Benthic macroinvertebrates of the northern Caspian Sea during recent rises in water-level

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Abstract. Data on benthic macroinvertebrates of the northern Caspian Sea in 1980–1991 were collected by the Caspian Fishery Research Institute. During the initial period of the water-level rise, the main trends in benthic macroinvertebrates were increases in the biomass of the main groups and decreases in the relative abundance of species of Mediterranean origin. There was no significant alteration in species composition. The increased abundance was due to improved trophic conditions and a decrease in the numbers of benthos-feeding fish. Some decrease in the relative abundance of species of marine origin was related to a decrease in water salinity.

Key words: benthic macroinvertebrates, Caspian Sea, salt lakes, water-level rise, zoobenthos

Introduction

The Caspian Sea, like many lakes in arid regions, has undergone marked changes in the water-level. In the first half of the 20th century, the water-level fell and by 1977 had reached 28.9 m below ocean level. In 1978, however, the water-level began to rise and by 1991 had risen 1.8 m. At present (1998), the level of the Caspian Sea has risen 2.2 m. This level was attained in 1997 and has been more or less stable since then.

The unique biological resources of the Caspian Sea, as well as its significant social and economic values, have attracted close public and scientific attention in recent years. Explorations of its benthic communities have revealed large numbers of endemic species, and spatial irregularity and significant long-term fluctuations in the abundance of benthic invertebrates (Birstein, 1945; Vinogradov, 1955, 1959; Saenkova, 1959; Osadchikh, 1963, 1968; Romanova, 1960, 1963; Yablonskaja, 1975). Many studies identified a significant correlation between the abundance of benthic taxa and elements of the hydrological regime, particularly salinity, river outflow volume, and flood periodicity etc. (Yablonskaja et al., 1974; Osadchikh, 1980; Yablonskaya and
Osadchikh, 1996). Changes in key environmental factors followed the fall in water-level in the period 1930–1970s and significantly influenced benthic communities (Osadchikh, 1988; Yablonskaya and Osadchikh, 1996). Likewise, recent rises in water-level have apparently caused significant ecosystem changes. Unfortunately, these recent changes are less well known because of difficulties in the support of scientific research.

The main objective of the present paper is to evaluate the state and dynamics of benthic macroinvertebrates in the northern Caspian Sea during the initial period of recent rises in water-level (between 1980 and 1991).

Materials and methods

Data were obtained in the northern Caspian Sea in 1980–1991 during the course of standard June hydrobiological observations by the Caspian Fishery Research Institute (KaspNIRH) (Figure 1). Benthos at depths of 2 to 10 m was investigated. Bottom samples were collected using an “okean” bottom sampler of 0.1 m² gape size. Sample collection and treatment was made using standard methods (Anon., 1983). A total of 1400 quantitative benthic samples was collected and analysed.

Results

Northern Caspian as a whole

In the period 1980–1991, benthic communities of the northern Caspian comprised 110 species of aquatic invertebrates (Table 1). The largest number of species (50) recorded were amphipod species. Polychaetes comprised 6 species, leeches 3, bivalves 22, gastropods 2, ostracods 10, Cumacea 14, Mysidacea 8, Isopoda, Cirripedia and Decapoda, 1 species. Species of Turbellaria, Nematoda, Oligochaeta, Chironomidae and Trichoptera were not identified.

A number of the species recorded (70 taxa) was found during the whole period of the investigation. Other species were represented only occasionally and without any noticeable trends.

Bivalve molluscs formed the greatest part (75 per cent) of benthic macroinvertebrate biomass in the northern Caspian (Table 2). The abundance of Annelida, crustaceans and chironomids was much lower (12, 12, and 1 per cent, respectively). Mytilaster lineatus and Abra ovata were the dominant bivalves. Oligochaetes dominated the Annelida. Among crustaceans,