Case Study

Composition and Distribution of Benthic Diatoms in Different Habitats of Burdur River Basin

Burdur Nehir Havzasındaki Farklı Habitatlarda Bentik Diyatome Kompozisyonu ve Dağılımı

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Received Date: 11.12.2019, Accepted Date: 23.12.2019

Abstract

Diatoms constitute an essential component for biomonitoring studies to determine the ecological quality of waterbodies. In this study, benthic diatoms of Burdur River Basin were investigated as a consequence of a project on river basin management plan. This is the first detailed taxonomical study of diatoms taken from 13 streams, 4 lakes and 6 reservoirs of Burdur River Basin and a total of 223 taxa have been observed. Among genera, *Navicula* Bory (27) and *Nitzschia* Hassal (27) were represented with the highest numbers of taxa and followed by *Gomphonema* Agardh with a total of 22 species. *Navicula antonii* Lange-Bertalot and *Nitzschia palea* var. *debilis* (Kützing) Grunow had the highest relative abundance with 17.1% and 15.5% respectively. As a closed basin, salinity varied greatly from fresh to saline water between the sampling stations and diatom composition contained species with a different tolerance level. *Navicula antonii* and *Nitzschia frustulum* (Kützing) Grunow observed in all habitats indicating their euryhaline characters; however *Navicula digitoconvergens* was only detected in saline Acığöl lake with a high relative abundance (38%) in autumn. Other two dominant species were *Halamphora coffeiformis* (Kützing) Levkov and *Navicula cincta* (Ehrenberg) Ralfs in Acığöl lake showing their tolerance to high salt content as a brackish species. According to first results, 11 species were new records for Turkish diatom flora. The high biodiversity of diatoms revealed the presence of different habitat characteristics within the basin. These results are an important contribution of Turkish diatom flora and could be useful for monitoring specific areas like Burdur River Basin.

Keywords: Burdur River Basin, diatoms, phytobenthos, salinity tolerance
Diyatoller, su kütlelerinin ekolojik kalitesini belirlemek için yapılan biyolojik izleme çalışmalarında kullanılan önemli bir bileşendir. Bu çalışmada, Burdur Nehir Havzası'nın tatlı su bentik diyatollerinin birlikteki ekolojik kalitesini belirlemek için yapılan bilimsel izleme çalışmalarında kullanılan önemli bir bileşendir. Bu çalışmada, Burdur Nehir Havzası'nın tatlı su bentik diyatollerinin birlikteki ekolojik kalitesini belirlemek için yapılan bilimsel izleme çalışmalarında kullanılan önemli bir bileşendir. Bu çalışmada, Burdur Nehir Havzası'nın tatlı su bentik diyatollerinin birlikteki ekolojik kalitesini belirlemek için yapılan bilimsel izleme çalışmalarında kullanılan önemli bir bileşendir.
Detection of ecological quality of rivers and lakes has become more important for the last decades in Europe, according to Water Framework Directive (WFD) regulations (Ács et al. 2004; Rimet, 2012). Similarly, studies were conducted to use biological components, including benthic diatoms, of aquatic ecosystems to assess the ecological quality based on WFD. As a result, basin-scale studies on diatom biodiversity and ecology have increased recently. Demir et al. (2017) reported diatom composition of Lake Eber and the streams in Akarçay River Basin, while Solak et al. (2018) analysed the distribution of diatoms in streams and reservoirs of Küçük Menderes River. Benthic diatom community of streams, lakes and reservoirs of Gediz River Basin was also studied by Solak et al. (2019). Unlike the other 24 river basins in Turkey, there is no data on benthic diatom composition in the lakes and streams of Burdur River Basin.

The aim of this research is to determine the benthic diatom flora of streams and lakes/reservoirs of Burdur River Basin and provide a taxonomical data for the environmental quality monitoring of the basin according to regulations of WFD (2000/60/EC).

Method

Sampling

Burdur River Basin is located in the southwest of Turkey, covering some natural lakes and wetlands such as Burdur Lake, Acıgöl Lake and Salda Lake (Figure 1). Sampling was carried out in 23 waterbodies including the streams, lakes and reservoirs. A total of 30 sampling points were selected in the basin area; however, sampling could not be performed due to the drought in seven locations (Table 1). Benthic diatom samples were taken twice a year (April and October 2018). According to Communique on Biological Monitoring (T.C. Resmi Gazete, 2019), one sample collected from lakes and reservoirs smaller than 50 ha; 2 samples in areas between 50-500 ha area and 3 samples from the lakes and reservoirs greater than 500 ha were taken. However, all samples were mixed and one subsample was prepared for each lake and reservoir. Epilithic diatom samples were collected from the submerged stones, and epiphytic samples were collected from macrophytes. Physicochemical measurements were performed monthly in 2018.
Diatom Analysis

Samples were cleaned from organic material by boiling with $\text{H}_2\text{O}_2$ and washed by distilled water several times. In order to remove the carbonates, samples were treated with 10% HCl. Frustules were air-dried and mounted in Naphrax®. Zeiss Axio Observer Z1 (Carl Zeiss microscopy GmbH, Jena, Germany) microscope was used for light microscopy (LM) observations at Limnology Laboratory, Department of Freshwater Resource and Management, Istanbul University.

Diatom valves were identified according to the following literature; Krammer & Lange-Bertalot (1986, 1988, 1991a,b), Hofmann et al. (2011) and Kulikovskiy et al. (2016). Taxonomic classification and nomenclatural on genera and taxa names follow the latest updates from Guiry & Guiry (2019) and Kociolek et al. (2019). Slides and processed materials were deposited at the collection of the Department of Freshwater Resource and Management, Istanbul University and the Ministry of Agriculture and Forestry archives.
The relative abundance of the species was expressed as percentages of the total number of frustules counted. The relative abundance (RA) of particular taxa and the taxa richness of the assemblages were estimated on the basis of at least 300 diatom valves counted per sample. The RA of the species identified in lakes, reservoirs and streams were determined separately and the species constituting higher than 5% were evaluated in Table 4.

