

The International Alliance of Research Universities Climate Change Congress (Copenhagen March 2009)

In March 2009, the International Alliance of Research Universities (IARU) held a congress in Copenhagen called *Climate Change: Global Risks, Challenges and Decisions*. The aim of the Congress was to gather together the new knowledge that has emerged since the release in 2007 of the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), described in other Australian Collaboration Fact and Issue Sheets.

The March Congress was important on many grounds. First, it brought together the most distinguished scientists in the field of climate change, as well as economists, epidemiologists, political scientists, sociologists and philosophers and others. Second, it provided the opportunity to present, discuss and summarise the most recent findings in climate change research following a growing number of individual reports of worsening climate change conditions. Third, it drew much sharper attention to equity issues associated with climate change and the need for societal transformation in order to deal with climate change. Finally and very importantly, the congress was a key precursor to the Conference of State Parties to be held in Copenhagen in December 2009. This was the primary reason for holding the congress.

Copenhagen, December 2009.

Over a decade ago, most countries joined an international treaty, the United Nations Framework Convention on Climate Change (UNFCCC). The aim was to consider what can be done to reduce global warming and to cope with whatever temperature increases are inevitable. More recently, some nations approved an addition to the treaty, the Kyoto Protocol, which has more powerful and legally binding measures that came into force in February 2005. In Copenhagen in December 2009, the UNFCCC will hold the 15th Conference of the Parties (COP15). A series of UNFCCC meetings are taking place throughout 2009, culminating at the Copenhagen meeting. In attendance will be parties to the UNFCCC, observer organizations and accredited press.

Currently, the 2007 IPCC synthesis report is the key scientific document feeding into the Copenhagen negotiations. Because the report from the Congress contains much more recent science than the 2007 IPCC report, it is crucial that this new knowledge be taken into account in the lead up to and at the UNFCCC meeting in Copenhagen in December 2009, when significant international steps must be taken to provide an effective response to climate change.

The findings presented at the Congress are collected in a synthesis report which covers climate science, the impacts of a changing climate on society and the environment, and the options available to deal effectively with the challenges of climate change. This information is communicated through six key messages, outlined below.

1) Climatic Trends

Recent observations show that greenhouse gas emissions and many climate indicators are changing near the upper boundary of the IPCC predictions. Indeed, several indicators are exhibiting change in excess of IPCC projections. Increasing ice loss from Greenland, Antarctica and glaciers means a new prediction of one metre sea rise in the next century, about double the 2007 IPCC prediction. Large polar ice sheets lose mass through melting and ice discharge; in Greenland, new satellite measurement systems show that the ice sheet is losing mass at a rate that contributes 0.5 mm/yr to global mean sea level rise.

One of the most alarming changes since the 2007 report concerns Arctic sea ice in summer. In 2007, the minimum area covered decreased by about two million square kilometers as compared to previous years. The decrease was almost as great in 2008. Decreasing ice coverage affects climate change because ice and snow reflect radiation from the sun back into the atmosphere, whereas oceans absorb the sun's heat. An ocean without ice thus warms much more quickly, creating a feedback loop in the system that increases global warming.

The temperature of the ocean is a better indicator of climate changes than atmospheric temperatures. Heat from the sun enters the ocean more slowly than it enters the atmosphere, but far more heat is ultimately stored in oceans. Change in this stored heat is, thus, an important climate indicator. New observations of surface ocean temperature and heat content show that ocean warming is currently estimated to be fifty per cent greater than previously reported by the IPCC. Ocean warming contributes to sea level rise due to the thermal expansion of water.

The global carbon cycle is in a state of disequilibrium because of continually rising CO₂ emissions and changing land use patterns. Since 2000, the rate of fossil fuel emissions has accelerated to about 3.4 per cent per year. This sits at the upper edge of the range of growth rates in the IPCC scenarios. Historically, about half the CO₂ emitted into the atmosphere by fossil fuel combustion and land use change has been absorbed by land and ocean CO₂ sinks. However, natural CO₂ sinks are vulnerable to climate and land use change and are highly likely to weaken in the future. Increasing ocean acidification, ocean circulation changes, and water, temperature and nutrient constraints on land CO₂ uptake combine to disrupt the equilibrium between emissions and absorption.

