Among extant marine mammals, sirenians (manatees, dugongs, sea cows) are unique in that they feed exclusively on aquatic plants, a dietary preference that extends back to the origins of this group. Both geochemical and morphological evidence suggest that this group’s affinity for life in the water extends back over 50 Myrs, to the earliest occurrence of sirenians in the fossil record. The close association of sirenians with producers at the base of aquatic foodwebs means that bottom-up effects may have had a more direct impact on the fitness and diversity of sirenians than other marine mammals. As these effects are largely in response to climatic or environmental changes, careful study of living and fossil sirenians, as well as ecological information archived in the isotopic composition of their remains, could provide a means of reconstructing the physical conditions of coastal habitats through time. New discoveries of the fossil sirenians from India, Pakistan, and Puerto Rico have led to a significant accumulation of fossil material documenting most of the critical steps within the transition from terrestrial to marine ecosystems by sea cows. This wealth of collected material makes it now possible to examine the evolution of this group in a more rigorous, quantitative manner. This, in turn, can provide new insights into the relationship between ecological change and morphological evolution for sirenains as well as provide a longer and more nuanced record of Cenozoic climate change within shallow-water, coastal habitats.