

**ALGAL BLOOM FROM TIRANA LAKE (AUTUMN 2024)****ALEKO MIHO<sup>1</sup>, SHPËTIM VATA<sup>2</sup>**

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***Abstract***

*An algal greenish jelly layer was clearly visible on the water surface, mostly in a wide lakeshore area of the Tirana Lake during October-November 2024. Sporadic lakeshore plankton samples were collected almost weekly and were observed fresh or stained with Lugol solution using the Leica DM4B light microscope and Leica DMI8 inverted microscope. A cyanobacteria bloom of Microcystis, usually known to be toxic, was concluded. These blooms occur as evidence of excessive nutrients, especially phosphates, from human activity (urban, agricultural); they cause harsh conditions for the aquatic livings, and sometimes even for humans. Collecting wastewater and their treatment is strongly suggested.*

**Key words:** *Tirana Lake, ,microcystis, harmful algal blooms, wastewater treatment.*

***Përmbledhje***

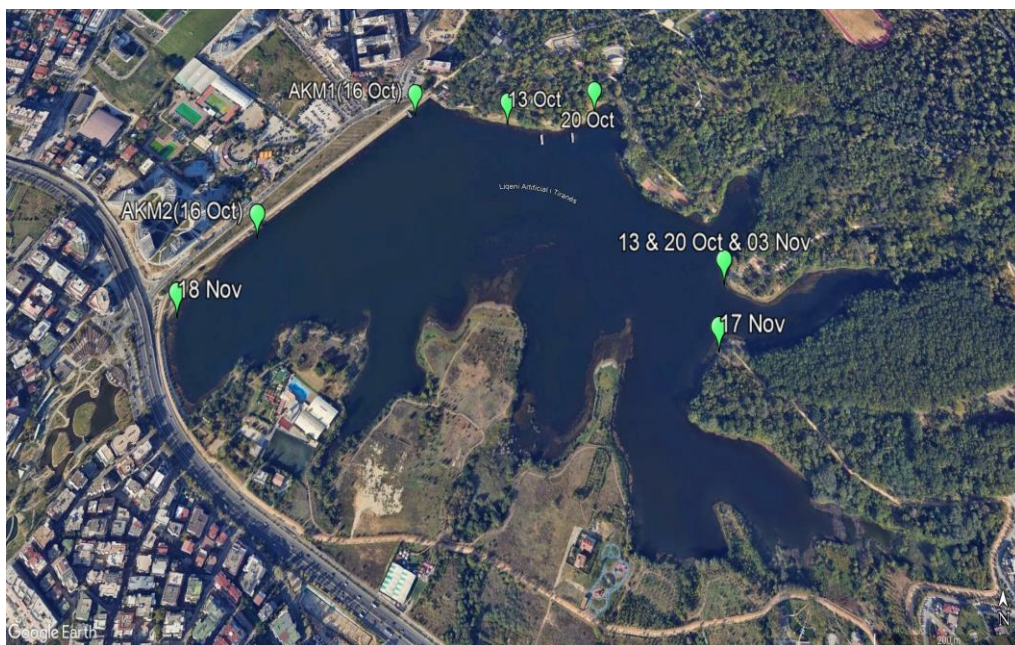
*Një shtresë e gjelbër jargore algash ishte e dukshme qartë në sipërfaqen e ujit, kryesisht në zona të shtrira përgjatë brigjeve të Liqenit të Tiranës gjatë periudhës tetor-nëntor 2024. Mostra bregore rastësore planktoni u mblodhën pothuajse çdo javë dhe u vëzhguan të freskëta ose në tretësirë Lugoli me mikroskopin optik Leica DM4B dhe mikroskopin invers Leica DMI8. U arrit në përfundimin se ishte një lulëzim cianobakteriesh i gjinisë Microcystis, i njohur zakonisht si helmues. Këto lulëzime ndodhin dhe tregojnë praninë me tepriçë të lëndëve ushqyese, veçanërisht të fosfateve, me origjinë nga aktiviteti i njeriut (urban, bujqësor); ato shkaktojnë kushte të*

*vështira për gjallesat ujore, ndonjëherë edhe për vetë njeriun. Këshillohet shumë grumbullimi i shkarkimeve të ujërave të zeza dhe trajtimi i tyre.*

