

Essay summary of relationship between algae and tidepool chemistry

[Environment](#), [Plants](#)



Relationship between algal cover and water chemistry in rockpools

Mukluks Mad Midair ABSTRACT Interstitial Rockpools are one of the

harsh environments in marine ecosystems. Most of the organisms living in it have adaptations to survive in harsh conditions, especially algae. A research was done to see if biotic factors such as temperature, dissolved oxygen, temperature and pH value could have a significant correlation with total percentage of algal cover. Initial hypothesis was dissolved oxygen and pH value are correlated to total algal cover.

Each pool sample's water parameters were measured and tested for 2 day period. The correlation between dissolved oxygen and algal cover is weak, proving that dissolved oxygen is not fairly important, where pH value has stronger correlation than the other chemical property tested. Most of the rockpools observed have high percentage cover of coralline algae.

INTRODUCTION Rocky shores are coastal shores that consist of hard substrates. It is regarded as the most ecological part of the marine system (Library et al, 2012).

Rocky shores have three zones; low, mid and high with variety of communities living on each interstitial matrix (Phenylalanine's, 2007). High interstitial zone has rockpools and go for several months without being replenished from the seawater (McAllen & Taylor, 2001). Interstitial Rockpools have a relatively stable environment where there are few changes in terms of physical conditions when the water reaches low tide (Kemp, 2009). Both McAllen & Taylor (2001) and Berkshire et al (1987) stated that rockpools undergo

many extreme physic-chemical conditions and few organisms are able to live in rockpools.

These biotic factors have a significant influence in community dynamics and population (Theatrical, 2002). Thus, it has large abundance of specialized taxa living in rockpools, such as algae (Murals, 2013). The water chemistry of rockpools fluctuates rapidly when low tide, particularly oxygen concentration, pH value, temperature and salinity. Temperature and salinity is important for algae, whereas oxygen concentration and pH value is produced by algae. Oxygen is important to all living organism and the availability of oxygen in rockpools is low, which can lead to hypoxia to organisms living in it (Berkshire et al, 1987).

However, high algal cover could increase the saturation level of oxygen in rockpools, but there is little research done on hypoxia in rockpools. Algae requires sunlight and carbon dioxide for photosynthesis, which in return produce more oxygen in rockpools. It will also produce hydrogen, which makes the Rockpool more acidic. Temperature is also important, because the temperature in rockpools is relatively higher than normal seawater temperature. Increasing temperature could affect the algae in terms of physiology and actions of algae (Library et al, 2012).

According to Kemp (2009), increasing water temperature can be caused by long exposure from sunlight and also the location of Rockpool. In a study done by Kemp at the coast of South Africa, the water temperature in rockpools were ranging from low ICC to high ICC during peak hours. Nowhere

(1998) specified that sunlight has a tremendous effect on primary production in the aquatic system in rockpools. Salinity also can affect the water chemistry of rockpools.

The changing level salinity of rockpools are varied according to location and geographically and it can be caused either by input from seawater during high tide, evaporation and terrestrial runoff or rainfall (Kemp, 2009). Ended et al (2014) showed that salinity has large role in terms of species richness in rockpools. The purpose of this study is to investigate if the total algal cover is being affected by the water chemistry in rockpools during low tide. The aim of this experiment is to observe the relationships between algal cover and water chemistry, especially dissolved oxygen concentration.

I expected to see high level of oxygen saturation in rockpools due to photosynthesis. I also expecting high algal cover in alkaline rockpools. Since there is few fauna living in rockpools, I do not take them as measurement in this experiment because I more interested in functional algal group. From this, I deduced a hypothesis for this experiment. The hypothesis is percentage of algal cover is positively correlated with pH value and dissolved oxygen and negatively correlated with salinity and temperature.

METHOD Location The study site was at Cape Palliat, southern most point in North Island and the experiment ran for three days, from February 1st to February 3rd 2014. Pool sample A transect line of 50 meter was laid out across the high rocky shore and began find suitable Rockpool samples. I try to locate good pools sample with pool criteria of a depth of 1 CM, area

around 2-mm and the presence of algal cover per pool. I assure depth of each pool by measuring the depth 3 times at different deepest point in the pool to obtain an average depth.

The length of the pool is measured across by a measuring tape. A total of twelve pools that quite meet the measuring criteria similar were marked at high shore in a two day period. As a reference, one pool sample from lower rocky shore was marked and measured to compare water chemistry only. After pools were marked, a CACM x CACM quadrant were put on the pool, a Perspex glass layer with 25 random points were put on top of the quadrant. The quadrant is used to measure percentage of algal cover and functional algal cover y using point intercept method.

Each pool sample has it chemical properties measured on the 2nd and 3rd of February Measurement of oxygen concentration Measurement of oxygen concentration was made by using a portable oxygen measurer that is measured twice, one when the water reached low tide and one an hour later for a maximum exposure from the environment. Measurement of salinity Measurement of Rockford salinity was made by using a refractors. The salinity was measured twice, one when the water reached low tide and one an hour later for a maximum exposure from the environment. Measurement of temperature

The temperature of the Rockford was measured by using a simple thermometer twice, one when the water reached low tide and one an hour later for a maximum exposure from the environment. Measurement of pH

value The pH value of the Rockford is measured using a pH meter and measured twice, one when the water reached low tide and one an hour later for a maximum exposure from the environment. However, while measuring the chemical properties of Rockford, I discovered that 5 out the 12 pool sample has geographical problems, such as drainage, constant terrestrial runoff and shadowed that will alter findings.

It was decided that problem pool samples was not counted, and 7 remaining sample is used for the experiment. Statistical analysis I used ASS Enterprise Guide 5. 1 to obtain the linear regression to see the relationship between algal cover with 4 water chemistry; percentage of dissolved oxygen, salinity, temperature and pH value. I also will use ASS to obtain the p-value of each correlation, regression (RE) and F ratio for each correlation. RESULTS Table 1 : measurement of water chemistry of pool sample at low tide after being exposed Pool sample pH value Temperature (co) salinity (US)