Table 1

**Burdur River Basin Sampling Coordinates**

| Code | Name     | Category | Salinity            | Province | Coordinates |
|------|----------|----------|---------------------|----------|-------------|
| BH1  | Acıgöl   | Lake     | Saline (39‰)        | Afyon    | 37.81844 29.77163 |
| BH2  |          |          |                     |          | 37.82721 29.84914 |
| BH3  |          |          |                     |          | 37.85838 29.92875 |
| BH4  | Karaçal  | Reservoir| Freshwater          | Burdur   | 37.56175 30.08104 |
| BH5  |          |          |                     |          | 37.54444 30.08007 |
| BH6  | Burdur   | Lake     | Brackish (18.2‰)    | Burdur   | 37.70125 30.11597 |
| BH7  |          |          |                     |          | 37.75088 30.20211 |
| BH8  |          |          |                     |          | 37.78928 30.26449 |
| BH9  | Belenli  | Reservoir| Freshwater          | Burdur   | 37.29235 29.98792 |
| BH10 |          |          |                     |          | 37.28849 29.98258 |
| BH11 | Salda    | Lake     | Brackish (1.1‰)     | Burdur   | 37.53238 29.70349 |
| BH12 |          |          |                     |          | 37.55788 29.68351 |
| BH13 |          |          |                     |          | 37.57749 29.66961 |
| BH14 | Yarışlı   | Lake (Dry)|                   | Burdur   | 37.56182 29.97482 |
| BH15 |          |          |                     |          | 37.57202 29.96020 |
| BH16 |          |          |                     |          | 37.58831 29.96729 |
| BH17 | Karataş   | Lake     | Freshwater          | Burdur   | 37.38701 29.97508 |
| BH18 |          |          |                     |          | 37.39292 29.96579 |
| BH19 |          |          |                     |          | 37.39989 29.97259 |
| BH20 | Gönen    | Stream   | Freshwater          | Isparta  | 37.90820 30.45358 |
| BH21 | Çukurharman| Stream (Dry)|             | Isparta  | 37.90046 30.34642 |
| BH22 | Asar     | Stream   | Brackish (0.53‰)   | Burdur   | 37.72920 30.28935 |
| BH23 | Bozçay   | Stream   | Freshwater          | Burdur   | 37.34401 29.95839 |
| Code  | Name         | Category                | Salinity   | Province | Coordinates | X     | Y     |
|-------|--------------|--------------------------|------------|----------|-------------|-------|-------|
| BH24  | Büğdüz Stream (Dry in October) | Freshwater | Burdur     | 37.66174 | 30.16703   |
| BH25  | Bozçay Stream | Freshwater | Burdur     | 37.58073 | 30.07316   |
| BH26  | Ulupınar Stream (Dry) | - | Burdur     | 37.69160 | 30.05794   |
| BH27  | Gönen Stream  | Brackish (1.9 ‰) | Isparta | 37.86231 | 30.39985   |
| BH28  | Çukurharman Stream  | Brackish (0.7‰) | Isparta   | 37.84485 | 30.35068   |
| BH29  | Bozçay Stream  | Freshwater | Burdur     | 37.51586 | 30.07599   |
| BH30  | Bozçay Stream  | Freshwater | Burdur     | 37.56599 | 30.07000   |
| BH31  | Karamanlı Stream (Dry) | - | Burdur     | 37.36173 | 29.84796   |
| BH32  | Beylerli Reservoir  | Freshwater | Denizli    | 37.67316 | 29.61199  |
| BH33  | Beylerli Reservoir  | Freshwater | Denizli    | 37.66217 | 29.61534  |
| BH34  | Karamanlı Reservoir  | Freshwater | Burdur     | 37.40121 | 29.83880  |
| BH35  | Karamanlı Reservoir  | Freshwater | Burdur     | 37.41066 | 29.83226  |
| BH36  | Sarı Stream (Dry) | - | Burdur     | 37.33204 | 29.85228  |
| BH37  | Akgöl Lake (Dry) | - | Burdur     | 37.67674 | 29.75361  |
| BH38  | Akgöl Lake (Dry) | - | Burdur     | 37.67821 | 29.76745  |
| BH39  | Akgöl Lake (Dry) | - | Burdur     | 37.67559 | 29.78304  |
| BH40  | Keçiborlu Stream (Dry in April) | Brackish (1.45 ‰) | Isparta   | 37.93891 | 30.31606  |
| BH41  | Dazkırı Stream (Dry) | - | Afyon      | 37.90446 | 29.86472  |
| BH42  | Başmakçı Stream (Dry in April) | Brackish (6 ‰) | Afyon    | 37.88374 | 29.99386  |
| BH43  | Özdere Stream  | Freshwater | Burdur     | 37.43224 | 29.81980  |
| BH44  | Tefenni Reservoir  | Freshwater | Burdur     | 37.31703 | 29.74366  |
| BH45  | Bademli Reservoir  | Freshwater | Burdur     | 37.43503 | 29.90621  |
| BH46  | Yarımalı Stream  | Freshwater | Burdur     | 37.43503 | 29.90621  |
Results

Physicochemical Parameters

The physicochemical measurements revealed that reservoirs, lakes and streams in the basin were generally alkaline. The mean conductivity values were generally low in reservoirs and streams (0.5 and 1.7 mS cm\(^{-1}\), respectively) but higher in lakes (22.3 mS cm\(^{-1}\)). Notably, in Burdur and Acıgöl lakes, conductivity was higher throughout the year, and the mean conductivity values were 29.4 mS cm\(^{-1}\) and 57.2 mS cm\(^{-1}\) respectively. Significant changes were observed in dissolved oxygen values in reservoirs, lakes and streams throughout the year. Although the lowest dissolved oxygen (DO) values were observed in Burdur Lake as 2.7 mg L\(^{-1}\) and Acıgöl Lake as 1 mg L\(^{-1}\), the average values were between 6.9 and 7.8 mg L\(^{-1}\) in the reservoirs and lakes (Table 2).

As a closed basin, salinity varied remarkably between freshwater to saline among studied areas. While all reservoirs were classified as freshwater (<0.5‰), streams were categorized between fresh to brackish water (<0.5 - 6‰). On the other hand, salinity variation was higher in lakes, from freshwater (Karataş Lake, <0.5‰) to brackish (Salda Lake, 1‰ and Burdur Lake, 18‰) and even saline environment (Acıgöl Lake, 39 ‰).

Table 2

| Temperature (°C) | pH | Conductivity (mS cm\(^{-1}\)) | Dissolved Oxygen (mg L\(^{-1}\)) | Salinity (%) |
|-----------------|----|-------------------------------|----------------------------------|--------------|
| **Mean** | **Min** | **Max** | **Mean** | **Min** | **Max** | **Mean** | **Min** | **Max** | **Mean** | **Min** | **Max** |
| Reservoirs      | 13.7 | 3.8 | 24.0 | 8.5 | 7.4 | 9.3 | 0.5 | 0.2 | 0.6 | 6.9 | 3.0 | 11.4 | <0.5 | <0.5 | <0.5 |
| Lakes           | 15.2 | 5.1 | 29.0 | 8.8 | 6.4 | 9.6 | 22.3 | 0.5 | 69.6 | 7.8 | 1.0 | 11.4 | 19.4 | <0.5 | 47.6 |
| Streams         | 15.8 | 2.2 | 27.9 | 8.3 | 7.0 | 9.7 | 1.7 | 0.3 | 12.9 | 6.9 | 0.5 | 12.7 | 2.7 | <0.5 | 7.5 |
Diatom Composition

Composition and distribution of diatoms have been studied in two seasons, and a total of 223 taxa belonging to 57 genera were identified; within these taxa, 11 were identified in genera level. The seasonal composition of species were presented according to sampling habitats; streams, lakes and reservoirs (Table 3).

