



MONASH University



8th AIDA CLIMATE CHANGE WORKING PARTY MEETING

XIV AIDA WORLD CONGRESS – ROME

Meeting –29th September 2014

Agricultural Insurances – Coping with the threats to food production

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- 1) The long range weather outlook for Australia for 2014 – 2015
 - Trending to strong El Nino. Warmer waters moving to tropical central to Eastern Pacific. Drier conditions for much of Q'land, NSW and northern Victoria over the next 18 months.
 - Sea temperature anomalies support near normal rainfall for parts of SW , Western Australia ,and southern Victoria and Tasmania , but trend to a positive pattern meaning drying in late winter and spring
 - The above situation is expected to modify the important weather related insurance risks in the following manner.
 - Flood and flash flood potential likely to be significantly less than normal for Q'Land and NSW for winter spring and summer. Much of Australia will be drier than normal.
 - While tropical cyclones are expected to be below average , the bushfire risk is above average with extreme fire out breaks likely.
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 - BUSH FIRE RISK - very much above average for ALL PARTS of AUSTRALIA except south western Victoria , most of Tasmania , and the south coast of NSW where the risk is classified as above average .
 - SEVERE THUNDERSTORM and WIND RISK - Below average for North Western Western Australia , southern Western Australia , far north Q'Land , south central Q'land , Average for Victoria , Central coast Western Australia and South Australia , and Above Average for southern NSW and far eastern Victoria .



- TROPICAL CYCLONE RISK - generally average or below average for all parts of Australia ordinarily exposed with a later start to the season
- RAINFALL – relevantly for crop exposure , below average for virtually all of Australia except central west coast of Western Australia where it is expected to be slightly wetter than average and western Victoria where it is predicted to be near average .
- While these forecasts are for an 18 month period only, the predicted general trend for the future is for higher than average temps, lower than average rainfall and cyclonic activity of increasing severity and frequency. For Australia this forecast represents a serious risk for crop and general agricultural production.

THREATS TO AGRICULTURAL PRODUCTION

Firstly, at a global level, greenhouse emissions from livestock, soils, and land clearing represent 25% of global annual greenhouse emissions.

Secondly, efforts to mitigate greenhouse gas emissions from agriculture may reduce agricultural production placing further pressure on global food supplies.

Thirdly, if climate change effects cannot be reduced, the long term impact is likely to result in a further reduction in agricultural productivity and food production.

In the context of a global issue, where does Australia sit?

We occupy the second driest continent on Earth (second only to Antarctica)

Climate change that results in less rainfall, poses a serious threat to Australian agricultural output .With the short term weather and longer term climate predictions for Australia, the relative sparsity of arable land, above average and cyclonic rainfall falling in far northern Australia is of little benefit for food production. Accordingly we are faced with a prediction of lower than average rainfall in those parts of Australia traditionally viewed as our, “food bowl “

While Australia’s population and resources suggest that we are not at risk of experiencing food scarcity, it remains in Australia’s long term political and financial interests, to ensure global food security.



Australia produces, 1% of the world's food, and 3% of the food traded world wide . Australia, currently exports 76% of its agricultural products and, globally remains a major supplier in a number of key areas – 10% of the global dairy export market, the third largest beef exporter behind 2 “vulnerable” countries, India and Brazil . In the global context , Australia has 0.3% of the World’s population and 3.4% of the world’s arable land . In contrast China has 22% of the World’s population and 7% of the arable land .

By retail value, Australia produces 93% of the food consumed domestically however we are constrained in our efforts to raise productivity because we are highly exposed to the impacts of climate change, with constraints on water for irrigation, and the fact that per capita we are one of the highest green house gas producers in the world!

Australia’s climate, farming systems and soils are particularly relevant to food vulnerable/insecure regions such as Africa, South and South East Asia.

