

Antarctic science: past achievements, future visions

Over the past seven years, changes in the Australian Antarctic programme have reflected its increasing focus on the Government's goals in Antarctica.

A number of major new scientific research programmes have resulted, including those run through the Antarctic Climate and Ecosystems Cooperative Research Centre (ACE CRC), which has the ambitious objective of linking changes in the physical environment of the Southern Ocean to its biological productivity. Already, research within the CRC – which replaced the Antarctic and Southern Ocean CRC in 2003 – has revealed that the deep waters of the Southern Ocean are changing more quickly than we previously thought. Another major CRC programme on the Amery Ice Shelf aims to understand the dynamics of heat exchange between the ocean, ice and atmosphere.

The AAD's Human Impacts programme has established strong and effective links with the University of Melbourne and other collaborators, and instituted a solid programme of research at Casey station and on Macquarie Island. The work focuses on the remediation of contaminated soils, and assesses the consequences of pollution run-off into the marine environment. The Canadian Government is interested in the outcomes of this research and is now a partner in the work.

Australia's growing influence within the Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR) was recognised with the establishment of a dedicated science programme – Southern Ocean Ecosystems – which now takes a strong leadership role in the deliberations of CCAMLR. Major field studies have included a survey of the foraging ranges and diet of the land-based predators in the Heard Island and McDonald Island Marine Reserve. This year, programme scientists completed a krill survey of the ocean from 30 to 80 degrees east. The results of this survey, together with those from a 1996 survey, will describe krill distribution and abundance across the whole of CCAMLR's statistical areas – 58.4.1 and 58.4.2 (*Australian Antarctic Magazine* 8: 12).

With the passing of responsibility for international whale policy issues to the AAD, a programme in cetacean biology was developed within Southern Ocean Ecosystems. While the programme is still in its infancy, great strides have been made in the development of molecular biology techniques for the identification of whale diet from faecal analysis, and in the use of passive sonar for estimation of whale stocks. Australia has a high profile in the International Whaling Commission's Scientific and Conservation Committees, and strongly supports the Commissioner's role.

The most significant study undertaken with considerable outside support was a major geophysical expedition in 2002–03 to the southern Prince Charles Mountains (*Australian*

Antarctic Magazine 5: 2–7). The expedition, conducted in collaboration with the German Bundesanstalt für Geowissenschaft und Rohstoffe, resulted in the mapping of the Gamburtsev Mountains which lie under the ice cap.

The future of our Antarctic science programme looks equally ambitious. The introduction of the inter-continental air service offers many opportunities for the science programme to increase participation by Australian and

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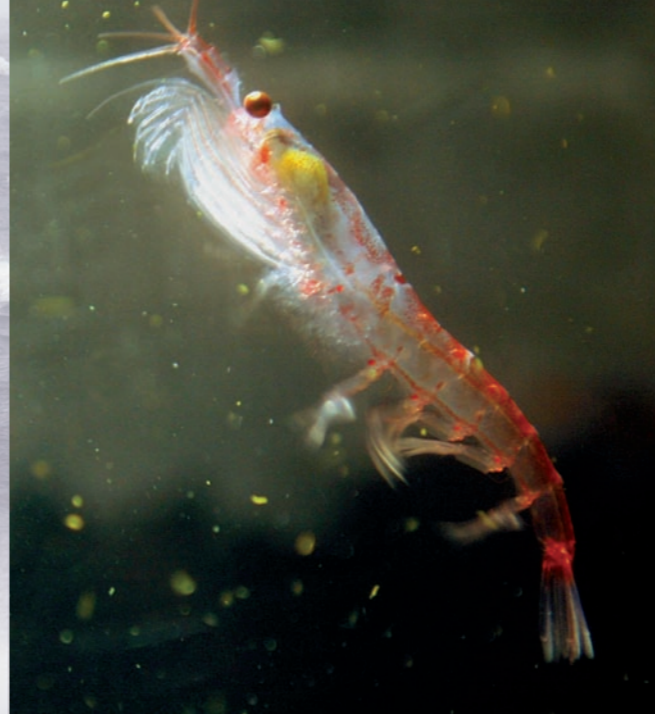


Australia has a high profile in the International Whaling Commission and has developed a number of non-lethal techniques to study whale diets and population numbers.

international scientists. Long periods of sea time will be eliminated, making research in Antarctica more attractive to busy scientists than it is today. The AAD's Science Branch is currently developing a 'Bold New Vision' for its future which will make best use of the inter- and intra-continental flight opportunities, and establish new foci for research.

