Introduction

As a nation of ‘fringe-dwellers’ (more than 80% of us live on or near the coast) it is not surprising that many of our environmental problems are to be found in our lakes, rivers, estuaries and coastal embayments. With much of the country now in the grip of drought and two of our major cities under water restrictions, the realisation that we do inhabit the driest continent is only now starting to hit home. Replicating the Snowy scheme on vast scales around the continent is not the solution – changing the way we perceive, value, and use our water is. Like many other Australian cities, Adelaide adopted a ‘one shot’ approach to water – we harvest it, use it once, and dispose much of it to a marine environment. The combination of elevated nutrient levels, toxic agents, and even the freshwater component of our treated effluent and stormwaters has been shown to have harmful effects on marine biota.

The coastal waters off Adelaide support a diverse range of marine habitats with many of these now stressed and degraded from years of unabated pressure from point and diffuse inputs. One of the most conspicuous impacts has been the loss of some 4,000 hectares of seagrass off the Adelaide coast. Seagrasses have important ecological significance and also help stabilise sea floor sediments. The causes for the initial and continuing loss of seagrass are not well understood nor are some of the more complex interactions between seagrasses and other components of the ecosystem. While elevated nutrient levels may be implicated, there are no doubt other factors involved. Before deciding on an appropriate management strategy we need to improve our level of understanding of this natural system. This increased level of understanding will accrue from rigorous scientific investigation which in turn underpins effective environmental management. This is precisely what the Adelaide Coastal Waters Study is designed to do.

The Adelaide Coastal Waters Study will engage predominantly local scientific expertise to undertake a series of linked research tasks to address some of the unanswered questions and to raise the level of understanding of the processes associated with seagrass loss/recruitment, sediment dynamics, and water quality. The outcomes of these investigations will be synthesised and presented in a variety of formats ranging from technical publications to informative fact sheets. Information gathered during the course of the Study will assist in the development of an integrated monitoring and evaluation strategy to ensure the long-term sustainability of this natural asset.

The Adelaide Coastal Waters Study will make important contributions to our scientific understanding of coastal ecosystems. It will integrate and build upon the expertise and experience accrued from similar studies around the country such as the Port Phillip Bay Environmental Study, the Brisbane River and Moreton Bay Study, the Gippsland Lakes Environmental Study and the Perth Coastal Waters Study. CSIRO’s Environmental Projects Office is pleased to be working with the local research community and stakeholders of this landmark study.

ACWS Project Director

David Lee
Study Overview

Stage 1 of the Adelaide Coastal Waters Study (ACWS) was completed early in 2002. At this time, a comprehensive report was provided to the stakeholders that detailed the scope of research tasks considered necessary and able to address the diversity of stakeholder concerns and deliver the understanding and tools to allow sustainable management of the coastal waters. The research program has been valued at approximately $2.3 million.

By mid 2002, the ACWS Steering Committee had committed to proceed with the Study and to provide the funding necessary to implement the full scope of works. Subsequently, CSIRO’s Environmental Projects Office was retained to manage the remaining two Stages of the Study with an expected completion date in June 2005.

A research team is being assembled to undertake the six Stage 2 research tasks (detailed elsewhere in this newsletter). Providers are expected to be engaged before the end of 2002 with research tasks and associated field studies and data collection to commence early in 2003.

ACWS Project Management Team

Study Director, Professor David Fox, Centre for Applied Hydrology, University of Melbourne and CSIRO Land and Water.

Professor Fox has many years of experience in managing large integrated scientific studies involving multi-disciplinary research teams. He was co-recipient of the CSIRO Chairman’s medal for his contributions to the Port Phillip Bay Environmental Study and served on the technical group of that study. He has directed or been involved in a number of other important studies including the Gippsland Lakes Environmental Study and Melbourne Water’s Effluent Management Study as well as contributing to the National Water Quality Management Strategy. In addition, he has held teaching and research positions in universities in Australia, the United Kingdom and the United States and led research groups in CSIRO’s divisions of Land and Water and Mathematical and Information Sciences.

Study Coordinator, Mr David Ellis, CSIRO Environmental Projects Office, Adelaide Laboratories. David is an experienced project manager with qualifications in natural resource management and Antarctic and Southern Ocean Studies. He has been involved in numerous coastal and marine planning projects in South Australia and provides a local point of contact for the Study.

Marine scientific adviser, Dr Karen Hillman, Director DAL Science and Engineering, Perth Western Australia. Karen is an aquatic ecologist with over twenty years experience in the environmental monitoring, impact assessment and management of estuarine and coastal ecosystems. She has been involved in—and reviewed aspects of—a number of large multidisciplinary studies in WA, including the Peel-Harvey estuarine system, Princess Royal Harbour (Albany), Cockburn Sound, and the Perth Coastal Waters Study, and is currently involved in the Perth Long-term Ocean Outlet Monitoring (PLOOM) Program. Work on multidisciplinary studies interstate and overseas includes the East Coast Armaments Complex (Port Phillip Bay), and review of a CSIR coastal monitoring program off Natal, South Africa.

Project funded by:
The research tasks to be undertaken between December 2002 and December 2004 are designed to provide managers with a better understanding of all of the inputs to the coastal system and the ecological effects that these inputs have on coastal seagrass ecosystems and key plants and animals within these systems. The research tasks are listed on the following page. All tasks will contribute directly to refining the conceptual model above. For example, components of task IS 1 will seek to determine the extent and importance of inputs from groundwater flows and atmospheric fall out. The relative significance of all contaminant input flows from catchments, coastal effluent treatment plants and atmospheric / groundwater inputs will influence long-term allocations of resources and management effort.

The complex interactions between small (micro) algae growing as epiphytes on seagrass plants and the grazing animals that control the density of algae in the marine environment will be investigated. Task EP 1 will consider the response of both algae and grazers to inputs of nutrients, fresh water flows, sediment and chemical contaminants and seek to improve our understanding of seagrasses’ response to inputs of freshwater, high sediment loads / low light levels and high and diverse contaminant loads. This critical research will involve both seafloor assessments and controlled laboratory experiments in environments that mimic real ocean conditions.

The five research tasks are essential for us to gain an adequate understanding of the complexities of the ecosystem processes. The results of these tasks will enable researchers to recommend management actions to halt and reverse the degradation that has occurred over the past fifty years or more. Task EMP 1 calls for the definition and establishment of an environmental monitoring program that will assist the region’s marine managers to assess the success of any recommended management action and allow the managers to adjust their actions accordingly.
**Quantification of diffuse and point source terrestrial inputs.** This task will investigate daily loads and variability in flows and contaminant contributions from major and minor catchments, stormwater drains and treated effluent discharges, groundwater and the atmosphere.

**Assessment of the effects of inputs to the Adelaide coastal waters on seagrass ecosystems and key biota.** This task will investigate the effects of inputs of nutrients, freshwater, sediments, toxicants and other contaminants on ecosystem health and population dynamics.

**Remote sensing and interpretation of marine and coastal features and development of an environmental information system.** This task will determine correlations between ecosystem changes and spatial and temporal patterns in inputs of potential concern and establish the data management system for the Study.

**Coastal sediment budget.** This task will characterize marine sediment types and distributions providing information on sources, storages and the dispersal of sediments from catchment flows.

**Physical – ecological studies in the Adelaide coastal and Gulf St Vincent waters.** Using high-resolution modeling and satellite techniques, this task will examine past, current future loads, dispersal patterns and predict anticipated ecological effects.

**Environmental Monitoring Program.** The aim of this task is to coordinate spatial, temporal and statistical design of a long term EMP.