

# Sea level change and Sea-level rise

## Introduction

Global Mean Sea level has always been changing over time due to natural causes. However, recent sea level rise is mainly

attributed to human activities emitting large amount of Greenhouse gases (GHG) in the atmosphere.

## Sea level change

Sea level in the region of the Mauritius has been changing over geological time scale. The last ice age occurred about 20 000 years ago. The sea level was then about 120 m below its present level. As the glaciers retreated and released vast quantities of water to the ocean, sea level rose quickly until about 6000 years ago, when the rate of sea level decreased dramatically. Since that time sea level has increased only slowly.

Changes in sea level can take place over a short time scale lasting for a few hours to a few days as a consequence of large scale meteorological/oceanic systems. Sea level usually rises from low tide to high tide on average every six hours by about 70 cm. The passage of a tropical cyclone can cause a sea level rise of more than 2 m. Seasonal changes of sea level also occur In Mauritius, the difference in sea level between the winter and summer season is about 30 cm.

## Sea level rise

Sea Level Rise (SLR) is a direct consequence of global warming. This is causing the ocean to expand and increase in volume and ice caps to melt adding thus more water to the ocean. It has been estimated that global sea level rise has been

of the order of 1 to 2 mm/yr since the beginning of the 20<sup>th</sup> century. However, since the 1990s, there is evidence from satellite observations that it has been of the order of 3.2 mm/yr. (Figure 1)

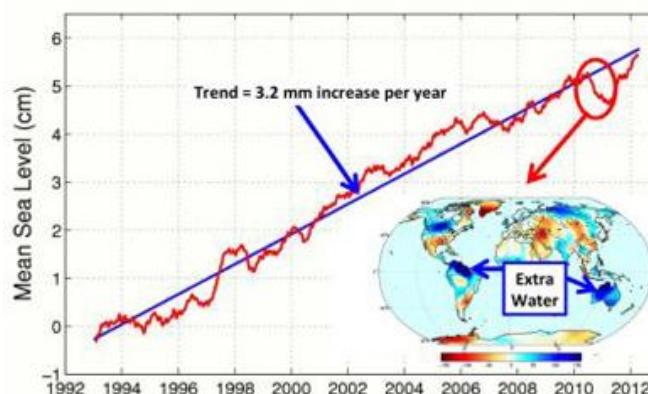


Figure 1. Global mean sea level as measured by satellite altimetry (NASA/CNES Topex/Poseidon and Jason-1; and NASA/CNES/NOAA/EUMETSAT Jason-2)

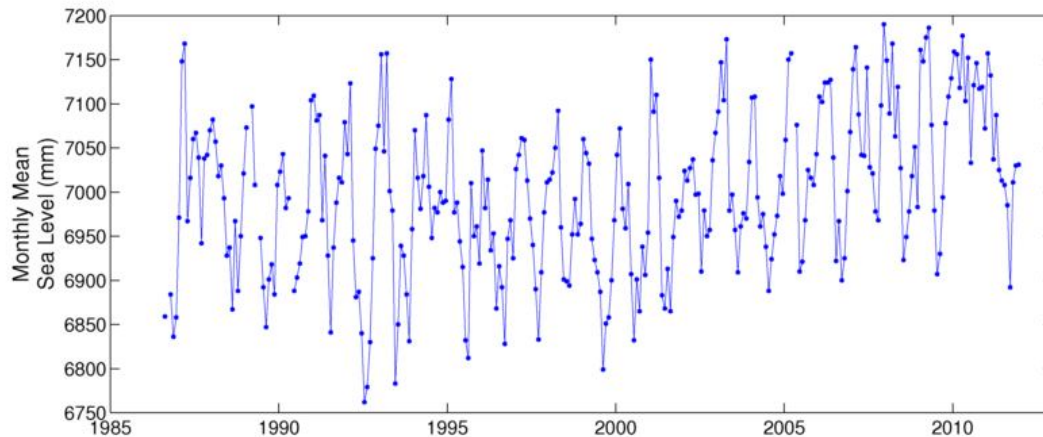


Figure 2. Annual Sea level variation at Port Louis

Sea level rise differs from region to region. Around the Mascarenes islands, according to the

Meteorological service, it has been around 1.8 mm/yr. A plot of annual average MSL at Port Louis is given in the Figure II. The data is from the University of Hawaii Sea level centre.

### Sea level projection

The Intergovernmental Panel on Climate Change (IPCC) in its 2007 *Fourth Assessment Report (AR4)* stated that global sea-level rise between the late 20<sup>th</sup> century (1980-1999) and the end of this century (2090-2099) would be of the order of 0.18 to 0.59 m. This is considered very conservative as the melting of ice caps and

glaciers have not been considered due to uncertainties on their contributions. It is estimated that a large fraction of the Greenland ice sheet and part of the Antarctic ice sheet, mostly likely West Antarctica, will melt giving rise to more than 1 m increase in sea level by the end of this century.

### September 2013 Fifth IPCC Assessment Report (AR5)

Rajendra Pachauri, the chairman of the Intergovernmental Panel on Climate Change (IPCC), said his organisation's latest report provided "unequivocal" evidence that since 1950 the atmosphere and oceans had

warmed, and that scientists were now "95 per cent certain" that humans were the "dominant cause". The sea level rise may vary between 0.26 to 0.82 m

## **Consequences of Sea Level Rise (SLR)**

Sea level rise is a serious concern for the Republic of Mauritius, particularly with regards to coastal erosion. It has been found mathematically that the retreat shoreline rates are 50 to 100 times the rate of SLR (Bruun 1962). Coastal erosion is already ubiquitous around Mauritius and Rodrigues. Hard measures taken to address the issue have, to a large extent, worsened the problem. It is expected that erosion will accelerate due to the projected

increase in the rate of SLR with global warming. Taking into consideration the IPCC projection of 59 cm by the end of this century, this implies that the shoreline retreat could be in the range between 29 m to 59 m. Mauritius is a coastal-based destination for tourists. Consequently, an accelerated SLR will impact very serious the sustainable socio-economic development of the country.

## **ADD contribution**

Sea level rise is one of the topics which is included in the presentation made to schools within the framework of sustainable development.

Some studies on sea level rise is also being conducted.