REGIONAL IMPACTS – GEOPOLITICAL STABILITY IN THE REGION

Weather extremes, and large fluctuations in rainfall and temperature are likely to have a major impact on Asia’s agricultural output and exacerbate food water and energy scarcities in Asia and the south west Pacific . These regions include many 3rd world or developing nations with limited capacity to adapt to climate change

Likely impacts include displacement of human settlement due to rising sea levels, reduced food production, water scarcity, and increased disease. Flowing from these impacts is the potential to destabilise domestic and international political systems in parts of Asia and the SW Pacific. The impact is likely to be increased if, climate changes coincide with other transnational challenges to security, such as terrorism, pandemic diseases or add to existing ethnic and social tensions.

Such regional problems could easily become Australia’s problems as recent experience attests. Over the last 10 to 15 years Australia has been required to intervene, in New Guinea , Bougainville, Solomon Islands and East Timor in response to political and humanitarian crises.

Climate change is likely to impact on food production in the Asia Pacific region.

- An increase in the frequency and intensity of severe weather events with the corresponding impact on agricultural production.
- Rising sea levels could inundate, and render unusable, coastal agricultural land.



- Shifts in rainfall patterns could disrupt river flows, used for agricultural production, accelerate erosion, and desertification and reduce livestock and crop yields.
- Increased temperatures could result in reduced crop yields by shortening the growing seasons and accelerating grain sterility in crops .
- As fish is a major food source in Asia, there remains a risk that marine ecosystems could experience major migratory changes in fish stocks due to rising sea temperatures and also the degradation of tropical reefs and marine reef species.

Any disruption to the South East Asian monsoon is likely to impact on the northern China plain with increased drought resulting. Other areas of vulnerability is the disruption to flows of Asia's principal river systems arising from deglaciation of the Himalayas and the Tibetan plateau.

The 2002 Consultative Group on International Agricultural Research, predicted that food production in Asia will decrease by as much as 20% due to climate change, at a time when populations in the region are rising. These forecasts are consistent with IPCC projections showing significant reductions in crop yields (5 -30% compared with 1990) , affecting more than 1 billion people in Asia by 2050 .

Third world countries, in the region with predominantly rural economies and low levels of agricultural diversification will be at risk. They have limited food options and capacity to diversify. Higher world food prices associated with climate change and declining production disproportionately impact poorer nations as it diminishes the opportunity to seek food security form international trade .In these circumstances , in the absence of international food trade liberalisation , it is likely that price volatility on world markets will increase , particularly at times of pressure on global food supplies. The impacts of food scarcity, and increased prices in countries with limited financial capacity to meet global prices has the potential to create starvation conditions and political insecurity. In the Asia pacific region, this has the capacity to create "climate refugees". In terms of international security, in the future, climate refugees could constitute a major component of refugee movement, globally, with serious consequences for international security. While early adaptive measures , in developing countries with effective governments can reduce the risk , other nations may be overwhelmed by the task confronting them , in which case , Australia , is likely to experience the impacts of climate induced political disturbances and even the potential for violent conflict in the region .

The security issues this gives rise to have already been identified internationally and recently featured in strategy plans currently under consideration by the US Defence



Department in relation to security risks confronting the US spheres of political, regional influence.

CLIMATE CHANGE ADAPTION AND MITIGATION STRATEGIES - AUSTRALIA

Australia's CSIRO (Commonwealth Science and Industrial Research Organisation) has introduced, four research initiatives designed to address the challenges of food security

- 1) Sustainable Agricultural Flagship - Aim is to reduce the carbon foot print of Australia's land use , while achieving the productivity needs of agriculture and forestry The major focus is on developing farming systems that use limited water and soil nutrients more efficiently .
- 2) Climate Adaption Flagship – Involves adaption responses to counter anticipated damaging effects of climate change. Research involves combining information from real mixed cropping systems with indentified vulnerable areas of climate risk , to adapt cropping practices to offset the impacts
- 3) Water for Healthy Country Flagship – Involves research into areas such as the Murray –Darling basin and South Western Australia, to undertake a comprehensive analysis of water resources and competing demands for supply for agricultural purposes. It is a 1 million square mile area
- 4) Food Futures Flagship – Developing agrifood and processing technologies to increase the sustainability of Australia's agricultural sector. Research into grain types as a means of achieving higher yields in wheat production, greater nitrogen use efficiency and improved nutritional yield.

