Fact Sheet: Sea Level Rise and Associated Impacts in Kiribati

Sea Level is Currently Rising in Kiribati

Kiribati, a nation of 33 coral atolls and reef islands in the central Pacific Ocean, is acutely threatened by sea level rise and coastal flooding, which are exacerbated by climate change. Spanning more than 3,000 km eastward from the capital of Tarawa, Kiribati comprises of three island groups (Gilbert Islands, Phoenix Islands, and Line Islands), each with distinct sea level rise challenges. The NASA Sea Level Change Team has used satellite observations, on-the-ground sources, and tide gauges to assess sea level rise and its impacts for each island group.

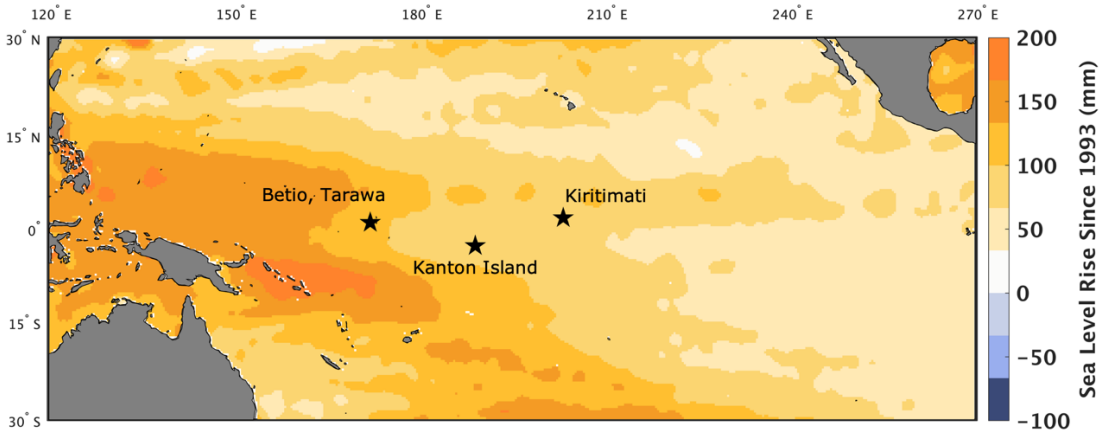

Figure 1: *Amount of sea level rise (mm) from 1993 to 2022 estimated from satellite altimetry data. Stars indicate the locations of the tide gauges in the Gilbert (Tarawa), Phoenix (Kanton Island) and Line (Kiritimati) Islands.*

Sea level in Kiribati has risen between 5 cm (Line Islands) and 11 cm (Gilbert Islands), at an average rate of between 1.7 and 3.7 mm/year since 1993. Sea level rise decreases from west to east across Kiribati, as measured by tide gauges and confirmed by satellite altimetry. Notably, the Gilbert Islands sit on the edge of a region in the western tropical Pacific with persistent sea level rise, with a higher rate of sea level rise than the global average, while both the Phoenix and Line Islands have rates lower than the global average. Even when accounting for subsidence, storms, and variability, there is still an observed increase in the rate of sea level rise across Kiribati.

In Tarawa, Coastal Flooding is Occurring More Frequently

Tide gauge measurements reveal an accompanying increase in the number of days where the total water level exceeds the Low Flooding Extent (50 cm above the mean higher high-water level), indicative of flooding. This threshold has been reached numerous times in Tarawa, but only a few times in Kanton Island and never in Kiritimati, within the tide gauge record.

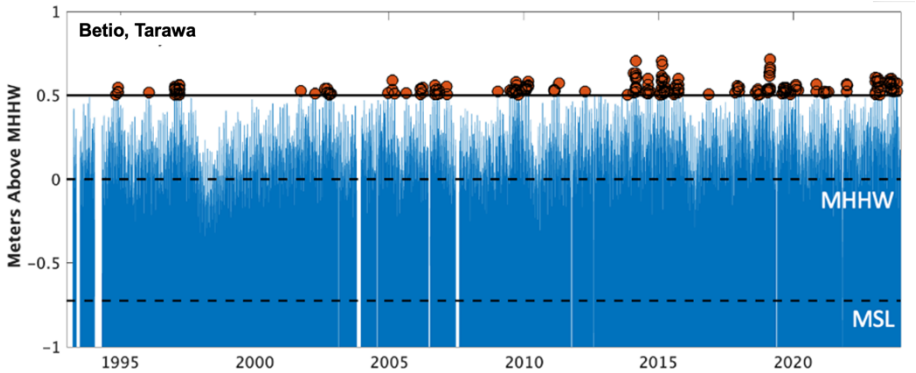

Figure 2: *The range of total water levels (blue) for the tide gauge records in Tarawa, with flooding days (red circles), where the water level exceeded 50 cm above mean higher high water (MHHW). Mean sea level (MSL) is also shown.*

Sea Level Rise Will Continue to Accelerate in Kiribati in the Next Century

Timelines for future sea level rise and associated flooding are developed using the IPCC Sixth Assessment Report (AR6) released in 2021. Regardless of changes in greenhouse gas emissions, relative sea level is projected to increase between 20 and 26 cm by 2050, relative to 2005, and 50 cm to 1 m by 2100, with a low confidence, worst-case estimate approaching 2 m. Projected values have a narrow range of values before 2050 and expand significantly thereafter. The rate of sea level rise by 2100 could also be more than double the current rate, adding over 1 cm every year to the foundation of sea level rise on top of which other ocean variability sits.

