

FIT5147 Data Exploration and Visualisation

Programming Exercise: Tableau Public

• Introduction

Exploratory data analysis and visualisation can be performed using various tools. Tableau is an effective tool for interactive data visualisations which is simple and user friendly. Using tableau we are analysing coral bleaching over 8 sites in The Great Barrier Reef.

Coral bleaching occurs when the corals expel algae called “zooxanthellae” present in their tissues which causes the corals to turn white due to lack of food. The corals can survive after this event but they are under stress that causes mortality.

The coral bleaching data used for exploration and analysis consists of bleaching percentage for 8 sites and for various types of corals viz. soft corals, blue corals, sea fans, sea pens and hard corals in Great Barrier Reef over the years of 2010 to 2017.

• Data processing

The data is read from the provided xls file and put into a dataframe using Python. This data was then formatted using dataframes and coding methods in Python.

The data was then further used for analysis using Tableau.

	name	longitude	latitude	year	bleaching_rate	coral_types
0	site01	143.515	-11.843	2017	0.8387	soft corals
1	site01	143.515	-11.843	2016	0.8021	soft corals
2	site01	143.515	-11.843	2015	0.7534	soft corals
3	site01	143.515	-11.843	2014	0.7499	soft corals
4	site01	143.515	-11.843	2013	0.5770	soft corals

While plotting the above data using Tableau, the following errors were encountered in the data:

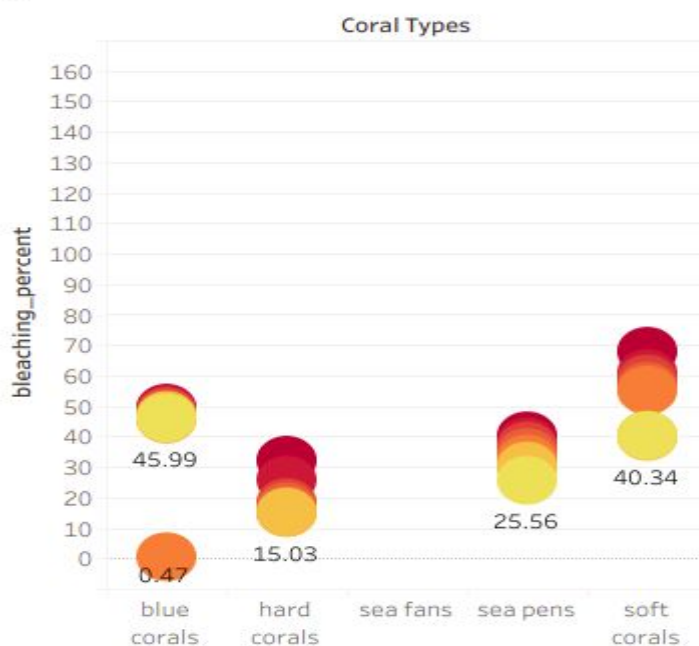
- **Bleaching percentage data entry error for Hard Corals**



In the above graph for the Site 8, the X axis represents the different types of corals while the Y axis represents the bleaching percent. The colored circles represents the bleaching rate for different years. The highlighted part in the graph shows that for hard corals the bleaching percent was suddenly increased in the year 2014 to 148.8% and then dropped in the subsequent years. This shows an erroneous entry and might be typo issues. The above value was then corrected to 14.80% and used for further analysis.

- **Bleaching percentage data entry error for Blue Corals**

Bleaching percent for Site 7 for different corals types



In the above graph for Site 7, it can be observed that for the blue corals there is a sudden drop in the bleaching percent to 0.47% as compared to the percentage in subsequent years. This shows that the data was entered incorrectly which might have occurred due to typo. The above value was then corrected to 47% and used for further analysis.

- Latitude value error

Coral reef site locations



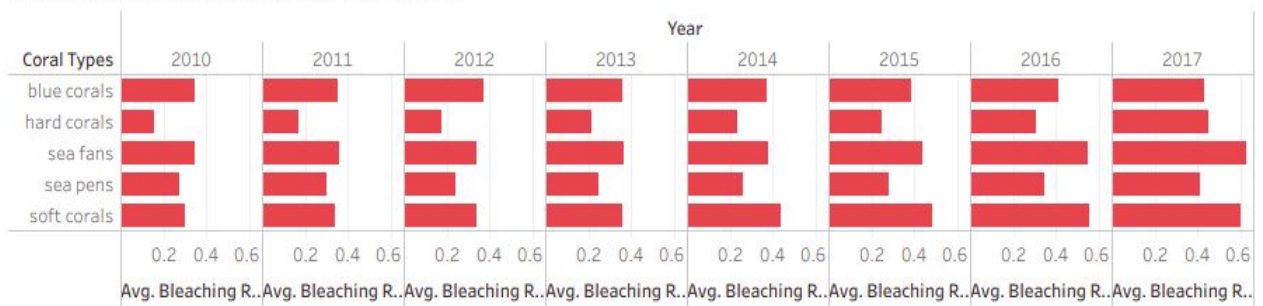
In the above symbol map it can be observed that all the sites from Site 1 to Site 8 except Site 2 are along the coastline of the Great Barrier reef. Site 2 lies in the middle of the ocean whose latitude value is 18.937. As the Great Barrier reef is in Australia which lies below the equator the latitude value should be negative. Thus, the above latitude value is changed to -18.937 and used for further analysis.

• Data Analysis

After fixing all the errors and removing the outliers from the data, it was used to analyse the bleaching effect for the period 2010-2017 over different sites.

