


Estimating the potential economic impacts of climate change on Southern California beaches

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Abstract

Climate change could substantially alter the width of beaches in Southern California. Climate-driven sea level rise will have at least two important impacts on beaches: (1) higher sea level will cause all beaches to become more narrow, all things being held constant, and (2) sea level rise may affect patterns of beach erosion and accretion when severe storms combine with higher high tides. To understand the potential economic impacts of these two outcomes, this study examined the physical and economic effects of permanent beach loss caused by inundation due to sea level rise of one meter and of erosion and accretion caused by a single, extremely stormy year (using a model of beach change based on the wave climate conditions of the El Niño year of 1982/1983.) We use a random utility model of beach attendance in Southern California that estimates the impacts of changes on beach width for different types of beach user visiting public beaches in Los Angeles and Orange Counties. The model allows beachgoers to have different preferences for beach width change depending on beach size. We find that the effect of climate-driven beach change differs for users that participate in bike path activities, sand-based activities, and water-based activities. We simulate the effects of climate-related beach loss on attendance patterns at 51 public beaches, beach-related expenditures at those beaches, and the non-market (consumer surplus) value of beach going to those beaches. We estimate that increasing sea level will cause an overall reduction of economic value in beach going, with some beaches experiencing increasing attendance and beach-related earnings while attendance and earnings at other beaches would be lower. We also estimate that the potential annual economic impacts from a single stormy year may be as large as those caused by permanent inundation that would result from a rise in sea level of one meter. The economic impacts of both permanent inundation and storm-related erosion are distributed unevenly across the region. To put the economic impacts of these changes in beach width in perspective, the paper provides simple estimates of the cost of mitigating beach loss by nourishing beaches with sand.