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Mr John Carter, Committee Secretary
Department of the Senate
PO Box 6100
Parliament House
Canberra ACT 2600
Australia

Re: Senate Inquiry into the Effects of Climate Change on Training and Employment Needs

James Cook University (JCU) provides training and education in many aspects of climate change. The University provides a vital service in this regard, due to its location in north Queensland – one of the regions within Australia most affected by climate change and which has amongst the highest risks going forward. These risks arise from vulnerability to new infectious diseases, communities at risk (rural, remote, Indigenous), major climatic events as cyclones and intense rain events, coastal inundation, and risks pertaining to the economic base which is particularly vulnerable (tourism, fishing, mining, agriculture).

In regard to climate change, JCU provides research-led teaching in:

- Ecological responses to climate change, particularly in tropical forests and coral reef systems
- Emergency response and hazard management
- Building standards and design for cyclone-affected areas
- Urban and infrastructure planning
- Adaptation to and mitigation of climate change
- The implications of climate change for rural, remote and Indigenous communities
- Vulnerability of coastal areas to sea-level rise and storm inundation
- Long-term climate record reconstruction and prediction
- Climate change, tropical health and medicine
- The implications of climate change for water resources in tropical environments
- Climate change policy and governance

JCU is a founding partner of the National Climate Change Adaptation Research Facility (NCCARF).

JCU welcomes the opportunity to make a submission to the Senate Inquiry into the Effects of Climate Change on Training and Employment Needs and we tender the following points:

1. ***There is a need for education and training that is place-relevant.*** For example, the vulnerabilities to climate change of the tropical north are different to those of other parts of Australia. Training should reflect these place-based implications, because they give rise to particular employment needs. In the tropics there are specific requirements in terms of infrastructure design and planning, emergency response, and health impacts, for instance.
2. As the developed nation with the largest geographic footprint in the tropics, Australia has well-developed expertise in tropical science, knowledge and innovation. Areas of particular note include tropical environmental science and management (marine, freshwater and terrestrial), tropical health and medicine, urban planning and design, architecture and infrastructure, Indigenous societies and communities, and tropical agricultural science. This knowledge platform provides an important foundation for training and education on climate change throughout the Asia-Pacific region and indeed beyond (e.g., Africa, Latin America). The significant scientific and educational resources located in the Australian tropics (especially in north Queensland and the Northern Territory) provides an obvious base for the provision of education, training and skills assistance in the context of climate change. ***Australia should play a proactive role in the training and education of people the near tropics in respect of climate change, from a base in tropical Australia.*** The requirements for training include formal award programmes (e.g., university degrees), professional development programmes, and short-course training.
3. ***Training and education in climate change should be structured with reference to the major areas of science, knowledge and innovation; viz., climate science, impacts and adaptation, and mitigation.*** These knowledge areas map reasonably clearly to employment needs; e.g., expertise in climate science is required in the areas of prediction and modelling, whereas skills and knowledge in the technological sciences is relevant to mitigation.
4. The societal needs in terms of education and training in climate change are diverse. They extend from a requirement to develop a basic level of social literacy in climate change (e.g., to facilitate behavioural change) through to the need to train specialists in relevant science, business, policy and technology. ***A strategy needs to be developed to address the full spectrum of social and community needs for education about climate change.*** This inevitably implies a broad range of delivery formats and styles and diverse needs in terms of content.
5. Within the higher education sector, the need for training and education about climate change extends across a large number of courses and programmes. In addition to the atmospheric sciences, an understanding of climate change is relevant, for example, to:
 - Engineering
 - Politics and governance
 - Indigenous studies
 - Health and medicine
 - Architecture
 - Urban planning and built environment
 - Law
 - Business management studies
 - Finance
 - Economics
 - Education
 - Ecology and environment
 - Water resources
 - Agricultural science.

The challenge from an educational perspective is how to deliver the training in a meaningful and integrated way across such diverse programmes. In the context of other broad-scale

issues (e.g., 'sustainability') a debate has flourished, for example, as to whether it is better to integrate the content into existing subjects or to offer specialist, standalone subjects. The issues are not dissimilar in relation to climate change. **Careful consideration needs to be given to how education and training in climate change is best delivered across a broad constituency, in order to meet the needs of employers in a wide range of professions.**

6. Australia is suffering a serious decline in interest in science, engineering and technology (SET) at secondary school and university levels. While the needs for education and training in climate change are not limited to the SET portfolio, there can be no question that Australia, like all nations, must have access to people skilled in the sciences and technology if we are to address employment needs. Accordingly, it is not possible to separate training and education needs in climate change from the wider problems attending to enlistment of students in SET. **It is imperative, therefore, that direct attention is given to how secondary and university students are attracted into science and technology studies.**
7. Innovation in response to the challenges of climate change demands a highly skilled workforce in industry, government, research agencies and the universities. This goes to the matter of post-graduate training. It is proving increasingly difficult in Australia to recruit post-graduate students, especially in the SET portfolio. **As a matter of priority, a programme of targeted scholarships should be established, with a level of support above that currently provided through the Australian Postgraduate Awards program, to encourage students into priority areas relating to climate change.**
8. Attending to the impacts of climate change necessarily requires an interdisciplinary approach. Our current structures and approaches to education and training are not well suited in many respects to interdisciplinarity, though there are notable exceptions. It does represent a significant challenge to address this and support is required in the development and delivery of a climate change curriculum that imbeds the necessary level of interdisciplinary studies. **It is recommended that material support is given to the design and delivery of climate change education and training which reflects its interdisciplinary character.**
9. While the balance in particular skills and competencies will vary from one climate change specialisation to another, it is possible nonetheless to identify a common skill set. This includes:
 - An understanding of atmospheric processes and how they are affected by human activities
 - A knowledge of climate impacts on human and environmental systems
 - Concepts of risk, uncertainty and vulnerability
 - The ability to conduct risk assessments
 - An understanding of the concept of impact assessment and its methods
 - A knowledge of governance and the policy formulation process
 - An appreciation of the science-policy interface
 - Environmental and resource economics
 - Organisational and behavioural change management

An adequate response to the needs for training and education in climate change demands a clear articulation of the basic knowledge and core skills – at range of levels - that are required and the design of frameworks to deliver these competencies.

JCU's mission and goals are centered on positioning the university as a leader in teaching and research, addressing the critical challenges facing the tropics, including climate change. The University's Statement of Strategic Intent affirms that it seeks to promote a 'brighter life in the

tropics, worldwide', through 'graduates and discoveries that make a difference'. The University Plan is headlined by a commitment to focus the University's teaching and research on four pillars of particular relevance to the tropics:

- *Tropical ecosystems, conservation and climate change*
- *Industries and economies in the tropics*
- *Peoples and societies in the tropics*
- *Tropical health, medicine and biosecurity*

The first of these refers to climate change specifically and climate change is implicit in each of the others. The University is currently undertaking a review of its entire curriculum with a view to ensuring alignment with these themes. Consequentially, the University will be even better placed to provide education and training relevant to the impacts of climate change on the Australian tropics and to the Asia-Pacific region.

Yours faithfully



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DEPUTY VICE-CHANCELLOR (RESEARCH AND INNOVATION)