Table 3

Diatom Composition and Distribution in Streams, Lakes and Reservoirs of Burdur River Basin

| Taxa                                                      | Stream | Lake | Reservoir |
|----------------------------------------------------------|--------|------|-----------|
| Achnanthes petersenii Hustedt                            | +      |      |           |
| Achnanthidium eutrophilum (Lange-Bertalot) Lange-Bertalot| +      | +    |           |
| Achnanthidium minutissimum (Kützing) Czarnecki           | +      | +    | +         |
| Achnanthidium minutissimum var. jackii (Rabenhorst) Lange-Bertalot | +      | +    | +         |
| Adlafia minuscula var. muralis (Grunow) Lange-Bertalot   | +      |      |           |
| Amphora aequalis Krammer                                 | +      |      |           |
| Amphora alpestris Levkov                                 | +      |      |           |
| Amphora copulata (Kützing) Schoeman & R.E.M. Archibald   | +      |      |           |
| Amphora inariensis Krammer                               | +      |      |           |
| Amphora indistincta Levkov                               | +      |      |           |
| Amphora lange-bertalotii Levkov & Metzeltin              | +      |      |           |
| Amphora ovalis (Kützing) Kützing                         | +      | +    | +         |
| Amphora pediculus (Kützing) Grunow                       | +      | +    | +         |
| Amphora stechlinensis Levkov & Metzeltin                 | +      |      |           |
| Anomoconeis sphaerophora Pfitzer                         | +      |      |           |
| Aulacoseira ambigua (Grunow) Simonsen                    | +      |      |           |
| Aulacoseira italica (Ehrenberg) Simonsen                 | +      |      |           |
| Berkeleya sp.                                            | +      | +    | +         |
| Caloneis amphissaena (Bory) Cleve                        | +      |      |           |
| Caloneis bacillum (Grunow) Cleve                         | +      |      |           |
| Caloneis silicula (Ehrenberg) Cleve                      | +      |      |           |
| Cocconeis lineata Ehrenberg                              | +      | +    | +         |
| Taxa                                                                 | Stream |       | Lake |       | Reservoir |       |
|---------------------------------------------------------------------|--------|-------|------|-------|-----------|-------|
|                                                                    | Sp.    | Aut.  | Sp.  | Aut.  | Sp.       | Aut.  |
| Cocconeis pediculus Ehrenberg                                      |        | +     | +    |       |           |       |
| Cocconeis placentula var. placentula Ehrenberg                     |        | +     | +    | +    | +         |       |
| Craticula accomoda (Hustedt) D.G. Mann                              |        |       | +    |       |           |       |
| Craticula ambiguа (Ehrenberg) D.G. Mann                            |        | +     | +    | +    | +         |       |
| Craticula buderi (Hustedt) Lange-Bertalot*                          |        | +     | +    |       |           |       |
| Craticula cuspidata (Kützing) D.G. Mann                            |        | +     |      |       |           |       |
| Craticula subminuscula (Manguin) Wetzel & Ector                     |        | +     | +    |       |           |       |
| Craticula sp.                                                       |        | +     |      |       |           |       |
| Cyclostephanos dubius (Hustedt) Round                               |        | +     |      |       |           |       |
| Cyclostephanos invisitatus (Hohn & Hellermann) Theriot, Stoermer & Håkasson |        |       | +    |       |           |       |
| Cyclotella meneghiniana Kützing                                     |        | +     | +    |       |           |       |
| Cymbella affinis Kützing                                            |        | +     |      |       |           |       |
| Cymbella cymbiformis Agardh                                         |        | +     | +    | +    | +         |       |
| Cymbella dorennotata Østrup                                        |        | +     |      |       |           |       |
| Cymbella excisa Kützing                                            |        | +     |      |       |           |       |
| Cymbella helvetica Kützing                                          |        | +     |      |       |           |       |
| Cymbella lanceolata (Agardh) Agardh                                 |        | +     |      |       |           |       |
| Cymbella lange-bertalotii Krammer*                                  |        | +     | +    |       |           |       |
| Cymbella neocistula Krammer                                         |        | +     |      |       |           |       |
| Cymbella vulgata Krammer                                            |        | +     |      |       |           |       |
| Cymbopleura amphicephala (Nägeli) Krammer                          |        | +     | +    |       | +         |       |
| Cymbopleura inaequalis (Ehrenberg) Krammer                          |        | +     |      |       |           |       |
| Cymbopleura rhomboidea Krammer                                      |        | +     |      |       |           |       |
| Cymbellafalsa diluviana (Krasske) Lange-Bertalot & Metzeltin        |        |       | +    |       |           |       |
| Diatoma moniliformis (Kützing) D.M. Williams                        |        | +     | +    |       |           |       |
| Diatoma tenuis C. Agardh                                            |        | +     |      |       |           |       |
| Diatoma vulgaris Bory                                               |        | +     |      |       |           |       |
| Diploneis elliptica (Kützing) Cleve                                 |        | +     |      |       |           |       |
| Diploneis krammeri Lange-Bertalot & E. Reichardt                   |        | +     |      |       |           |       |
| Diploneis parma Cleve                                               |        | +     |      |       |           |       |
| Dorofeyukeya kotschyi Kulikovskiy et al.                            |        | +     | +    |       |           |       |
| Taxa                                                                 | Stream | Lake    | Reservoir |
|---------------------------------------------------------------------|--------|---------|-----------|
|                                                                    | Sp.    | Aut.    | Sp.       |
| Encyonema caespitosum Kützing                                        | +      | +       | +         |
| Encyonema hebridicum Grunow ex Cleve                                 | +      |         |           |
| Encyonema lacustre (C. Agardh) Pantocsek                              | +      |         |           |
| Encyonema lange-bertalotti Krammer                                   | +      |         |           |
| Encyonema latum Krammer                                              | +      |         |           |
| Encyonema leibleinii (C. Agardh) Silva et al.                        | +      | +       |           |
| Encyonema minutum (Hilse) D.G. Mann                                   | +      | +       | +         |
| Encyonema silesiacum (Bleisch) D.G. Mann                             | +      | +       | +         |
