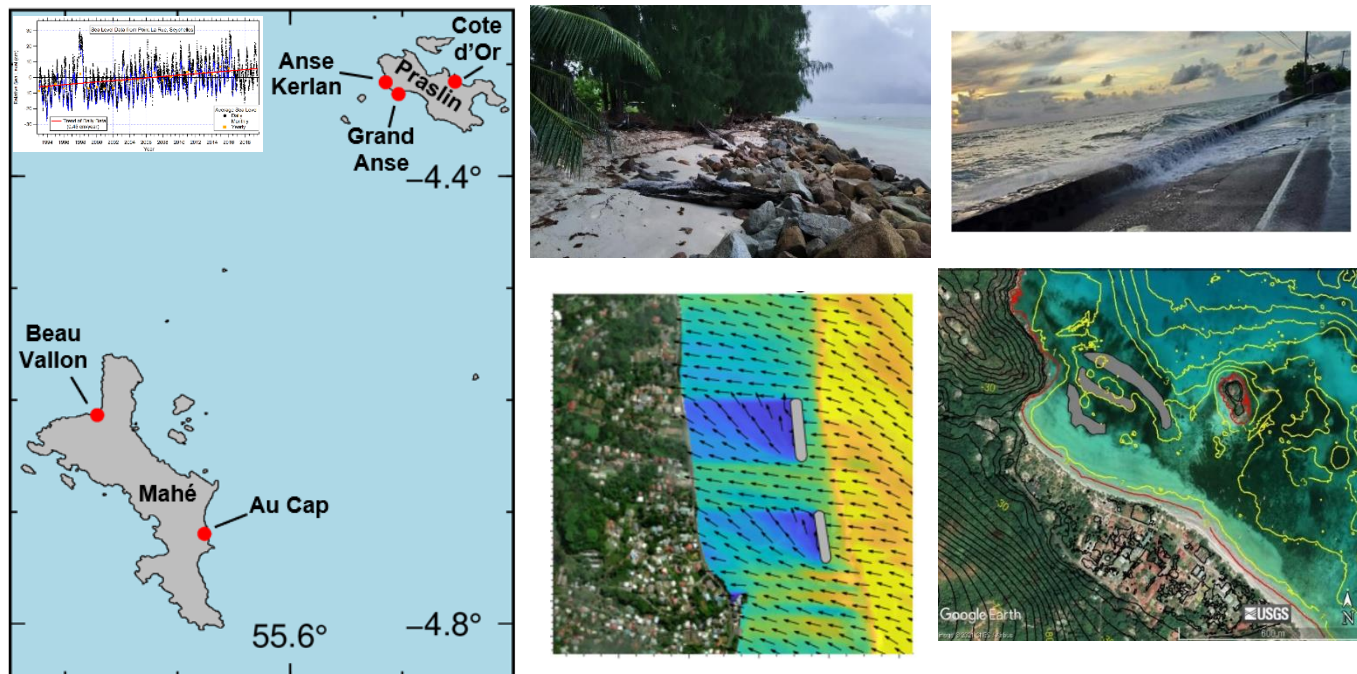


COASTAL MODELLING AND ASSESSMENT OF SOLUTIONS FOR COASTAL DEFENCE AND ADAPTATION

SEYCHELLES



(left) Map of the study sites in Seychelles, inset shows the steady rise in sea level of 0.45 cm/yr since 1994 (clockwise from top middle) Failed coastal protection at Gand Anse, Overtopping at Au Cap, a proposed offshore reef system for Cote d'Or and a modelled offshore breakwater for Au Cap.

PROJECT INFORMATION:

Location: Seychelles
Client: The World Bank
Project Date: 2020-2022

SCOPE OF WORK:

- Historic Shoreline Analysis
- Data acquisition
- Numerical Modelling
- Feasibility Design
- Detailed Reporting

PROJECT DESCRIPTION:

ORCAS Directors Jose Borrero and Dougal Greer led a landmark study looking at coastal problems Seychelles. The study involved: developing baseline data and models to understand flood and erosion impacts at the priority sites; identifying the causes; assessing the exposure of coastal assets and communities; identifying solutions for these impacts to a pre-feasibility level and developing informative sketches and technical drawings; and developing comprehensive solutions that are effective in the long-term. Both hard engineering and nature-based solutions were considered. The coastal processes at each of the study sites were analysed and the results from this analysis were used to better understand the causes of coastal flooding and erosion. We used long term (~40 years) wind and wave hindcast data to drive wave, hydrodynamic and sediment transport models, which were then used to explain the observed flooding and erosion that has occurred in recent years. An extreme value analysis defined wave heights at return periods of 10, 50, 100 and 500 -years while a Monte Carlo analysis was used to assess the combined effects of tide level, water level set up, wave runup in conjunction with the extreme wave conditions. Wave and wind effects were analysed as a function of the monsoon season and each beach was assessed relative to the season in which it is most exposed to flooding and/or erosional hazards. Erosional and flooding hazard were also assessed in terms of long-term or chronic forcing as well as episodic or extreme events. The results of the modelling indicated that the coastal erosion observed in Seychelles over recent years is a result of the combined effects of increased storminess and higher water levels acting concurrently on the Seychelles coastline. The deterministic modelling of extreme events was able to reproduce the observed effects in terms of coastal flooding and erosion hotspots at the study sites, providing support for the methodology. This modelling and analysis have produced a valuable resource for future planning and design for coastal development in Seychelles.