

A STATEMENT ON THE EVIDENCE FOR AND
IMPLICATIONS OF A RECENT RISE IN SEA LEVEL

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It's been happening so slowly that most of us are missing what may become the most awesome display of the century. Sea level is rising. Prior to 1970 sea level was rising one millimeter or less per year. Along most coastlines of the world this rise was shadowed by gradual subsidence or uplift of the land. Not so for the past decade.

There is now strong evidence that sea level has risen 10 to 14 centimeters (4 to 5-1/2 inches) during the past 10 years. This dramatic increase is recorded world wide and is most certainly caused by melting of polar glaciers and ice caps. This pulse in sea level rise may be in response to a temporary climatic fluctuation or it may signal the beginning of a significant global warming trend.

Scientists cannot predict future trends of sea level from the past record. Those scientist monitoring the increase of carbon dioxide in the atmosphere, however, are predicting a global warming trend and rise of sea level. The burning of fossil fuels and the production of cement is causing a rapid build-up of atmospheric carbon dioxide. This increase does not affect incoming sunlight, but does inhibit back radiation of longer wavelength heat from the earth.

If the trend of the past decade continues, sea level will rise at least 1 to 1.4 meters (3 to 4-1/2 feet) during the next 100 years. It would likely be more because any significant warming and sea level rise should trigger the breakup and rapid melting of the vast but unstable West Antarctic ice sheet. This in itself would cause a 2 to 8 meter (6 to 26 foot) global rise of sea level.

K.O. Emery, geologist at Woods Hole Oceanographic Institution, and S.D. Hicks, of NOAA, have both detected the possibility of a recent increase in sea level rise through a detailed examination of records from several hundred tide-gauge stations around the world.

This rise appears to be dramatically displayed on the seawalls and pilings of south Florida. Attached intertidal organisms, especially barnacles and oysters, have quite strictly defined positions and upper limits in the intertidal zone. Dr. Hilary Moore and his students at the University of Miami's Rosenstiel School of Marine and Atmospheric Science have documented and photographed the zonation of these organisms in Florida during the past 30 years.

Comparison of the positions of intertidal organisms at present with their positions as recorded in the older photographs permits a rough estimate of sea level change.

In the Coral Gables waterway, for example, the upper limits of both

oysters and barnacles have shifted upwards about 16 centimeters (over 6 inches) since 1949. The barnacles on the sea wall adjacent to the University of Miami's Rosenstiel School of Marine and Atmospheric Science have shifted upwards over 14 centimeters since 1958. These findings need to be verified by further documentation. They are however compatible with the suggested one millimeter per year rise in sea level through the 1950's and 1960's and a 10 to 14 millimeter per year rise since 1970.

The evidence in hand, together with the possibility that sea level may continue to rise at a rapid rate, is sufficient to demand that all levels of government begin re-evaluating coastal and community management policies. Most of the pertinent problems today become meaningless in the face of an encroaching sea. How do we properly plan for a future based on a reduction in land area, a progressive loss of freshwater supply, retreating barrier shorelines, and a gradual inundation of toxic dump sites? Can we afford to continue encouraging urban growth and permitting major development projects on land that is only a few meters above sea level?

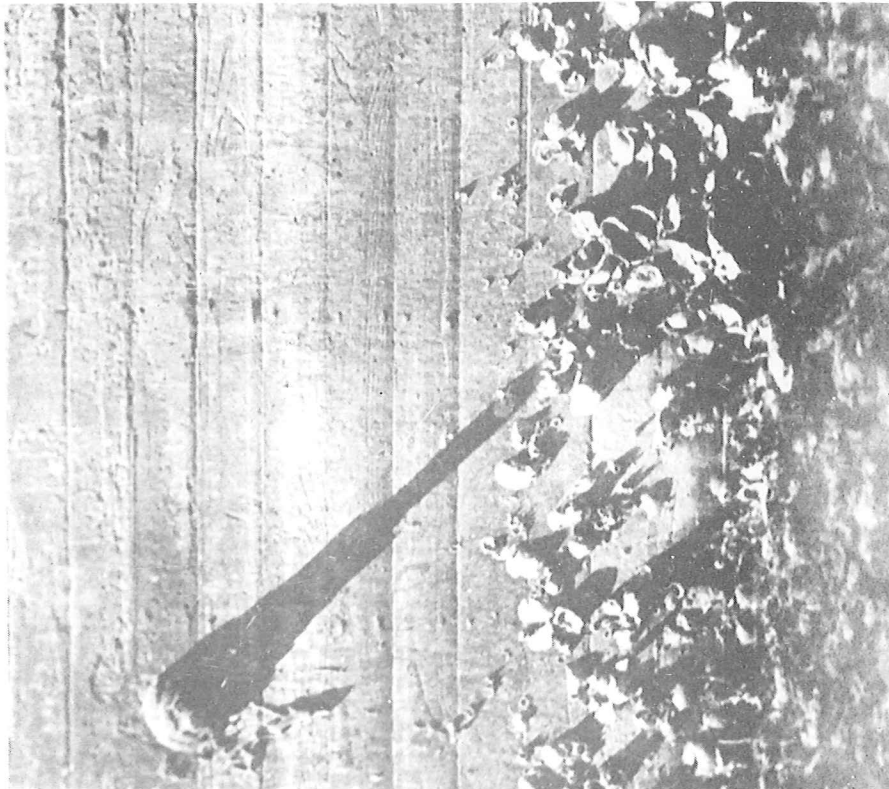
The first priority for Florida is to begin and maintain a program to carefully monitor sea level at a number of sites around the state. There is evidence for differential subsidence or uplift of different coastal sectors. The impact of a global rise in sea level will vary around the Florida coast.

