SUBMISSION TO INQUIRY INTO AUSTRALIAN FARMERS AND CLIMATE CHANGE

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My professional experience and research in this area suggest that Australian farming will require the following changes by about 2040 if it is to be sustainable in a low-energy global warming scenario*:

1. The transition of many currently export-dependent farms to 'energy farms', producing transportation fuel and electrical power from (a) wind, solar and geothermal sources in suitable locations, and (b) conversion of organic wastes and a wide range of non-food crops to biofuels. Most of this production would be for Australian use, and not for export.
2. The transition of many farms to new crops and forms of livestock suited to the changing climate conditions, as well as to reduced water availability, nutrient-deficient soils, and the need to minimise greenhouse gas emissions. This could involve the replacement of methane-emitting cattle and sheep with poultry, rabbits, emus, appropriate kangaroo species or other environmentally benign animals.
3. Considerably reduced production and consumption of animal protein and correspondingly increased production and consumption of vegetable protein. This may require public educational programs to modify culturally induced attitudes towards meat and vegetable consumption.
4. Withdrawal of Australian government policies that favour free trade and extensive export-oriented production, and replacement with policies that favour 'food sovereignty' and 'energy sovereignty' for most countries or regions of the world.
5. Greater food production near and within urban areas. In general, this would be intensive production on relatively small lots and could feature permaculture, hydroponics and other water-efficient and nutrient-efficient systems. This change would also include notable increases in aquaculture production near urban and coastal areas.
6. Government actions to ensure that the limited areas of fertile soils in Australia, especially near urban and coastal areas, cannot be used for purposes that make them unavailable for farming.
7. Government actions to ensure there is adequate uncleared land effectively managed to conserve natural biodiversity and ecosystems. This is necessary to maintain longer term farming options because (a) natural plant and animal species represent genetic resources needed for new products or to improve existing products, (b) natural ecosystems contain scientific information on biophysical processes that may be needed to solve future farm problems, and (c) losses of key species could risk the disruption of life support systems such as nutrient, water and oxygen recycling.
8. Implementation of an Australian population policy that aims to limit the population to a stable level consistent with the constraints of unreliable water supplies, poor soils, and Australian expectations of social harmony and quality of life. This should be coupled with a policy to strongly promote population stabilization in all countries.
9. More effective international efforts to prevent greenhouse gas concentrations reaching ice mass 'tipping point' levels where irreversible rises in ocean levels would be initiated with catastrophic consequences for all countries.

Further explanations of some of these points are to follow.

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* This is by no means a 'worst case' scenario. It is a feasible scenario that would probably be imposed internationally if it became evident that greenhouse gas concentrations were approaching the ice mass 'tipping point' (see p.2 for further explanation).

The role of Governments

The role of Australian state and federal governments in assisting adaptations to the changes should include (a) ensuring sufficient research funding to develop the required technology and plant/animal resources, (b) provision of appropriate incentives and guarantees for the private sector to invest in, or convert to, the required new production and practices, and (c) promotion of national and international policies that aim to stabilize national and global populations, and keep greenhouse gas concentrations below the critical ice mass tipping point.

With regard to (a) much research is being done by ACIAR and various divisions of CSIRO that would be relevant to some of the changes identified above. However, technology and knowledge transfer to farmers, especially for changes 1, 2, and 3, do not appear to be adequately addressed.

With regard to (c), I am well aware that the issue of population stabilization is politically sensitive and avoided by most governments. As a scientist I regard this avoidance as grossly irrational. Continuing population growth is obviously one of the most important factors in climate change and other global problems, and also in Australian farming problems. Governments cannot expect to effectively address any of these problems until they recognize that it is necessary for all aspects of population growth to be examined in depth and discussed honestly, without political or religious constraints.

With regard to greenhouse gas concentrations, there is no scientific consensus yet on the level corresponding to the critical ice mass tipping point. Various attempts to estimate it have ranged from 400 to 650 ppm equivalent CO_2, so our present level of 385 ppm may not be too far below (see Hansen, 2004, 2006; Church and White, 2006; Rignot *et al*, 2006; Thompson et al, 2006, IPCC, 2008).

Consequences of concentration reaching tipping point

The ice mass tipping point is the greenhouse gas concentration that initiates one of the following:

- collapse of the extensively unstable West Antarctic ice mass, causing an irreversible rise in ocean level of about 5.5 metres over a period that could be as short as 50 years,
- collapse of the similarly unstable Greenland ice mass, causing an additional irreversible 6.5 metre rise in ocean levels over a period of similar length.

Either of these events would result in inundation of many of the world's most densely populated areas, dislocating a billion or more people and eliminating much of the productive land needed to feed them.

Scenarios and risk management

The detailed examination of feasible scenarios may be regarded as a technique in scientific risk management. This is an area of professional expertise that usually involves (a) objective assessments of the consequences and probabilities of adverse occurrences, and (b) the formulation of measures to avoid, minimize, or otherwise cope with the consequences. As there is still much uncertainty in the severity, locations and timing of the consequences of climate change, there is little basis yet for calculating costs and probabilities. Under these circumstances an appropriate risk management approach is to select and analyse a pessimistic but quite feasible scenario to assist the formulation of management measures.

The selected scenario in this case assumes a time in the future (possibly 2020 to 2040) when better estimates of the ice mass tipping point are available and it becomes definitely evident that greenhouse gas concentrations are approaching this level. The expected immediate international reaction would probably aim to reduce concentrations as rapidly as possible, and reasonable measures for doing this would include:

- Large reductions in international trade and all forms of transport,
- Relatively rapid transitions to low energy societies with dependence on local sources for both food and renewable energy,
- General recognition of the need for 'food sovereignty' for most countries or regions.

Food sovereignty

For more than a decade there has been widespread dissatisfaction in developing countries with the policies of the World Trade Organisation and the resulting 'economic colonization' of their food production by transnational organizations. This has led to an angry social movement demanding 'food sovereignty' which is essentially the right of a country or cultural region to decide and produce their own food instead of being forced to produce and consume food determined by foreign-controlled markets (see Rosset, 2006; Patel, 2007; Desmarais, 2007).

The recognition of food sovereignty appears to be incompatible with the recent policies of Australian governments favouring free trade and a free market system. Food, however, is a basic resource that is essential to life, and the dependence of any country on others for such a resource is a potential source of hostility and conflict. As highly destructive and sophisticated weaponry is now available to people perceiving themselves to be victims of inequity, exploitation and oppression, the world would be safer if every country could feed itself. This has failed to happen with the operation of free markets and globalized international trade, both of which are becoming increasingly resented and increasingly likely to be dismantled. Such circumstances may not be politically palatable to Australian governments and farmers, and their consideration may seem beyond the terms of reference of this inquiry. Unfortunately, such circumstances are highly relevant to the future of farming in Australia, and must be realistically addressed if your recommendations are to be helpful.

References

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My background and experience

I am a biophysical scientist with almost 50 years professional experience in Australian government agencies, universities in Australia, USA and UK, and as a consultant in the private sector. My first degree was in applied mathematics and natural resources, and my higher degrees were in civil engineering, hydrology, and the mathematical modelling of environmental processes. My recent research and consulting have been in environmental impact assessment, risk assessment, catchment management, global warming and sustainable development. I am the author or co-author of about 120 publications and major reports resulting from professional assignments and research.