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BIOECOLOGICAL PECULIARITIES OF HIGHER WATER PLANTS IN THE WATER BODIES OF THE SOUTHERN ARAL SEA REGION

T. K. Matjanov
Junior Scientific Researcher of the Karakalpak Scientific Research Institute of Natural Sciences of the Karakalpak Branch of the Uzbekistan Academy of Sciences, Nukus city

Abstract
The lowering of the Aral Sea level affected the entire hydrographic net of the Amudarya delta. This was especially reflected in coastal water bodies, which are located along the southern coast of the sea and the sea bays of the former coast of the Aral Sea. The deterioration of the hydrological regime and the increase in water salinity led to a qualitative and quantitative change in the phytocenoses of water bodies. Here a change of plant communities takes place. The change in the species composition mainly occurs due to the increase in hydrohalophilic species. Therefore, the study and monitoring of the current state of higher water plants, species composition and overgrowth of water bodies in the lower reaches of the Amu Darya by them is relevant.

Key words: Salinity of water, Water bodies of the delta zone of the Amu Darya River, higher water plants, bio ecological features of macrophytes, overgrowth, hydrohalophilic species.

Relevance

Currently, one of the most important components of water ecosystems, the study of which in the region has so far received insufficient attention, are macrophytes - large aquatic higher plants that normally develop in an aquatic environment and excessive moisture and live both in water and in the coastal zones. This group of water organisms represents the initial link in the cycle of matter and energy as the primary producers of organic matter. Macrophytes affect the chemical and physical properties of water. They serve as a powerful biological filter in the process of natural self-purification of water bodies (this may be the physical deposition of pollutants on plant organs, accumulation, and inclusion in metabolism). In addition, they play an important environmental role. They create habitats for many organisms and are a food base for fish [11].

Water plants are the main producers of water ecosystems: without them, aquatic animals could not exist. During photosynthesis, they are not only food organic

substances, but they release oxygen in the atmosphere, which aerates the water used for breathing by fish and other inhabitants of water bodies. Absorbing dissolved minerals, water plants clean the water of water bodies. Finally, they provide shelter and food for aquatic insects and other small animals, which, in turn, serve as food for fish. Some species of fish, in particular from the cyprinids - grass carp feed directly on macrophytes [11].

However, in the practice of fisheries studies it has been established that in the abundance of plants above the norm, fish productivity in water bodies decreases. A large number of plants reduces the space for the life of the fish population: closes the bottom from sunlight, does not allow the water to warm up, there is a lack of oxygen. Reservoirs are slowly but steadily turning into swamps. The species composition of fish is reducing, only the most resistant survive. Therefore, the issues of overgrowing of reservoirs with higher aquatic plants, the study of bio ecological features of their growth in the reservoirs of the Southern Aral Sea is devoted to this article.

Material and Methods

As a methodological basis, traditional geobotanical and ecological research methods were used, set out in the classic guidance: "Determinant of higher plants of Karakalpakstan" [3], Illustrated determinant to higher plants of Karakalpakstan and Khorezm [5, 6], "Guidance to methods of hydro biological analysis of surface waters and bottom sediments" [14], "Water vegetation of the Amudarya delta" [4].

The main water bodies of the study are the water bodies of the delta zone of the Amudarya River (Dautkul and Jiltirbas lakes).

The hydro chemical composition of water bodies was carried out according to the "Unified Methods for Water Analysis" [7, 12]. Sulphates were determined by the gravimetric method, and carbonates, chlorides, calcium and magnesium were determined by the volumetric method, carbonates were titrated with a 0.02 N solution of sulfuric acid, chlorides were titrated with a 0.1 N solution of silver nitrate, calcium and magnesium were titrated with a 0.05 N solution of Trilon B. The amount of sodium (potassium) was determined by the difference in the sum of anions and cations. The results of the chemical analysis were controlled by the dense residue. The classification of waters according to chemical analysis was carried out according to Alekin [1].

When studying reservoirs, the following characteristics were taken into account: air and water temperature, organoleptic indicators of water such as: color, smell, turbidity, foaminess

The Discussion of the Results

The climatic conditions of the Aral Sea region have undergone significant changes in the last three decades. According to experts, this is due to the coincident change in circulation processes in the territory of Central Asia and the drop in the level of the Aral Sea. The studied lakes - Dautkul and Jiltirbas - are located in the Republic of Karakalpakstan on the territory of the Amudarya delta. In summer, the territory of the Amudarya delta is located mainly in the area of influence of warm, dry tropical continental masses, which contribute to a significant increase in air temperature in the daytime.

