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DISCUSSION

Discussion of Ellison, Joanna C. and Stoddart, David R., 1991. Mangrove ecosystem collapse during predicted sea-level rise: Holocene analogues and implications. *Journal of Coastal Research*, 7(1), 151–165.

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The conventional wisdom concerning sea level rise and Florida mangrove habitats is that this coastal ecosystem will either eventually disappear or be forced to occupy a more upland location if there are no barriers to inland migration and colonization (*vide* PARK *et al.*, 1989). In this context, the authors examined Holocene stratigraphic records and sea level curves for a number of sites worldwide, including south Florida, and predicted a mangrove ecosystem collapse. Based on their detailed analyses they specifically concluded (p. 161) that "... mangrove ecosystems appear to be able to keep pace with rising sea-level of 8–9 cm/100 cal years, are under stress at rates between 9 and 12 cm/100 cal years, and cannot persist in their expansive mode at rates above this." In this particular regard, however, PARKINSON (1989) documented that Holocene mangroves in the Ten Thousand Island region of southwest Florida maintained a continuous landward expansion at rates of sea level rise of 27 cm/100 yr.

The authors further stated that low [elevation] limestone [carbonate] islands are the most vulnerable to rising sea level because they lack significant inputs of allochthonous sediment from upland sources. This statement ignores the high rate of autochthonous carbonate production of many oceanic island systems which, in the past, compensated for extremely high rates of sea level rise and subsidence as evidenced by the existence of atoll islands (DARWIN, 1837). It also ignores the high rates of carbonate deposition in similar settings such as the Bahama Islands (NEWELL *et al.*, 1951).

The authors' conclusions are particularly difficult to reconcile with reality in south Florida now that MAUL and MARTIN (1993) have reported a relative sea level rise over the past 147 yr of about 30 cm at Key West, Florida, attributed to sea level rise plus post-glacial rebound and subsidence. In this regard, it is pertinent to note that the mangrove ecosystem of the Florida Keys has neither "collapsed" nor has it lapsed into a state of stress even though MAUL and MARTIN report the rate of relative sea level rise since *ca.* 1925 to be equivalent to 23 cm/100 cal yr, almost twice the critical maximum threshold reported by the authors.

With regard to the vulnerability of low islands, ROSS *et al.* (1991) compared habitat areas in 1935 and 1991 aerial photographs of Sugarloaf Key, a low elevation limestone island in the lower Florida Keys close to Key West. They showed that during the comparison period, the area of mangroves increased from 111.33 to 148.09 ha, an increase of about 33 percent over the 56 yr period. On two other Florida Keys islands, Key Largo (northern section) and Long Point Key, the same authors noted increases in mangrove area of 3.6 and 8.0 percent per decade, respectively, over the period 1959–1991. On all three islands, the mangrove communties expanded both by seaward colonization of adjacent, historically accreting carbonate shoals and by landward colonization of tran-

sitional and upland habitats. These are not isolated examples since MEEDER *et al.* (1993) have also reported significant mangrove expansion at several other locations in the Keys, all of which have occured on newly deposited carbonate muds filling shallow open water areas.

These reports of mangrove expansion are consistent with the historical observations of the venerable field naturalist, John Henry Davis, Jr. He observed widespread accretion and expansion of mangroves in south Florida and the Florida Keys, and accordingly published several papers on the putative land-building role of mangroves (DAVIS, 1938a,b, 1940).

With all due respect to the authors, their paper illustrates the problem associated with using a narrowly focussed analysis to make broad generalizations about the possible impacts of sea level rise.

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