In May 2012 ,Australia made a submission to the UN sponsored body SBSTA (Subsidiary Body for Scientific and Technical Advice) an organisation set up pursuant to article 9 of the UN Framework Convention on Climate Change (UN FCCC) and in the course of doing so identified a number of issues of particular relevance to Australia and initiatives to address risks to our domestic agriculture, arising from climate change .

Given the approach of the current government it is in a sense ironic that the submission recommended a number of new practices requiring:

- 1) Robust projections of climate change impacts at local or regional level to provide land managers with the confidence to take action
- 2) The motivation to change to avoid risks or to exploit opportunities
- 3) Demonstrated technologies to enable change to occur



- 4) Support during transitions to new management or new land use
- 5) Altered transport and market infrastructure and
- 6) An effective monitoring and evaluation system to learn which adaptation approaches work well, which do not and why.

Notably, the submission identified the risks facing Australia as a major food producer . Our farmers face increased risk of drought over the next 20 to 30 years, with the attendant social and final consequences that flow from that prediction.

The Intergovernmental Panel on Climate Change (IPCC), in its 5th report released in March 2014, took data from the 4th report of 2007, as a basis for future predictions and concluded that by the middle of the century, if temperatures rise by more than 2 degrees C, two thirds of the studies agree that there will be crop yield declines of more than 10%. Australian CSIRO Scientist Dr Mark Howden, claims that for wheat alone the average decline will be 2% per decade, in temperate climates, but in the tropics, for every degree increase the decline is 8% .

Graeme Hammer of Queensland University recently asserted that for Australia, the drier air, a product of warmer temperatures, is causing a reduction in yields, as a consequence of “crop water stress”. With a drier atmosphere expected the data predicts that by 2060 the yields will drop by 15 to 30%. For Australia this places substantial demands on plant breeders to produce low water, heat tolerant species of wheat, rice and maize. Currently we do not have the species to deal with these changing conditions.

In order to address this need the Federal Government has been investing in research through the Farming Future Climate Change Research Program (CCRP).

The research focuses on reducing greenhouse gas emissions, improving soil management, and adapting to climate change .The areas identified as exhibiting potential for emission reductions, while maintaining productivity are:

- 1) The use of feeding supplements to reduce livestock emissions ;
- 2) Using alternative pasture species to counteract the impacts of shorter growing seasons , predicted under climate change scenarios;
- 3) Incorporating low methane traits into livestock , breeding programs ;
- 4) improved fertiliser management in high rainfall cropping areas to reduce nitrous oxide emissions ;
- 5) identifying the effect of management practices on soil carbon levels ;and



- 6) analysing the costs and opportunities of relocating industries to areas with more suitable climates .

