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## Ipcc report on sea level rise

The latest report by the Un Intergovernmental Panel on Climate Change (IPCC) paints a very sobering picture of the challenges we face due to sea level rise. The Special Report on the Sea and Cryosphere in a Changing Climate (SROCC) finds that the global average sea level is likely to rise between 0.95 feet (0.29 m) and 3.61 feet (1.1 m) by the end of this century. These are the most dire sea level rise forecasts ever made by the IPCC. As alarming as it is to think of sea levels that could be 3.61 feet (1.1m) higher by the end of this century, IPCC projections are still somewhat conservative and do not cover the full range of scenarios scientists believe are possible. Dr. Michael Oppenheimer, a lead author of the SROCC chapter on sea level rise, said in a recent article he co-authored for Scientific American that climate skeptics and deniers have often accused scientists of exaggerating the threat of climate change, but the evidence shows that not only have they not exaggerated, they have underestimated. That may well be true for SROCC and previous IPCC sea level rise forecasts. Sea levels will rise under all emission scenarios for centuries to come and accelerate in the second half of this century. Sea levels have already risen about a foot in recent decades and communities along the entire East and Gulf coasts of the United States are already experiencing chronic tidal flooding. Coastal communities face the threat of direct flooding as well as severely magnified risks from storm surges, tidal floods, extreme rainfall and other effects of climate change. The NRDC has been working on a range of solutions that can help the nation better prepare for and adapt to the reality of sea level rise. These are hardly the only solutions communities, states, and the federal government must pursue and focus only on the built environment. Sea level rise is a complex issue with multidimensional effects. The forecasts themselves depend on a large number of factors. The number of people who will be affected in the future depends on development decisions that we cannot predict reliably. Similarly, the potential strategies for addressing these challenges are complex and multidimensional. What the IPCC projections do (and don't) tell you about sea level rise It's important to realize that IPCC SROCC projections reflect the scenarios that are most likely; not the full range of scenarios scientists believe are possible. SROCC's forecasts do not fully take into account the possibility of rapid changes in polar regions. But it has become apparent that much higher levels of sea level rise are reasonable because Greenland is melting much faster and there is increased instability in West Antarctica. Both of these were once thought to be future concerns, but it is no longer an assumption we should trust. These scenarios were better reflected in the 2017 sea level rise forecasts av National Oceanic and Atmospheric Administration Administration informed the UNITED States' own national climate assessment. NOAA estimates that sea levels are likely to rise between 1 foot (0.3 m) and 4.27 ft (1.3 m); higher than the IPCC's SROCC forecasts. The National Climate Assessment pointed out that these ranges did not, however, capture the full range of physically reasonable global average sea level rise during the 21st century, and that sea levels could rise as much as 8.2 meters (2.5 m) by the end of the century if rapid loss of Antarctic ice occurred. The colored lines show different scenarios for sea level rise. The boxes are the very likely ranges while the lines above the boxes show increases based on recent research on Antarctica. National Climate Assessment, Chapter 2, KM4: Sea level rise. A recent paper in proceedings of the National Academy of Sciences (co-authored by Dr Oppenheimer, who is a leading author at SROCC) acknowledged that sea level rise above 6.56 feet (2.0 m) is possible even if we successfully limit warming to only 2°C by the end of this century. Although such a result is considered extremely unlikely, it was not long ago that such a result was considered so unlikely that it was not more than consideration. Depending on where you are, sea levels can rise much higher sea level rise forecasts given in terms of global average sea level rise, or GMSL. This is the amount of sea level rise on average above each point on the planet's oceans. But sea levels at a certain point vary depending on ocean currents and several other factors, including the gravitational force of Greenland and Antarctica (or lack thereof, if it melts). The amount of sea level rise in a given location can vary about 30 percent from the global average. For the US, NOAA projects such as sea levels along the East Coast could be 0.4m –0.7m higher than GMSL, 0.2m-1.0m higher along the Gulf Coast, 0.2-0.3m higher along the west