

National Marine Sanctuary of American Samoa

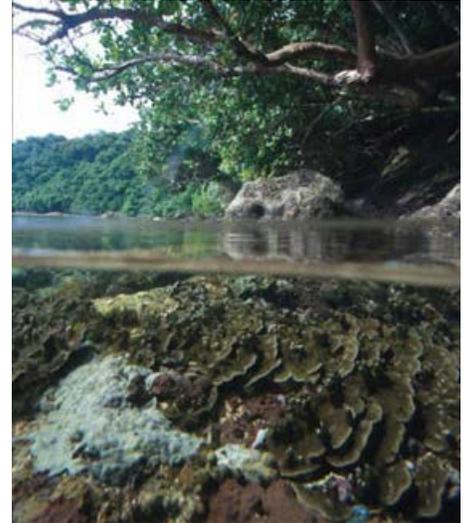
Climate Change: Sea Level Rise

Management Issue

The National Marine Sanctuary of American Samoa (NMSAS or Sanctuary) encompasses coastal waters of American Samoa. The potential impact of sea level rise on the natural resources and the associated impacts to the people and communities that rely on those resources are significant. The NMSAS is working to understand the impacts and processes to support local preparation, response and mitigation efforts.

Description

Warming of the atmosphere from climate change contributes to the warming of the oceans. Thermal expansion together with the melting of ice is predicted to raise sea level steadily if current climatic trends continue. Sea level is already subject to tidal and atmospheric mediated fluctuations. It is unclear how these factors will work synergistically to produce a particular localized sea level change in many coastal areas including the Sanctuary. It is absolutely imperative to understand these issues well in, order to best plan for these changes. Sea level rise brings with it threats of habitat loss, accelerated coastal erosion, changes in water quality and light penetration. Additionally, it brings potential for creating new shallow water habitat. It will be necessary to explore rigorous statistical models in concert with actual research data to attempt to predict these potential changes. Additionally, improved mapping skills can help to plan for managing the potentially impacted areas.



Coastline along Fagatele Bay, Tutuilla, American Samoa. Photo credit: Kip Evans

Questions and Information Needs

- 1) Which coastal areas will be affected by sea level rise the soonest?
- 2) How much coastline will be lost adjacent to the Sanctuary as sea level rises?
- 3) How will sea level rise affect coastal erosion?
- 4) How much land habitat is likely to be lost due to sea level rise in the Sanctuary?
- 5) How much shallow water habitat will be created from sea level rise?
- 6) Which species (marine and terrestrial) are likely to be impacted by increases in sea level?
- 7) What options are available to managers to address and potentially mitigate sea level rise in the Sanctuary?
- 8) How does changing weather patterns affect sea level rise?
- 9) Will sea level change impact deep water photosynthesizing organisms?

Scientific Approach and Actions

- Construct coastal inundation maps using GIS and perform sea level rise modeling at local scales
- Take long term monitoring data on sea level rise
- Perform a coastal zone erosion assessment and factor into coastal inundation mapping
- Assess the use of the coastal habitat by the associated organisms
- Perform modeling to predict use of new shallow water habitat
- Develop and test mitigation strategies
- Monitor sedimentation rates and water quality
- Identify species and habitats within marine ecosystems that are highly vulnerable to sea level rise
- Identify habitats that will provide for shifts in distribution and abundance of species
- Complete a vulnerability assessment of village communities in American Samoa to identify vulnerable reef dependent human communities
- Monitor intertidal and shallow subtidal benthic assemblages
- Investigate similarities between efforts around the Pacific in terms of response to sea level rise
- Monitor the socioeconomic correlation to sea level rise and its impact of the marine ecosystem.

Updated: 5/26/2011

For More Information -- <http://www.sanctuaries.noaa.gov/science/assessment>

Key Partners and Information Sources

Hawai'i Institute of Marine Biology; NOAA/NMFS/PIFSC/Coral Reef Ecosystems Division; NOAA/NMFS/PIFSC/CRED/Pacific Benthic Habitat Mapping Program; NOAA/NMFS/Pacific Islands Fisheries Center; NOAA/NOS/National Center for Coastal Ocean Science; NOAA/NMFS/PIRO, US Fish and Wildlife Service; US Geological Survey/Biological Resources Division; USGS/BRD/National Biological Information Infrastructure/Pacific Basin Information Node; Territorial Government of American Samoa, American Samoa Department of Marine and Wildlife Resources, The National Park Service of American Samoa

Management Support Products

- Coastal inundation maps
- Sea level rise models
- Record of sea level rise in the sanctuary
- Report of coastal zone erosion and predicted change with sea level rise
- Ecosystem models that predict utilization of new habitat and changes due to loss of habitat
- Developed targeted mitigation strategies
- Assessment of water quality and benthic assemblages

Planned Use of Products and Actions

- Sensitive resources may be moved to alternative habitats
- Work with nearby villages to reduce the socioeconomic impact
- Work with land usage to reduce potential enhances coastal erosion
- Sensitive areas may be managed with extra protection
- Mitigation options identified by scientific activities will be considered for action

Program References

NMSAS Management Plan

- Action Plan 4.1 Marine Conservation Science
 - Strategy MCS-5: Continue to enhance research and monitoring programs throughout the life of the plan
- Action Plan 5.1 Climate Change
- Strategy CC-2: Identify and implement strategies to maximize the resiliency of coastal and marine resources to potential climate change impacts at National Marine Sanctuary sites in American Samoa.
- Strategy CC-3: Conduct and facilitate targeted research and monitoring efforts to respond to the effects of climate change impacts at National Marine Sanctuary sites in American Samoa.

NMSAS Condition Report

- These activities will support questions 1, 4, 5-9, 11-14

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