

Effect of Barrier Reef on Wave and Current at Xai-xai Beach

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Xai-Xai Beach is characterized by a continuous reef separating the beach and the open sea, with small gaps along the reef, where waves break and spill water over the reef into the inner beach. Giant waves and strong currents occur inside beach causing hazard to swimmers and fishermen. On average 7 deaths by drowning are reported to occur in Xai-Xai Beach a year. Two field experiments were conducted in Xai-Xai Beach: one in October 2011 during neap tides and in October/November in 2012 aimed at observing the waves and currents. Wave heights were measured by means of precision pressure gauge, an accelerometer and an ultrasonic altimeter; currents were measured by Anderaa Seaguard and a Lagrangian drifter; in addition standard meteorological parameters consisting of winds and air temperature were measured by a portable meteorological station. The major gap of the reef is located in the northern end.

The observed waves outside the reef varied from 2 to 8 m and in the inner beach varied from 1 to 2 m, during relatively calm whether with winds of about 5 m s⁻¹ and in the rough weather with winds of about 9 m s⁻¹, respectively; the wave setup reached about 14 cm. The alongshore currents ranged between 1 and 1.5 m s⁻¹, unidirectional and towards the North all the time. Strong and permanent rip currents with velocities of about 1.5 – 3.5 m s⁻¹ were observed. The reef barrier projects up to 75 cm above the mean seal level, constrains the water movement back to sea resulting in pressure building force between the inner beach and the sea and along the beach. These result in strong rip and alongshore currents.

It is concluded that the observed alongshore and rip currents are too strong that endanger even the experienced swimmers. It is, therefore, recommended that warning signs be placed along the beach to prevent deaths by drowning.

Key word: Wave, currents, barrier, rip currents