Introduction
Coastal Seagrass and Submerged Aquatic Vegetation Habitats in the Gulf of Mexico

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This special issue compiles original research and reviews of previous research on an important geographic constitution at the water-land interface: the seagrass/Submerged Aquatic Vegetation (SAV) beds in the Gulf of Mexico (GoM) coastal zone. SAV are a group of vascular plants that grow underwater; and seagrass is a specialized subgroup of SAV that have adapted to live in the high salinity coastal and marine waters. Presence of, types of, and seasonality of SAV beds have substantial influences on geography, ecology, landscape, culture, and economy in the coastal zone.

Healthy SAV beds help shape, maintain, and modify coastal landscapes by buffering wave energy, modifying water currents, protecting shorelines from erosion, aiding sediment deposition, consolidating substrate, and changing littoral profiles and water depth. Coastal seagrass resources are among the most productive ecosystems on Earth. Seagrass beds perform numerous vital ecological functions and provide food and shelter for commercially and ecologically important organisms, including blue crabs, shrimp, turtles, manatees, and waterfowl. Therefore, assessment of SAV distribution, composition, and abundance has been of particular interest to coastal environmental managers, scientists, developers, and recreationists as this information serves as an excellent indicator of estuarine environmental quality.

Coastal areas containing seagrass and SAV beds carry geographical and historical importance in the Southeast, especially throughout the GoM. The GoM and its resources have immense ecological, economical, and historic values to the U.S. but have been going through several major environmental disturbances and disasters including, but not limited to, major hurricanes (e.g., 2005 Hurricane Katrina), the 2010 Deepwater Horizon Oil Spill, red tides, rapid subsidence, marsh erosion, threats from sea level rise, and river water diversions. Man-made levees

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along major rivers (e.g., Mississippi River) prevent natural flooding from the rivers that historically used to deliver the necessary nutrients and sediments for coastal wetland growth and delta formation. This has resulted in coastal wetland retreat and subsidence. In addition, environmental quality has been significantly degraded, which in turn, results in the loss of ecological/economical services in the region. Loss of coastal land and environmental degradation are projected to be amplified with changing global climate, which is a growing threat to coastal SAV beds (Scavia et al. 2002, Doyle et al. 2010, Unsworth et al. 2014).

The low-lying coastal areas of the GoM are particularly vulnerable to natural/anthropogenic disturbances due to the effects of sea-level rise, increases in population density, extensive landscape alternation, modification, and armoring of natural shorelines, as well as natural/man-made disasters. Documentation of habitat conditions, change over time, and interactions with the human environment are critical needs to better assess current status and predict future trends for SAV/seagrass habitats, a critical component of coastal geography. However, many regionally focused relevant studies on these habitats have not been addressed in the increasingly international scope of many pertinent scientific journals.

We, the Guest Editors, agreed that compiling regional studies on a unifying topic would help enhance understanding of long-term and larger scale trends in SAV/seagrass beds of the GoM. In response, requests for manuscripts on seagrass and other SAV occurring in tidally-influenced GoM coastal habitats were sent out to several regional seagrass/SAV scientists. In order to comply with the scope of Southeastern Geographer, the papers in this issue present studies on SAV/seagrass with a regional geography focus, particularly relating to issues of temporal variation and changes related to land use change, human alteration, and climate change.

The five papers published in this special issue synergistically help to summarize change occurring across the GoM. Geographically, this special issue covers coastal habitats from Texas (the Coastal Bend and Laguna Madre), Louisiana (Terrebonne Bay, the Pontchartrain basin), areas around the borders of Mississippi and Alabama (Grand Bay National Estuarine Research Reserve), and west Florida (Tampa Bay). The topics of the papers extend from (1) evaluation of SAV for nekton habitat value in comparison to marshes during one season (Jerabek et al.), (2) test of a model to assess carbon stocks in seagrass meadows in a single year (Congdon & Dunton), (3) temporal changes in seagrass coverage and biomass from 2005–2013 (Cho et al.), (4) historical and geographical review of the SAV community within a coastal basin extending from freshwater to barrier islands over multiple decades (Poirrier et al.), and (5) review of a bay-wide seagrass recovery to 1950s levels after implementation of habitat improvement and education projects and its benefits (Sherwood et al.).

Jerabek et al. report on consequences of wetland loss caused by combined effects of climate change and human development resulting in landscape fragmentation in coastal marshes of Louisiana. As a result, the marsh nursery and foraging habitats for fish and crustaceans are decreasing, but the marsh disintegration increases shallow open water areas which
also provide room for SAV colonization. The paper compared nekton communities among co-occurring habitat types including marsh edge, SAV beds, and submerged bare substrate in degrading brackish marshes of Terrebonne Basin, Louisiana. Their results document the regionally missing evidence of SAV as important nekton habitat comparable to emergent marshes. This study offers future research direction for understanding the extent to which SAV could compensate for marsh loss in fragmenting brackish wetlands, which is a critical information for future management and restoration decisions for other similar areas in the GoM.

As global atmospheric carbon concentrations increase, carbon sequestration into seagrass biomass is an important factor to be considered in evaluating seagrass ecosystem function. The paper by Congdon and Dunton used data obtained in 2015 through the Texas Seagrass Monitoring Program, tissue carbon content, and their species-specific biomass:percent cover models in order to estimate carbon inventories for above and belowground biomass of three dominant seagrass species. They suggest and emphasize the importance of knowing belowground biomass, a relatively stable and larger portion of the total seagrass carbon stock, compared to seasonally fluctuating aboveground biomass.

One of a few persistent seagrass beds along the mainland coastline of Mississippi occurs in within the Grand Bay National Estuarine Research Reserve (NERR) adjacent to the Mississippi-Alabama state boundary. The 2005–2013 seagrass surveys conducted at three sites in the NERR by Cho et al. documented the annual changes in the *Ruppia-Halodule* seagrass beds. The value of the paper includes presentation of important and previously unreported documentation of seagrass beds before, during, and after the 2005 Hurricanes Katrina and Rita and the 2010 Deepwater Horizon oil spill.

Poirrier et al. compiled previous research and reports on SAV/seagrass beds in the Pontchartrain Basin, Louisiana. They present a review paper using information from published studies of their own research or by others as well as unpublished observations over 60 years (since 1953). They present the valuable documentation of history and biogeography of SAV from tidal freshwater bayous to the barrier islands of the Chandeleurs within the Pontchartrain basin.

The Tampa Bay Estuary Program implemented over 450 projects since 1995 to restore seagrass areal coverage to 1950's level. The paper by Sherwood et al. presents the success story of seagrass restoration, which exceeded the original restoration goal. This paper possesses not only regional importance but also national value because this is a documentation of a large scale, long-term seagrass restoration success due to collective and cooperative management and restoration by multiple sectors of the Estuary Program funded through the US Environmental Protection Agency.

Environmental changes associated with coastal wetland and SAV loss and habitat quality degradation open new challenges for management towards implementing adaptation to change and towards enhancing resilience to disturbances. Coastal restoration partnerships (i.e., the Gulf of Mexico Alliance: GoMA) have been organized; and numerous restoration projects have been conducted to
conserve and enhance sustainability of GoM communities and resources. The papers in this issue document trends of long-term and short-term changes in these coastal habitats and SAV communities, natural and anthropogenic factors that are responsible for the changes, short-term responses of seagrass beds after Hurricanes Katrina and Rita, and after the 2010 Deepwater Horizon, how collaborative efforts resulted in a bay-wide large scale seagrass recovery, and future directions and recommendations for regional SAV research and coastal restoration efforts.

REFERENCES CITED

