

3. Storm surge is an episodic process that helps to determine erosion and morphology, wetland and upland vegetation type, and distribution as well as delivery of nutrients, salt and biotic properties. The current knowledge about individual storms and the surges they produce is good for some well-studied events, but the paucity of water level stations in the APES means that other events have not been assessed.
4. The knowledge of the hydrology of (i.e., flow of water through) surface and subsurface wetland and upland (including tidally flooded dendritic ramp and platform marshes as well as irregularly flooded and ditched wetlands) is currently patchy and lacking for small scales. The knowledge needed includes residence time, material input, output and transport, wetland distribution and function, and water column and benthic community structure and function.
5. The knowledge of the hydrology of the estuaries and sounds is locally good, except for open sound currents. Needed for modeling are residence time, material input, output and transport, upland habitat, wetland distribution and function, and water column and benthic community.
6. Information about water salinity, temperature and turbidity helps understanding about stratification, chemistry, biogeochemical cycles, salt water intrusion, and bio-optical properties and is locally good but regionally variable.
7. Wind waves can cause erosion and shoreline movement, sediment re-suspension, transport and deposition, and can help determine geomorphology and habitat type. Prediction ability is adequate but there is little wave data in the APES.
8. The geologic framework, both surface and subsurface, is generally well understood generally but inadequate specifically.
9. Bathymetry, topography, and geomorphology determine drainage patterns as well as inundation and habitat type. Topography is well documented by the recently-collected LIDAR elevation data. Bathymetry data is good in the inlets and major deep waterways, but is poor especially in near-shore and inter-tidal areas.
10. Sedimentation within wetlands, tide flats, estuarine basins, perimeter platforms, shorelines and scarp/marsh edges is responsible for maintenance of wetlands and channels and sediment balance and is very poorly known.
11. Knowledge of human impacts/modifications including erosion control structures, ditches, wetland disturbance, run-off and land cover changes, roads, dikes, spoil banks and beach stabilization is not well documented.

Priorities for Research

The Workgroup established the following priorities (Table 1 below) for the various processes and variables. Processes as ranked for their important for the model system. Research was ranked highly only if the process was highly important but the state of knowledge was low.

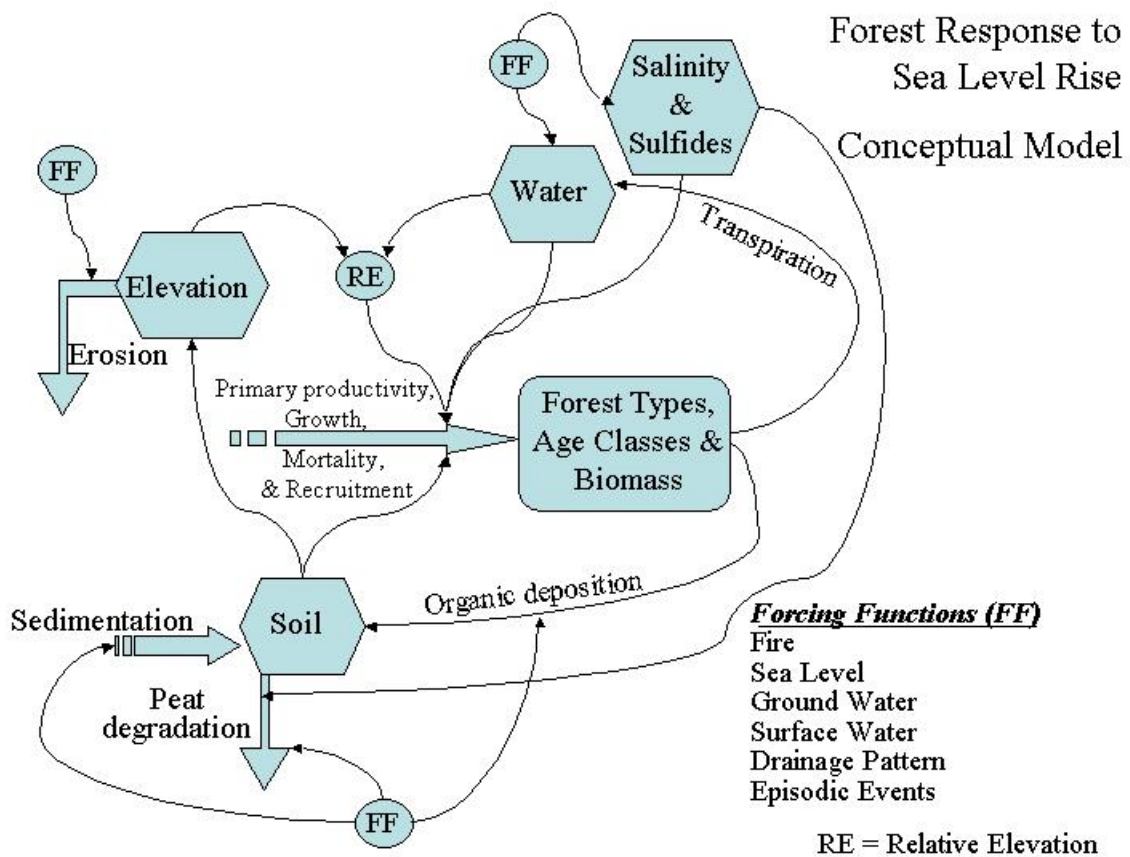
Table 1. Physical process, with their importance and research needs.

Category	Process/Variable	Important for Modeling	Important for Research
Water Levels	Long term sea level rise	High	Low
	Astronomical tides	Medium	Low

Modeling forest Changes

The response of a forest environment to sea level change depends on the interaction of a set of conditions (modeled as “state variables”) with a set of processes. State variables include elevation, water level, vegetative community types, salinity, soil type, and land cover and land use history. These are conditions that could change in response to environmental forcing. The combination of elevation and water level are key factors determining relative water level or inundation frequency. These alter the vegetative community. The salinity similarly determines the vegetative community based on mean and episodic events. Soil type determines what community may exist and the potential for loss of elevation by degradation. Finally, some communities have different characteristics depending on how they were previously used. For example, a recently abandoned field will have different characteristics than a mature forest. Also, areas that were drained for plantations may have different vegetation or water levels than expected based on the elevation.

The processes that drive the changes in the state variables include primary production, mortality, regeneration, organic deposition, transpiration, peat degradation, shore erosion, surface erosion, and sedimentation.



Conceptual ecosystem model for forest response to sea level rise.

