Title	Description	Geographic Extent	Type	Format	Collection/ Creation Dates	Methodology	Primary Contact	Email	Link
Ecological Effects of Sea Level Rise in Maryland: How will the benefits of coastal protection by wetlands change in the future?	This study aimed to assess how the benefits of coastal protection provided by wetlands in Maryland may change in the future due to sea level rise (SLR).	Maryland's Chesapeake Bay	Story Map	Website	May-23	By using a numerical modeling approach and field data, the study examined the impact of extreme storm events on coastal habitats and evaluated the role of salt marsh vegetation in reducing wave energy. The findings emphasized the vulnerability of marsh habitats and their protective services to SLR, which threatens their persistence and the resilience of coastal communities in the face of extreme events.	Catherine Hope Lau	clau5@gmu.edu	https://arcg.is/0y0O5z
Implications of Sea Level Rise on Maryland's Carbon Stock: Analysis of Blue Carbon Systems in the Chesapeake Bay	This study explores the implications of sea level rise on Maryland's carbon stock, focusing on blue carbon systems in the Chesapeake Bay. It examines projections of sea level rise, area changes, and carbon sequestration/emission rates, highlighting the challenges faced by coastal ecosystems in mitigating carbon release due to inundation.	Maryland's Chesapeake Bay	Story Map	Website	Apr-22	Sea level rise projections were established based on different greenhouse gas emission pathways, and the specific area changes and carbon stock were determined by comparing different scenarios. The study utilized existing studies and various carbon rates to estimate carbon sequestration or emissions upon area conversion.	Elliott Campbell	elliott.campbell@maryland.gov	https://arcg.is/0L99C11
Storm surges, Waves, Hydrodynamics and Vegetation Surveys in Chesapeake Bay Environmental Center, MD, USA	Measurements of wave conditions, and vegetation bio-mechanic characteristics (biomass, stem height, diameter, and density)	Chesapeake Bay Environmental Center, MD, USA (38.9480° -76.2190°)	Field measurements	.RSK .TXT .XLSX	2021-2023	Measurements were carried out with RBR D-wave sensors; vegetation surveys included the measurements of vegetation height, diameter and stem spacing using randomly placed 0.25 m2 quadrats on the ground surface. The sensors, topo-bathy data and vegetation measurement locations are georeferenced using a differential GPS Trimble R4.	Celso Ferreira	cferrei3@gmu.edu	https://doi.org/10.4211/hs.f487c02857ce4ebfadbbdd7fd268391a
Storm surges, Waves, Hydrodynamics and Vegetation Surveys in Karen Noonan Center and Blackwater National Wildlife Refuge, MD, USA	Measurements of hydrodynamic (currents and water levels) and wave conditions, vegetation bio-mechanic characteristics (biomass, stem height, diameter, and density), and topo-bathymetric features	Karen Noonan Center and Blackwater National Wildlife Refuge, MD, USA (38.2262° -76.0429°)	Field measurements	.SHP .RSK .TXT .XLSX .JPG .MAT	2020-2021	Hydrodynamic measurements were carried out with Acoustic Doppler Current Profilers (ADCPs) (Aquadopp Nortek 2 MHz) and RBR D-wave sensors; vegetation surveys included the measurements of vegetation height, diameter and stem spacing using randomly placed 0.25 m2 quadrats on the ground surface. The sensors, topo-bathy data and vegetation measurement's locations are georeferenced using a differential GPS Trimble R4.	Celso Ferreira	cferrei3@gmu.edu	https://doi.org/10.4211/hs.9034fa75324d46299984b681c54218e9
Submerged Aquatic Vegetation (SAV) Surveys at Karen Noonan Center and Blackwater National Wildlife Refuge, MD, USA	Measurements of SAV vegetation characteristics (visual percent cover, canopy height, shoot density and stem width) and relative water depth	Karen Noonan Center and Blackwater National Wildlife Refuge, MD, USA (38.2262° -76.0429°)	Field measurements	.XLSX	2020-2021	SAV measurements (visual percent cover, canopy height, shoot density, stem width) and relative water depth were collected using 0.25m2 quadrats placed every 20 meters running perpendicular to shore. Each quadrat's location was georeferenced using a handheld Garmin GPS.	Becky Golden	rebecca.golden@maryland.gov	https://doi.org/10.4211/hs.9034fa75324d46299984b681c54218e9
Storm surges, Waves, Hydrodynamics and Vegetation Surveys in Franklin Point State Park, MD, USA	Measurements of wave conditions, vegetation bio-mechanic characteristics (biomass, stem height, diameter, and density), and topo-bathymetric features	Franklin Point State Park, MD, USA (38.8141° -76.5000°)	Field measurements	.SHP .RSK .TXT .XLSX .JPG	2020-2021	Measurements were carried out with RBR D-wave sensors; vegetation surveys included the measurements of vegetation height, diameter and stem spacing using randomly placed 0.25 m2 quadrats on the ground surface. The sensors, topo-bathy data and vegetation measurement's locations are georeferenced using a differential GPS Trimble R4.	Celso Ferreira	cferrei3@gmu.edu	https://doi.org/10.4211/hs.f7350813a1de4025a3b8e4d05284dc57
