REMOTE MONITORING OF HARMFUL ALGAL BLOOMS

Ross G. McPherson

Hornsby Shire Council, PO Box 38, Hornsby, New South Wales, Australia, 2077
(E-mail: rmcpherson@hornsby.nsw.gov.au)

Background

The Hawkesbury River estuary is a major system just to the north of Sydney. This estuary supports significant recreational and commercial fishing, aquaculture and a host of other important uses. Regular summer algal blooms occur in the Berowra Creek tributary of the Hawkesbury River. These blooms pose a threat to the local aquaculture industry (oysters), commercial fishing, recreational fishing, other recreational pursuits, estuarine ecosystem health and public health in general. Over the last five years the estuary has been "closed" to all contact on at least three occasions with fish kills occurring on one occasion and a consumer recall on oysters from the area on another occasion.

Aims

The resources required to continuously monitor such an estuarine environment, using classical techniques, are significant. The primary aim of this work was, therefore, to reduce the resources required to monitor the development of harmful algal blooms. This would also lead to an increase in our understanding of the conditions leading to the production of such blooms and to hopefully supply information towards the development of predictive tools for algal bloom management.

Approach

To accomplish these aims a developmental program was established which has attempted to utilise off-the-shelf chlorophyll monitoring probes to collect real-time chlorophyll data (Schofield 1999) from the estuary and display this via the Internet. This real-time data, which includes chlorophyll, conductivity, salinity and temperature, is supplemented by monthly sampling of phytoplankton species density and diversity and a range of other biological and physio chemical data.

Results

The major outcomes of the program have been:

- The development of a successful mooring and data collection system for the monitoring of chlorophyll in this estuary.

- The development of data logging and communications systems to allow the information to be downloaded, analysed and displayed on a dedicated web page.

The major problems which needed to be addressed during the development of this technology included an assessment of instrument calibration drift and the need for fouling maintenance as the instrument is obviously deployed in a highly productive environment.

We are currently using the data to develop a cut off level for chlorophyll above which staff will need to be deployed to ascertain algal species density and diversity and the potential for the bloom to be of a harmful nature. This level would seem to be somewhere between 15 and 20 ug/L of chlorophyll.

Conclusions

The potential for the remote monitoring of harmful algal blooms has been established by this project. The development of the technology has proven to be cost-effective when compared to other classical algal bloom monitoring techniques. While this technology has not eliminated the need to microscopically assess algal populations it has developed an effective early warning system for the development of harmful algal blooms.

Future improvements to the technology will enable us to remotely identify algal species in situ and thus continue to reduce the resource allocation for such monitoring (Lohrenz et al. 1999).

As data from this installation accumulates with data from other affiliated programs it is hoped that predictive models will be able to be developed, on a local and regional basis, to assist in the better management of this phenomena.

References

Lohrenz, S., Fahnenstiel, G., Kirkpatrick, G., Carroll, C., and Kelly K. (1999) Microphotometric assessment of spectral absorption and its potential application for characterization of harmful algal species. *J. of Phycology* **35(6 supp.),** 1438-1446.

Schofield, O., Grzymski, J., Bissett, P., Kirkpatrick, G., Millie, D., Moline, M., and Roesler C. (1999) Optical monitoring and forecasting systems for harmful algal blooms: Possibility or pipe dream? *J. of Phycology* **35(6 supp.),** 1477-1496.