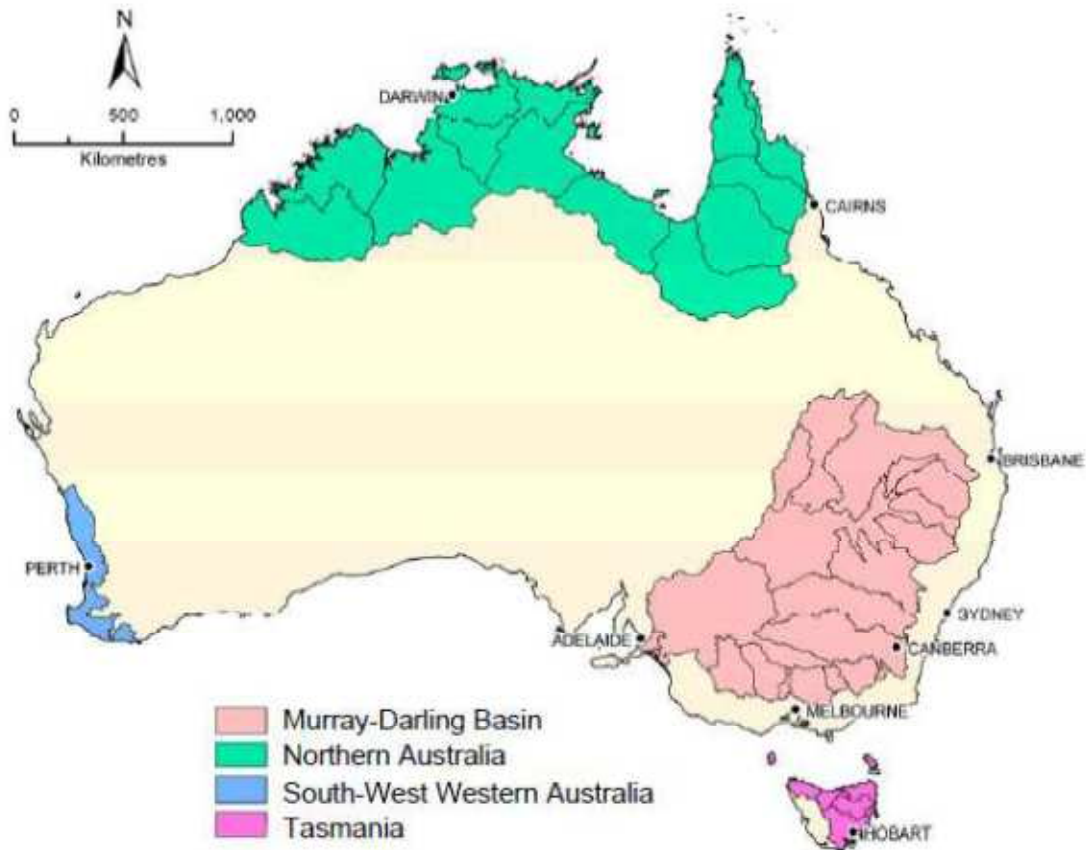
Other factors identified as major constraints to adaptive capacity of food organisations operating in Australia are risk management practises, an uncertain regulatory environment (itself a result of gaps in risk management) and uncertainty of climate change projections in part influenced by politically motivated misinformation.

Regulatory uncertainty is ranked highly as a risk facing the Australian food industry organisations and mirrors international rating agencies indexes of competitiveness and the cost of doing business. Australia now ranked by the World Economic forum , as 75th out of 142 , on the scale- “burden of government regulation“

The Murray – Darling Basin Project

The Murray – Darling Basin Authority was set up specifically to address water security in the basin, one of Australia’s largest and most important food production regions. During the Millennial Drought, water trading enabled some crop yields to remain fairly stable while others plummeted. Output for water intensive crops such as rice dropped dramatically. The water saved was on sold to farmers to produce higher value perennial crops such as fruit and wine grapes. Farmers in the region adapted to water scarcity and as a consequence efficiency per gicalitre of water more than doubled by the end of the drought. In the dairy industry, farmers purchased feed as a replacement for on farm irrigation, which left many farmers with excess water to on sell.

Another anticipated impact of climate change observed in other countries is the proliferation of new crop pests and diseases. As a consequence, farmers may have to contemplate changing crops, to reduce the exposure, such as moving from bananas to pineapples (which are more resistant to diseases , pests and cyclone damage) .



The future for water availability in South-West Western Australia in a drying climate: areas where CSIRO is conducting research into current and future water availability under the flagship [Sustainable Water Yields Projects](#) (Source: [CSIRO](#))

RESEARCH FUNDING FOR CLIMATE CHANGE ADAPTION and MITIGATION.

This remains an area in which Australia is extremely vulnerable. Recently the Australian Federal Government announced a reduction in funding for climate change related programmes from \$5.75 billion to \$500 million by 2017/18. Effectively a tenfold reduction!

As a consequence Australia is at risk of falling well behind its trading competitors. The US DA (US Dept of Agriculture) continues fund targeted research , on adaptive water management for cattle production , drought resistant livestock breeds , crop research etc . The USDA have recognised that climate change represents a substantial threat to agricultural capacity .The US has also committed to mitigation strategies such as green energy expenditure . More than 2/3rds of the US \$ 77 billion in Federal Expenditure was invested in technology research for green energy alternatives, with 8% committed to other nations to fund foreign climate change initiatives.



