A food secure world: how Australia can help

Report of the Crawford Fund World Food Crisis Task Force
October 2008

About the Crawford Fund

The Crawford Fund is an initiative of the Australian Academy of Technological Sciences and Engineering (ATSE), established to honour and carry forward the work of Sir John Crawford, an Australian internationalist who made major contributions to enhancing world food production in the 1960s–70s in his role as advisor to governments and the World Bank. The Crawford Fund's purpose is to make more widely known the benefits that accrue both to Australia and internationally from international agricultural research and development. The Fund conducts a range of public awareness activities, arranges specialist training in Australia and abroad for developing country scientists, and conducts master classes for developing country personnel in key topics in agricultural research and development. The Crawford Fund operates through state and territory committees throughout Australia and a small central office.

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ISBN 978-1-921388-00-2

Persley, G J and Blight, D G (eds) 2008, A food secure world: how Australia can help. Report of the Crawford Fund World Food Crisis Task Force, Australian Academy of Technological Sciences and Engineering (ATSE), Melbourne, Australia, 2008, 60pp

Cover photo
An African farmer tilling the soil in Ethiopia.

'*The African smallholder is usually a woman who does not plant any modern seed varieties, applies no nitrogen fertilizer to replace soil nutrients and has no irrigation and no access to veterinary medicine.'* Paarlberg 2008, *Starved for Science*, Harvard University Press, Cambridge Ma. USA

Photography
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About this report

This report has been prepared by a Task Force established by the Crawford Fund under the leadership of Mr James Ingram. The main authors of the report are Dr Gabrielle Persley and Dr Denis Blight with significant inputs from Mr Ingram and general oversight and review by the Task Force.

Membership of the Task Force also includes The Hon. John Anderson, Professor Kym Anderson, Dr Terry Enright, Dr Tony Fischer, Dr Tony Gregson, Dr Bruce Standen and Professor Beth Woods. (More information about the Task Force members is given in Appendix 1.)

There have been many analyses and policy prescriptions arising from the recent spike in global food prices. The Task Force drew in particular on the policy brief of the International Food Policy Research Institute (IFPRI) *High Food Prices: The What Who and How of Proposed Policy Actions* of May 2008 and on a more detailed presentation by Dr Mark Rosegrant of IFPRI at the Australian National University in Canberra in April 2008. The Task Force also commissioned the Centre for International Economics (the CIE) to review the IFPRI analysis from an Australian perspective. The analysis is based on the International Model for Policy Analysis of Agricultural Commodities and Trade (IMPACT), which is soundly based, transparent and publicly available. The CIE has used slightly different tools in closely related but independent lines of research and it has come to broadly the same set of conclusions as IFPRI on the major underlying causes and impacts of food price increases. These issues have also been well addressed in other reports including *High Food Prices: Causes, implications and solutions,* published by the Rural Industries Research and Development Corporation (RIRDC) in June 2008.

The Task Force also drew on the World Bank's *World Development Report 2008, Agriculture for Development*, which provides comprehensive guidance to governments and the international community on the design and implementation of agriculture for development agendas to help the poor.

The Task Force conducted its work through a series of exchanges among its members and through consultations with the Crawford Fund network of state and territory committees in Australia. It kept in touch throughout its work with several interested parties, including Federal, state and territory governments, consulting in particular with a number of state departments of agriculture and primary industries; the Federal Minister for Agriculture, Forestry and Fisheries; the Parliamentary Secretary for International Development Assistance; AusAID; the Australian Centre for International Agricultural Research (ACIAR); the Commonwealth Scientific and Research Organisation (CSIRO) and the National Water Commission.

A penultimate draft of this report was discussed at a Round Table in Canberra on 2 September 2008, attended by members of the Task Force, together with members of the ACIAR Policy Advisory Council and the ACIAR Commission, as well as a number of other Australian and international participants who were visiting Canberra for the Crawford Fund Annual Conference. The Task Force reflected on the Round Table discussion and its insights and adjusted the report accordingly.

The Task Force has assumed that as the Australian aid program expands to meet the Government's commitment of reaching 0.5% of GDP by 2015, there will be room for significant initiatives in agriculture and rural development, recent international financial

developments notwithstanding. We operated on the premise that resource allocation in the aid program should be guided both by need and by potential for impact, as shown by impact assessments and returns on investment. We have also identified some further financing modalities, such as self-funded study in Australia by young people from emerging economies, and new sources of funding such as the philanthropic sector, non-government organisations and individuals in Australia willing to contribute to food security and poverty alleviation activities.

We have given particular attention to the role of science and technology. This is one area in which we, and most analysts, are confident that significant gains can be made through donor and government interventions even in the most complex political and ecological environments—and it is an area in which Australia can claim considerable competence.

Task Force terms of reference

The Crawford Fund World Food Crisis Task Force was appointed by the Fund in June 2008 to address the causes and impacts of the world food price crisis and identify policy options for governments, especially in regard to the Australian aid program. The Task Force was charged with working closely with government agencies but providing an independent perspective.

A vital part of its undertaking has been to review the many analyses of issues relating to rising world food prices from respected international and national sources, and test them for their rigor and relevance to Australia and its region.

In particular, the Task Force was requested to identify how development assistance programs can encourage increased productivity of agricultural land in developing countries and remove specific constraints to the sustainable growth in food production, and to consider what role Australia may play in these efforts.

