Bay wetlands may face losing battle against sea level rise

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Students in Tom Parker's lab set up an experiment at a salt marsh in Corte Madera, Marin County.

(PhysOrg.com) -- San Francisco Bay's tidal marshes may face a grave threat from sea level rise in the next century, according to a new study published by a group of scientists, including Professor of Biology Tom Parker.

Tidal salt marshes form on the fringes of the Bay. Tall, reed-like cordgrass grows in lower marshes, inundated by the tide twice a day, while salt-resistant succulents are the signature plants of higher marshes, which only get wet during extreme high tides and storms.

These ecosystems are a critical natural resource. They sustain migrating birds and other wildlife, protect coastlines against flooding, provide

nursery areas for commercial fisheries and filter pollutants from seawater and the atmosphere.

But the survival of these wetlands depends on a delicate equilibrium between the water level and how quickly sediment is deposited by the seawater. That balance is likely to be thrown off course by climate change over the next century, the researchers found, as accelerated sea level rise outpaces the marshes' ability to build up layers of organic matter, mud and minerals.

The researchers found that in the worst case scenario, 93 percent of the Bay's tidal marsh could be lost in the next 50-100 years if no significant marsh restoration efforts are undertaken. This dire prediction was based on a sea level rise of 5.4 feet and low sediment availability.

"So far, wetlands in San Francisco Bay have been able to keep up with low rates of sea level rise of about 1 millimeter per year, which have increased to 2-3 millimeters per year in the last decade," Parker said. "But the sea level rise predicted for the next century is far greater and the bottom line is that there won't be many wetlands left."

Parker was part of a collaboration of researchers, led by scientists at PRBO Conservation Science, who built a model to predict how sea level rise may impact San Francisco Bay's tidal marshes. Parker contributed data on how quickly sediment builds up in the wetlands. Since 2003, he has conducted extensive fieldwork in the Bay's tidal marshes, funded by the California Bay-Delta Authority's CalFed program and the U.S. Department of Energy's National Institute of Climate Change Research.

"The amount of sediment in the water is expected to decline in the future which doesn't bode well for tidal marshes," Parker said, noting that the damming of rivers upstream has reduced the sediment available to replenish marshes.

The study was published Nov. 16 in the online journal PLoS One. The researchers produced an online tool with interactive maps showing where marshes will survive under various sea level rise scenarios.

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