ranges from 0,5 to 2,5 km/km2.
- Mean elevation in a watershed is important in terms of vegetation period for all plant community.
- In the watershed-based different studies, the topographical characteristics of the study area can be obtained from the digital elevation models to be constructed using GIS Technologies (Bağdatlı and Öztürk, 2014).
- In this way, a number of features to be determined with the aid of the digital elevation model for the area in the GIS environment will be provided to other researchers who will work in the same watershed.
- Especially in flood studies, the characteristics of the basin characteristics that constitute the priority should be determined. The TIN models play an important role in bringing out all the details of the basin.

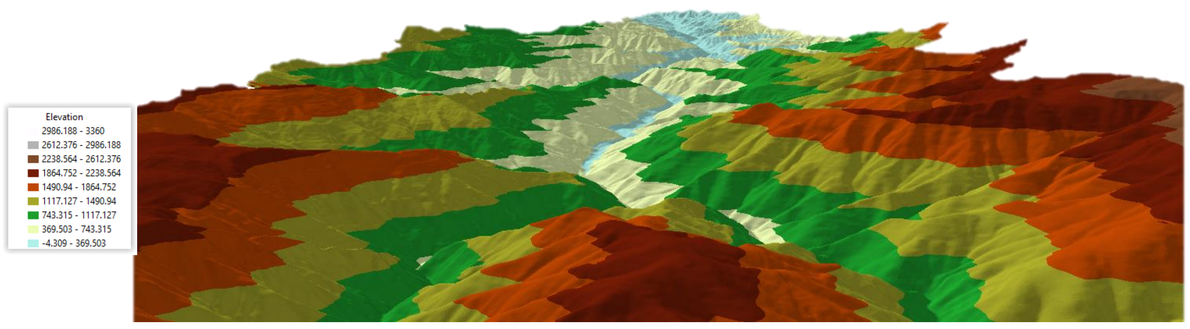


Figure Watershed Elevation Overview in ArcScene 10.0 software

References

1. Bağdatlı, M.C., Öztürk, B. 2014. Havza morfolojik özelliklerinin belirlenmesinde coğrafi bilgi sistemlerinin (CBS) etkin rolü. SAÜ. Fen Bil. Der. 18:1 (11-19)
2. Ecer, R. ve Yenigün, K., 2007. GAP Bölgesinde Kentsel Altyapının Bir Taşkın Örneğinde İrdelenmesi; Nedenler ve Öneriler, s.186, TMMOB Afet Sempozyumu, 5-7 Aralık
3. Koralay N., 2015. Solaklı Deresi Havzasında Nehir Tipi Hidroelektrik Santrallerin Su Kalitesine Etkileri, Yüksek Lisans Tezi, Karadeniz Teknik Üniversitesi, Fen Bilimleri Enstitüsü, Trabzon.
4. Özhan, S. 2004. Havza Amenajmanı, İstanbul Üniversitesi Orman Fakültesi Yayın No: 481, İstanbul, 384.
5. Terzioğlu, S. 1998. Uzungöl (Trabzon-Çaykara) ve çevresinin flora ve vejetasyonu. Doktora Tezi, Karadeniz Teknik Üniversitesi, Fen Bilimleri Enstitüsü, Trabzon