| Encyonema ventricosum (C. Agardh) Grunow                             | +      | +       | +         |
| Encyonema vulgare Krammer*                                            | +      | +       |           |
| Encyonopsis cesatti (Rabenhorst) Krammer                             | +      |         |           |
| Encyonopsis microcephala (Grunow) Krammer                            | +      | +       | +         |
| Encyonopsis minuta Krammer & E. Reichardt                            | +      |         |           |
| Encyonopsis subminuta Krammer & E. Reichardt                         | +      | +       | +         |
| Encyonopsis sp.                                                      | +      |         |           |
| Epithemia adnata (Kützing) Brébisson                                | +      |         |           |
| Epithemia gibba (Ehrenberg) Kützing                                  | +      |         |           |
| Epithemia smithii Carruthers                                         | +      |         |           |
| Epithemia sorex Kützing                                              | +      |         |           |
| Fallacia pygmaea (Kützing) Stickle & D.G. Mann                       | +      | +       | +         |
| Fragilaria gracilis Østrup                                          | +      |         |           |
| Fragilaria henryi Lange-Bertalot                                     | +      |         |           |
| Fragilaria pararumpens Lange-Bertalot, G. Hofmann & Werum            | +      |         |           |
| Fragilaria radians (Kützing) D.M. Williams & Round                   | +      | +       |           |
| Fragilaria tenera var. nanana (Lange-Bertalot) Lange-Bertalot & S. Ulrich | +    |         |           |
| Fragilaria vaucheriae (Kützing) J.B. Petersen                        | +      | +       | +         |
| Frustulia sp.                                                        | +      |         |           |
| Geissleria decussis (Østrup) Lange-Bertalot & Metzeltin              | +      |         |           |
| Gomphonema auritum A. Braun ex Kützing*                              | +      |         |           |
| Gomphonema calcareum Cleve                                           | +      |         |           |
| Gomphonema clavatum Ehrenberg                                        | +      | +       |           |
| Taxa                                      | Stream | Lake | Reservoir |
|-------------------------------------------|--------|------|-----------|
| *Gomphonema drutelingense* E. Reichardt   | +      |      |           |
| *Gomphonema exilissimum* (Grunow) Lange-Bertalot & E. Reichardt* | +      | +    |           |
| *Gomphonema innocens* E. Reichardt       | +      |      |           |
| *Gomphonema italicum* Kützing             | +      |      |           |
| *Gomphonema lippertii* E. Reichardt & Lange-Bertalot | +      |      |           |
| *Gomphonema minusculum* Krasske           | +      |      |           |
| *Gomphonema minutum* (C. Agardh) C. Agardh | +      |      |           |
| *Gomphonema olivaceum* (Hornemann) Brébiisson | +      | +    | +         |
| *Gomphonema pala* E. Reichardt            | +      |      |           |
| *Gomphonema parvulum* (Kützing) Kützing   | +      | +    | +         |
| *Gomphonema pseudoaugur* Lange-Bertalot   | +      | +    |           |
| *Gomphonema pumilum* (Grunow) E. Reichardt & Lange-Bertalot | +      |      | +         |
| *Gomphonema pumilum var. rigidum* E. Reichardt & Lange-Bertalot | +      |      |           |
| *Gomphonema rhombicum* Fricke             | +      |      |           |
| *Gomphonema saprophilum* (Lange-Bertalot & E. Reichardt) Abraca et al. | +      |      |           |
| *Gomphonema subclavatum* (Grunow) Grunow  | +      |      |           |
| *Gomphonema tergestinum* (Grunow) Fricke   | +      |      |           |
| *Gomphonema truncatum* Ehrenberg          | +      | +    |           |
| *Gomphonema sp.*                          | +      |      |           |
| *Gyrosigma acuminatum* (Kützing) Rabenhorst | +      |      |           |
| *Gyrosigma attenuatum* (Kützing) Rabenhorst | +      |      |           |
| *Halamphora coffeiformis* (C. Agardh) Levkov | +      | +    | +         |
| *Halamphora veneta* (Kützing) Levkov      | +      | +    | +         |
| *Hantzschia abundans* Lange-Bertalot      | +      |      | +         |
| *Hantzschia amphioxys* (Ehrenberg) Grunow | +      |      |           |
| *Hippodonta capitata* (Ehrenberg) Lange-Bertalot, Metzeltin & Witkowski | +      | +    | +         |
| *Hippodonta hungarica* (Grunow) Lange-Bertalot, Metzeltin & Witkowski | +      |      |           |
| *Lemnicola exigua* (Grunow) Kulikovskiy, Witkowski & Plinski | +      | +    |           |
| *Lemnicola hungarica* (Grunow) Round & Basson | +      |      |           |
| Taxa                                      | Stream | Lake | Reservoir |
|-------------------------------------------|--------|------|-----------|
| *Lindavia balatonis* (Pantocsek) Nakov et al. | +      | +    |
| *Luticola ventricosa* (Kützing) D.G. Mann   | +      | +    |
| *Mastogloia elliptica* (C. Agardh) Cleve   | +      | +    |
| *Mastogloia smithii* Thwaites ex W. Smith  | +      | +    | +         |
| *Mastogloia cf. pseudosmithii* Lee et al.  | +      | +    |
| *Melosira varians* C. Agardh               | +      | +    |
| *Navicymbula pusilla* (Grunow) Krammer    | +      | +    | +         |
| *Navicula antonii* Lange-Bertalot          | +      | +    | +         |
| *Navicula capitatoradiata* H. Germain      | +      | +    | +         |
| *Navicula cari* Ehrenberg                 | +      | +    |
| *Navicula cincta* (Ehrenberg) Ralfs        | +      | +    | +         |
| *Navicula cryptocephala* Kützing           | +      | +    |
| *Navicula cryptotenella* Lange-Bertalot    | +      | +    | +         |
| *Navicula digitovergeregens* Lange-Bertalot | +      | +    |
| *Navicula erifuga* Lange-Bertalot          | +      | +    |
| *Navicula gottlandica* Grunow              | +      | +    |
| *Navicula gregaria* Donkin                 | +      | +    |
| *Navicula hanseatica* Lange-Bertalot & Stachura | +      | +    |
| *Navicula lanceolata* Ehrenberg            | +      | +    |
| *Navicula meniscus* Schumann               | +      | +    | +         |
| *Navicula metareicharditiana* Lange-Bertalot & Kusber | + | + |
| *Navicula notha* J.H. Wallace              | +      | +    | +         |
| *Navicula phylepta* Kützing                | +      | +    |
| *Navicula rynchotella* Lange-Bertalot      | +      | +    |
| *Navicula rostellata* Kützing              | +      | +    |
| *Navicula simulata* Manguin                | +      | +    |
| *Navicula striolata* (Grunow) Lange-Bertalot | +      | +    |
| *Navicula tripunctata* (O.F. Müller) Bory  | +      | +    | +         |
| *Navicula trivialis* Lange-Bertalot        | +      | +    |
| *Navicula upsaliensis* (Grunow) M. Peragallo | +      | +    |
| *Navicula vandamii* Schoeman & R.E.M. Archibald | +      | +    |
| *Navicula veneta* Kützing                  | +      | +    |
| Taxa                                                      | Stream |         | Lake  |         | Reservoir |
|----------------------------------------------------------|--------|---------|-------|---------|-----------|
| *Navicula viridula* var. *germainii* (Wallace) Lange-Bertalot | +      | +       | +     | +       | +         |
| *Navicula* sp.                                             | +      |         | +     |         |           |