The ocean's absorption of anthropogenic CO₂ emissions has not come without a price: it has dramatically changed ocean chemistry, in particular ocean pH and carbonate and bicarbonate ion concentrations. This acidification threatens many organisms, with recent reports, for example, indicating a 19 per cent growth decrease in the Great Barrier Reef. Of further concern is the likelihood that previously inert stored carbon may be released into the atmosphere in the form of methane. For example, tropical peat-land carbon is vulnerable to land clearing and drainage, and the organic carbon in Arctic permafrost is vulnerable to warming. Recent work on the quantifying effect of these vulnerabilities has increased confidence that their net result will be to increase climate change.

2) Social and Environmental Disruption

The Congress report notes the lack of global consensus regarding what constitutes 'dangerous' climate change. The figure most often cited as the guardrail beyond which climate change becomes dangerous is a 2°C global temperature rise above pre-industrial levels. However, recent

research shows that even with temperature rises lower than 2°C, impacts could be significant and only some societies will cope through pro-active adaptation measures. With rises above 2°C, the possibilities for adaptation within both societies and ecosystems plummet, and the risk of social disruption through health impacts, water shortages and food security rises significantly. Research presented at the Congress indicates that the old guardrail of 2°C is inadequate to prevent serious risk to threatened ecosystems and to avoid increases in extreme weather events.

Water resources are particularly vulnerable, with severe impacts anticipated with temperature rises of only 1.0 to 1.5°C. Melting glaciers and mountain snow and ice cover are having significant impacts on river flows and on fresh water availability for agriculture and human consumption. Water resources are highly susceptible to abrupt climate change: loss of water storage in the Himalayan glaciers, for example, would lead to extreme environmental stress by reducing water availability in the Indo-Gangetic plain.

Extreme climatic events may also increase in frequency and severity. For example, with a rise in ocean temperature of only 1°C, wind speeds in tropical cyclones can increase by 5 metres per second, potentially doubling the number of Category Five cyclones. New research also suggests that a temperature rise of 1 to 2°C could be sufficient to trigger some major 'tipping elements' such as Arctic summer sea ice. Tipping elements occur when a small change in an important variable, such as temperature, brings about a rapid and large change in a feature of the climate, altering its condition or pattern of behaviour. The likelihood of triggering tipping elements with a 2°C rise is now considered 'moderate' rather than 'low' (the IPCC's 2001 estimate).

3) Long-term Strategy: Global Targets and Timetables

While a 2°C temperature rise entails risk to societies and ecosystems, it is difficult to envisage how a more ambitious goal could be achieved. The global average temperature has already risen by 0.7°C, and anthropogenic greenhouse gas emissions are still increasing. Atmospheric carbon dioxide levels are already at the levels predicted by the IPCC to lead to global warming of between 2 and 2.4°C. To stabilise greenhouse gas concentrations at

this level, global emissions would need to be reduced by 60 to 80 per cent immediately, which is impossible. Thus, exceeding the atmospheric CO₂ concentrations needed to maintain the 2°C guardrail has become inevitable. Emissions, therefore, need to peak in the very near future. New research shows that if emissions do not peak until after 2020, emissions would thereafter have to decrease by 5 per cent per annum in order to have any chance of staying within the 2°C guardrail. Given that there is currently a 2 per cent increase in emissions per annum, this prospect is daunting.

Reluctance in shifting from short- to long-term views of the economic impacts of climate change is a major barrier to emissions reduction. However, many recent analyses confirm that the costs of both adapting to and mitigating climate change will increase if action is postponed. Emissions pricing, through trading and/or taxes, is an essential step towards curbing emissions. The current global economic crisis warns against creating an intricate, highly connected global system in which collapse of one element might lead to collapse of the whole. A global action plan remains nevertheless essential.

