

## **Drivers of coastal water pH - examples from an Australian river estuary, the Great Barrier Reef lagoon and coral reefs globally**

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The drivers of coastal water pH are far more complex than the open ocean and include the delivery of nutrients, acids, inorganic and organic carbon and alkalinity from the catchment, ecosystem metabolism and benthic biogeochemical processes. These factors that control the pH of coastal waters operate on a range of spatial (local to global) and temporal (diurnal, seasonal, episodic) scales making it difficult to discern trends in coastal pH due to ocean acidification (driven by the uptake of anthropogenic CO<sub>2</sub>). This presentation will demonstrate some of the various drivers of coastal pH and scales they operate on using three very different case studies. The Richmond River Estuary on the east coast of Australia illustrates how local episodic flooding and the associated delivery of acid from acid sulphate soils results in an acute reduction of estuarine pH (<4), far below anything likely to be caused by future ocean acidification. Carbon and alkalinity budgets for the Great Barrier Reef will be used to illustrate the regional influence of catchment processes, ecosystem metabolism and benthic biogeochemical processes on the acidification of a large coastal lagoon. Finally a global analysis of coral reef pCO<sub>2</sub> and pH will be used to illustrate how regional scale inputs of organic matter and nutrients may have resulted in the long-term (20 year) acidification of coral reefs that is much faster than the open ocean.