| *Neidium affine* (Ehrenberg) Pfitzer                      |        |         | +     |         |           |
| *Nitzschia alpina* Hustedt                                | +      | +       | +     | +       | +         |
| *Nitzschia amphibia* Grunow                               | +      | +       | +     | +       |           |
| *Nitzschia buhheimiana* (Rabenhorst) H.L. Smith*          | +      |         |       |         |           |
| *Nitzschia capitellata* Hustedt                           | +      | +       | +     | +       |           |
| *Nitzschia denticula* Grunow                              | +      | +       | +     | +       |           |
| *Nitzschia desertorum* Hustedt                            | +      |         |       |         |           |
| *Nitzschia dissipata* (Kützing) Rabenhorst                | +      | +       | +     | +       | +         |
| *Nitzschia filiformis* (W. Smith) Van Heurck              | +      |         |       |         |           |
| *Nitzschia fonticola* (Grunow) Grunow                     | +      | +       | +     | +       |           |
| *Nitzschia frustulum* (Kützing) Grunow                    | +      | +       | +     | +       | +         |
| *Nitzschia gracilis* Hantzsch                            | +      |         |       |         |           |
| *Nitzschia hantzschiana* Rabenhorst                      | +      | +       | +     | +       |           |
| *Nitzschia heufleriana* Grunow                            | +      |         |       |         |           |
| *Nitzschia inconspicua* Grunow                            | +      | +       | +     | +       | +         |
| *Nitzschia linearis* W. Smith                             | +      | +       | +     | +       |           |
| *Nitzschia palea* (Kützing) W. Smith                     | +      | +       | +     | +       | +         |
| *Nitzschia palea* var. *debilis* (Kützing) Grunow         | +      |         |       |         |           |
| *Nitzschia palea* var. *minuta* (Bleisch) Grunow          | +      |         |       |         |           |
| *Nitzschia pusilla* Grunow                                | +      |         | +     |         |           |
| *Nitzschia recta* Hantzsch ex Rabenhorst                 | +      |         |       |         |           |
| *Nitzschia rosenstockii* Lange-Bertalotii                 | +      |         |       |         |           |
| *Nitzschia sociabilis* Hustedt                            | +      |         |       |         |           |
| *Nitzschia solita* Hustedt                                | +      |         | +     |         |           |
| *Nitzschia supralitorea* Lange-Bertalot                   | +      |         | +     |         |           |
| *Nitzschia temuis* W. Smith                              | +      |         |       |         |           |
| *Nitzschia tubicola* Grunow                               | +      |         |       |         |           |
| *Nitzschia umbonata* (Ehrenberg) Lange-Bertalot           | +      |         |       |         |           |
| *Pantocsekiella iranica* (Nejdsattari et al.) Kiss et al. | +      | +       |       |         |           |
| *Pantocsekiella ocellata* (Pantocsek) Kiss & Ács           | +      | +       | +     | +       | +         |
| Taxa                                                                 | Stream | Lake | Reservoir |
|----------------------------------------------------------------------|--------|------|-----------|
|                                                                      | Sp.    | Sp.  | Sp.       |
|                                                                      | Aut.   | Aut. | Aut.      |
| Paraplaconeis minor (Grunow) Lange-Bertalot*                         | +      |      |           |
| Paraplaconeis placentula (Ehrenberg) Kulikovskiy & Lange-Bertalot    | +      |      | +         |
| Pinnularia brebissonii (Kützing) Rabenhorst                         | +      | +    |           |
| Pinnularia divergens W. Smith                                       | +      |      | +         |
| Pinnularia suchlandtii Hustedt                                      | +      |      | +         |
| Pinnularia sp.                                                       | +      |      |           |
| Placoneis anglophila (Lange-Bertalot) Lange-Bertalot*               | +      |      |           |
| Placoneis clementis (Grunow) E.J. Cox                               | +      |      |           |
| Placoneis clementioides (Hustedt) E.J. Cox *                        | +      |      |           |
| Placoneis ignorata (Schimanski) Lange-Bertalot                      | +      |      |           |
| Placoneis sp.                                                       | +      |      |           |
| Planothidium frequentissimum (Lange-Bertalot) Lange-Bertalot        | +      | +    | +         |
| Planothidium lanceolatum (Brébisson ex Kützing) Lange-Bertalot      | +      |      |           |
| Planothidium rostratum (Østrup) Lange-Bertalot                      | +      |      |           |
| Pseudostaurosira brevistriata (Grunow) D.M. Williams & Round        | +      | +    |           |
| Reimeria sinuata (W. Gregory) Kociolek & Stoermer                    | +      |      |           |
| Rhopalodia gibberula (Ehrenberg) Otto Müller                       | +      | +    | +         |
| Sellaphora absoluta (Hustedt) Wetzel et al.                         | +      |      |           |
| Sellaphora pupula (Kützing) Mereschkovsky                          | +      | +    | +         |
| Sellaphora sp.                                                      | +      |      |           |
| Staurosira acidoclinata Lange-Bertalot & Werum*                     | +      | +    |           |
| Staurosira gracilis Ehrenberg                                       | +      |      |           |
| Staurosira dubia Grunow                                             | +      |      |           |
| Staurosira venter (Ehrenberg) Cleve & J.D. Möller                   | +      |      |           |
| Staurosirella pinnata (Ehrenberg) D.M. Williams & Round             | +      |      |           |
| Stephanodiscus astreia (Kützing) Grunow                             | +      |      |           |
| Surirella amphioxys W. Smith                                        | +      |      |           |
| Surirella angusta Kützing                                            | +      |      |           |
| Surirella brebissonii Krammer & Lange-Bertalot                      | +      | +    |           |
Amongst the diatom genera, *Navicula* Bory and *Nitzschia* Hassall were represented with the highest numbers of taxa (27) in the river basin, this was followed by *Gomphonema* Agardh (22), *Encyonema* Kützing (10) and *Cymbella* Agardh (9). 20 genera were represented with only one species. 136 species were identified in spring, while the number of species increased to 174 in autumn. The species number varied between the environments; 131 taxa were observed in reservoir samples, while 61 and 160 taxa found in lake and stream samples, respectively. The taxa numbers also showed a variance in different habitats between spring and autumn. Total 78 taxa found in spring whereas 86 taxa were detected in autumn in the reservoirs. There were 34 taxa in spring with an increase to 45 taxa in autumn in lakes, and the highest species diversity was found in streams, 90 and 124 taxa in spring and autumn, respectively.