**Fjalë kyçe:** *Liqeni i Tiranës, microcystis, lulëzimi i algave të dëmshme, trajtimi i ujërave të zeza.*

## Introduction

Tirana Lake is an artificial basin of 48 ha, with a 400 m dam (Fig. 1). It is the most important part of the Great Tirana Park, a public park of 290 ha, built in the 1950s, which lies in the southern part of the Tirana capital ([https://en.wikipedia.org/wiki/Grand\\_Park\\_of\\_Tirana](https://en.wikipedia.org/wiki/Grand_Park_of_Tirana)). The Park and its Lake, in the southernmost part, form a green-blue (terrestrial-water) ecosystem complex, very attractive and relaxing. The area is almost unique in its attractiveness for the whole Tirana urban area, with more than 800 thousand inhabitants, extending in more than 1,100 km<sup>2</sup>.



**Figure 1.** Lake Tirana satellite map with sampled sites (elaborated with Google Earth Pro 2021).

A greenish algal jelly layer was clearly visible on the water surface, mostly in a wide lakeshore area of the Lake during October-November 2024 (Fig. 2). We will report here briefly some data related to this phenomenon, how to deal and prevent it in the future.

### **Material and methods**

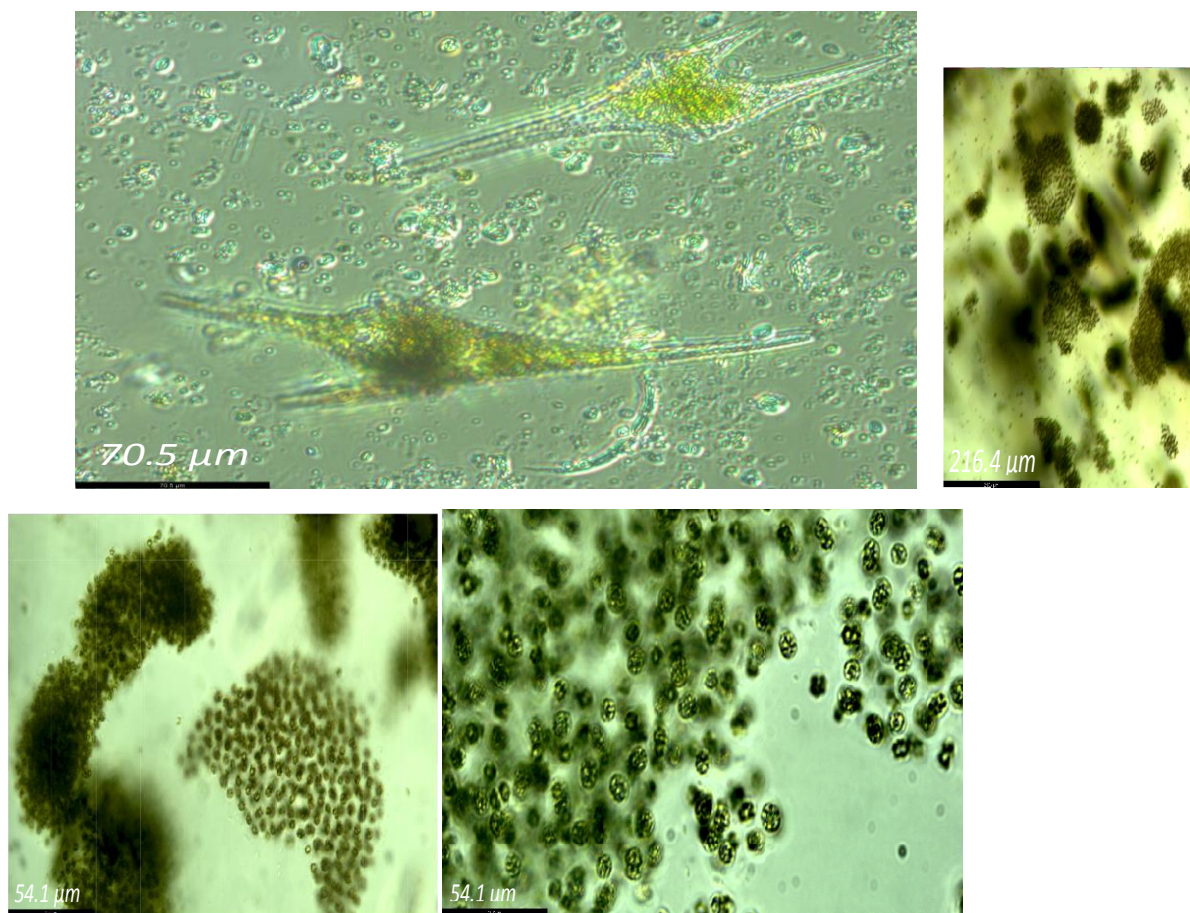
Sporadic lakeshore plankton samples were collected almost weekly on October 9, 13, and 20, and November 3, 17, and 24, 2024, near the western part of the Dam, and on the eastern lakeshores (*see* the map in the Fig. 1). The samples were observed fresh or stained with Lugol solution in the Leica DM4B light microscope and Leica DMi8 inverted microscope, equipped with DIC optics, with Flexacam C3 digital camera, with Leica LAS X program. The determination was done using the available literature (Bellinger & Sigee, 2010; Bourrelly, 1970-1981; Streble *et al.*, 2018; Mohan *et al.*, 2020; etc.). We had the possibility to consult the physic-chemical data and nutrients of the Lake waters measured by the Lab of the National Environmental Agency, in October 16, 2024 (AKM1 & AKM2).