coast, 0.3m-0.5m higher in Hawaii and the Pacific Islands, and as much as 1.0m lower in Alaska. Direct inundation is only part of the problem when sea levels rise, it's not just those under the new high tide that have to worry. Rising seas mean higher potential for flood events of all kinds. Tidal floods, storm surges and other forms of flooding in low-lying coastal areas become even more likely; what the IPCC calls extreme sea-level events. In fact, SROCC finds that in the absence of adaptation, more intense and frequent extreme sea surface events, along with trends in coastal development will increase expected annual flood damage by 2-3 orders of magnitude by 2100. Floods are just one of the challenges the world is already facing and that more areas will face in the future as sea levels rise. Erosion of beaches and coastal lands, salinity of soils and farmland, and saltwater intrusion into aquifers used for drinking water are all problems we are beginning to see and to grow in the future. Future. systems may not be able to keep pace with the rapid sea level increases that are now being calculated. The salinity of freshwater rivers and wetlands may increase. Tidal wetlands and mangroves, which have some ability to migrate in response to rising seas, may find that they have nowhere to migrate to because of human development that hems them in. If sea level rise cannot be stopped, what can be done about it? Sea level rise is not a reversible effect of climate change. Sea level rise will not stop in 2100. It's just that we usually only talk about the forecasts out to that time frame. The SROCC makes it clear that even under the most optimistic scenarios for emission reductions, the world will experience rising sea levels for centuries to come. Coastal areas and island nations must consider a wide range of adaptation strategies, including migration or managed retreat. SROCC presents the key strategies available to communities and nations. Strategies include doing nothing, Protecting (seawalls, levees, etc.), Accommodate (enlightenment structures or insurance), Advance (building a buffer out into the sea), Retreat (moving away from the coast), and Ecosystem-based Adaptation. Natural Resources Defense Council, 2019. All these climate adaptation strategies are suffering from a current shortcoming: we do not usually take action against them until after a major coastal disaster has already happened. The Strategies of Protect, Hold and Advance have some serious limitations, especially as sea levels approach or exceed these upper limits in the SROCC. First, these strategies aren't very flexible—they hinge on correctly guessing how much the risk of flooding will increase. Structural methods like seawalls and embankments not only cost a lot to build, but can cost even more to maintain and operate. These solutions also tend to be one-dimensional, protecting against a single security problem. A sea wall can be effective against storm surge or direct flooding, but if groundwater rises behind the barrier or precipitation accumulates there, flooding will still occur. On the other hand, Retreat and Ecosystem-based Customization has some clear benefits. Managed retreat is the only strategy that permanently eliminates the risk of future damage. It also provides the opportunity to also address older problems such as social injustice and access to modern infrastructure and services. Retreat doesn't just mean moving away from vulnerable coasts. It can also mean moving towards a better place than the one that people leave behind. Ideally, these two strategies are best implemented together, in a complementary way. As we help people move to higher ground and un-build previously developed areas, we will create new land that can then be used for ecosystem-based strategies. This can not only address vulnerabilities to sea level rise, but also create new habitats for wildlife, improve water quality or improve groundwater recharge. groundwater recharge. societies can rethink where people live, where economic development should take place, and how roads, water, sewerage, and other infrastructure can be improved and redesigned for the future. There are certainly drawbacks to Retreat and ecosystem-based adaptation, starting with being the two strategies we have the least experience with, especially to the extent that sea level rise will require. They also raise the same questions that are common to all adaptation strategies in terms of who pays and who makes money, as well as who is and will not receive state aid to move. All these strategies (Protect, Accommodate, Advance, Retreat, and Ecosystem-Based Strategies... as well as doing nothing at all) will be used as communities, states, and the federal government to come to terms with the reality of sea level rise. What we need to do is start implementing them. Preferably well in advance of major coastal disasters occurring. Where appropriate.