Some crystal ball gazing suggests that our work will increasingly be multi-disciplinary and collaborative, drawing on financial and scientific resources outside those provided by the Australian Government. The days of 'going it alone' are over for most of Australia's research institutes. Australia's programme in Antarctic science is already the fifth most collaborative in the world (see page 25) – a position we will try to improve upon in the next decade. The introduction of a new funding framework for the European Union (EU) science programme (for 2007–2013) will encourage increased international collaboration within the EU, and between EU consortia and other nations. Opportunities exist for our strong links with European scientists to flourish, and to bring in the new resources we will need for major projects.

WAYNE PAPPS



ROSS KING

Environmental protection, marine ecosystem sustainability and climate will continue to be high on the Australian Government's scientific agenda, as the Southern Ocean becomes an increasingly attractive source of animal protein for human consumption, and climate change bites into the global economy.

The future will see continual refinement of our scientific focus to support the policy objectives of Government. Currently these are in the broad fields of environmental protection, marine ecosystem sustainability and climate science. As the AAD's resources are unlikely to increase significantly, scientists in the 'non-priority' areas of science will have to find sources of cash to pay for field and other support. Emphasis on marine science will probably increase over the coming decades as the Southern Ocean becomes increasingly attractive as a source of animal protein for the world's human population, and as climate change bites into economies around the world.

The Australian Government is likely to maintain its interest in the conservation and sustainable management of its marine resources, and the resources in international waters. It may also be increasingly concerned about past human footprints in Antarctica, given the requirements for nations to clean up old work sites and rehabilitate damaged land. If tourism continues to grow at its present rate, there will be calls for us to understand its impacts and consequences on Antarctica's environment, and take preventive measures before damage is apparent.

The future will be exciting and challenging. Australia must seize the opportunities the air service into Casey will offer, to bring more of the outside scientific world to our doorstep, and to collaborate in new ways. With the International Polar Year imminent, we must be alert to new collaborative opportunities afforded by the big research efforts that will be undertaken, and so continue to secure our place among our peers as a leading nation in the execution of science in Antarctica.

—MICHAEL STODDART
Chief Scientist, AAD

EPiC research underway

The Australian Antarctic Division Science Branch recently announced a new Environmental Protection and Change (EPiC) programme, formed through the amalgamation of the former Impacts of Human Activities in Antarctica and the Adaptations to Environmental Change programmes.

The new programme, led by Dr Martin Riddle, aims to understand how the biodiversity of Antarctica responds to human-induced environmental change, and to develop new techniques to remediate environmental impacts. The programme will study impacts ranging from large-scale global processes, including climate change and ocean acidification, to localised impacts caused by the presence of people in Antarctica, such as site contamination and the spread of alien species. The merger provides exciting opportunities for scientists from both programmes to broaden the scope of their research, to establish new collaborations, and to address important questions facing Antarctic science and policy.

The programme has five priority themes:

- Antarctic biodiversity – life in a highly fragmented environment;
- Global climate change – biological responses in the Antarctic and Southern Ocean;
- Acidification of the Southern Ocean – biological impacts and feedback mechanisms;
- Environmental guidelines for Antarctica; and
- Zero-discharge stations and remediation of contaminated sites.

Further details of the programme will appear in the next issue of the *Australian Antarctic Magazine*.

Bronze for Australia in Antarctic publications

Australia was recently ranked third in the world for the number of scientific papers published on Antarctic research between 1980 and 2003. According to a statistical analysis in *Current Science* last year, Australia published 1259 scientific papers in 934 journals over this 24-year period, behind the USA on 3311 and the UK on 1738. These Australian papers were also cited 3782 times in scientific papers from other countries.

The study compared the number of papers published on Antarctica, within the context of the Antarctic Treaty System, which provides the framework within which much Antarctic research is conducted. The top 20 rankings were filled by Consultative (voting) Parties to the Treaty (except Canada at number 14), while 'acceding states' (non-voting) and other countries external to the Antarctic Treaty System, showed considerable productivity in the next 15 rankings. The study also showed that Australia was the fifth biggest contributor to collaborative research, reflecting the spirit of the Antarctic Treaty system, which aims to ensure Antarctica remains a continent of science and peace.

More Information: Dastidar PG and Persson O (2005). Mapping the global structure of Antarctic research *vis-à-vis* Antarctic Treaty System. *Current Science* Vol 89, No 9: 1552–1554.