The most abundant species was *Navicula antonii* (17.1%) in the whole basin. The other common taxa (≥5%) observed were *Nitzschia palea* var. *debilis* (15.5%), *Tabularia fasciculata* (6.6%) *Cyclotella meneghiniana* (5.6%), *Nitzschia frustulum* (5.4%), and *Amphora pediculus* (5.3%). The remaining numbers of species showed less than 5% occurrences in the samples (Figure 2,3,4).
The most abundant species in the studied areas differed significantly according to the sampling period (Table 4). The number of species which exceeded 5% was higher in spring than in autumn. Diatom material observed in the reservoir samples showed that *Pantocsekiella iranica* (in autumn), *P. ocellata* and *Ulnaria delicatissima* (in spring) were the most abundant species (14%, 17% and 17%, respectively). In the lake samples, abundant species changed and *Achnanthidium minutissimum* var. *jackii* (in autumn) and *Encyonema caespitosum* (in spring) were the most abundant taxa (20% and 35%). On the other hand, especially in autumn, only two species, *Nitzschia palea* var. *debilis* (38%) and *Navicula antonii* (38%), were dominant in the stream samples and other species remained below total RA 5%.

Table 4

| Species Identified Above 5% of the Total RA in Reservoirs, Lakes And Streams |
|---------------------------------|---------------------------------|
| Spring (%) | Autumn (%) |
| Reservoirs | Reservoirs |
| *Pantocsekiella ocellata* | 17 | *Pantocsekiella iranica* | 14 |
| *Ulnaria delicatissima* | 17 | *Encyonema lacustre* | 9 |
| *Cymbella cymbiformis* | 13 | *Nitzschia palea* | 6 |
| *Aulacoseira ambigu* | 10 | *Amphora pediculus* | 5 |
| *Encyonema ventricosum* | 5 | |
| *Encyonema caespitosum* | 35 | *Achnanthidium minutissimum* var. *jackii* | 20 |
| *Fragilaria vaucheriae* | 19 | *Encyonopsis subminuta* | 17 |
| *Navicymbula pusilla* | 19 | *Gomphonema calcareum* | 11 |
| *Navicula capitatoradiata* | 9 | *Nitzschia fonticola* | 7 |
| *Mastogloia smithii* | 6 | *Berkeleya* sp. | 8 |
| *Tabularia fasciculata* | 15 | *Nitzschia palea* var. *debilis* | 38 |
| *Cyclotella meneghiniana* | 13 | *Navicula antonii* | 38 |
| *Amphora pediculus* | 11 | |
| *Nitzschia frustulum* | 11 | |
| *Nitzschia dissipata* | 7 | |
| *Nitzschia palea* | 7 | |
Figure 2. Common Diatoms of Burdur River Basin 1-2. *Aulacoseira ambiguia*; 3. *Cyclotella meneghiniana*; 4-5. *Pantocsekiella iranica*; 6-7. *P. oceallata*; 8-9. *Lindavia balatonis*; 10. *Pseudostaurosira brevistriata*; 11. *Hippodonta capitata*; 12. *Planothidium frequentissimum*; 13-14. *Halamphora veneta*; 15. *Amphora pediculus*; 16. *Staurosirella pinnata*; 17. *Diatoma vulgaris*; 18. *D. moniliformis*; 19. *Lemnicola hungarica*; 20. *Reimeria sinuata*; 21. *Achnanthidium minutissimum*; 22. *A. minutissimum var. jackii*; 23-24. *Fragilaria vaucheriae*; 25-26. *F. radians*; 27. *Craticula buderii*; 28. *C. accomoda*; 29. *Stauroneis acidoclinata*; 30. *Placoneis clementoides*; 31. *Paraplaconeis minor*; 32. *Placoneis anglophila*; 33-34. *Diploneis parma*; 35. *Fallacia pygoea*; 36-37. *Berkeleya sp.*; 38. *Navicymbula pusilla*; 39. *Craticula ambiguia*; 40. *Tabularia fasciculata*; 41. *Ulnaria acus*. Scale bar: 10 µm.
Figure 3. 42. Pinnularia brebissonii; 43-44. Navicula capitatoradiata; 45. N. veneta; 46-47. N. cincta; 48. N. cryptotenella; 49. N. trivialis; 50. N. exilis; 51. N. tripunctata; 52. Cymbopleura amphicephala; 53. C. lata; 54-55. Mastogloia elliptica; 56. M. smithii; 57. Pinnularia silicula; 58. Encyonema ventricosum; 59. E. vulgare; 60. Cymbella affinis; 61. Encyonema caespitosum; 62. Cymbella lange-bertalotii; 63. C. cymbiformis. Scale bar: 10 µm.
Figure. 64. Anomoeoneis sphaerophora; 65. Caloneis amphistaena; 66. Nitzschia palea; 67. N. palea var. debilis; 68. N. recta; 69. N. bulnheimiana; 70. Tryblionella hungarica; 71. Surirella librile; 72-73. Gomphonema pumilum var. rigidum; 74. G. pumilum; 75. G. auritum; 76. G. exilissimum; 77. G. drutelingense; 78. G. olivaceum. 79. Hantzschia amphioxys; 80. Epithemia gibba; 81. E. smithii; 82. E. sorex; 83. Surirella minuta; 84. S. brebissonii; 85. S. ovalis. Scale bar: 10 µm.
Discussion and Conclusion

Burdur River Basin is one of the two smallest basins out of 25 in Turkey. In this research, diatom composition and its distribution through the streams, lakes and reservoirs of the basin were studied for the first time in detail, and the diversity was found relatively higher in comparison with different river basins. Solak et al. (2018) found 94 taxa from Küçük Menderes River Basin, Çelekli et al. (2018) reported 80 taxa from the North Aegean catchment while 148 taxa reported from western Black Sea River catchment (Özer et al., 2018) and Demir et al. (2017) observed 64 diatom taxa from Akarçay River Basin. Similarly, 65 diatom taxa were found in Aras River catchment (Çelekli et al., 2019). The highest number of taxa observed in Burdur area could be the result of the variation of physico-chemical and geological characteristics of the aquatic ecosystems in the basin. The lower diversity was also detected in several diatom composition studies conducted in some lakes and rivers, Çiçek & Yamuç (2017) found out 42 diatom taxa in Eğirdir Lake, Isparta Province and Karacaoğlu & Dalkıran, (2017) detected 134 taxa in Nilüfer Stream and Şanal & Demir (2018) studied epiphytic samples of Lake Mogan and 58 diatoms species were observed. Since the samples were taken seasonally or even monthly in these studies, a more diverse diatom community was typically expected in comparison to the present study. However, focusing on one type of ecosystem (lake or river) and relatively similar characteristics of sampling points compared to whole basin studies could be the reason for detecting lower diversity of diatoms.