**Figure 2.** Photo from Lake Tirana, October 13, 2024.

## Results

We concluded that it was a cyanobacteria bloom of *Microcystis*, probably several taxa *M. aeruginosa*, *M. flos-aquae* (Fig. 3). In such a dense form, it was seen for the first time by us in Lake Tirana. The bloom intensity was relatively high during the first week of October, then vanished, and later intensified until the third week of November when the rainy and cool weather started. It vanished during the second and third weeks of October, probably due to temperature drops; the plankton there was dominated by the dinophlagellate *Ceratium hirundinella* (Fig. 4), a common autumnal species in our freshwater lakes (Bellinger & Sigeo, 2010).



**Figure 3.** Microscopic photo with Leica DM4B light microscope, 20x, 40x and 100x objectives, of *Microcystis aeruginosa* (above) and *M. flos-aque* (below) from Lake Tirana, October 09, 2024.

**Figure 4.** Microscopic photo with Leica DMi8 inverted microscope, objective 10x, of the dinoflagellate *Ceratium hirundinella* from Lake Tirana, October 20, 2024.

## Discussion

*Microcystis* blooms often form during warm, calm weather in lakes and ponds with relatively high nutrient content (nitrogen or phosphorus), or low nitrogen-to-phosphorus ratios ( $N:P < 15$ ). It is worth mentioning that *Microcystis* blooms are usually toxic (*see* Bellinger & Sigee, 2010); but no signs of dead fish or other livings were observed in Lake Tirana. According to the assessment carried out by the Lab of the National Environment Agency, Tirana, at October 16, 2024, at the Lake Dam, the P-PO<sub>4</sub> value in one of the measured samples was 0.055 mg/L, corresponding to highly eutrophic waters (*Anonymous*, 2020; etc.).

A similar cyanobacterial bloom was observed in Lake Fierza, Kukesi, in July 2014, of *Aphanizomenon*, fortunately without negative effects on biota (Miho *et al.*, 2014). These blooms occur as evidence of the presence of excessive nutrients, especially phosphates, from human and animal wastewater, industrial effluents, and fertilizer runoff (*Anonymous*, 2020).

They become detrimental when they over-fertilize aquatic plants and increase the rate of natural eutrophication, sometimes called cultural eutrophication or accelerated eutrophication. It depletes dissolved oxygen in the water creating anaerobic conditions, and therefore mass die-offs of animals (e.g. fish) and aquatic plants. Therefore, the algal bloom in Lake Tirana could be a probable consequence and a signal of eventual heavy nutrient load (N & P). In our opinion the nutrient origin could be probably from the leakage of the untreated urban wastewater and/or from other nearby services.

### **Recommendations**

After the 1990s, urban constructions, services, and much traffic increased around the Tirana Park, and Lake Tirana. In synergy even with climatic conditions, high temperature and heavy water level drop, for sure constitute a pressure on the Lake's water quality. The collection and treatment of wastewater are urgent challenges, as is the need to maintain the quality of life for aquatic organisms and humans.

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