The diagram (Fig. 3) shows the indicators of the species occurrence. The rare littoral species *Crambe maritima L.* (10.3%), distributed throughout the territory of the spit, has the highest occurrence. The second place is occupied by the steppe species *Medicago falcata L.* (9%), *Linaria genistifolia*, and *Eryngium campestre*, which is associated with the high distribution of steppe communities on this spit. The last place is occupied by *Reseda lutea L., Lepidium ruderale, L. Arenaria uralensis Pall. ex Spreng* 0.6% each species.

Particular attention was paid to the study of rare plant species. It should be noted that, in comparison with the data of other spits of the Azov coast, the rare gene pool is characterized by low indicators, both in terms of the total number of species found and their abundance. In total, five rare species have been recorded, of which only one *Crambe maritima* is characterized by widespread distribution. *Ephedra dystachia* is found in spots in the middle steppe part. The remaining species are represented only by single local populations. So, *Sakile euxina* was registered in the amount of 15 individuals on the territory of "The Rosa Vetrov" camp site, *Gypsophila perfoliata* in the amount of 20 individuals on the territory of the beach of "The Rosa Vetrov" recreational center, *Eryngium marinimum* was found in a single copy on the beach near the touristic center.

Conclusion

Thus, it should be stated that the taxonomic structure and composition of the flora correspond to the patterns of development and functioning of natural littoral and steppe natural complexes of the coastal zone of the Sea of Azov. Rare species, for the conservation of which this Protected area was established and recorded. However, their low numbers are alarming. The areas with a developed recreational infrastructure, a transport network of sandy roads, parking lots without the necessary coverings lead to the development of large-scale transformed areas with destroyed vegetation cover and to the development of synanthropized communities. Intensive recreational activities on the territory of protected areas are carried out without complying with the requirements of environmental legislation. The flow of recreants is not regulated by the recreational capacity of littoral ecosystems. It is necessary: 1) to regulate the delimitation of the special protection zone from the recreational territory, where recreational activities are possible, taking into account environmental standards, 2) to develop recreational development plans to ensure the environmental safety of coastal areas.

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Knysh I.A., Pikalova N.A., Semenova S.N.

Ecological State of the SPNA «Sudzhuk Lagoon»

Kuban State University
(Russia, Krasnodar)

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Abstract

The article examines the current ecological situation in the lagoon, as well as the changes caused by anthropogenic impact. The dynamics of tourists and the dynamics of vehicles in the

adjacent territory, as well as the consequences of construction work (based on the study of the state of the protected area) were given in the research. It is necessary to take measures for the development of regulated sustainable recreational nature management.

Keywords: anthropogenic impact, consequences, nature management, “Sudzhuk lagoon”, SPNA (special protected natural areas), recreational load, ecological state.

Аннотация

В статье рассматривается современная экологическая обстановка на территории лагуны, а также изменения, вызванные антропогенным воздействием. На основании изучения состояния ООПТ, были установлены динамика отдыхающих и динамика транспортных средств на прилегающей территории, а также последствия строительных работ. Вследствие чего необходимо принять меры для развития регламентированного устойчивого рекреационного природопользования.

Ключевые слова: антропогенное воздействие, последствия, природопользование, «Суджукская лагуна», ООПТ (особо охраняемые природные территории), рекреационная нагрузка, экологическое состояние.

Natural monuments are usually protected by the state. Moreover, the legal regime of such objects in each country is different and individual. In general, the importance of these objects is great and equates to the nature reserves. So in our country a problem is the fact that many natural objects are not included in the corresponding lists and do not have the status of a protected object. Unfortunately, the specially protected natural areas are only written “on paper”: no real measures are taken to protect them.

Natural monuments need attention, protection and reconstruction. The legal regime for the implementation of these measures is in the legislation of the Russian Federation, and not only organizations and enterprises, but also citizens must comply with it [4].

The purpose of the work is to study the current ecological state of the lagoon, as well as changes caused by anthropogenic impact and to propose ways to restore and protect the “Sudzhuk lagoon”.

By the decree of Novorossiysk City Executive Committee dated of June 26, 1979, the Sudzhuk Spit and the adjacent territory were declared a natural monument [1].

The “Sudzhuk lagoon” is a unique water basin characterized by high dynamics of biochemical processes [3]. Its role is a feeding place for fish and a wintering place for waterfowl. The lagoon and the spit (located within the boundaries of a large industrial city) are of great importance for the recreational economy [2].

Currently, it is a favorite vacation spot, and the maximum recreational load is here during the period of July–August. Although the bulk of the load is in summer. The consequences can be observed all year round.

In 2019, the following recreators’ violations were observed: a) walking with pets on the territory, which is prohibited on the lagoon; b) smoking in unintended places and drinking alcohol; c) making fires on the territory; d) leaving garbage in the wrong place.

However, these violations were eliminated in 2020.

In recent years, residential buildings, a large sports complex, the Naval Cathedral are being very actively built in the southern district of the city. The beach is developing rapidly. The future of the lagoon is at stake.

Therefore, the studies were carried out during three years (2019–2021). The dynamics of vacationers at various points was observed within an hour.

Figure 1. Points of calculation of vacationers

The number of tourists at each site is unevenly distributed (Fig. 1). It depends on their location, arrangement and condition of the sites. The number of recreators and dynamics are present in diagram (Fig. 2).