Diatom diversity of Burdur River Basin varied among streams (160 taxa), lakes (61 taxa) and reservoirs (131 taxa). Besides, the diatom community structure also differed among the habitats (Table 4). Pantocsekiella ocellata, P. iranica and Ulnaria delicatissima were dominant species in the reservoirs, but did not observe as dominant species in other habitats.

The seasonal changes of dominant taxa were also remarkable in the same habitat. The most distinct variation was in streams. Dominant taxa number was six in spring and declined to two species in autumn when Navicula antonii (37.7 %) and Nitzschia palea var. debilis (37.8 %) were dominant and constituted 74.4% of total abundance.

*Navicula* Bory and *Nitzschia* Hassall are generally the most diverse and widespread genera in freshwater diatoms (Karacaoğlu & Dalkıran, 2017; Kociolek et al. 2019). In Burdur River Basin, the results are consisted with this general trend and *Navicula* and *Nitzschia* species diversity were high; however, their relative
abundances were low. Aside from the dominant taxa, *Navicula antonii* and *Nitzschia palea* var. *debilis*, only *Navicula capitatedradiata, Nitzschia dissipata, N. frustulum* and *N. palea* were represented over 5%.

Diatoms are essential tools for bio-assessment of aquatic ecosystems and the identification of the taxa together with its ecological requirements would contribute further to the detection of water quality. Burdur River Basin is a closed basin, which has no connection to the sea and salinity gradient of the habitats were very broad. Therefore, the species composition found in the basin comprised the species with different tolerances to the salinity. Some species prefer waters with high salinity, while others may have a wide salinity tolerance (Schröder et al., 2015). In the present study, we detected *Navicula antonii* and *Nitzschia frustulum* in all habitats with different salinity. Although *N. antonii* and *N. frustulum* species are generally defined as freshwater species, they have also been identified in Ebro Estuary which is a salt wedge estuary in the Mediterranean (Rovira et al., 2009; Costa-Bödkeker et al., 2017). Our results confirmed their euryhaline characteristics based on their presence in the basin from fresh to saline habitats.

Two unique habitats related to salinity in the basin are Burdur and Acıgöl Lakes. Our observations indicated that some taxa which are present in brackish and marine waters found in these sampling areas. Specifically, the brackish species, *Halamphora coffeiformis* and *Navicula cincta* were dominant in Acıgöl Lake and their relative abundance was 69% for *N. cincta* in spring and 40% for *H. coffeiformis* in autumn. Similarly, species such as *Berkeleya* sp., *H. coffeiformis, Navicula simulata, Tryblionella apiculata*, which are known to be found in both marine and brackish waters, also showed significant presence in Burdur Lake. Some taxa like *Tabularia fasciculata* which is common in the marine coastal areas (Baytut and Gönülol, 2016) were observed in the river basin with an accomplice of a high number of taxonomically complex taxa (*Navicula, Nitzschia, Tryblionella, Surirella*). Species like *Halamphora coffeiformis, Navicula capitatedradiata, N. cincta, N. erifuga, N. hanseatica, Nitzschia tubicola, Tryblionella apiculata, T. hungarica* were assigned to marine or brackish water ecosystems and also in freshwaters with high electrolyte content (Guiry & Guiry, 2019). Furthermore, Akbulut (2010) reported *N. cincta* and *T. apiculata* in the Tuz Lake basin which is under the brackish, saline category. Species with high tolerance to salinity living in brackish waters or freshwaters with high conductivity could be found in different habitats, like some freshwater taxa observed in the marine coasts. Another taxon which generally referred to as marine species is *Berkeleya* sp. (Figure 2). This species resembles *Berkeleya fennica*, a brackish species previously reported from the Baltic Sea (Witkowski et al. 2000) and occurred
mainly in brackish and a few freshwater habitats of Burdur river basin. Nevertheless, ultrastructure details are needed for the identification of the taxa.

In this research, a total of 223 taxa were found with 11 new records for Turkey. These taxa were *Craticula buderi, Cymbella lange-bertalottii, Encyonema vulgare, Gomphonema auritum, G. drutelingense, G. exilissimum, Nitzschia bulnheimiana, Paraplaconeis minor, Placoneis anglophila, Placoneis clementoides* and *Stauroneis acidoclinata*. The results would contribute to the knowledge of diatom distribution in Turkey and Burdur River Basin, in particular. To determine the ecological quality of the river basins, taxonomical results would be a supplement for the physicochemical parameters for further studies. The results extend the biogeography of diatoms in Turkey and contribute to the knowledge of the diatom composition and distribution in the river basin.

**Acknowledgements**

This study was supported by the Ministry of Agriculture and Forestry, General Directorate of Water Management.
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Extendend Turkish Abstract
(Genişletilmiş Türkçe Özet)

Burdur Nehir Havzasındaki Farklı Habitatlarda Bentik Diyatome Kompozisyonu ve Dağılımı

Diyatomeler, sucul sistemlerdeki biyolojik izleme çalışmalarında önemli bir bileşendir. Avrupa Birliği Su Çerçeve Direktifi’nin (2000/60/AT) (SÇD) yürürlüğe girmesi izleyen yıllarda, uyum süreçleri kapsamında Türkiye’de de havza bazında izleme çalışmaları başlamıştır. Bu çerçevede, Türkiye’deki 25 havza içerisinde en küçük alana sahip iki havzadan biri olan Burdur Havzası’nın bentik diyatome kompozisyonu ilk defa bu çalışma ile detaylı olarak incelenmiştir.