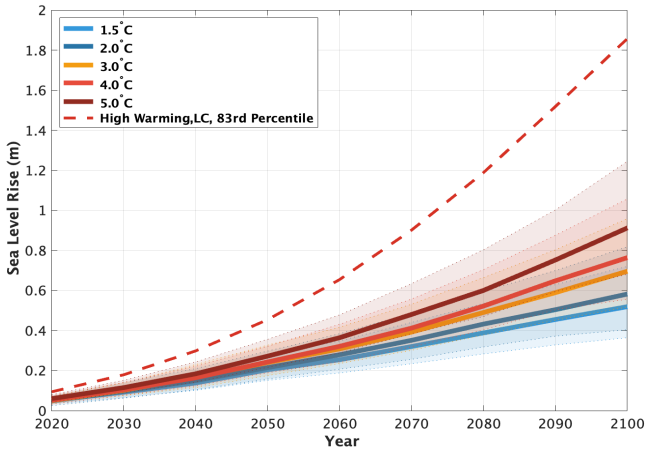

Figure 3: *Projections of future sea level rise from 2020 to 2100 for Kiribati in meters, relative to 2005. Shaded regions represent the likely range for each projection, and the red dashed line represents a plausible upper limit.*

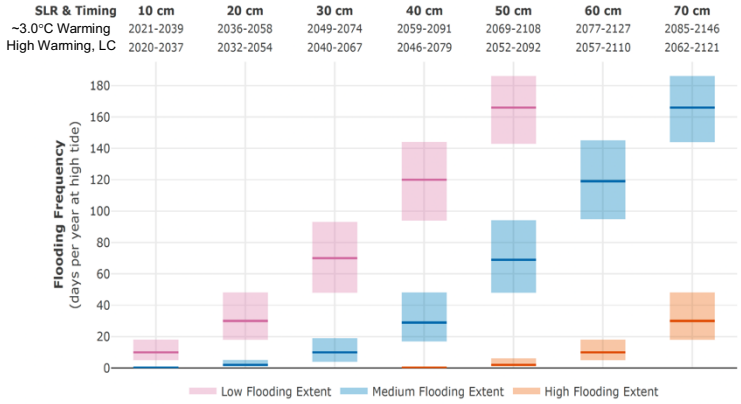

Figure 4: *Flooding frequency in Tarawa for different amounts of future sea level rise (10-70 cm) above current MHHW, shown with timings for the ~3.0°C warming, medium confidence scenario and the high warming, low confidence scenario.*

Flooding Will Increase in Severity and Frequency Across Kiribati

Future sea level rise will cause a large increase in the frequency and severity of episodic coastal inundation and groundwater flooding in Kiribati. The impact on the islands of Kiribati will vary due to geography. In the near-term (prior to 2050), the Gilbert Islands will see worsening of the erosion and inundation that are already underway. The Phoenix and Line Islands will potentially see a very rapid increase in frequency and severity of impacts shortly thereafter. By 2100, all islands are projected to have substantially more than 100 days of flooding per year in all future scenarios, assuming no additional protections. Regular assessments like this, coupled with ongoing monitoring of sea level rise, its underlying processes, and the associated impacts will be critical to support adaptation planning.

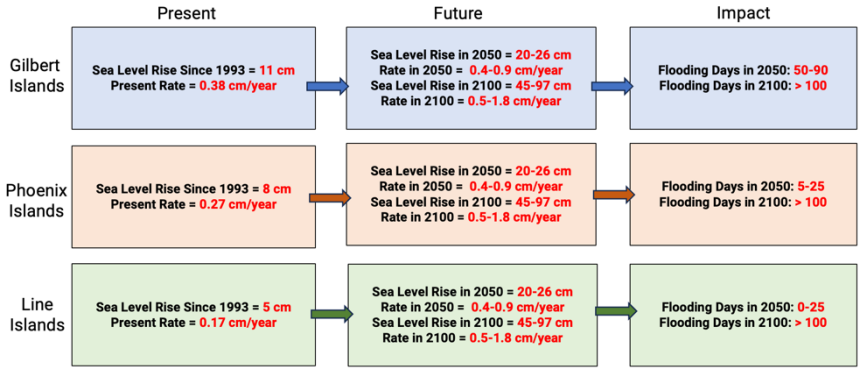

Figure 5: *Summary of current sea level rise and future projections for rates of sea level rise and flooding occurrence*