# 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 worldwide. One of the most prominent manifestations of this phenomenon is the fluctuations in sea and ocean water levels, 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. Observational data from coastal stations, satellite altimetry, and the outputs of the sixth generation climate models (CMIP6) were used for the period 1980–2100. The trend of water level changes was examined using the Mann–Kendall and Sen's slope statistical tests, along with its relationship to climate variables such as temperature, precipitation, and evaporation.

Results showed that in the Caspian Sea, increasing temperatures and decreasing precipitation in the catchment area have caused a decrease in 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 northern lowland coastal settlements are exposed to water receding, reduced aquatic populations, and increased dust incidence, while southern coastal areas are at risk of inundation, erosion, and increased soil salinity.

These findings provide a scientific 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