Proceedings of International Scientific-Practical Conference «Sustainable Development Goals: Youth Policy and Innovative Technologies», February 15-16, 2023, Oguz Han Engineering and Technology University of Turkmenistan, Ashgabat, Turkmenistan

ANALYSIS OF CHLOROPHYLL IN PHYTOPLANKTON OF THE CASPIAN SEA

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DoI: https://doi.org/10.5281/zenodo.7776839

Nowadays under the leadership of our esteemed President, the study of the ecology of the Caspian Sea is one of the most important ecological tasks of Turkmenistan. It is obviously evidenced by the activities carried out at the international level on the ecology of the Caspian Sea.

The main attention in the ecological monitoring of waters is focused on phytoplankton, which have a major place in the food chain and influences the development and distribution of other organisms, and also synthesizes almost all of primary organic compounds. Phytoplankton is involved in the formation of aquatic communities, affecting the organoleptic properties of water and quality of water in general. It contains several pigments, the most important of which are considered to be chlorophyll. The period of intensive development of phytoplankton coincides with the high concentration of its pigments. This allows us to analyze phytoplankton production by chlorophyll concentration. In addition, phytoplankton have a bioindicator properties. These properties of phytoplankton make it possible to determine the quality of the aquatic ecological system.

Determination of chlorophyll concentration by spectrophotometry requires less time than determination of phytoplankton productivity than optical microscopy. Conducting a spectrophotometric analysis of phytoplankton pigments of the Caspian Sea and establishing the productivity of marine phytoplankton is considered the goal of the study.

The pigment composition of planktonic algae is very diverse. One of these pigments, chlorophyll a is the most important, and the total biomass and productivity of phytoplankton can be determined from concentration of chlorophyll a [1, 2].

The Turkmen part of the Caspian Sea shore is predominantly indented and composed of limestone. The climate of the Caspian Sea is variable, with the cold desert climate, cold semi-arid climate and humid continental climate being present in the northern portions of the Caspian Sea, while the Mediterranean climate and humid subtropical climate are present in the southern portions of the Caspian Sea.

The Caspian Sea is considered one of the lakes with high biological diversity. In the study has been studied the phytoplankton, which plays a pivotal role in the food chain of living organisms. Water samples for the study of phytoplankton were taken from 3 points in the northern part of the Turkmen coast of the Caspian Sea, more precisely from Avaza (39.97° N, 52.85° E), Soymonov Bay (40.01° N, 52.90° E) and Karshi (40.75° N, 52.85° E) points. These points were chosen to determine the impact of tourism on biodiversity in the Avaza National Tourist Zone and nearby areas.

Water samples for the study of phytoplankton were taken using sampling methods for the study of water (Ари Мякеля, Сари Антикайнен, Ирма Мякинен, Ярмо Кивинен & Туула Леппянен) and transported to the laboratory.

Chlorophyll concentration can be calculated using spectrophotometry. Currently, the concentration of photosynthetic pigments (Chlorophyll a – Chl a) is determined by the spectrophotometric method (N.M. Mineeva) is used as the value of phytoplankton biomass.

Analysis of chlorophyll requires immediate implementation. Because it is very sensitive to light, air oxygen and high temperatures. The concentration of chlorophyll is measured at the appropriate wavelengths using a spectrophotometer by preparing a liquid (extract) according to a special technique [3].

Calculation was conducted according to the equation of Jeffrey and Humphrey. When calculated according to this formula, the concentration of chlorophyll a (Chl a) does not differ from the concentration of phaeopigment a.

CE,a=11.85*(Abs 664-Abs 750)-1.54*(Abs 647-Abs 750)-0.08*(Abs 630-Abs 750)

CE,b=21.03*(Abs 647-Abs 750)-5.43*(Abs 664-Abs 750)-2.66*(Abs 630-Abs 750)

CE,c=24.52*(Abs 630-Abs 750)-7.6*(Abs 647-Abs 750)-1.67*(Abs 664-Abs 750)

Spectrophotometric analysis of phytoplankton were carried out in water samples taken in the spring in the Avaza National Tourist Zone, Soymonov Bay and Karshi points in the Caspian Sea (Figure 1).

