Economic Pulse

Impacts of Rising Seas

by Jim Lee

Global sea levels are expected to rise up to two feet by the end of this century, according to the Conrad Blucher Institute at Texas A&M University-Corpus Christi. In a recent panel presentation, Dr. Philippe Tissot, associate director of the Institute, emphasized how rising water levels will affect ports and coastal communities particularly in the Gulf of Mexico.

How High?
During the last century, sea water levels worldwide rose by two-thirds of a foot. Partly due to the global warming trend (see Economic Pulse, 2013, Issue 5), which has contributed to the melting of glaciers and ice sheets and thermal expansion of the oceans, rising sea levels have appeared to accelerate in recent decades.

While Tissot described the change as a “manageable” condition, there is currently no consensus among scientists as to the projected water level surges or the underlying reasons for the change.

A recent article in Nature, a popular science journal, warns that six feet or more of global

Cities Locked In By 2100

SOURCE: climatecentral.org.
What Rising Seas Would Cause

Tissot’s assumption of up to two feet in sea water level is rather conservative in comparison with many dramatic scenarios, such as the recent claim of a possible six-foot surge. The Climate Central team measures a water level using elevation above the local high tide line, instead of the standard elevation value found on traditional maps.

The table on the next page compares the projected impacts on the individual counties of the Corpus Christi metro area under two alternative hypothetical scenarios: a 2-foot water-level rise and a 6-foot water-level rise.

We draw most data and projections from Climate Central (climatecentral.org), which compares elevation data of geographical locations from NOAA’s Office for Coastal Management against demographic and economic data of local residents from the Census.

In the case of two feet, more than 1,000 people in the area would be affected. Most of those residents would lose their homes, with losses of property values in today’s dollars totaling about $430 million. A total land area of nearly 9 square miles along with 16 miles of roads would also be swamped by sea water.

Population Affected By 6-ft. Water-Level Rise

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While those impacts amount to no more than half of one percent of respective measures of the metro area as a whole, a breakdown of impacts by county highlights the vulnerability of certain areas. According to Climate Central, the risk of relative sea-level rise, tidal patterns, or storm surge varies from place to place, so the same water level will become a risk factor at different times in different places. The maps on the previous page illustrate the specific areas at greatest risk.

The coastal communities of Aransas County, such as Rockport-Fulton and Aransas Pass, are most affected by the rising sea water levels. With only 5 percent of the area population, this county accounts for nearly one in five people and one-third of public infrastructure likely affected within the metro area.

In Nueces County, about 1,000 people would live on exposed land below 2 feet. The impacts concentrate on North Padre Island and areas surrounding Oso Bay in Flour Bluff and Ward Island, the main campus of Texas A&M University-Corpus Christi, as well as the downtown seawall and marina districts. Out of the projected 680 homes in that county swamped by water, 530 are located within the Zip code 78418.

Because the marina has already replaced traditional wooden docks with floating docks to allow for storm surges and high tides, no severe property damages would be expected there under this scenario.

An increase of sea level by two feet would also not likely affect most industries even in the low-lying areas within the Corpus Christi Port District. However, this is not the case if the sea level rises by six feet. Under this scenario, the city’s six oil refineries are expected to submerge under water, so are six local schools, the local university, and 10 wastewater sites.

The key takeaway from the table is not the exact amounts of economic losses. Instead those estimates highlight that the projected impact increases exponentially for each additional foot of higher water level, especially for waterfront communities susceptible to the rising seas.

While the estimates of economic losses seem less striking than we might have conceived, the true impact would most likely be far beyond the direct damage to private and public properties. Damage to public infrastructure, such as roads and water treatment facilities, adversely affect local residents and economic activity in addition to the replacement costs. For instance, the National Parks Service estimated in 2015 that sea-level rise by about three feet would put coastal parks and beaches worth $40 billion at high risk.

The current replacement value for Padre Island National Seashore totals about $41 million, which include the costs of roads, parking areas, a concession building and other facilities. Still that estimated economic loss does not factor in the loss in leisure and economic activities due to beach erosion and the missing park infrastructure.

Likewise, given the reliance of the Corpus Christi economy on the oil and gas industry, damage to the local oil refineries would generate tremendous spillover effects on other parts of the business community. Also, the risk of storm surge flooding increases with higher sea levels.

On the other hand, rising seas would probably not adversely affect the shipping activity in Corpus Christi, according to Port Authority officials. Ironically, in a nutshell, a higher sea level alone might benefit navigation of larger ships without dredging the seabed.

This exemplifies the policy dilemma of managing global climate change.

**Impacts of Rising Sea Levels**

<table>
<thead>
<tr>
<th></th>
<th>Nueces</th>
<th>San Patricio</th>
<th>Aransas</th>
<th>Metro Total</th>
</tr>
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<tbody>
<tr>
<td>2 Ft. Rise:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population</td>
<td>1,003</td>
<td>110</td>
<td>260</td>
<td>1,373</td>
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<tr>
<td>Land</td>
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<td>8 miles</td>
<td>3 miles</td>
<td>5 miles</td>
<td>16 miles</td>
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<tr>
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<td>680</td>
<td>106</td>
<td>424</td>
<td>1,210</td>
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<tr>
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<td>$323M</td>
<td>$18M</td>
<td>$8M</td>
<td>$429M</td>
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<tr>
<td>6 Ft. Rise:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population</td>
<td>8,964</td>
<td>1382</td>
<td>3,757</td>
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<tr>
<td>Land</td>
<td>27 sq. miles</td>
<td>22 sq. miles</td>
<td>43 sq. miles</td>
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<td>Roads</td>
<td>167 miles</td>
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<td>136 miles</td>
<td>338 miles</td>
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<tr>
<td>Homes</td>
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<td>950</td>
<td>3,886</td>
<td>11,615</td>
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<tr>
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<td>$2.5 Billion</td>
<td>$196 Million</td>
<td>$628 Million</td>
<td>$3.4 Billion</td>
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</table>

SOURCE: riskfinder.climatecentral.org; author’s calculations.

References
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