

OVERVIEW

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Sea Level Rise (SLR) is a major global concern and a pressure for several goals of the Ocean Health Index. Its ultimate cause is the rise in global temperature caused by release of carbon dioxide and other heat-trapping gases as a result of fossil fuel combustion. The warming atmosphere transfers heat to the ocean's surface waters. Some of the heat slowly penetrates into deeper waters. The "temperature" of water describes the average velocity of the water molecules. At higher temperature, the molecules move faster and take up more room: their volume increases. The warmer ocean's increased volume can't spread outwards, because the shape of the ocean is relatively constant on short time scales. The only place it can go is up, as an increase in sea level. Global warming is also melting mountain glaciers and continental ice caps, and increasing flow of meltwater into the sea from those sources is also causing global sea level to rise.

On average, global sea level is rising slightly more than 3 mm per year, which equals slightly more than 1 inch per decade. Increased warming will would accelerate that rate. Though each year's rise is small, SLR is steady, cumulative and relentless, and is already causing serious socioeconomic consequences. Current and predicted damage includes: coastal flooding, erosion, saltwater penetration into coastal groundwater and wells and potential damage or destruction of infrastructure such as roads, rail lines, subways, ports and airports. Some low lying coastal or island nations are making plans to evacuate portions of their populations.

Lack of global data prevented inclusion of SLR in the 2012 Index, but it was added as a new data layer beginning in 2013. Exact details for computation are shown in the [2013 Ocean Health Index Supplementary Online Material](#).

HOW IS IT MEASURED?

Sea Level Rise is measured by satellites using radar altimeters and by local tide gauges along the coast. While the global trend shows that sea levels are steadily rising at about 3.2 mm each year, rates differ considerably among different coastal locations owing to the local effects of prevailing wind and water currents and local rising or sinking of the land itself. High resolution data on those factors do not yet exist at the global scale, preventing world-wide evaluation of SLR at local scales.

All pressures have different affects on different goals. For each goal, the affect of each pressure is weighted 'low' (1), 'medium' (2) or 'high' (3). The actual data-derived value of the pressure is then multiplied by the weight assigned to it for that goal. That process is repeated for each pressure-goal combination. The sum of those values divided by 3 (the (the maximum pressure-goal value) expresses the total affect of that pressure on the goal.

Sea level rise has high effect (weight = 3) on Coastal Protection (Seagrasses and Salt Marshes). It has medium effect (weight = 2) on Carbon Storage (Seagrasses and Salt Marshes), Coastal Protection (Mangroves, Corals, and Sea Ice), Tourism and Recreation, Livelihoods and Economies (Tourism, and Ports and Harbors), and Biodiversity (Habitats-Seagrasses and Salt Marshes). It has low effect (weight = 1) on Food Provision (Mariculture), Carbon Storage (Mangroves), Livelihoods and Economies (Mariculture, and Energy: wave and tidal), Sense of Place (Lasting Special Places), and Biodiversity (Habitats-Mangroves, Corals, and Sea Ice).

REFERENCES

Nicholls and Cazenave, 2010, <http://www.aviso.oceanobs.com/en/news/ocean-indicators/mean-sea-level.html> 