# Chapter 6

# Conclusions and Recommendations

## 6.1 Physicochemical characteristics

Physicochemical characteristics of the sediment, such as pH, indicate that mangrove sediment at Klong Lad Khao Kao is weakly acidic. pH values did not vary significantly with depth. Redox potential of mangrove sediment is generally higher at the surface, decreasing with depth. This suggests that at deeper levels reduction occurs.

## 6.2 Nutrient distribution

Chemical analysis of sediment collected in March 1990 (dry season) and October 1990 (wet season) at different depths showed that relatively small differences exist in vertical distribution and also that seasonal differences were significant except for dissolved organic notrogen.

In addition:

- Nitrite plus nitrate analysis of samples collected in October 1990 indicate that concentrations of nitrite plus nitrate decreased with depth. The study also found significant ($\propto$ =0 .05) differences between seasons.

- Concentrations of ammonia vary significantly ($\propto$ = 0.05) with seasons and vertical profile analysis indicates that levels increase with depth.

- Dissolved organic nitrogen distribution was also investigated in both dry and wet seasons (March and October 1990). Concentrations were not significantly different ($\propto$ = 0.05). It was also found that dissolved organic nitrogen levels generally decrease with depth.

- Concentrations of phosphate in interstitial water increased with depth. The concentrations of phosphate were significantly different at $\alpha = 0.05$ between seasons.

- Dissolved organic phosphorus in interstitial water increased with depth. There were significant differences between season ($\alpha = 0.05$).

## 6.3 Nutrients releases from sediment

Water samples collected in October 1990 and March 1991 to study amounts of nutrients released from sediment during a tidal cycle showed that released $NH_4$+ averaged 0.177 mmol $m^{-2}$ $h^{-1}$ in October and 0.017 mmol $m^{-2}$ $h^{-1}$ in March. Average release rates of DON were 27.76 mmol $m^{-2}$ $h^{-1}$ in October and 4.446 mmol $m^{-2}$ $h^{-1}$ in March.

Nitrite release in October averaged 0.005 mmol $m^{-2}$ $h^{-1}$ and the rate of uptake in March averaged -0.003 mmol $m^{-2}$ $h^{-1}$. A similar pattern was found for phosphate; the rate of release in October averaged 0.022 mmol $m^{-2}$ $h^{-1}$ and the rate of uptake in March averaged -0.001 mmol $m^{-2}$ $h^{-1}$. while The rate of dissolved organic phosphorus in October was 0.011 mmol $m^{-2}$ $h^{-1}$ and the rate of release in March averaged 0.039 mmol $m^{-2}$ $h^{-1}$.

The rate of nitrate uptake in October was -0.005 mmol $m^{-2}$ $h^{-1}$ and -0.011 mmol $m^{-2}$ $h^{-1}$ in March.

Higher levels of nutrients are released from sediment during ebb tide than flood tide. This could result from complex chemical processes at the sediment surface.

## 6.4 Stirred and unstirred sediment

Higher levels of nitrite and phosphate are released from stirred than unstirred sediment. The rate of release of nitrite in stirred sediment averaged 0.035 µmol $m^{-2}$ $h^{-1}$ and 0.078 µmol $m^{-2}$ $h^{-1}$ for phosphate. Average released and uptake rates of nitrate, ammonia, dissolved organic nitrogen, and dissolved organic phosphorus

were not higher in stirred sediment.

The higher rates of nutrient release in stirred sediment help to explain the source of nutrients in estuaries.

## 6.5 Recommendations

Though it is hoped that the findings of this research will be of some usefulness in terms of making a contribution to the literature on mangrove forests, it is clear that further research is required.

The study of nutrients in interstitial water is important to a greater understanding of nutrient status in sediment. Further enquiries should be conducted on a greater range of elements such as iron, aluminium, manganese, and oxygen in sediment.

Work should also look at the role played by the many animal species found in mangroves in nutrient distribution, as well as the contribution of plankton and nekton.

Measurements of nutrient release should be taken over a longer period and the relationship of released rates with soil fraction should also be investigated.