

 *Australian Institute of Marine Science*

Australian Institute of Marine Science Research Activities 2000-2003

By

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Australian Institute of Marine Science

The challenge of understanding ecosystems and managing the resources in the Australian Marine Jurisdiction will require a continued effort by Government and others to ensure the wise and sustainable use of marine environments.

This poster outlines the activities of the Australian Institute of Marine Science for the next three years, showing the commitment by the Institute, to meet the challenge to support the national aspirations to understand, use and care for the marine environment:

Research fields include:

- Predicting Climate Impacts upon Marine Ecosystems
- Exploring and Conserving Marine Biodiversity
- Sustaining Marine Living Resources
- Measuring Human Impacts in Coastal Marine Ecosystems
- Deriving Benefits from Marine Biotechnology

The Information Service of the Australian Institute of Marine Science ensures that institute staff has access to the information sources, both through electronic methods or hardcopy, that will allow them to perform their tasks effectively and efficiently in achieving these outcomes.

A full description of the research plans for the Australian Institute of Marine Science can be located at www.aims.gov.au

Australian Institute of Marine Science

The ecologically sustainable development of the environment demands an understanding of how natural and human impacts interact to change ecosystems, an ability to forecast those changes and to plan response strategies. Because ocean currents disperse dissolved matter (nutrients, pollutants) and suspended matter (sediments, plant spores, and animal larvae) over great distances, the downstream effects of critical processes need to be tracked over large spatial domains. As the ocean environment is the outcome of climate variations that have annual and decadal cycles, these studies must also have a long-term perspective. Obtaining large-scale, long-term observations in a cost-effective manner from the vast area of coastal seas in northern Australia is a major challenge for AIMS.

History

Australia's ocean territory is the largest, most diverse and potentially most valuable, yet least understood, of all our natural assets.

The Australian Institute of Marine Science (AIMS) was established by the Australian Commonwealth government in 1972 to generate the knowledge needed for the *sustainable use and protection of the marine environment* through innovative, world-class scientific and technological research.

In November 1994, Australia became responsible for one of the world's largest ocean territories, Exclusive Economic Zone (EEZ), straddling the Indo-Pacific, and extending from the tropics to Antarctica. Australia's oceans are rich in resources and biodiversity that present opportunities for both industry development and conservation. How can we, as Australians, achieve sustainable development of our oceans? The Australian Institute of Marine Science research program is designed to provide the information we need to meet this challenge.



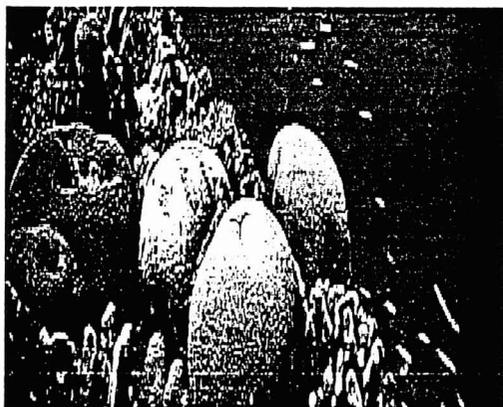
Australia's ocean territory is likely to contain the greatest diversity of marine life on earth and molecular studies are a powerful key to its understanding

Exploring and Conserving Marine Biodiversity

Biodiversity has been invoked as a cornerstone of ecosystem maintenance, a source of useful products, and the reason for the high aesthetic and conservation values associated with habitats such as coral reefs.

This project seeks to elevate awareness of marine biodiversity, catalogue its attributes, understand its origins, conserve its values within a multiple use framework, and contribute to its preservation through research supporting the National Representative System of Marine Protected Areas (NRSMPA).

Research methodology and results from this Project will be extended globally through the Global Coral Reef Monitoring Network (GCRMN), which is coordinated from AIMS.



The preservation of the Great Barrier Reef requires an understanding of which changes are 'natural' and which are the result of human activity.

AIMS has long been a leading provider of ecological concepts and information to underpin the management of coral reefs. Studies of spatial variability and temporal change in coral reefs provides the means of distinguishing 'normal' change (reflecting geographic differences in evolutionary history, biogeographical processes, environmental settings and climate) from changes that are attributable to human impacts. Research results are disseminated through books, journals and electronic databases in such a way that they can readily be used by management organisations both within Australia and overseas.



A scientifically rigorous record of change is an essential component of good management of the GBR and provides a model for others to copy

Predicting Climate Impacts Upon Marine Ecosystems

This Project focuses on the impact of the physical environment upon marine ecosystems, primarily coral reefs and fisheries.

Climate impacts incorporate both natural and human-related processes. These include global changes such as the enhanced Greenhouse effect and regional processes such as sediment and nutrient run-off from land that has been modified by human activities in the river catchments. At the same time the marine ecosystems also respond to natural disturbances, such as upwelling, and recruitment events. These events are controlled by the water circulation, which itself responds to climate.

This knowledge base involves understanding the strong links between physics, chemistry and the biology of the marine ecosystems.



Sustaining Marine Living Resources

The focus is on coral reef ecosystems and tropical fisheries, which are major resources for industry as well as sources of conservation values.

Ecologically sustainable development of the resources requires that management and use is compatible with the attributes of the exploited resources.

This requires critical knowledge about the natural variability of marine ecosystems and the dynamics of living marine resources in time and space.



Deriving Benefits from Marine Biotechnology

Australia's Oceans Policy provides integrated strategy for the exploration and ecologically sustainable utilisation of marine natural resources.

Research in tropical aquaculture will focus on prawn domestication and genetics, the culturing of new species, and the improvement of methodologies to enhance industry production.

The search for new biochemicals from Australia's diverse marine biota will continue towards the development of pharmaceuticals and healthcare products, agrochemicals for crop protection, and novel bioremediation agents for environmental protection.

The search for novel biochemicals is complemented by examining the adaptations of marine organisms to harmful and aggressive environments resulting in the production of biotoxins and venoms, antifoulants, signalling agents, and other molecular defences.

Measuring Human Impacts in Coastal Marine Ecosystems

Australia's tropical coastline is being encroached upon daily by human development. The complexity of the ecosystems where land meets sea, and of the multiple environmental impacts colliding in the coastal zone, requires a skilled multidisciplinary approach to problem solving.

The focus of our research is to identify and quantify the impact of various human activities (agricultural run-off, pesticides, freshwater diversion, aquaculture effluents, oil) on the ecology and biogeochemistry of coastal habitats along key areas of the north Queensland, Pilbara and Kimberley coasts.

Understanding how subtle shifts in ecosystems can and do impact biota and the chemical balance of tropical coastal waters is the underlying focus of this research.



Information Services

The service ensures that staff of the Institute has access to information sources, either through electronic methods or hardcopy, which will allow them to perform their tasks effectively and efficiently

Goals

- to provide information required by research, project and support teams;
- to assist staff in the use of specialised information sources;
- to assist Science Communications in relation to AIMS research publication reprints;
- to provide policy, procedure and management of AIMS data.



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