RESEARCH ARTICLE

Eurasian Journal of Medical and Biological Sciences
AN INTERNATIONAL JOURNAL
Eurasian J Med Biol Sci **2(1): 19-22**

Comparison of the Flow Height of Biga Stream in Two Different Water Years

Kürşat Şekerci[1*], Muhammed Cihat Tuna[2]

[1] *Department of Civil Engineering, Faculty of Engineering, University of Bingöl, Bingöl, Turkey*
[2] *Department of Civil Engineering, Faculty of Engineering, University of Fırat, Elazığ, Turkey*

Received : 22/02/2022 Revised : 13/04/2022 Accepted : 15/04/2022

ABSTRACT: Biga Stream (Çınar bridge) flows from the bridge at the 1st km of Sinekçi sub-district road, which turns right at the 14th km of the Biga - Karabiga highway. It is one of the important waters of the Marmara basin. It is in danger, like many streams, due to excessive pollution and the depletion of the sources it feeds on. In recent years, great efforts have been made for the improvement of the stream and its surroundings. As of the beginning of January 2007, improvement works have been started around the stream. In this study, the flow heights of Biga Stream in Çınarköprü locality in two different water years were investigated. By the General Directorate of Electrical Works and Survey Administration, flow heigh measurements were made in the Çınar bridge section of the Biga stream in the 2006 and 2011 water years. The data used is the flow height in mm obtained by multiplying the monthly total flow by thousand and dividing by the precipitation area. Probably due to the reclamation work carried out, all the flow heights of the stream except February and March of the 2011 water year were seen to flow at a higher level than all the months of 2006.

Keywords: Biga stream, water year, flow height

INTRODUCTION

Biga Stream (with other uses; Kocabaş Stream, Granikos Stream, Barenos Stream) is located in the Biga and Çan districts of Çanakkale province. The river that Alexander the Great fought on the shores divided the district into two, there are two big bridges connecting the two sides and many small bridges. Its length is about 80 kilometers. It rises in the interior, passes through the district of Çan, and irrigates the Biga Plain, pouring into the Marmara Sea, 3 kilometers away from the town center of Karabiga, without forming a delta. The economic contribution of stream to the region is negligible, and it is in danger like many streams due to excessive pollution and the decrease in the sources it feeds on. In recent years, great efforts have been made for the improvement of the stream and its surroundings. Due to the floods in the past, the water of the stream, which changes its beds frequently, is withdrawn in the summer and increases greatly in the winter due to the rains. Therefore, a 600-meter-long dam was built in 1966 on the bed of the stream in the district center, which caused material damage. However, despite this, the waters of the creek continued to rise to dangerous levels many times. As of the beginning of January 2007, improvement works have been started around the stream. The increase in greenhouse gases causes climatic changes such as global temperature increase and precipitation differences (Arnel, 2003). It is predicted that these changes will cause significant reductions in the existing water potentials of the regions and accordingly, water scarcity or water stress will be experienced in water-based sectors such as energy, agriculture, drinking water and wetlands (IPCC, 2007). It has been reported by many researchers that river flows are affected not only by changes in temperature but also by differences in precipitation regime. Zhang et al., (2012) investigated the effects of climate change on the river flows of the Dongliao river basin (China) and found that annual river flows generally tend to decrease, with a significant decrease in summer and fall in autumn, similar to precipitation. Herawati and Suripin (2015) in their study examining the effects of climate change on the flow of Kapuas river in Indonesia, stated that annual river flows tend to decrease and the hydrological characteristics of the river change. Many different approaches can be used to predict the effects of climate change on river hydrology. On the other hand, in controlled trials, mechanics can develop understanding, but efficient results related to spatial and temporal scale are often not obtained (Kale et al., 2016).

For this reason, in this study, the observation data of Biga Stream, named after the Biga district of Çanakkale province, in 2 different water years were examined. The future of the stream and the possible effects of climate change were investigated by using the flow heights obtained from the observations (Figure 1).

*Corresponding author : kursatsekerci2323@gmail.com

Figure 1. *Biga Stream (Wikipedia, 2022)*

MATERIALS AND METHOD

In this study, the changes in water levels were investigated by using montly flow height data of the Biga Stream, which takes its name from the Biga district of Çanakkale, one of the most important rivers of Turkey, in 2 different water years. Flow heights in the Biga Stream Çınar Bridge location were measured daily by the General Directorate of Electrical Works and Survey Administration in 2006 and 2011 water years. Monthly mean water level heights were obtained by using the read-out height data for all days. By using the monthly average water level heights obtained, the water level changes in the river were examined. Readings were made from October of the relevant year to September of the following year. The effects of climate change on streams have been studied at a basic level by examining flow changes. The data used is the runoff height in mm, which is the monthly total runoff multiplied by thousands and divided by the precipitation area. (Table 1).

