

# Time to Start Planning for Sea Level Rise

Life is full of uncertainties. Almost every day we face issues that are surrounded by uncertainty; like how to pay an unexpected bill or plan for future college cost. We face uncertainties about our careers, the economy, and our health. The list is almost endless. In most of these cases we accept the uncertainty and, through serious thought and planning, we set up contingencies and set into motion a plan of action. The future is uncertain but we don't let this stop us from making a better future. It should not be any different with an uncertain climate future and the serious consequences this will bring such as sea level rise.

The science is very clear and certain. Human induced climate change is happening and it is far beyond the normal climate variability of the Earth. Humans have changed the atmosphere by burning fossil fuels resulting in a huge increase of CO<sub>2</sub> in the atmosphere. CO<sub>2</sub> acts like an insulator and is causing the temperature of the Earth to increase. It is scientific fact that CO<sub>2</sub> in the Earth's atmosphere ranged between 180 and 280 ppm over the past 800,000 years when life as we know it evolved and thrived. But since the beginning of the industrial age the level of CO<sub>2</sub> has risen to the present value of over 385 ppm. CO<sub>2</sub> has not been this high in our atmosphere since 15 million years ago when the temperature of the earth



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*A recent high tide shows examples of coastal infrastructure that would be underwater with a two foot sea level rise. (Portsmouth waterfront)*

was 5 to 10 degrees warmer and the sea level was 75 to 120 feet higher than today! Why? Because at those temperatures there was no permanent sea ice cap in the Arctic and very little ice on Antarctica and Greenland.

The uncertainty of the issue is because there is no way to predict human behavior and if we will cut our CO<sub>2</sub> emissions. Scientists can predict a range of future sea levels based on a range of CO<sub>2</sub> levels, but we will never know what sea level will be in 2100 until 2100. Should this stop us planning for sea level rise?

We know that the ice in the Arctic, Antarctica, and Greenland is melting at a faster rate than anyone predicted ten, five or even two years ago, and recent studies on glaciers in Greenland show unprecedented changes in flow rates to the sea. What does this mean? It means we have a very uncertain future in regards to sea level rise. The rate of sea level rise is accelerating. Models had predicted a sea level rise between 1/2 to 2 feet by 2100. But now with new science behind it, the IPCC, a very conservative scientific body, is predicting a sea level rise of between 1.6 and 4.6 feet by 2100. Until we stabilize the level of CO<sub>2</sub> in the atmosphere, the predictions

will continue to change as new science is incorporated.

If this was data about a stock in the market, your broker would be telling you to buy it. All the indicators are up and the research shows it will continue to go up. Well, now is the time to buy and start planning for an uncertain, but rising sea level. Does it matter that we don't know if sea level will be two feet, or four feet or six feet higher in 100 years? The important thing right now is to start planning for this future and to include an adaptive planning model to take into account an uncertain future the same way we plan for other uncertain futures.

A good place to start is to read the recently completed "Adaptation Planning for Sea Level Rise in Seabrook, NH" by the Rockingham Planning Commission and the town of Seabrook. The Coastal Training Program is currently developing workshops to be offered in 2010 to help towns begin the planning process to address a changing sea level. If you'd like to get a flyer, email me at [Steve.Miller@wildlife.nh.gov](mailto:Steve.Miller@wildlife.nh.gov) and request to be put on the climate change email list.

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*The road to New Castle*

# New Flood Risk Information for the Lamprey Watershed

The power and consequences of floods are indelibly imprinted into the memories of many New Hampshire residents after major flood events in 2005, 2006, and 2007. Each of these events constituted a “100-year flood”, an event of such magnitude that it has only a 1% chance of occurring in any given year. Floods pose substantial risk to lives and property, and the recent major floods in New Hampshire took lives, inundated homes, destroyed roadways, and caused many other types of damage.

While it is unusual for three 100-year floods to occur within such a short period of time, two key factors—land use change and climate change—contribute to the increasing frequency and magnitude of flood events. As commercial and residential development increases, impervious surfaces such as roadways, parking lots, and roofs exacerbate the risk of flooding during storms because they accelerate the flow of water instead of allowing it to percolate into the soil. In addition, heavy rainfall events are already becoming more frequent in the Northeast United States, and the number of intense rain events is expected to rise further due to climate change. When combined, the effects of land use and climate change have substantial implications for the frequency and extent of flooding in the Seacoast Region and throughout New England.

To better understand how these two factors will affect flood risk locally and to provide decision-makers with useful information, the Great Bay NERR is partnering with scientists at the University of New Hampshire (UNH) and Antioch University New England on a new two-year project in the Lamprey watershed. Led by Cameron Wake of Carbon Solutions New England at UNH,

this project will define where the 100-year flood plain actually is today based on recent land use changes, and it will look towards the future to understand its extent under a variety of climate change and land use scenarios.

A hydrologic model of the Lamprey River and its tributaries will use elevation data, rainfall forecasts, and parcel build-out data to investigate how water flows will change under different scenarios and, in turn, where certain flow levels will cause flooding within the basin. When the technical analyses are complete, the information and products developed from this project will include maps at the watershed and municipal scales of the 100-year flood plain boundaries as well as river discharge at specific locations. These products will provide municipal decision makers, regional planners, and the public with new information regarding local flood risk that may shape infrastructure investments and development decisions. While this project will not develop legal 100-year flood plain instruments, it will provide voluntary tools to assist communities and individuals making decisions related to both land use and climate change adaptation.

To ensure that the products are relevant and useful to diverse stakeholders, the project team will collaborate with local and regional planners, municipal engineers, business representatives, citizens’ associations, and state and federal managers through an advisory committee and focus groups. This collaborative process will shape the research approach, results interpretation, product development and dissemination and training so that they suit local needs and capacities. The Great Bay NERR will play a key role in facilitating this collaboration between scientists and deci-



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*A culvert failure floods Main Street in Newmarket in 2006.*

sion-makers by designing workshops to disseminate products to users in the watershed.

Ultimately, this project will not only provide locally-relevant flood risk information, but it will also facilitate community-level climate change adaptation planning. Flooding is one of the primary climate-related challenges facing communities surrounding Great Bay. This project will support advanced planning and investment that will help minimize flood risks to key infrastructure. It will also enable communities to make wise land use decisions that help ameliorate the risk of flooding in the context of climate change. The Great Bay NERR looks forward to working with the project scientists and local decision-makers to help provide solid technical information that supports community efforts to reduce flood risk and adapt to climate change.

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