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The application of diatom indices in the Felent Creek (Porsuk-Kütahya)

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INTRODUCTION

Water is one of the most essential factors for civilization, and also among the most important items in the new world order due to its unrenewable feature. In this concern, developed countries have been continually monitoring and classifying their current sources. For this reason, a number of EU countries have developed a national water quality system, considering characteristic structure of their own rivers and have used this type of indices for revealing the current stituation of water quality level of their waters.

The water quality monitoring, based on diatom indices, is a new topic for Turkey especially after 2000s; and this topic is getting more and more important with each day. There are several studies on water quality monitoring based on diatom indices inTurkey. The first ones based on Saprobity Index. For example:, Bodrum Creek (Muğla) (Barlas et. al. 2001), Akçapınar Stream ve Kadınazmağı (Muğla) (Barlas et. al. 2002), Aksu Creek (Isparta) (Kalyoncu, 2002), Isparta Stream (Kalyoncu, 2006). Firstly, Karasu River was investigated different diatom indices (TDI, SI, GI ve DAIpo) by Gürbüz and Kıvrak (2002) and then, Upper Porsuk River (Kütahya) was investigated according to TDI, SI, EPI-D ve DES by Solak et. al. (2007b,c,d) and the results of this study was presented in different national symposiums. OMNIDIA Software Program was used firstly in Akçay (Muğla) by Solak et. al. (2007a) and .Düden Waterfall by (Solak et. al. (2007e). The aim of the study is to use diatom indices, used European and other Countries; to see how these indices will in evaluating the water quality of Felent Stream; and to help determine the best index for Turkish rivers.

MATERIAL AND METHODS

The sampling was carried out at five stations along the Felent Stream between June 2006 and May 2007 monthly. Some limited analyses (DO, temperature, pH and conductivity) were measured in the field. Slides were studied LM microscope with x1000 magnification, and species were identified according to Krammer and Lange-Bertalot (1986-1991). At least 300 valves were counted on each slides. Diatom indices were calculated by OMNIDIA. Then the correlation were investigated between water analyses and diatom indices values.

RESULTS AND DISCUSSION

In this study, 117 diatom species, belonging to 41 genera were found during the study. The composition of the assemblages changed from one sampling station to another (Table 1).

Achnanthidium minutissimum, Cymbella affinis ect. which are sensitive-organic pollution taxa were found in high densities at the unpolluted stations, while Gomphonema parvulum, Nitzschia palea and Nitzschia palea, Nitzschia capitellata, Navicula cryptocephala which are pollution tolerant taxa were dominant at the F4 and F5, polluted by sewage discharges in this study.

According to our foundings, IPS, IDG, TDI, TID, IBD, CEE, SLA ve DI-CH indices worked over 80% of our species, so these indices seems to be the best. IDAP, WAT, CEE and IPS indices were high correlated with physico-chemical parameters (Table 2). The highest correlation was IPS and EPI-D ($r = 0.993$, $p < 0.01$, $n = 11$) while the lowest correlation was IDP and LOBO ($r = -0.001$, $n = 11$). Also there was a few significant correlation between LOBO and other indices.

As a result, the pollution in the Felent Stream increased throught the course according to the indices values. Also, the water quality monitoring, based on diatom indices, is a new topic for Turkey; and this topic is getting more and more important with each day. For this reason, by doing more and more studies using the indices, we think that we can restructure the current monitoring procedure with respect to the aquatic organisms like diatom.

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***Table 1.** Different diatom communities represented by the most abundant taxa found at the studied stations on the Felent Stream.*

F1	*Cymbella affinis*, *Achnanthidium minutissimum*, and *Nitzschia fonticola*
F2	*Nitzschia palea*, *Stauroneis smithii*, *Nitzschia acicularis*, *Nitzschia commutata and Amphora pediculus*
F3	*Gomphonema olivaceum*, *Achnanthidium exiguum* and *Nitzschia gracilis*
F4	*Nitzschia linearis*, *Luticola mutica*, and *Nitzschia acicularis*
F5	*Planothidium lanceolatum*, *Nitzschia palea*, *Nitzschia capitellata*, *Navicula angusta*, *Gomphonema parvulum* and *Fragilaria ulna* var. *acus*

Table 2. *Canonical correlation coefficients between the calculated diatom indices and some physico-chemical variables of Felent Stream.* $* p < 0.05$; $** p < 0.01$; *-- not significant (n = 11).*

	EC	TDS	ÇO	Sıc	pH
IBD	-0.577*	-0.715**	0.740**	--	--
TID	-0.607*	-0.518*	--	-0.477*	--
IPS	-0.619*	-0.707**	0.713**	--	0.481*
SLA	--	--	--	--	--
IDG	-0.749**	-0.670**	--	-0.640**	--
CEE	-0.512*	-0.702**	0.888**	--	0.714**
DI-CH	--	-0.660**	0.951**	--	0.911**
TDI	-0.487*	-0.505*	--	--	--

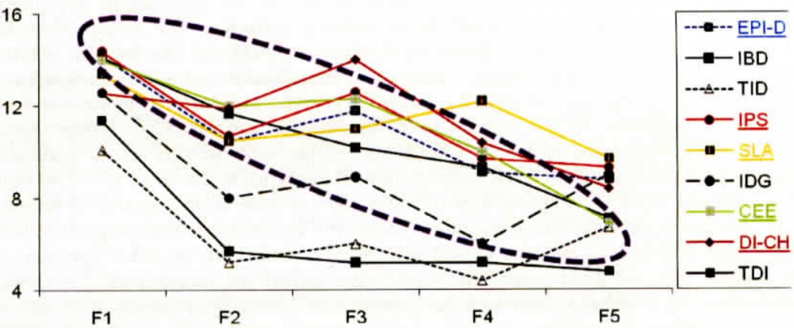

Figure 1. *Changes in different diatom indices at sampling sites along Felent Stream.*