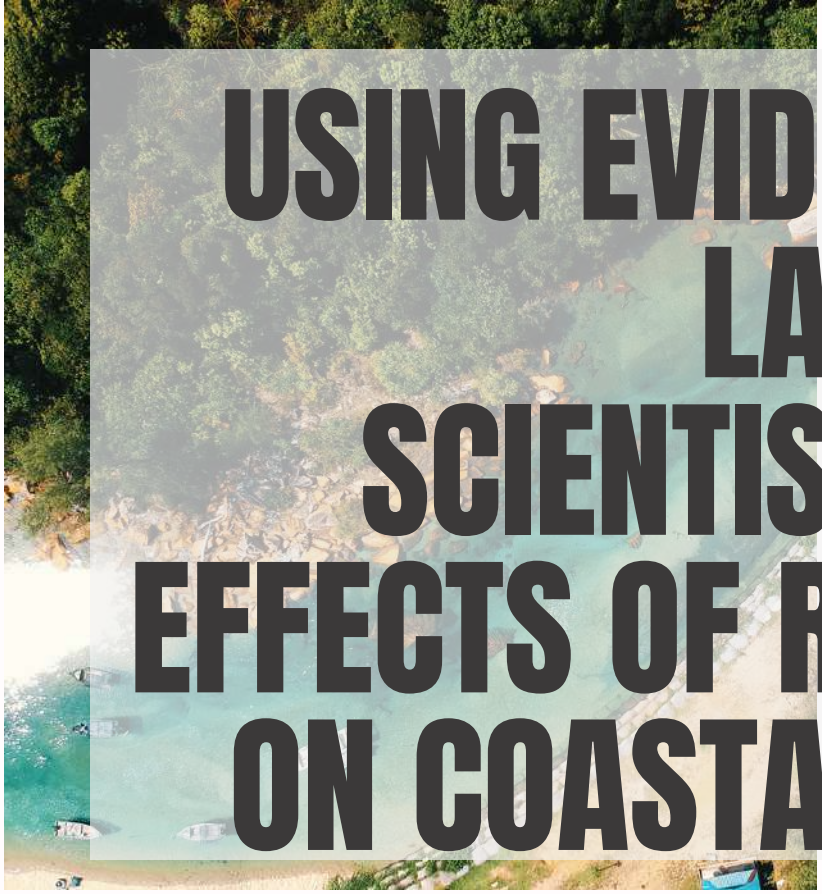

USING EVIDENCE FROM LAST ICE AGE, SCIENTISTS PREDICT EFFECTS OF RISING SEAS ON COASTAL HABITATS

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Summary: The rapid sea level rise and resulting retreat of coastal habitat seen at the end of the last Ice Age could repeat itself if global average temperatures rise beyond certain levels, according to an analysis by an international team of scientists.

The rapid sea level rise and resulting retreat of coastal habitat seen at the end of the last Ice Age could repeat itself if global average temperatures rise beyond certain levels, according to an analysis by an international team of scientists from more than a dozen institutions, including Rutgers.

In a study published in Nature, scientists reported how ancient coastal habitats adapted as the last glacial period ended more than 10,000 years ago and projected how they are likely to change with this century's predicted sea level rise. They conducted their analysis by examining the ocean sediments of ancient shorelines from a time when oceans rose rapidly, mainly because of melting ice sheets in the Northern Hemisphere. This examination allowed them to infer how ancient coastal habitats changed and formed the basis of improved predictions about the present.

"Every ton of carbon dioxide humankind emits turns up the global thermostat, which in turn increases the pace of global sea level rise," said Robert Kopp, a Distinguished Professor in the Department of Earth and Planetary Sciences in the Rutgers School of Arts and Sciences and an author of the study. "The faster the oceans rise, the greater the threat to tidal marshes, mangroves and coral reefs around the world. For example, in our analysis, most tidal marshes are likely to be able to keep up with sea level rise under 1.5 degrees Celsius [2.7 degrees Fahrenheit] of warming, but two-thirds are unlikely to be able to keep up with 2 degrees Celsius [3.6 degrees Fahrenheit] of warming."

The temperature ranges mentioned in the study are significant because they relate directly to the Paris Agreement, an international treaty on climate change adopted in 2015, said Kopp, who is also the director of the Megalopolitan Coastal Transformation Hub and co-director of the University Office of Climate Action. The goal of the Paris treaty is to substantially reduce carbon emissions worldwide to limit the global temperature increase in this century to 2 degrees Celsius above preindustrial levels while pursuing efforts to limit the increase even further to 1.5 degrees Celsius.

The study predicted higher global temperatures will provoke sea level rises that will lead to instability and profound changes to coastal ecosystems, including tidal marshes, mangrove forests, coral reefs and coral islands.

Tidal marshes -- low-lying areas flooded and drained by tidal salt water -- protect many of the world's coastlines. They sequester pollutants, absorb carbon dioxide and protect nearby communities from storm surge and flooding. They are common along the Atlantic shores of North America. Large expanses of tidal marshes line New Jersey's coast.

"This new paper provides evidence from geological history that, without mitigation and under current projections, tidal marshes will not have the capacity to adjust," said Judith Weis, a Professor Emerita of Biological Sciences at Rutgers-Newark who isn't an author of the study but is an expert on tidal marshes. "For many tidal marshes in New Jersey, this is not a prediction but a description of the present situation, in which sea level is rising faster than the marshes can increase their elevation. This makes it even more vital to reduce climate change as rapidly as possible."Tidal marshes and mangrove forests adapt to rising seas by accumulating sediment and moving slowly inland."Mangroves and tidal marshes act as a buffer between the ocean and the land -- they absorb the impact of wave action, prevent erosion and are crucial for biodiversity of fisheries and coastal plants," said Neil Saintilan, the paper's lead author and a professor at Macquarie University in Sydney, Australia. "When the plants become water-logged due to higher sea levels, they start to flounder."

Under worst-case scenarios, these coastal habitats, buffeted by rising sea levels, will shrink and, in some cases, wash away, as they have in the distant past, according to the study.