

**DCC Submission to the  
PARLIAMENT of AUSTRALIA HOUSE of REPRESENTATIVES INQUIRY  
INTO RESEARCH TRAINING and WORKFORCE ISSUES IN AUSTRALIAN  
UNIVERSITIES**

**Summary**

- Climate change represents a major challenge for Australia and the world in the 21st century.
- The future impacts of human-caused changes in the climate system represent systemic and major risks to key areas of the Australian economy, society and the environment.
- The Government's climate change strategy is built around three pillars – reducing Australia's greenhouse gas emissions, adapting to climate change that we cannot avoid, and helping to shape a global solution.
- Current national research capacity is inadequate to support the growing demand for climate change information by decision makers and drive the technological innovation required for deep reductions in emissions and adapting to climate change.
- The effective harnessing of the Government's Future Fellowship scheme to build university research and training capacity to address mitigation, adaptation and improve earth system science is critical to the delivery of the national response to climate change.
- The establishment of an Australian Research Council cross-disciplinary panel for Earth System Science and Climate Adaptation that bridges multiple ARC panels has potential to support the national climate change research effort through assessing the best possible use of limited scientific resources and avoiding barriers to integrative research agendas.
- There is a need to ensure the most effective collaboration between the universities and government research providers such as CSIRO and the Bureau of Meteorology.
- Collaboration between university researchers and national research initiatives such as the Centre for Australian Weather and Climate Research (CAWCR) and the National Climate Change Adaptation Research Facility (NCCARF) will be key in maximising the national climate change research effort.
- The scale of the climate change problem is enormous and the time to address systemic restrictions on research capacity is now.

**Magnitude of the Climate Change Research Challenge**

University researchers must make significant contributions to bringing about deep reductions in greenhouse gas emissions and in equipping Australia with the capability to adapt to climate change impacts.

In the past 18 months there has been a dramatic increase in demand by government business and the community for climate knowledge support. The demand, particularly concerning changes in climate variability and extremes, will grow with increasing consequences of climate change over the decades ahead. The climate change research community is struggling for capacity to meet the demand for information, while also continuing to develop the underpinning fundamental science.

A key research challenge revolves around addressing the uncertainties in the fundamental science to provide greater surety for key decisions on setting emissions targets and effective adaptation. Australian climate scientists play a role of global importance in this regard as they are the primary provider of information on southern hemisphere climate processes spanning research in Antarctic systems, the oceans which surround the continent and Australia's unique temperate, tropical and arid ecosystems. There is also a national imperative to be self reliant for research into Australia's climate processes and unique ecosystems as there are few if any analogues with northern hemisphere systems that we can borrow from to drive our climate change response.

Research to date indicates that Australia is highly vulnerable to the unavoidable impacts of climate change. This vulnerability can be broadly defined by the impacts of increasing temperatures, declines in rainfall across the southern half of the continent, rising sea levels, and the increased frequency and magnitude of extreme climatic events such as storms, flooding, storm surge, drought and fire.

For an effective national and global response to climate change it is essential that all key research expertise be harnessed in a coordinated manner.

### **Key role of Universities**

Australian universities have a dual role in climate change science; they are an important contributor to climate change research and are responsible for training the next generation of researchers. In recent years there has been an increase in the sectors capacity through the appointment of key world class researchers. Most recently a leading British researcher has been recruited to lead the National Climate Change Adaptation Research Facility (NCCARF).

NCCARF provides the means of harnessing Australia's research capabilities to produce strategic knowledge required to address the 2007 Council of Australian Governments identified priority areas for early adaptation response – water resources; coastal regions; biodiversity; agriculture, fisheries and forestry; human health; settlements, infrastructure and planning; and natural disaster management. It will be important that Australia's universities support the institutional shell created by the initial Australian Government investment of \$50 million in this Adaptation Research Facility.

There is a growing recognition that to meet the challenge posed by climate change we require a comprehensive and highly integrated climate science effort, in which natural systems scientists collaborate in a whole-of-system approach. At present, our research efforts across the many relevant facets of earth system science are seriously under-resourced compared to what is needed to meet this urgent national challenge.

Research groups remain poorly integrated, despite recent moves to consolidate efforts.

The new joint venture between CSIRO and the Bureau of Meteorology on climate change research (Centre for Australian Weather and Climate Research, CAWCR) and the building of a next generation Earth Systems model (ACCESS) are welcome steps towards delivering integrated research outcomes. Key universities are also linking with the CAWCR initiative to develop components of the ACCESS model such as dynamic vegetation and to assist with model evaluation.

Consortia arrangements such as the Western Australian Marine Science Institution also provide a successful institutional model for the delivery of collaborative multi-disciplinary research on regional climate processes, their impacts and the sustainable development of resources.

Australia's climate change science capacity depends largely on a cohort of globally recognised researchers who are approaching retirement which serves to highlight the dearth of younger researchers positioned to carry the response to climate change forward. Universities have a major role to play in training the next generation of researchers. The effective harnessing of the recent Future Fellowships scheme and Higher Education Revolution policy will be critical to building the required training capacity in our universities.

### **Addressing barriers to collaboration and building research capacity**

In 2007 the PMSEIC independent working group on Climate Change in Australia found that the current Australian Research Council panel fragments climate change research into major disciplines. Effective climate adaptation bridges all science disciplines (biophysical, technological and social), this challenges existing funding structures. A potential solution would be a cross-disciplinary panel for earth system science and climate adaptation that bridges multiple ARC panels. Funding allocated by such a panel should be free of impediments to collaboration between researchers in universities and major government research providers such as CSIRO and the Bureau of Meteorology.

In the past 18 months there has been a dramatic increase in demand by government and industry for climate knowledge support. More research personnel are needed to develop models and theory, to interpret observations, data time-series and experiments, and to work with industry and decision makers to interpret results correctly. At present the number of graduates beginning Ph.D. studies in earth system science is inadequate for both present and future demand. It is vital that the universities build and adequately support undergraduate and postgraduate programs, and enhance institutional cooperation.

The scale of the problem is enormous and the time to address the systemic restrictions on research capacity is now.