In the pictures given in the Figure 2 and Figure 3 below, the changes in the average flow heights of the Biga Stream in the 2006 and 2011 water years were examined using the Origin and excel program. In the chart made in the Origin program, the black dashed line shows the water heights in 2006, and the red dashed line shows the water heights in 2011. In the column chart made with the help of Excel, the blue colored columns represent the water heights in 2006, and the orange colored columns represent the measurements of the water heights in 2011.

Table 1. *Flow Heights of Biga Stream in 2 different Water Years*

MONTH	WATER YEAR	
	2006 (mm)	2011 (mm)
OCTOBER	2,68	40,1
NOVEMBER	8,97	10,3
DECEMBER	11,8	24,1
JANUARY	27,7	33,4
FEBRUARY	115	25,5
MARCH	82,6	37,3
APRIL	13,6	47,0
MAY	5,54	20,6
JUNE	4,15	5,96
JULY	1,82	3,27
AUGUST	1,94	2,81
SEPTEMBER	2,52	4,31

Figure 2. *Flow Heights in Two Different Water Years*

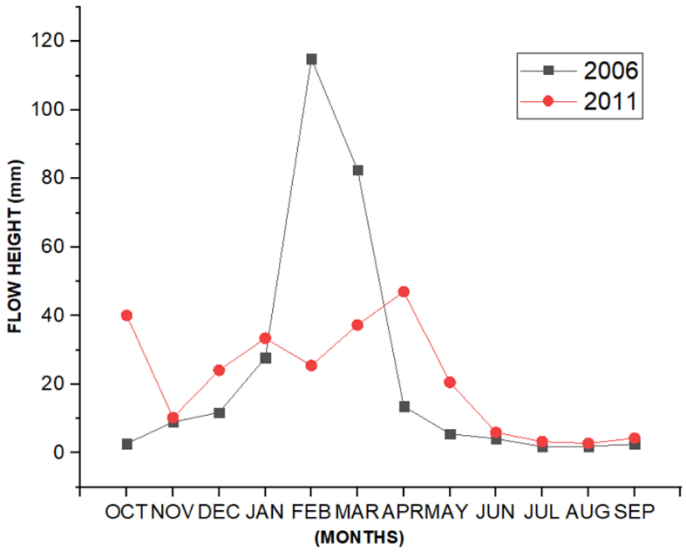

Figure 3. *Change in Flow Heights of 2006 and 2011 Water Years*

RESULTS AND DICCUSSION

In recent years, great efforts have been made to improve the creek and its surroundings. Since the beginning of January 2007, improvement works have been started around the stream. Again, as of 2011, improvement works continued. One of the important effects of climate change is the sudden changes on the flow heights of the rivers.

It can be said that in all months except February and March, flow heights have increased significantly over the past 5 years. Although the reason for this is thought to be the improvement studies carried out in the first place, climate change may also have an effect. Since only short-term flow heights are used in this study, it is not possible to reveal the effects of climate change in real size. However, these reveal the fact that by observing the characteristics of the creek such as long-term flow and regime, a study should be made to determine whether global warming really has an effect or if it has, to what extent.

CONCLUSION

As in the whole world, global warming and climate change have negative effects on water resources in our country. The pressure on rivers, which is one of the surface water resources, is increasing in parallel. All this points to the more efficient and careful use of our future rivers. As seen in the study, the average flow height of the Biga Stream increased significantly even in a short period of 5 years. Since only short-term mind heights were used in the study, it was not sufficient for us to understand

the effects of climate change on Biga Stream in real terms, but it revealed that climate change may have an effect on stream. For this reason, by examining the long-term flow characteristics of Biga Stream, it will be possible to fully understand the extent of the effect of climate change.

CONFLICT OF INTEREST

No conflict of interest was declared by the authors.

REFERENCES

Arnell, N. W. (2003). Effects of IPCC SRES* emissions scenarios on river runoff: a global perspective. Hydrology and Earth System Sciences, 7(5), 619-641.

Herawati, H., Suharyanto, S. (2015). Impact of climate change on streamflow in the tropical lowland of Kapuas River, West Borneo, Indonesia. Procedia Engineering, 125, 185-192.

IPCC. (2007). Impacts, Adaptation and Vulnerability. In: Parry ML, Canziani OF, Palutikof JP, van der Linden PJ, Hanson CE (eds) Contribution of working group II to the fourth assessment report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge/New York

Kale, S., Ejder, T., Hisar, O., Mutlu, F. (2016). Effect of climate change on annual streamflow of Bakırçay River. Adıyaman Üniversitesi Fen Bilimleri Dergisi, 6(2), 156-176.

Zhang, L., Lu, W., Yang, Q., An, Y., Li, D., Gong, L. (2012). Hydrological impacts of climate change on streamflow of Dongliao River watershed in Jilin Province, China. Chinese Geographical Science, 22(5), 522-530.

Wikipedia, (2022). https://tr.wikipedia.org/wiki/Biga_%C3%87ay%C4%B1#/media/Dosya:Granicus_River.jpg Accessed 05 May 2022