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Population Dynamics of Small Mammals as a Bio Indicator of Ecosystem Status

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Currently, the world pays great attention to solving the problem of sustainability of tugai ecosystems, especially for the ecological study of tugai ecosystems within the framework of population evolution theory and further development of the concept of ecotons as a unique natural model. The study of the number and species composition of mammals in tugai ecosystems is of great theoretical and practical interest in the field of ecology, as well as knowledge of the basic laws of formation of regional biota and identification of ecological mechanisms.

Determining the basic laws and mechanisms of adaptation of living organisms to different environmental conditions is one of the central directions of modern ecology. Population structure is the main form of existence of all mammals, which fully reflects the adaptive response to changes in the environment and reveals the regional characteristics of intraspecific variability [1, 8, 9].

The study of the numerical dynamics of animals is one of the most important problems of modern ecological science. This problem is of great theoretical and practical importance, as it allows to know many important aspects of the evolutionary process, to develop measures for the rational use of natural resources and the conservation of biological diversity [1, 6, 8].

Small mammals have a distinct life form and are characterized by great sensitivity to external influences. Low individual resilience to various environmental factors and therefore high mortality rates they recover with accelerated reproduction, adaptive resilience, and increased group resilience [3].

In recent years, studies devoted to the analysis of the interaction of mammalian populations with the population dynamics of animals have collected data on populations living in different geographical, climatic and biocenotic conditions. The large amount of material collected to date in some species of small mammal fauna in the South Aral Sea region allows a quantitative analysis of the data obtained to assess the impact of various factors on the number and structure of small mammal populations studied in sharply deteriorating conditions.

65 species of mammals belonging to 6 genera, 16 families and 41 genera have been recorded in the region. In the faunal complex of mammals of the Southern Aral Sea, mesophilic and hydrophilic species (23 species) are common in the Amudarya lowlands, xerophiles (24 species) live in the Kyzylkum and Ustyurt, eurybionts - in the Amudarya plains (8 species) and Ustyurt (around 11 species) [8].

Analysis of the distribution of mammalian fauna by ecological biotopes in the South Aral Sea region shows that many species (more than 62%) are distributed in sandy-desert and mud-gravel landscapes; in the desert landscape - around 6%, in the tugai - 16% (found mainly in the valley and Amudarya delta) [2,3].

It should be noted that relatively more mesophilic species are found, such as flat-toothed rats and others. However, the dominant background species among rodents are house mice and voles. Due to the drying up of many reservoirs and lakes, the re-formation of mammalian fauna due to the reduction of species composition in reeds, and the number of many species is sharply reduced [1,4,9].

16 species of mammals are recorded in the tugai forests. Rodents include the house mouse, the flat-toothed rat, *Microtus Ilaeus*, and the rattlesnake. In the Amudarya ravine and delta, 13 species of rodents have been recorded, the most common of which are the flat-toothed rat (23.2%), the house mouse (13.6%), the small rat (14.5%), and the yellow rat (10%). tamarisk sandpiper (15.5%), *Microtus Ilaeus* (3%); in ponds - muskrat.

In the analysis, we can note that the population of Microtus Ilaeus is one of the few species in the mammal fauna of the Southern Aral Sea. In the lower Amudarya delta, Microtus Ilaeus often lives in a mesophilic environment, i.e. in thick reedbeds, grasslands, and grasslands with periodic flooding. However, tugai can be found in sernam areas, on the banks of rivers and canals, as well as in irrigated fields. It was previously thought to be *Microtus Ilaeus* Caspian (*Microtus transcaspicus Satunin*), 1905 [5], or Kyrgyz *Microtus Ilaeus* (*Microtus kirgisorum Ognev*), 1950 in the Lower Amudarya delta. However, according to modern concepts, in the Lower Amudarya delta lives exactly the population of Ili Microtus Ilaeus [7, 8].

It is known that populations of rodents are characterized by a complex age structure due to rapid renewal. In a study of the age structure of the house mouse *Mus musculus* population, it was found that in spring natural specimens the adult group was almost non-existent, while in synanthropic populations (populations) they accounted for 24.0%. This suggests that in nature, adult groups of adults are completely eliminated during the winter (death for some reason), and animals of the autumn generation survive until spring [2].

For the rest of the year, the proportions of the different age groups of the compared micropopulations were equal, but in all seasons the animals of the second group were more numerous.

Population regulation is the most important ecological adaptation, more specifically the adaptation complex that creates the basis for the stabilization and prosperity of a species. At the same time, these mechanisms, which are an important product of the evolution of adaptation, enhance the specialization of the species, its "recognition" by the environment, and in a sense limit the possibilities of its subsequent evolution.

Quantitative dynamics, which reflects the quantitative aspects of a population's interactions with the environment, is the culmination of the struggle for survival in the broadest sense. It is, in a sense, a process of adaptation in which the population participates as a self-governing system, striving for optimal stabilization and dynamic balance with the resources of the habitat. Spring floods and rising Amudarya levels periodically flood large areas of reedbeds and reed-tamarisk thickets, which dramatically destroys small mammal populations. However, along with the intensity of reproduction, this causes abrupt changes in the seasonal quantities of the rodent.

Small mammals are a traditional (classical) model object for environmental research. They meet many requirements for monitoring species, that is, they are widespread in different biotopes, play an important role in ecosystems, have a high sensitivity to anthropogenic impact on nature, and are sensitive to environmental changes [8].

The study of species in all areas of the range meets the modern challenges of comprehensive environmental research, as well as the fate of certain species under the influence of human activities. Due to changes in the ecological situation of the Southern Aral Sea region, certain changes are taking place in the biotopic dependence of small mammals.

According to research, the influence of climatic factors on the quantitative dynamics of small mammals is of particular importance. The rate and variability of the quantity is realized primarily by the rate of extinction, and this rate increases with respect to the force index, which adversely affects the optimal conditions.

However, the mortality and survival rate is determined only by the intensity of the influencing factor, taking into account the resilience of the animal organism and some characteristics of the environment: the presence of a shelter with relatively favorable conditions, the mitigating effect of mixed factors.

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