While other countries invest in green energy initiatives, Australia's reliance on fossil fuels increases with our dependency on coal fired power generation. States such as Queensland and NSW openly discourage alternative energy sources due to the states massive reserves of coal. The cost of coal generated power is becoming increasingly unsustainable when compared to green energy sources. Electricity consumption in Australia has declined 13% in the last 3 years while domestic consumers continue to install solar panels for private consumption. Despite grid feed in tariffs dropping, installation demand increases and grid demand continues a steady decline, a cause of anxiety for Australia's power generating companies

The IPCC predicts more frequent and severe droughts for much of the food producing regions of Australia, with the CSIRO predicting reduced crop yields in our 2 major regions (Murray – Darling Basin and South West Australia). With reduced rainfall, higher temps , and the effects of increased heat stress on livestock productivity is predicted to decline (reduced meat and dairy output) At the same time it is predicted that the changes will also alter the distribution of weeds , pests and diseases .

The effects of climate change on agriculture obviously have global ramifications with wheat and rice prices expected to double (in real terms) by 2050 and Australia as a major food exporter is heavily exposed. As a dry continent Australia is more heavily exposed than many countries but as an exporter of food what occurs in Australia impacts both national and global food security.

While other nations such as China, USA , even New Zealand ,continue to invest in alternative energy sources as a means of addressing climate change , Australian investment at a Governmental level is declining . In the recent Federal Budget the Government announced plans to scrap the Australian Renewable Energy Agency (ARENA) ,the Climate Change Authority (CCA) and the Clean Energy Finance Corporation presumably at the urging of the coal mining lobby and energy companies. Unfortunately the current Australian Government is populated by many climate change sceptics who appear more interested in ensuring the financial protection of the coal industry than the reduction in green house gas emissions.

The consequence of Australia's attitude to commercial green energy production is that companies such as the US corporation Solar Reserve (based in Santa Monica) is that they have shelved plans to expand into the business and domestic market in Australia and focus primarily on production at remote mining sites, currently reliant on polluting and heavily subsidised fuel .



Government policy changes and the planned scrapping of the Carbon Tax have substantially curtailed large scale renewable energy projects. In this regard Australia is moving in the opposite direction to many other western industrialised nations, notably the US.

The Californian Energy Commissioner David Hochschild, recently observed :“I really feel that Australia is starting to actually fight the future and it seems a mistake to me for a country with a wealth of natural renewable energy “

The irony is that while Australia is continuing to invest heavily in relation to flood mitigation strategies, and continues to explore options for water conserving food production and drought resistant crops we are doing far less to address the causes of climate change, which increasingly put in peril the food supply we are endeavouring to preserve.

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SOURCE MATERIAL

- 1) Submission on Agriculture to SBSTA , by the food , Agriculture and Natural Resources Policy Analysis Network (FANRPAN)
- 2) Submission jointly prepared and endorsed by FRANRPAN and Mary Robinson Foundation – Climate Justice (MRFCJ)
- 3) Significant Weather Long- Range Outlook – 2014-2015 Financial Year . Dr Bruce Buckley - IAG Insurance Australia
- 4) Sustainable Agriculture . Feeding the World – Dr Megan Clark (CSIRO) Australia.
- 5) Impact of Water Scarcity in Australia on Global Food Security in an Era of Climate Change .(2013) Regional Australia Institute – Authors Qureshi ; Ejaz ; Hanjra; Munir ;Ward .



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- 6) Climate Change and Australian Food Security – Strategic Analysis Paper . Future Directions International . Author, Jinny Collet . Global Food and Water Crises Research Programme .
- 7) What Does the Future Hold for Crop Yields ? – Editorial .. Authors C O’Neil and E Finkel Cosmos. July 2014
- 8) Food Security and Food Production Systems – Final draft –IPCC WGH AR5 Submission Chapter 7 .Coordinating Lead Authors JR Porter and L Xie . Lead Authors . A Challinor , K Cochrane ,M Howden , MM Iqbal , D Lobell and M Travasso .
- 9) National Climate Change Research Facility (NCCARF) . Food Security Risk Management and Climate Change . D Michael and R Crossley



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