MDV/SLR/9

SMALL STATES
CONFERENCE ON
SEA LEVEL RISE
MALE', 14 – 18 NOVEMBER 1989

SEA-LEVEL RISE THROUGH HISTORY

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The volume of water in the oceans has fluctuated over geological time. It is instructive in planning for future sea-level rise to examine both the fluctuations of sea level which have occurred over the Quaternary (the last two million years) and the response of coastlines to the most recent post-glacial rise in sea level. We now know from analysis of deep sea cores that ocean volume has fluctuated during the ice ages. Sea level has been close to its present level during interglacials, and about 100m lower during glacials when water has been incorporated into the ice sheets. There is some evidence that temperature was slightly warmer ($<1^0$C) than present and sea level slightly higher (0-10m) than present during the last interglacial 120,000 years ago. At the peak of the last glaciation around 18,000 years ago it was cooler than present ($4-6^0$C) and sea level was lower (80-150m). Since that time the sea rose rapidly as a result of ice melt, and global rates of sea-level rise of up to 10-15 mm/yr were experienced until approximately 6000 years ago. During the last 6000 years the rate of sea-level change has been slower and has not been the same all over the globe. Adjustments of the earth's surface to the redistribution of ice and water, propagated through the mantle, have led to regional variations in relative sea-level history. Islands in different parts of the world have experienced different patterns of sea-level change over the last 3000 years; West Indian Islands appear to have experienced a

relative sea-level rise at average rates of 0.1-0.5mm/yr, whereas many of the islands in the Indo-Pacific appear to have experienced a relative sea-level fall at average rates of 0.1-0.5mm/yr. Presently average rates of sea-level change of up to a rise of 1.0-1.5mm/yr are interpreted from existing tidal records of several decades length, although there is an enormous variability between gauges. Islands have adjusted to these past sea-level changes in different ways, but all have existed in a delicate balance with the level of the sea. The latest predictions of the rate of sea-level rise over the next few decades (3.7-5.8mm/yr) indicate the need to maintain that balance. Local tectonic and regional isostatic factors will continue to lead to regional disparities in the pattern of future detectable sea-level change.

Scientific knowledge of past climate and past sea-level changes has come primarily from the oceans and the islands within them. Small islands have acted as natural geologic recorders of past water levels. It has only been possible to interpret this past record by bringing together data from many different islands in different oceans. It will only be possible to monitor future changes in sea level by collecting and bringing together a lot more data in a co-operative and organised manner from those islands.