4) Equity Dimensions

The Congress report notes that “climate change is having, and will have, strongly differential effects on people within and between countries and regions, on this generation and future generations, and on human societies and the natural world” (1). The climate is not changing uniformly: certain effects are felt more prominently in some parts of the world than in others. Inequity is also present in the origins of climate change: in general, developed countries have been responsible for the majority of emissions while developing nations are suffering the majority of the impacts. A strong instance of the need to better integrate policies of climate change mitigation with policies of poverty alleviation can be seen in the 2008 spike in food prices. It was attributable at least in part to the demand from wealthy nations for biofuels, which compromised the food security of the poor in developing nations. Adaptation is a further area of inequality, with poor nations the least able to adapt to climate change. Current voluntary funding from wealthy nations is grossly inadequate, and there needs to be a shift in attitude such that funding be considered restitution for damages done rather than optional charity. The notion of equity also extends to intergenera-

tional responsibility and to ethical issues regarding the relationship between humanity and the rest of nature.

5) Inaction is inexcusable

Reducing anthropogenic greenhouse gas emissions entails a process called ‘decarbonising the economy’. There are already many tools and approaches at hand to achieve this, such as the various renewable energy technologies available. While there is no single renewable technology that can entirely replace fossil fuels, combinations of technologies can be found to suit different regional needs. In some developing countries which do not currently have electricity systems, the use of renewables such as solar is more immediately applicable than fossil fuels. In these cases, the goals of climate change mitigation and of development should be more fully integrated than is currently the case. There are further examples of mitigation strategies where there is no excuse for inaction. In agriculture, for instance, very significant and cost effective greenhouse gas reductions can be made through altered management practices including the practice of soil carbon storage. In transport, the technology already exists for second-generation biofuel systems, making the use of oil crops for biofuel production outdated and unsustainable.

The implementation of these mitigation strategies must always occur alongside strategies for adaptation, and in some cases such as agriculture, strategies for adaptation are highly synergistic with mitigation practices. In general, it is easier to develop adaptation strategies for systems that are already tightly controlled by humans, such as food, forestry and water systems. The effective development of adaptation strategies for natural systems is more complex. The Congress called for a new paradigm for nature conservation in the face of climate change, based on enhancing the resilience of well functioning ecosystems. But perhaps the most important message emerging from current adaptation efforts is that climate change policy cannot be treated as an ‘add-on’ to existing policies. Policies of mitigation and adaptation must be synergistic and must be integrated into both domestic policy and foreign assistance from the ground up.

6) Meeting the Challenge

The Congress argued for a greater role for the humanities and social sciences in climate change research and discussions. As noted above, much of the technology for mitiga-

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tion is already in existence: what is lacking is political will and the social acceptance of the need for change. The insights into human cultures, behaviours and organisations offered by the humanities and social sciences have the potential to facilitate the social transformation needed to address climate change. Scientific knowledge, technologies and economic instruments are essential parts of the solution, but they are interpreted and applied through the lens of an individual or community's worldview. Worldviews incorporate factors such as religious or spiritual values, indigenous knowledge systems and ways of conceiving nature-culture relationships.

Behavioural change is at the centre of any transformation, and this applies equally to individuals, businesses and governments. In a democratic political system, individual voters will only drive change if their values are deep enough to make hard long-term decisions, and in turn this will only occur if their worldviews have shifted to prioritise climate change policy and its implementation. For the business community, there is an acute need for stable policy frameworks that create a positive environment for investment and change. On an international level, there is a need to develop an innovative, integrated institutional architecture for Earth System governance.

Preparation for the Conference of Parties, Copenhagen, December 2009

The Danish Government will hand over the results of the March Scientific Congress to decision-makers at the Conference of Parties, Copenhagen, December 2009 (COP15). What is being sought is a binding global climate agree-

ment at this United Nations Conference which will apply to the period after 2012. United Nations Climate Chief Yvo de Boer doubts that the fine details of a new global climate treaty will be finalised at the December meeting. He, however, hopes the meeting will reach agreement on four political essentials: How much are the industrialized countries willing to reduce their emissions of greenhouse gases? How much are major developing countries such as China and India willing to do to limit the growth of their emissions? How is the help needed by developing countries to engage in reducing their emissions and adapting to the impacts of climate change going to be financed? And how is that money going to be managed?

Reference:

1. *Climate Change: Global Risks, Challenges and Decisions (Copenhagen 2009, 10-12 March)*, University of Copenhagen, p 22.

Sources:

The synthesis report from the IARU conference:
<http://climatecongress.ku.dk/>

General information about COP15:
<http://en.cop15.dk/about+cop15>

The Intergovernmental Panel on Climate Change:
<http://www.ipcc.ch/>

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