CHAPTER 5

CONCLUSIONS AND DISCUSSIONS

In this chapter, the conclusions are presented and discussed. In the following sections the results for each of the objectives of study were described

1. Conclusions and Discussions

The first objective to investigate the patterns of the temperature, salinity, transparency, alkalinity, oxygen, pH, nitrite, phosphate and silicate variation in Pattani Bay in 1995-96.

Table 3 shows the statistical significance of the spatial variation (both in time and location) for each of the hydrographic variables. These results are based on the two-way analysis of variance given in Figures 15 to 24. The r-squared values refer to the proportion of the total variation accounted for by differences in both location and day.

Table 3: The statistical significance of spatial - temperal

variables	F-statistic	p-value	r-squared	conclusion
temperature	1.548	0.1026	0.8062	not significant
salinity	6.228	0.0000	0.7813	significant
transparency	8.074	0.0000	0.5118	significant
alkalinity	3.16	0.0002	0.6821	significant
oxygen	2.567	0.0024	0.5437	significant
pH	4.095	0.0000	0.5237	significant
log2(nitrite)	3.611	0.00004	0.7241	significant
log2(nitrate)	2.456	0.0041	0.5881	significant
log2(phosphate)	2.729	0.0013	0.7651	significant
sqrt(silicate)	2.401	0.0050	0.7401	significant

From Table 3 we can conclude that there are spatial differences in all of the variables, with the single exception of temperature. The r-squared values are generally

high (greater than 65%), with the exception of transparency (51%), oxygen (54%), pH (52%), and nitrate (59%).

These analyses highlighted several outliers, which could have invalidated the normally assumption. Table 4 shows the corresponding results after omitting these outliers.

Table 4: The statistics of hydrographic variables after m outliers are omitted

variables	m	p-value	r-squared	Conclusion
temperature	4	0.0	0.8442	significant
salinity	3	0.0	0.8045	significant
transparency	2	0.0	0.5441	significant
alkalinity	2	0.0	0.7320	significant
oxygen	1	0.0	0.5971	significant
pH	4	0.0	0.5817	significant
log2(nitrite)	2	0.0	0.7384	significant
log2(nitrate)	1	0.0	0.6055	significant
log2(phosphate)	3	0.0	0.8239	significant
sqrt(silicate)	2	0.0	0.7925	significant

Clearly, omitting the outliers improves the goodness-of-fit substantially in most cases. From this table, it can be concluded that there are differences between stations for all the hydrographic variables.

The second objective was to develop a model that can be used to describe this spatial temporal variation. From Tables 1 and 2, it can be seen that the fitted model to estimate values of the hydrographic variables at a given place and time, as follows:

(1) Read the value for the specified hydrographic variable for the specified day from Table 1 (for Dato).

(2) Read the adjustment (from Dato) for the hydrographic variable for the specified station from Table 2.

(3) Adjust the result in (1) by adding the result obtained from (2).

For example;

If you want to know the value of temperature at Tunyong Lulo on February 15, 1996 you can estimate it as follows :

(1) The temperature (at Dato) on February 15, 1996 = 25.4

(2) The adjustment for temperature for Tunyong Lulo = -0.5

(3) The resulting estimate is the 25.4 + (-0.5) = 24.9 ° C

Similarly, the value of transparency at PSU on February 26, 1996 can be estimated it as follows :

(1) The transparency (at Dato) on February 26, 1996 = 66.4

(2) The adjustment for transparency for PSU = -17.8

(3) The resulting estimate is the 66.4 + (-17.8) = 48.6 cm.

The graphs shown in Figures 4.11 – 4.20 give an indication of the extent of the variation between locations and between days. With one exception (transparency) the variation in location is quite small compared with the variation over time.

These graphs also show strong seasonal patterns for many of the variables, particularly for temperature, salinity, transparency, alkalinity, nitrite and phosphate. However, the pattern is irregular for oxygen, pH, nitrate, and silicate.

2. Limitations

The study had some limitations. First, by fitting effects for each day and only for the days when measurements were taken, a direct estimate of the predicted value for any day of year is not immediately available. Some kind of interpolation is needed. Second, the model may give some estimates that are outside a reasonable range, due to the additivity assumption in the two-way anova model. For example, the value predicted for salinity at Yaring River on 321 (November 17,1995) is –1.9.

3. Suggestion for further studies

(a) Fit a model, such as a harmonic time series model, containing an annual seasonal component, rather than a component for each day.

(b) Collect more data in the further studies, using a more carefully designed study.

(c) Take into account the time of day at which the measurement is taken.