However, the quarantine introduced in 2020 in our country had a positive effect on the natural monument. The overall environmental situation of the lagoon has improved compared to 2019. The negative factors of influence have decreased significantly, namely, anthropogenic and transport impact.

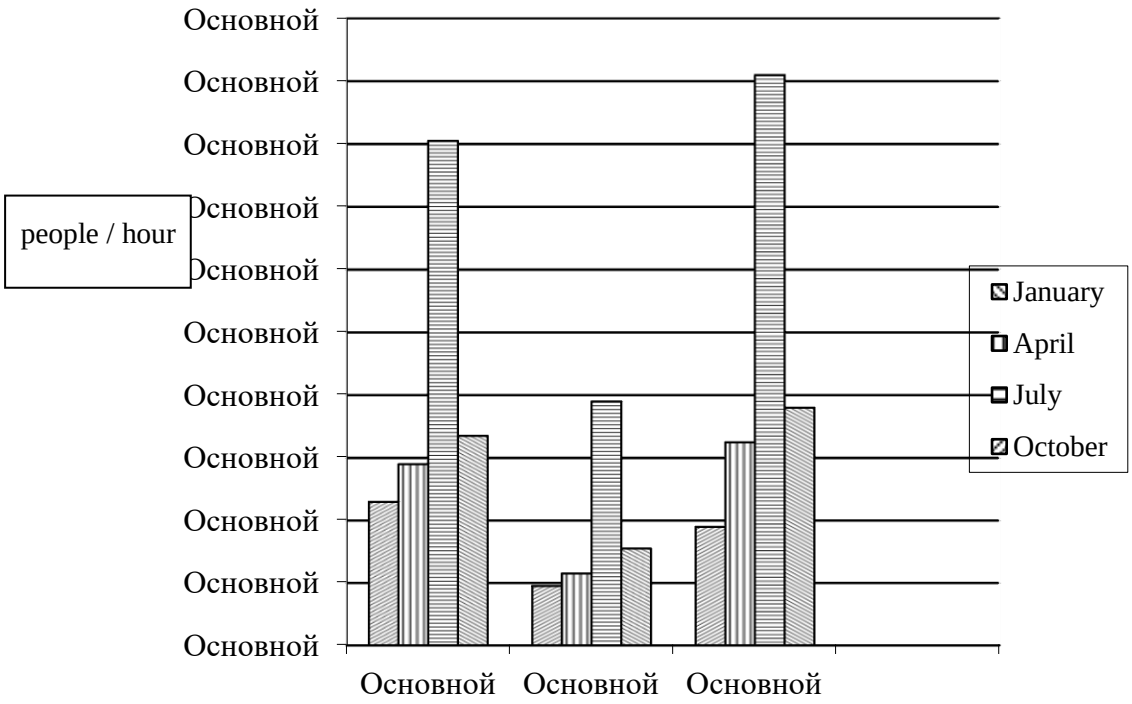

Figure 2. General dynamics of recreators in the period 2019-2021 (from 1:00 p.m. to 2:00 p.m.)

In 2021, there is an increase in tourists compared to previous years. Nevertheless, thanks to total clean-ups, usually carried out in April–May, the state of the natural monument has improved significantly. By the way, we did not notice unauthorized dumps. Garbage bags with recycled waste were observed around the entire perimeter of the territory.

When visiting the "Sudzhuk lagoon" in 2021, the first thing that caught our attention was the large number of urns. 30 additional waste bins were installed on the lagoon, including 5 waste containers for collecting solid municipal waste. We also allocated 3 more equipped smoking areas. As a result, the amount of garbage has decreased: cigarette butts, plastic bottles, polyethylene and other waste left by recreators.

When analyzing the ecological state of the "Sudzhuk lagoon" in 2021, we noticed a change in the structure of the territory – a closure channel connecting the Black Sea and the Salt Lake was restored. Environmentalists and activists of Novorossiysk are concerned about the state of the "Sudzhuk lagoon". Therefore, the problem is that the closure channel is covered with pebbles. Because of this, fry of fish from the reservoir cannot get into the sea, and migratory birds, which usually come to the "Sudzhuk lagoon" for wintering, will have nothing to eat. Local residents have repeatedly turned to the environmental prosecutor's office to pay attention to the situation and clear the closure channel. Nevertheless, the necessary work on this site did not begin, so the residents of Novorossiysk took buckets and shovels and decided to open the closure channel themselves [5].

Thus, in order to preserve a rare natural object, it is necessary to regulate the recreational load, prohibit all types of economic activities that damage the lagoon ecosystem, organize a centralized and permanent disposal of household waste. To maintain the right functioning of the lagoon ecosystem and water circulation, it is important to monitor the presence of the closure channel connecting the Salt Lake and the Black Sea, which prevents siltation.

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Lemeshko P.V., Postarnak Yu.A., Semenova S.N.
To the Question of the Recreational Load on the Littoral Ecosystems of the Nature Monument «Salty Lake» (Veselovka settlement)

Kuban State University
(Russia, Krasnodar)

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Abstract

The article presents the results of the study devoted to the assessment of recreational load on littoral phytocenoses in the vicinity of the settlement of Veselovka (Temryukskiy district), confirming that the studied area is actively used for recreational purposes and is experiencing a high anthropogenic load. Violations of water and environmental legislation have been registered. It is necessary to develop a set of measures to optimize recreational environmental management, taking into account the maximum permissible levels of recreational use.

Keywords: recreational load, phytocenoses, littoral, Veselovka settlement, natural monument, Salty Lake.