

Investigation of Mahshar Creeks (North of Persian Gulf) as a protected area

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In recent years MPAs (Marine Protected Areas) have been known as a flexible tool to improve fishery management as well as to preserve biodiversity in valuable coastal waters habitats. This study was conducted to selecting the sensitive and high potential area that is impacted by several environmental stress and associated habitats are being damaged in Mahshahr creeks in Northwest of Persian Gulf. Study was done in eight creeks from October 2005 to September 2006. Different biotic parameters such as phytoplanktons, zooplankton, macrozooplankton, benthic animals and fishes (trawled species) communities and also physico-chemical parameters and sediments heavy metals were investigated. Different parameters were sampled monthly or seasonal from each creek. Water samples with bottle sampler and sediment were collected by Peterson grab. Several ecological and biological indices based on heavy metals and benthic communities were used. Concentrations of heavy metals were measured by using voltammetric plarography method (Methrom 797). The range and mean concentrations obtained in mg/kg were 35.16-15.03 (27.01) for Cu, 171.41-65.57 (102.672) for Ni, 20.06-4.63 (13.22) for Co, 0.78-0.093 (0.22) for Hg, 379-65.07 (113.7) for Zn, 1.00-0.27 (0.559) for Cd and 29.72-7.09 (14.66) for Pb. To evaluate the levels of sediment contaminations, the background values of the different heavy metals were calculated and contamination factor for each metals and degree of contamination for each creek determined as well. Measured concentrations were compared with International standards. Ultimately the heavy metals contamination factors (Cf) can be arranged as follows: Hg> Zn> Cu? Ni > Pb> Co > Cd and according to contamination degree (Cd), different creeks can be arranged as follows too:

Ghannam> Ahmady? Zangy> Doragh? Darvish> ghazaleh> Patil> Bihad

Regarding the results some elements such as Hg, Zn and Ni, are at risk level and all of the studied creeks are classified in moderate degree of pollution except Ghannam showing considerable degree of pollution. The benthic invertebrates are a well-established target in evaluations of environmental quality status. The AMBI (AZTI's Marine Biotic Index) was developed to determine the impacts and the quality status in soft-bottom marine benthic communities. All creeks are characterized by muddy bottom. Macrobenthic animals, according to their sensitivity to an increasing stress gradient, classified in five ecological groups. In present study due to appearance of dominant species such as *Capitella* sp and nematodes (as opportunist species), diversity values was reduced. Two way ANOVAs showed only seasonal significant differences in mean abundance ($P < 0.05$, $f = 5.712$, $df = 3, 21$) and Richness index values ($p < 0.05$, $f = 4.975$, $df = 3, 21$), while all of creeks showed similar biological characters based on benthic communities. According to annual, mean of AMBI (BC) all of creeks classified in ecological group III with slightly pollution, except Darvish that was placed in unpolluted category.

In general, according to AMBI and BI values, the most creeks are classified in unpolluted (34%) and slightly pollution (34%) categories except Zangy, Doragh and Patil in summer and also Zangy and Bihad in winter that showed moderate to heavily pollution (32%). The results of chemical quality of sediments, Cf values, Cd values, AMBI Index and water quality and risk Indices have confirmed each other. In general, the Mahshahr creeks are classified in moderate to heavy pollution status. In addition, biological parameters of benthic communities and other biotic parameters have shown-descending trend in ecological quality in all of the studied creeks. We used of some criteria for evaluation of biotic potential or sensitivity and also to explain the ecological health level of studied creeks. Positive and negative criteria are classified in three level 1,3 and 5 for low, moderate and high degree of conservation value respectively. According to gained points the creeks Darvish, Doragh and Ghazaleh in high level and creeks Ghannam , Zangy and ahmady in low level of conservation value were classified.

Key word: Bottom sediments, Heavy metals, Contamination factor, AMBI Index, Risk Index, Mahshahr creeks, Khuzestan coastal waters.