Coastal Monitoring of the Caspian sea (In Noshahr Area)

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Abstract

This study aims to assess and monitor physical and chemical parameters of the sea (dissolved oxygen, pH, temperature, salinity, density, pH), nutrients (phosphate, nitrate, nitrite, and silica), phytoplankton, zooplankton and macrobenthic communities in the Noshahr regional water (Chalus: Sardab rud, Nowshahr: Kapoorchal, Anarvr and Sisangan) in four transects perpendicular to the coast in the fall and winter of 1392 (12 stations at depths of 5-10 and 20 m) were sampled. Results explained below. Also the mechanism of sediment transport and shoreline Noshahr Port was examined briefly.

Chemical properties examinees using Multi meter (Hach) and Spectrophotometer (specord210): The results indicated range of dissolved oxygen 7.67- 10.65 mg/lit, total alkalinity 3359- 4194 µmol/Kg and pH 8.55- 8/84 respectivly. The concentrations of phosphate (fewer than 5 µg/lit), nitrite (non detection), nitrate (maximium 35.88 µg/lit in autumn) and silica (maximium 469.27 µg/lit in winter) were very same to last data. Also, there was significant differences in nitrate and silica concentration among stations ($P<0.05$).

Variations of the seawater properties (e.g. temperature, salinity and density) based on the field measurement over the continental shelf of the southern Caspian Sea were investigated. A portable CTD probe was applied for profiling from sea surface to

bottom at 12 fixed stations in October 2013 and March 2014. Maximum depth of the profiling stations was more than 40 m in the study area. Vertical structure of temperature in the southern Caspian Sea waters is characterized by a seasonal shallow thermocline through the subsurface layer. Average values of temperature, salinity and density in the first step of field observations were around 27.27oC, 12.29 psu and 1006.61 kg/m3, respectively. While, mean values of mentioned characteristic in the second measurement were around 11.44 oC, 12.19 psu and 1008.17 kg/m3, respectively. According to the vertical structure of sea water properties, correlation between seawater density and temperature is obviously seen. Local river discharge is the most important factor in changing the physical parameters in the region. Horizontal gradient of the above-mentioned parameters were slight and due to daily variations or coastal process.

Also Phytoplankton and zooplanktons species composition and abundance were investigated in samples collected from 9 stations along three transects (Chaloos, Nowshahr and Sisangan).

A total of 29 species of phytoplankton with mean density of 189.42 ± 373.39 cells.l-1 from 23 genera, 21 families, 18 orders, 4 classes and 4 phyla were identified, which comprise of Bacillariophyta, Pyrrophyta, Chlorophyta and Cyanophyta. Phylum Bacillariophyta was dominant in term of both abundance (261.96 ± 819.68 cells.l-1) and diversity (16 species). Among species, Thallassionema nitzschioides with mean density of 2998.89 ± 2930.12 cells.l-1 shows highest abundance in both seasons. Besides, two other species Prorocentrum micans with mean frequency of 1234.44 ± 2275.75 cells.l-1 and Pseudo-nitzschia seriata with mean density of 905 ± 1364.36 cells.l-1 were abundant in autumn and winter, respectively. Comparison of Phytoplankton abundance in different

transects showed an increasing trend from western transect (Chaloos) towards eastern transect (Sisangan) with highest abundance in Sisangan ($p<0.05$). One way ANOVA showed significant differences in phytoplankton densities between different depths ($p<0.05$) and different seasons ($p<0.05$).

in 2 seasons (autumn and winter) Samples were collected with 100 µ plankton Net. Totally 8 zooplankton groups identified. In autumn, lamellibranch larvae had highest abundance (8060 ind.l-1) and lowest abundance belongs to N. diversicolor (Polychaete) (299 ind.l-1). But, in winter, Aslanchnasp, (Rotifera) had highest abundance (6877 ind.l-1) and lowest abundance belongs to larval stage of Balanus sp. (Cypris) (372 ind.l-1). In each of the two seasons, abundance of zooplankton groups in most of stations had significant differences with each other ($P<0.05$). But, in some stations, no significant differences found between abundances ($P>0.05$). Diversity and richness indices in two seasons were different. Shannon diversity and Margalef richness indices at most of the stations in autumn were higher than winter. But, Simpson diversity and Senhinick richness indices in winter were higher. Also, Jaccard and Kulczynski (Qualitative and Quantitative) similarity indices in two seasons were completely different. In autumn, stations had deferent similarity indices (Jaccard and Kulczynski), but in in winter, indices were completely similar at all stations.

The diversity and distribution of macrobenthic communities in four transects mentioned in autumn and winter sampling was performed using a Van Veen sampler. Totally, 6 families and 9 species of macrobenthic communities in autumn and 7 families and 9 species of macrobenthic communities in winter were identified in sampling sites. Regarding the obtained results, Hypania invalida, Streblospio gynobranchiata and Oligochaeta were dominant at each both seasons. Average density, Shannon, evenness

and Margalef index were 823.16±588.23 Ind/m2, 1.54±0.40, 0.82±0.12 and 1.04±0.35 in autumn. Also, Average density, Shannon, evenness and Margalef index were 977.20±807.35 Ind/m2, 1.77±0.28, 0.81±0.12 and 1.27±0.38 in winter.

Comparison of measured parameters showed that Margalef index has significant difference between two seasons ($p<0.05$) and Margalef index was higher in winter in comparison to autumn. Also, others diversity index had no significant difference between two seasons. According to Pearson test, there were positive and significant correlations between Mud with TOM while sand with TOM had negative and significant correlation ($p<0.01$). Density had negative correlation Mud and TOM ($p>0.05$). Shannon had negative correlation Mud and TOM while Shannon had positive correlation with sand and depth ($p>0.05$). Also, evenness had positive correlation with all parameters exception to mud.

Keywords

Environmental Monitoring,Caspian Sea,Noshahr Coasts