

Planning for Sea Level Rise and Shoreline Change at the Local Level

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Where is sea-level headed? Up, but how much?

- IPCC 4th Assessment projections are likely too conservative.
- New projections attempt to incorporate effects of accelerated ice melting, better understanding of ice sheets, reservoir impoundment of fresh water, and the relationship between temperature and sea level over geologic and historic time.
- Recent publications suggest potential for ~1 meter of sea-level rise by 2100.

What will be the coastal changes due to sea-level rise (SLR)?

- A recent report for the U.S. Climate Change Science Program - Coastal Sensitivity to Seal Level Rise: A Focus on the Mid-Atlantic Region - describes potential impacts. Three scenarios ranging from 30-110 cm rise by 2100 were used. Some key findings include:
 - The coastal zone is dynamic and the response of coastal areas to sea-level rise is more complex than simple inundation. However, coastal elevation is a critical factor in assessing SLR impact, particularly for heavily urbanized and stabilized shorelines.
 - Current elevation data is inadequate for quantitative assessments. Collection of lidar data would be valuable in assessing the extent of potentially inundated areas and providing a baseline for future comparison.
 - Erosion is virtually certain to be the dominant coastal change. Other possible changes include bluff erosion, overwash, island breaching, and threshold crossing.
 - The future of coastal wetlands will be determined by a number of factors and local data are needed to develop local management plans.
 - Coastal habitats will change due to SLR, which can have an adverse effect on a range of species. The changes will be determined by the natural abilities of habitats to change and by coastal management.

Case Study: Long-term Coastal Management Planning in Falmouth, MA

(Executive Summary of Coastal Resources Working Group Report, May 2003)

In April, 2000, the Falmouth Board of Selectmen formed the Coastal Resources Working Group (CRWG) and charged the Group to explore reasons for the current condition of the coastal zone and to provide future scenarios for the coastal zone based on an understanding of physical processes and management approaches.

The fundamental finding of the Coastal Resources Working Group (CRWG) is that over the past 150 years, the Falmouth shoreline has been developed in a manner that has significantly impaired the ability of the coast to evolve in response to natural processes, leading to an overall decrease in the viability of the coastal system. The natural processes that build and maintain beaches have become largely inoperative due to the presence of jetties, groins, and coastal armoring. Although groins and jetties trap sand on their upstream western sides, downstream beaches become starved of sand because their continued erosion is no longer offset by an upstream supply of sediment. Sand supply is further interrupted by armoring with seawalls and revetments. In the near future, all of these problems will be exacerbated by a predicted acceleration in the global rate of sea-level rise.

The Town today is at a crossroads. It is clear to the CRWG that if the next 100 years of shoreline development is similar to the previous 100 years, the Falmouth shoreline will be an undesirable, even hazardous environment, devoid of all beaches except those artificially maintained. However, with aggressive action this trend can be reversed. Falmouth can restore the values of our shoreline and become a national leader in proactive coastal management.

The CRWG has developed a long-term "vision" for the Falmouth south shore, which includes restoration of natural sediment processes wherever possible, and improving public access along the entire shoreline. This vision would be realized over the next 50 to 100 years, to achieve the following goals:

- Beaches and dunes will be wide enough for protection from storms and for public access and use.
- Sufficient sand will reside in the coastal system to maintain those beaches.
- Water quality, habitat and fisheries resources of the coastal zone, estuaries, ponds and marshes will be sustained and enhanced.
- A minimum of hard structures (e.g., groins, seawalls, jetties, etc.) will be found in the coastal zone, to reduce maintenance costs, allow natural sediment transport, and for ease and safety of public use; adverse impacts of their presence will be mitigated by passive and active management approaches.
- Shoreline armoring structures, where present, will not detract from the aesthetics of and access to the shoreline environment.
- Public infrastructure will be relocated from the immediate coast to reduce maintenance and repair costs and to reduce its impact on the coastal system.
- A proactive approach to shoreline management will be aimed towards prevention of problems and provide a response protocol when shoreline damage occurs.

The CRWG recommends the following actions to achieve these goals. Most of these goals should be achieved over the next 20 years. Monitoring and revising these actions and timelines for implementation should occur as necessary over a 50 to 100 year time frame. Some of the recommended actions include:

- Acquire coastal land for open space to increase public access, reduce property and infrastructure damage, and improve the functioning of coastal processes.
- Move or change vulnerable public infrastructure to reduce damage and maintenance costs.
- Conduct beach nourishment at key "source" locations to restore the natural sand transport system and provide recreation and storm protection.
- Remove unnecessary, hazardous, or damaging coastal armoring structures.
- Create sand management systems that will keep sand from being transported offshore into deep water by jetties at pond inlets.
- Develop improved regulations to protect coastal systems and beaches.
- Encourage landowners to obtain conservation easements that protect valuable coastal assets such as unarmored bluffs that provide sediment to down-drift beaches.

There is a clear need for a comprehensive coastal management plan that addresses long-term planning and provides for timely responses to short-term (e.g., storm-related) issues. In addition to the tools listed above, local, state and federal regulations can be used to implement such a plan. It will require coordination among many Town groups and agencies that already are involved in different aspects of coastal management. The CRWG believes coordinated, proactive coastal management is both highly desirable and achievable through concerted Town effort.

CRWG 2009 Update

- Several key high priority coastal parcels were purchased.
- Some unnecessary hard stabilization has been removed.
- Better coordination of beach management activities.
- Community awareness has increased.
- Town has secured funding to develop short- and long-term hazard mitigation plans, using the CRWG report as a starting point for a long-term vision.