Storm surges, Waves, Hydrodynamics and Vegetation Surveys in Assateague Island National Seashore, MD, USA	Measurements of hydrodynamic (currents and water levels) and wave conditions, vegetation bio-mechanic characteristics (biomass, stem height, diameter, and density), and topo-bathymetric features	Assateague Island National Seashore, MD, USA (38.2268° -75.1459°)	Field measurements	.SHP .RSK .TXT .XLSX .MAT	2020-2021	Hydrodynamic measurements were carried out with Acoustic Doppler Current Profilers (ADCPs) (Aquadopp Nortek 2 MHz) and RBR D-wave sensors; vegetation surveys included the measurements of vegetation height, diameter and stem spacing using randomly placed 0.25 m2 quadrats on the ground surface. The sensors, topo-bathy data and vegetation measurement's locations are georeferenced using a differential GPS Trimble R4.	Celso Ferreira	cferrei3@gmu.edu	https://doi.org/10.4211/hs.3ed0608d3bb84160a5714861632adcad
Application of the Sea-Level Affecting Marshes Model (SLAMM) to Coastal Maryland	The Sea-Level Affecting Marshes Model (SLAMM) was applied to the coastal areas of Maryland's Chesapeake and Atlantic Coastal Bays to assess the effects of sea-level rise on marshes and other natural features.	Maryland's Chesapeake & Coastal Bays	GIS datasets	.TIFF .SHP .R .PDF	2021	The study utilized elevation data, wetland land cover information, and other relevant datasets to predict wetland response to six future sea-level rise scenarios.	Michelle Canick	mcanick@TNC.ORG	https://warrenpinnacle.com/prof/SLAMM/EESLR_MD/
Projection of Submerged Aquatic Vegetation in Maryland under Sea-Level Rise	A refinement of the submerged aquatic vegetation (SAV) component of the Sea Level Affecting Marshes Model (SLAMM) was applied to two study sites: Tangier Sound and Choptank River to predict and project the effects of sea-level rise on SAV abundance.	Tangier Sound (38.06° -75.94°) and Choptank RIver (38.65° -76.29°)	GIS datasets	.TIFF .R .PDF	2021	The study utilized SAV distribution, elevation, water quality, and water velocity in a logistic regression model to estimate a percent likelihood of SAV precence in the study sites.	Becky Golden	rebecca.golden@maryland.gov	https://warrenpinnacle.com/prof/SLAMM/EESLR_MD/
ArcWaT: a model-based cell-by-cell GIS toolbox for estimating wave transformation during storm surge events	This study presents the ArcGIS Wave Transformation toolbox (ArcWaT), a model-based GIS toolbox for estimating wave transformation from wave magnitude and direction model outputs.	Maryland's Chesapeake Bay	Scientific Article	.PDF	2022	A case study was developed using ADCIRC + SWAN model outputs from a highly-resolved numerical mesh developed for the nearshore areas of the state of Maryland and forced with wind and pressure fields from Hurricane Irene	Felicio Cassalho	fcassalh@gmu.edu	https://doi.org/10.1080/10106049.2022.2037731
ArcWaT: a model-based cell-by-cell GIS toolbox for estimating wave transformation during storm surge events	A model-based GIS toolbox for estimating wave transformation from wave magnitude and direction model outputs	-	GIS tool	ESRI Arctoolbox	2022	ArcWaT was developed using Python programming language with theNumPY and ArcPY libraries and can be used on thefly in a user-defined folder either asan ArcGIS toolbox or within Model Builder.	Felicio Cassalho	fcassalh@gmu.edu	https://dataverse.orc.gmu.edu/dataset.xhtml?persistentId=doi:10.13021/orc2020/1IWPSC
The role of invasive Phragmites australis in wave attenuation in the Eastern United States	Investigation of the ability of a Phragmites marsh to attenuate waves via long-term field monitoring and compared this to native Spartina alterniflora via hydrodynamic modeling	Franklin Point State Park, MD, USA (38.8141° -76.5000°)	Scientific Article	.PDF	2022	A case study was conducted based on field measurements and numerical modeling.	Dan Colemann	daniel.coleman@uga.edu	https://doi.org/10.1007/s12237-022-01138-x

Understanding How Natural Shorelines Reduce Flood Risk: Maryland's Ecological Effects of Sea Level Rise Study	Maryland's Ecological Effects of Sea Level Rise Study is a collaborative effort between multiple organizations to understand how nature, such as salt marshes and submerged aquatic vegetation, can protect coastal communities from storm and flood impacts caused by rising sea levels. The study aims to quantify the wave attenuation and flood reduction benefits of coastal habitats in Maryland and inform conservation and management actions to enhance ecosystem services and community resilience.	Maryland's Chesapeake Bay	Project's homepage	Website	2022	-	Michelle Canick	mcanick@TNC.ORG	https://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/md/Pages/EESLR-Study.aspx