- Observation on coral bleaching each year

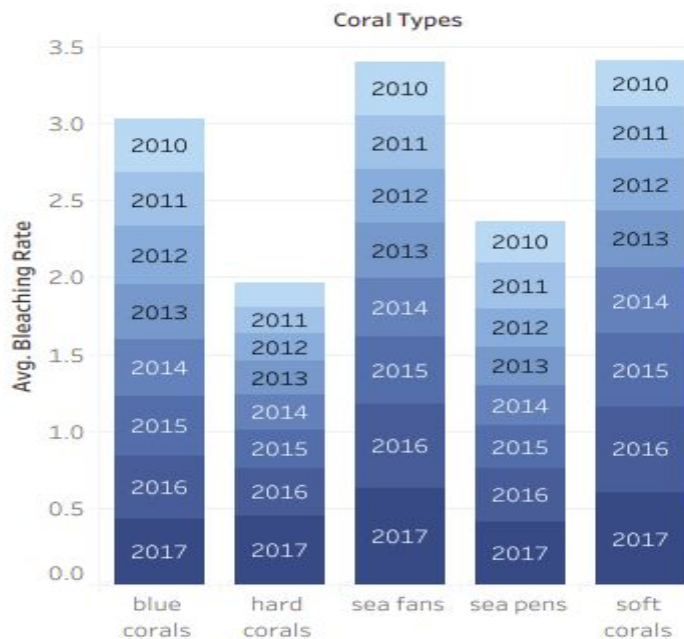
Bleaching rate of corals for different years



In the above graph the X- axis represents the average bleaching rate for each year and Y axis represents the types of corals. It can be observed that blue corals faced the worst bleaching in the year 2010 and 2012 while seafan faced the worst bleaching in the year 2011, 2013 and 2017. Soft corals observed the worst bleaching in three consecutive years 2014-2016.

- Observation on worst year for coral bleaching

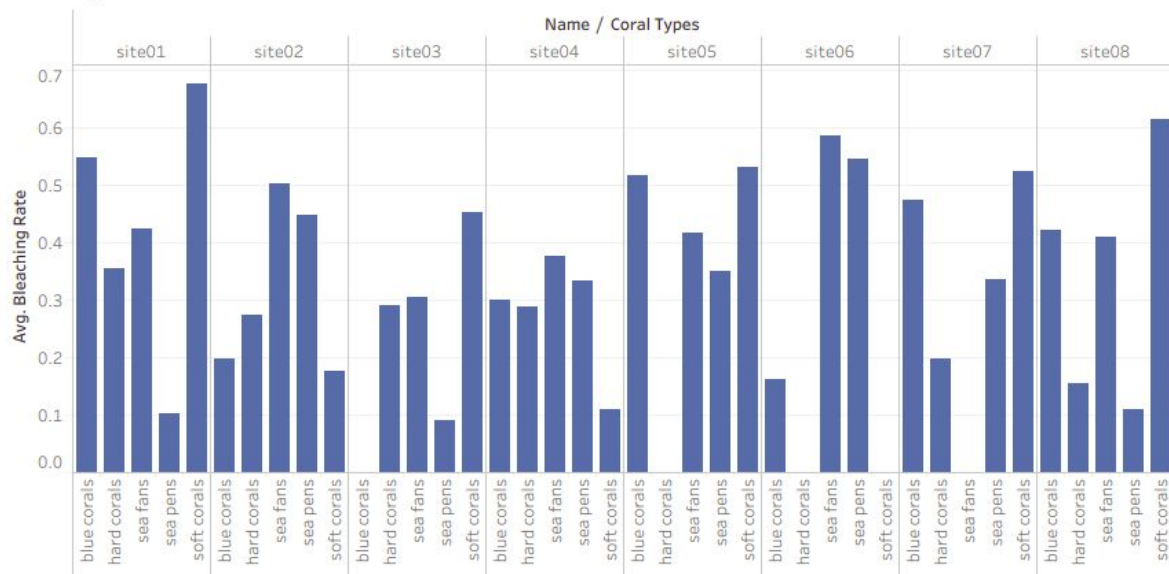
Coral bleaching for different corals



In the above graph, the X axis represents the types of corals and Y axis represents the average bleaching rate. Each coloured rectangle in the bar represents the average bleaching rate for that particular year. The colour changes from light to intense as the average bleaching rate increases. From the above graph it can be observed that the average bleaching rate for all the types of corals increased from 2010 to 2017. This indicates that all coral types observed the worst bleaching in the year 2017 and if preventive measures with respect to environment are not taken it would increase in the subsequent years.

- Analysis of bleaching rate with respect to site locations

Bleaching rate for each site



In the above graph it is observed that over the years of 2010-2017, soft corals observed the worst bleaching for site01, site03, site05, site07 and site08 while over the same period sea fans observed the worst coral bleaching for site02, site 04 and site06.



The above graph represents all the eight sites along the coastline of Queensland in Great Barrier Reef with average bleaching rate for soft corals. From the above graph it is observed that the average coral bleaching is worst for the sites in the upper part of the coast line viz. Site01 to Site08 while there is a sudden decrease in bleaching rate for the sites which lie in the lower part of the coast line viz. Site02 and Site04.

- **Conclusion:**

The above exploration and analysis for coral bleaching along the Great Barrier Reef which is known for the world's largest coral reef, shows that the average bleaching rate over the years is increasing drastically which is leading to the death of corals. Preventive measures such as pollution control, timely reef cleanup should be taken care of in order to prevent the degradation of corals in the reef.