

ABSTRACT

This research has canvassed the possibility of recovering useful evidence for mid-to-late Holocene environmental change in the central Sydney Basin using sediment cores from estuarine locations. If the indicators from the Sydney Basin are representative, environmental conditions in southeast Australia during the mid-to-late Holocene were anything but stable, albeit with a smaller range of variability than the greater perturbations of the last Glacial Cycle. The nature and amplitude of changes differ between sites but appear to be roughly synchronous, within the uncertainties of the available chronology and can be matched with other records from southeast Australia. Although there are well-known problems associated with the use of saline estuarine deposits, the lack of desiccation and degradation of the sediment record that mars most inland Australian wetlands more than compensates for these disadvantages. The patterns of sediment deposition and charcoal flux in estuarine muds and sands are complex, representing an interplay of anthropogenic, climatic, diagenetic and transport phenomena. Analysis of environmental conditions within anoxic, saline systems is hampered in part by the compositional complexity of sulphidic sediments, to which a large number of analytical techniques must be applied in order to characterise even basic parameters such as organic content. The multidisciplinary nature of the investigations has enabled better interpretation of Holocene changes. It has also demonstrated clear differences in the sensitivity of different palaeo-ecological indicators to environmental change. An achievement of this work was to blend the age profiles of Lead-210 and ^{14}C isotopes and, to some extent, bridge the troublesome gap of the last 500 to 1000 years, so that European impact can be compared directly with the period immediately preceding it. There is a wealth of evidence available in the sediment sinks of the Sydney estuaries and, even within the limits of the analyses used, periods of sharp and marked fluctuations are obvious. Four major boundaries of environmental change were identified, centred on ~2900 cal BP, 2000 cal BP, ~1400–930 cal BP and 1000–500 cal BP, with a fifth at ~3900 cal BP suggested by the one core that extends back that far. These boundaries were evident at several sites and over wide areas of the central Sydney Basin. As well as similarities in sedimentation rates, there was general agreement between the palaeo-environmental indicators both within and between the cores. This suggests that major changes are more likely to be climate-driven than anthropogenic or locally influenced. Furthermore, the general support for the trends in the Sydney sedimentary sequence found in other types of proxy records across southeast Australia suggests reasonably synchronous changes across a broad area. Such changes are thus more likely to be connected with regional climatic trends and less likely to be a consequence of human activities. The work lays a useful base for interpreting

the Holocene in the central Sydney Basin to which more sophisticated and expensive methods can be applied to show the regional extent of such changes and possibly refine the resolution of the record. However, the arduous but necessary work of correctly identifying and coring representative sites will always be the precursor of more complicated methods. This thesis presents the hard-won results of such work.