Fitobentoz (diyatome) örneklemesi Nisan ve Ekim 2018’deki iki dönemde gerçekleştirilmiştir, fizikokimyasal parametreler ise Ocak-Aralık 2018 döneminde aylık olarak izlenmiştir. Havzada örneklemeye noktaların belirlenen toplam 30 istasyonun 7’sinin her iki örneklemeye dönemde kuru olduğunu tespit edilen ın 23 istasyonda örneklemeye gerçekleştirilmiştir. 21.06.2019 tarihli Resmi Gazete’de yayınlanan Biyolojik İzleme Tebliği uyarınca fitobentoz örneklemesinde ağırlıklı olarak nehirlerde epilitik alg örneklemesi, göl ve rezervuarlarda ise epifitik alg örneklemesi yapılması gerekmektedir. Ancak, özellikle su seviyesindeki değişimler ve suyun fizikokimyasal özelliklerine bağlı olarak makrofit tespit edilememiştir. Alınan örnekler %10 HC1 ile muamele edilmiş sonrasında H₂O₂ ile yakılarak organik maddelerin uzaklaştırılması sağlanmıştır. Diyatome örnekleri Naphrax® kullanılarak sabit preparatlar haline getirilmiştir. Sayım ve teşhisler için Zeiss Axios Observer Z1 (Carl Zeiss mikroskobu Gmbh, Jena, Almanya) mikroskobu kullanılmıştır. Fitobentoz türlerinin teşhisinde Krammer ve Lange-Bertalot (1986; 1988; 1991 a, b), Hofmann ve ark., (2011), Kulikovskiy ve ark., (2016), Guiry ve Guiry (2019) ve Kociolek ve ark., (2019) kaynaklarından yararlanmıştır. Her bir örnekten en az 300 diyatome frustülü sayısı ile türlerin nispi bolluğu, sayılan toplam frustüllerin yüzdesi olarak ifade edilmiştir (% cinsinden nispi bolluk).

Fizikokimyasal ölçümler, havzada yer alan göl, rezervuar ve nehirlerin genel olarak alkali yapıda olduğunu ortaya koymuştur. Ortalama elektriksel iletkenlik (Eİ) genel olarak rezervuar (0,5 mS cm⁻¹) ve nehirlerde (1,7 mS cm⁻¹) düşük tespit edilen göllerde (22,3 mS cm⁻¹) nispeten daha yüksek ölçümüştür. Özellikle doğal göller içerisinde yer alan Acıgöl (57.2 mS cm⁻¹) ve Burdur (29.4 mS cm⁻¹) göllerinin Eİ değerlerinin yıl boyu boyunca diğer örneklemelerdeki nispeten az sayıda yüksek olduğu görülmüştür. Yıl boyunca tüm istasyonlarda çözünmüş oksijen (ÇO) değerlerinde önemli değişiklikler gözlemlemiştir. Burdur ve Acıgöl’de zaman zaman çok düşük ÇO değerleri gözlenen de (sarasyla, 2,7 mg L⁻¹; 1mg L⁻¹) ortalama değerler Burdur Gölü için 6,05 mg L⁻¹, Acıgöl için ise 7,75 mg L⁻¹ olarak tespit edilmiştir. Havzada çalışan 13 akarsu, 4 göl ve 6 baraj gölünde toplam 223 taksıon gözlemlemiştir. İlkbaharda 136 tür tespit edilirken, sonbaharda tür çeşitliliği 174 tür olarak tespit edilmiştir. Çeşitliliğin akarsularda 160 tür ve rezervuarlarda 131 tür arasında değiştiği görülmüş,
bununla birlikte, göllerde biyolojik çeşitlilik daha düşük bulunmuştur (61 tür). Rezervuar, göl ve akarsu istasyonlarında tespit edilen türlerin kendi içerisinde nispi bollukları hesaplanmış ve toplam nispi bolluğun %5 ve üzerinde oluşturulan türler ayrıca değerlendirilmiştir. Buna göre, rezervuar örneklerinde *Pantocsekiella iranica* (%14) ve *P. ocellata* (%17) ve *Ulnaria delicatissima* (%17) en bol bulunan türler olurken, göl örneklerinde bu türlerin yerini *Achnanthidium minutissimum var. jackii* (sonbaharda %20) ve *Encyonema caespitosum* (ilkbaharda %35) almıştır. Akarsu örneklerinde ise ilkbaharda *Tabularia fasciculata* (%15) en bol bulunan tür olurken sonbaharda *Nitzschia palea var. debilis* (%38) ve *Navicula antonii* (%38) dışında toplam nispi bolluğun %5'inin üzerine çıkan türün olmadığını görülmüştür. *Navicula* ve *Nitzschia* cinslerine ait türler tatl-su habitatlarında yüksek çeşitliliğe sahip ve yaygın olarak bulunan cinslerdir. Burdur Nehir Havzasında da bu cinslere ait tür çeşitliliği yüksek bulunan da, *N. antonii* ve *N. palea var. debilis* türleri dışında toplam nispi bollukları düşük bulunmuştur.

Burdur Nehir Havzası, denizle bağlantısı olmayan kapalı bir havzadır ve Burdur ve Acıgöl gibi yüksek tuzluluk karakterindeki göllere sahiptir. Bu çalışma sonucunda, havzada acısu ve deniz kıyı bölgelerinde yayılmış gösterdiği bilinen bazı türler tespit edilmiştir. Özellikle Acıgöl’de acısuarda bulundukları *Halophila coffeiformis* ve *Navicula cincta* türleri oldukça yüksek sayılara ulaşmıştır. Benzer şekilde, hem deniz hem de acı sularda bulunduğu bilinen *Berkeleya sp.*, *Halophila coffeiformis*, *Navicula simulata*, *Tryblionella apiculata* gibi türlerin Burdur Gölü’nde önemli miktarda varlık gösterdiği tespit edilmiştir. Havzada tespit edilen, *Navicula capitatoradiata*, *N. erifuga*, *N. hanseatica*, *Nitzschia turbica*, *Tryblionella apiculata*, *Tabularia fasciculata* gibi türlerin ekolojik tercihleri açısından deniz ve acısuarda bulunduklarına dair kayıtlar mevcuttur (Guiry & Guiry, 2019). *Navicula antonii* türü ise havzada farklı tuzluluk seviyelerine sahip tüm alanlarda bulunmuştur. Bu durum türün örihalin bir tür olduğunu göstermektedir.

Burdur Nehir Havzası’nda yapılan bu çalışma bölgedeki ilk detaylı çalışmadır ve Türkiye diyatome florasına 11 yeni kayıt türün ilave edilmesini sağlamıştır. Burdur Havzası’nda gözlenen yüksek biyovıçilikli havza içi sucul ekosistemlerin çeşitliliğinin bir sonucudur. Ayrıca, bu çalışmada kapalı bir havza olan Burdur Havzası’nın diğer havzalardan daha farklı diyatome kompozisyonuna sahip olduğunu gözlenmiştir. Elde edilen veriler, Burdur Havzası benzeri özel alanlarda yapılacak izleme çalışmalarında önemli olacaktır.