Assessing Coastal Protection: Modeling NNBFs' Wave Attenuation Capacity in Maryland under Current and Future Scenarios	A regional level numerical modeling framework was specifically designed and validated for the State of MD natural areas and local scale models for the field sites to evaluate evaluate NNBFs buffering and wave attenuation capacity at the State scale under current and future scenarios.	Maryland's Chesapeake Bay	Numerical model outputs	.NC	2021-2022	A numerical modeling framework was developed where we implemented a multi-tier, multi-model framework that combines Global Climate Model (GCM) projections, coastal habitat changes in response to SLR (SLAMM), large-scale simulation of tides, storm surge and waves (ADCIRC+SWAN).	Celso Ferreira	cferrei3@gmu.edu	available upon request
Thin-layer sediment in saltmarsh restoration: assessing its role in maintaining coastal protection ecosystem services in the face of sea-level rise	The study evaluated the potential benefits of raising wetland elevation through sediment placement using a high-resolution model considering future management scenarios with vegetation control strategies (i.e., Spartina vs Phragmites), sediment layering, SLR, and coastal storms under a range of climate pathways.	Janes Island and Cedar Island (37.964, -75.877)	Numerical model outputs	.NC	2023	A numerical modeling framework was developed where we implemented a multi-tier, multi-model framework that combines Global Climate Model (GCM) projections, coastal habitat changes in response to SLR (SLAMM), large-scale simulation of tides, storm surge and waves (ADCIRC+SWAN). Additionally, a layer of sediment was artificially placed in the study area in order to demonstrate the benefits of mantaining the protective ecosystem services of both Janes Island and Cedar Island under the effects of sea-level rise.	Andre de Lima	aedsouza@gmu.edu	available upon request
Coastal Resilience through Marsh Enrichment and Erosion Mitigation Strategies	The study evaluated the potential benefits of both enriching existing marsh and restoring previously lost marsh using a high-resolution model. The study assessed future management scenarios combining sediment layering, revetments, and marsh restoration, all within the context of addressing coastal storm resilience across various climate scenarios.	Broadwater Creek (38.797, -76.522)	Numerical model outputs	.NC	2023	A numerical modeling framework was developed where we implemented a multi-tier, multi-model framework that combines Global Climate Model (GCM) projections, coastal habitat changes in response to SLR (SLAMM), large-scale simulation of tides, storm surge and waves at regional (ADCIRC+SWAN) and local (XBeach) scales. Additionally, different adaptation strategies (e.g. thin-layer of sediment, revetment, and marsh restoration) were implemented in order to demonstrate the benefits of mantaining the protective ecosystem services of the marshes located in Broadwater Creek under the effects of sea-level rise.	Andre de Lima	aedsouza@gmu.edu	available upon request
EESLR Site Identification	This Story Map presents the utilized framework that was employed by the project's team in order to select study sites based on geographical representation (eastern, western, and coastal bay shorelines).	Maryland's Chesapeake Bay	Story Map	Website	2019	Sites were selected based on nine primary criteria: 1) Accessibility to the project team, 2) Inaccessibility to the public, 3) Sufficient wave energy, 4) Presence of marsh, 5) Presence of SAV, 6) Presence of a living shoreline, 7) Proximity to a vulnerable community, 8) On-going monitoring at the site, and 9) Relevance to organization conservation efforts.	Michelle Canick	mcanick@TNC.ORG	https://tnc.maps.arcgis.com/apps/Shortlist/index.html?appid=ee1ff27def2c4b6a9c9d5a4f1b07e230
EESLR: Assessing Nature's Role in Resilience	This video highlights the wave attenuation benefits of natural and nature-based features, how these benefits are expected to change over time, and how the state of Maryland is planning to adapt to these changes.	Maryland's Chesapeake Bay	Project Video	Website	2023	-	Michelle Canick	mcanick@TNC.ORG	https://youtu.be/yoIhA9YKqgM
Maryland Coastal Atlas Wetland Adaptation Areas	Map layers derived from the EESLR project SLAMM model run will be displayed on the Maryland Coastal Atlas Web Map and available for download through Maryland iMap. These include wetland adaptation areas, SLAMM landuse results, and drowned lands at 2050, 2070 and 2100 under the Upper Limit of the Likely Range, Growing Emissions scenario	Maryland's Chesapeake Bay and Coastal Bays	GIS datasets	Website Web services	2023	Coming Soon	Rachel Bacher	rachel.bacher@maryland.gov	Coming Soon
EESLR Infographics	Infographics developed to illustrate the habitat and wave attenuation changes predicted under future sea level rise	-	Infographic	Adobe Illustrator PDF PNG JPEG	2023	-	Michelle Canick	mcanick@TNC.ORG	https://tnc.app.box.com/folder/225050231219?s=rqjx8kmr0o46nm3q1dz4oniuanv7arj8