The decrease in the flow of the Amu Darya and the lowering of the level of the Aral Sea have led to the fact that many lakes have completely dried up. The deterioration of the hydrological regime and the increase in water salinity led to a qualitative and quantitative change in the phytocenoses of water bodies. There is a change of plant communities. Changes in the species composition mainly occur due to an increase in hydrohalophilic species [2].

The study of water vegetation was carried out on Lake Dautkul, one of the commercial lakes located in the south of the modern right-bank delta of the Amudarya, 80 km north of the city of Nukus on the territory of the Kegeyli district.

The shores of the lake are gently sloping, slightly indented, and the water is used for irrigation of farmland and maintenance of estuary hayfields. Water intake is carried out by gravity along the Akeden canal and by a pump from the lake. Dautkul. The soil is represented by sand and pebbles, in places of deepening on the site of the bed of former lakes, the soil is black with the smell of hydrogen sulfide. The source of pollution of the reservoir is the collector-drainage runoff. The area of the reservoir is 1700 ha along the bottom, the maximum depth is 5 m, the average depth is 3 m, the minimum depth is 0.7 m, the average water transparency is 0.5 m. The bottom of the lake system at a depth of 2–2.5 m is covered with patches of thickets of hornwort, whorled urut, and curly pondweed. Salvinia natans, naiad occurs in some places on the surface of the water [16]. The reaction of water is weakly alkaline (pH - 7.51) [15]. In reed beds, the bottom is silted and biochemical formation of hydrogen sulfide occurs due to mineral salts and organic compounds of plant and animal origin. Due to the lack of flow and renewal of water in the system, the oxygen regime was deteriorated, O_2 - 17.7, in places there were death of almost over the entire area occupied by reeds [2, 4].

At present, the following indicators characterize the hydro chemical indicators of the lake: the transparency of water is up to 4-5 m. The total mineralization in the samples of Lake Dautkul does not reach 2 g/l; water from all collection points is sulfate-

chloride in terms of predominant ions, and magnesium-sodium or calcium-sodium in terms of cationic composition. According to the accepted classification, water quality can be classified as brackish [13].

When investigating the water and coastal water vegetation of the lake, a high overgrowth was noted. Among coastal plants, growth of thickets of narrow-leaved cattail (Typha angustifolia L) was recorded, among water- submerged plants - comb pondweed (Potamogeton pectinatus L.), urut species - whorled (Myriophyllum verticillatum L.), spiked urut (Myriophyllum spicatum) prevails.

Another lake - Jiltirbas - is a large water body with an area of 10,000 hectares. The maximum depth is 4 meters; the minimum is 0.8-1m. It was formed on the site of the bay of the same name of the Aral Sea, is shallow and consists of a large number of stretches and reed beds. The State forestry and hunting economy is located here, fishing and hunting are actively conducted. The lake is relatively difficult to access; the nearest settlement - Kazakhdarya - is located 30 km, but during the flood period, when detours, the path lengthens to 80-90 km.

Lake Jiltirbas is replenished with the waters of the Kazakhdarya and several thermal artesian wells. Thanks to the construction of the dam, the water level in it stabilized a few years ago and this reservoir was one of the most significant wetlands and fisheries against the backdrop of the catastrophic drying up of the Aral Sea lakes. However, in dry years, the water level in the lake dropped sharply. There is siltation, shallowing and a sharp reduction in the area of the water area, and as a result, a reduction in fish stocks.

The water of Lake Jiltirbas is characterized by high mineralization, due to the high content of chloride ion (within 2 g/l and above). Chloride ions predominate in the mineral composition of water, and sodium ions are among the cations. According to the Alekin classification, the water belongs to the brackish, chloride salinity type [13]. Thickets of reeds, cattails, reeds are noted on open reaches; among the water-immersed vegetation, pondweed is dominant [8, 9].

Thus, the studied water bodies - Lakes Dautkul and Jiltirbas differ in the degree of overgrowth and species composition of aquatic macrophytes and depend on the inflow of water. Reeds and cattails are dominant, as well as curly pondweed, urut spiky, which take an active part in the overgrowth of water bodies.

We also note that the studies carried out on the water bodies of the Amudarya delta showed that they are characterized by strong overgrowth, and therefore, a complex of reclamation works is required. One of such effective measures is the fight against overgrowth by using herbivorous fish, in particular grass carp, white Amur bream and white silver carp [10].

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