

Impact of Climate Change on Sea Level Fluctuations in Iran: Caspian Sea & Persian Gulf

Abstract:

Climate change, as one of the main challenges of the 21st century, has had a significant impact on the hydrological cycle and ocean systems of the world. One of the most prominent manifestations of this phenomenon is the fluctuations in the water level of the seas and oceans, which have widespread consequences on coastal settlements. In this study, the effect of climate change on sea level fluctuations in two different basins of Iran - the Caspian Sea and the Persian Gulf - has been analyzed and compared. For this purpose, observational data from coastal stations, satellite altimetry data, and the output of the sixth generation climate models (CMIP6) were used in the period from 1980 to 2100. The trend of water level changes was examined using the Mann–Kendall and Sen’s slope statistical tests and its relationship with climate variables such as temperature, precipitation, and evaporation. The results showed that in the Caspian Sea, increasing temperatures and decreasing precipitation in the catchment area have caused a decrease in the average water level in recent decades, while in the Persian Gulf, a slight increase in water level is observed, especially under the extreme warming scenario (SSP5-8.5). Spatial analysis of the impacts showed that coastal settlements located in the northern lowlands are exposed to water receding, reduced aquatic populations, and increased dust incidence, and the southern coastal areas of the country are at risk of inundation, erosion, and increased soil salinity. The findings of this study can provide a basis for climate adaptation policies and integrated management of Iran's coastal areas.

Keywords: Climate change, sea level, Caspian Sea, Persian Gulf, coastal settlements, CMIP6, climate scenarios