Second, we must attempt to predict the rate of coastal retreat that will accompany various sea level rises. Much of south Florida is bordered by sand or swamp shorelines. These will be extremely unstable if sea level continues to rise rapidly. A rise of as little as one meter will cause marine inundation of major portions of the Everglades, southeastern Dade county and other low-lying coasts.

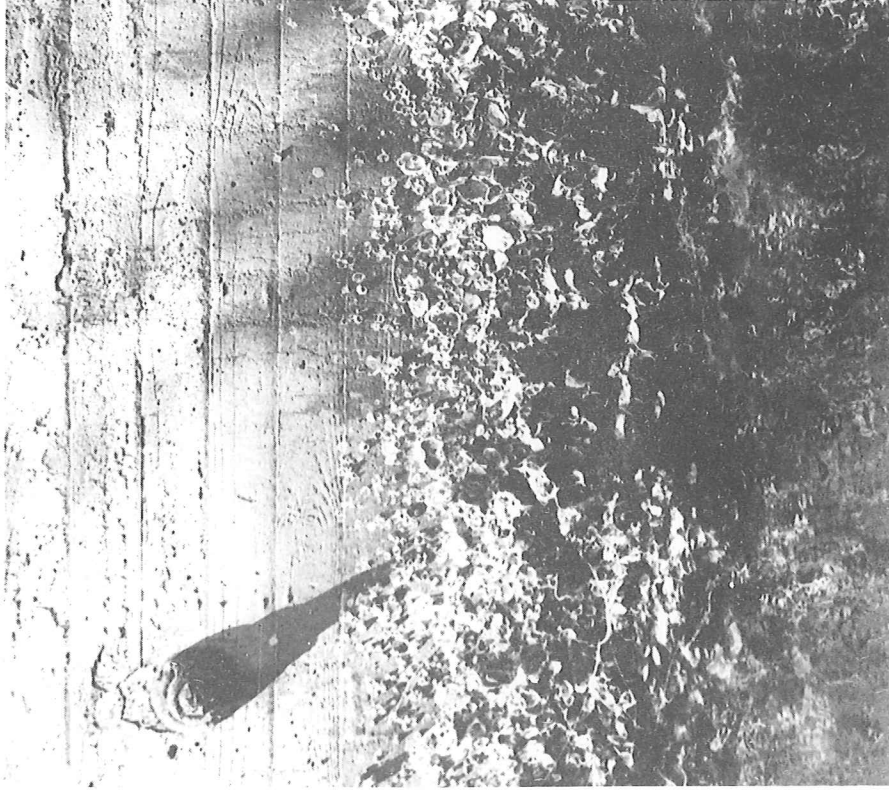
Third, our governments must take the lead in totally re-evaluating existing coastal, urban, and industrial management policies. Fourth, recognizing the possibility for continued rapid sea level rise, the state government must begin formulating rational policy and procedure.

It can be done rationally now.

1949



1981



6 in.
15 cm.

← Barnacles
← Oysters

Manless and Harlem 1981

Photographs of the intertidal organisms growing on the concrete bridge support at Le Jeune road and Coral Gables Waterway, Coral Gables, Florida. Support is located at the southwest corner and is imbedded in limestone. Horizontal grooves are about 8 centimeters apart.

Photograph on left was taken August 24, 1949 by Dr. Hilary Moore. Photograph on right was taken April 21, 1981. Upper limits of both barnacles and oysters have shifted upwards about 16 centimeters (6 inches).