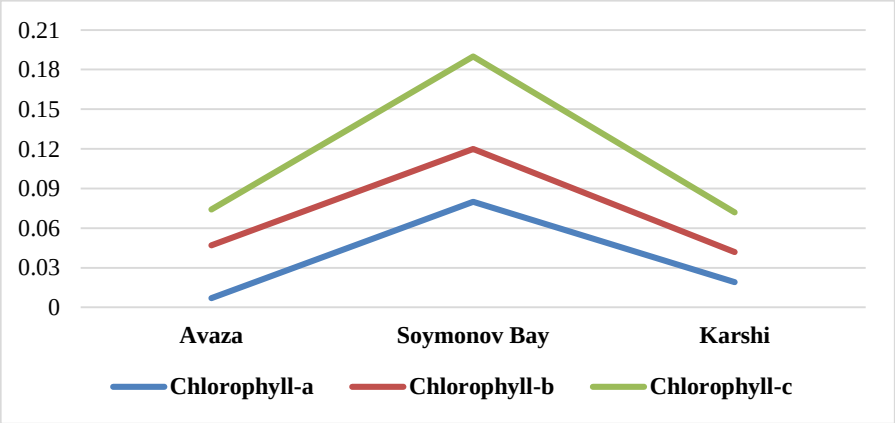

Figure 1. Spectrophotometric analysis of phytoplankton in water samples taken in spring

Spectrophotometric analysis of phytoplankton were carried out in water samples taken in autumn in the national tourist zone Avaza, Soimonov Bay and Karshi points in the Caspian Sea (Figure 2).

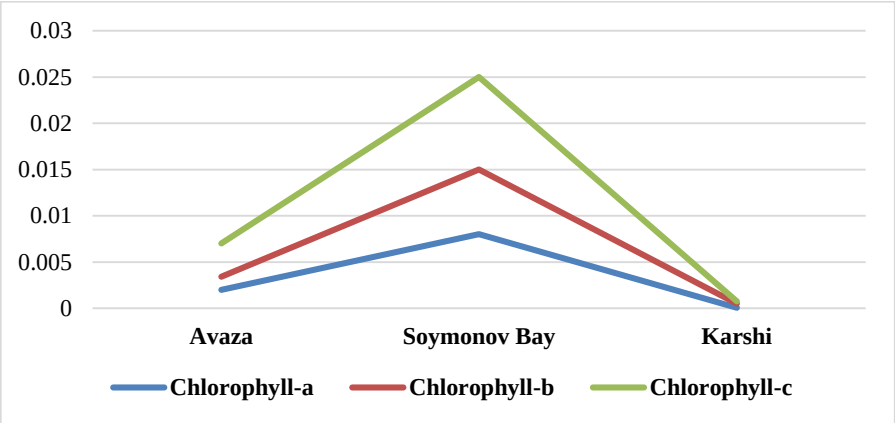

Figure 2. Spectrophotometric analysis of phytoplankton in water samples taken in autumn

Obtained data indicate the concentration of chlorophyll at a selected point in the water body. The spatial distribution of phytoplankton in the northern part of the Turkmen coast of the Caspian Sea was uneven and was determined by the quantitative change in chlorophyll a (Chl

a). Throughout the study, a significant influence of tourism on the amount of chlorophyll a was revealed. Due to increasing impact of tourism, the structural change of phytoplankton is accelerated, the aquatic ecosystem becomes eutrophic and the trophic status increases. As a consequence of anthropogenic eutrophication, phytoplankton biodiversity increases in the initial stages, but decreases at a high level of eutrophication.

The analysis of photosynthetic pigments of phytoplankton of the Caspian Sea was carried out in spring and autumn. Studies have shown that levels of chlorophyll concentration are high in the Avaza National Tourist Zone, in the Soymonov Bay in autumn and at the Karshi point in spring. It was determined that the productivity of phytoplankton increases in the Avaza National Tourist Zone, in the Soymonov Bay - in autumn and spring at the point of Karshi [5].

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