

## Global environmental effect at Palau coral reef ecosystem

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### Introduction

Coastal ecosystem supplies a number of ecosystem services that sustain human society, however it is now threaten by multiple anthropogenic impacts. Our need to understand the degree of human impacts in coral reef ecosystem is principally essential in small reef island countries because reef health is directly linked to the sustainability of their economy. In this present study, we will focus on the Republic of Palau and evaluated the global and local environmental change on the reef ecosystem of Palau for the aim of getting information needed for better reef conservation and management.

### Methods

Twenty two sites around the coast of Palau was selected and environmental parameters including temperature, salinity, dissolved oxygen, chl<sub>a</sub>, turbidity, suspended solid, particle organic carbon (POC), particle organic nitrogen (PON), dissolved inorganic nutrient (DIN, DIP), total inorganic carbon (DIC), alkalinity, pH and aragonite saturation was measured at surface (0 m) and bottom (8 m). At the same time, the benthic coverage and coral community was evaluated by 5 transects of 10 m length for each sites. From these parameters, we evaluated the most important factors that regulate coral reef community.

Next, we focus on the two main climate change factor (temperature and pH), and evaluate the recent pH and temperature trend in Palau coast and study the possible impact on the coral community. Additionally, we focus on the sewage discharge on the reef, and evaluate the recent nutrient and Chl<sub>a</sub> trend in Palau coast and evaluate the effect on the coral community.

### Results and Discussions

From present results we found that the reef environment and coral community in Palau can be divided into three areas: north-west area, east area and lagoon and south area. The North-West area was characterized by *Acropora* dominant community with high pH (high aragonite saturation), the East area by *Montipora* and *Pocillopora* community with high pH (high aragonite saturation) and variable turbidity, and Lagoon and South area by *Porites* with low pH, and high nutrient and turbidity. From these results it is suggested that coral reef management should be focused on these 3 different areas, and pH, nutrient and turbidity are the important environmental factors that should be monitored. Additionally, we found that both pH and temperature is significantly increasing in the coast of Palau suggesting the progress of ocean acidification and global warming. Finally, we found that the continuous sewage discharge have increased the nutrient concentration by two times within these 20 years. Additionally, this environmental change is suggested to causing out break of COTS (Crown of Thorns Starfish), which might affect coral community. From these results, we suggest that local management together with the consideration of climate change, will be essential for management of Palau coral reef ecosystem.

Keywords: coral reefs, climate change, sewage discharge, coral community, management