Acknowledgements

The Task Force is grateful to our colleagues at the IFPRI and their research partners, particularly Mark Rosegrant, Stan Wood, Nienke Bienyema and Phil Pardey, for sharing their data and analyses on the causes and consequences of the world food situation and trends in public investments in agricultural research. The Crawford Fund thanks members of the ACIAR Policy Advisory Council and Commission and other participants in the Round Table. We thank also Sandy Aureli and Jennifer More for their editing and layout of the final report.

Preface

The dramatic spike in food prices has shocked consumers and governments worldwide into a realisation that availability of abundant, cheap food can no longer be taken for granted. For the rich countries, where households spend around 10% of the family budget on food, the initial shock is soon absorbed. For net food-importing developing countries, where the poor may spend up to 80% of income on food, the consequences of the spike are very serious.

While prices will fall back from recent highs, as we explain in this report, the era of very cheap food is ending. Indeed the future long-term security of the global food supply is in jeopardy if governments continue to neglect agriculture as they have done over the past two decades. The World Bank projects that demand for food and feed will double within the next 50 years and that it will include increasing demand for a wider variety of more nutritious foods, especially in developing countries as incomes rise.

The international agenda continues to be set by rich countries. If, as is likely, they give priority to reducing carbon emissions there is a risk that efforts to deal with the long-term food crisis will be seen as a second-order issue. A further complicating factor is the connection between carbon abatement and increasing food production. How we deal with climate change can affect food output in many ways, most obviously in the diversion of food production to production of crops for conversion into biofuels. More importantly, since modern agriculture is very energy intensive, there will be pressure to reduce agriculturally linked greenhouse gas emissions. The policy challenge for the world community and individual governments, to devise policies that strike an appropriate balance, is daunting. The further rapid development of relevant science and technology applicable to agricultural innovation systems will be indispensable.

Herein lie the two themes of our report on how Australia can best help developing countries deal with the food security and carbon abatement challenges—namely it can help them to:

- formulate appropriate policies, and
- develop, and introduce into their farming systems, new or adapted technologies suited to their individual circumstances.

Both themes emphasise the necessity of increased research and its application. In a career much of which has been spent in the overseas aid field, I remain convinced that through promotion of good policy and modern science we, as Australians, have a rare means of assistance, which, when appropriately used, can bring demonstrable and lasting benefits.

Precisely because Australia stands to benefit economically from the likely long-term secular price rise in food products of all descriptions, much will be expected of us. Even more than now, in a more crowded world, Australia will be seen as privileged, with abundant natural resources and enjoying advantages not shared by more densely populated countries in Asia and Africa.

Our ability to help developing countries, especially those which share some of our geographical constraints, will be assisted by intensifying agricultural research and its application in both temperate and tropical Australia; and by investing in infrastructure that will enable our food production and exports to continue to increase.

For most of the last 30 years, food staples have been cheap and stocks high. Surpluses in developed countries meant that food aid was abundant. The consequence for some food-deficit poor countries, especially in Africa, was a preferential shift in demand for imported wheat and rice in place of traditional staples, and the neglect of domestic production. That situation must be reversed. 50% of the world's poorest people are resource-poor farmers with small holdings, and another 20% are the rural landless dependent on agriculture for their livelihoods. Thus, increasing the incomes of resource-poor farmers with small holdings will contribute directly to alleviating the poverty of a large majority of the world's poorest people. Unfortunately, over the past few decades governments seem to have lost sight of the reality that the foundation of economic development in poor countries remains a sustained rise in agricultural productivity. Investment in agriculture in developing countries fell away, including support for agricultural research. Official development assistance to the agricultural sector worldwide fell from about 18% of total aid in 1979 to around 3.5% in 2004. There was a similar fall in support for rural development and agriculture within the Australian aid program over this period.

While this report takes a long-term perspective in relation to global food security, the Task Force has also recognised the need for immediate measures. Unfortunately, it is mainly the world's poorest people who are disproportionately affected by drought and other natural disasters and by armed conflict leading to displacement from their land, as for example in Darfur. In increasingly climatically stressed regions we may expect many more food emergencies. Funds to enable purchase of local food are usually the best instrument for dealing with famine. However, steps are needed to accelerate further the transition away from food aid sourced from the surplus stocks of developed nations. The Task Force makes some concrete proposals in this regard, as well as for improving the critically important response of the United Nations' system to major humanitarian emergencies by building on the existing central role of the World Food Programme.

The Millennium Development Goals commit the international community to progressively eliminating poverty and its surrogate, hunger. That goal will be attained only if governments take practical actions sustained over many years. The danger is that world leaders, notwithstanding their good intentions, will be distracted by more immediate problems impacting directly on the finances of their constituents. The current global financial system crisis is an extreme example, but in years to come there will inevitably be other crises demanding urgent attention. As is frequently stated, the world's poor have no votes in rich countries. However, the long-term hunger challenge is not just a challenge to our altruism but dealing with it successfully is in the long-term national interest of the rich countries. Failure to significantly reduce poverty could eventually destabilise world peace and security. Given Australia's geography and abundant resources a global failure to overcome the hunger scourge could threaten our national security directly especially if climate change proceeds faster than under today's median projection.

There is therefore a need for consistent long-term leadership from the major powers and the United Nations Secretary-General. As a middle power that aspires to 'punch above its weight' in international affairs, and with unique capacities and responsibilities in this area of development, Australia can play a valuable leadership role. The recommendations made in this report provide the necessary framework. Their implementation is entirely feasible but will require a more focused Australian overseas aid program sustained by supportive, long-term, whole-of-government policies.

James Ingram AO

Executive summary

The future availability of food for all is at risk in a diverse and rapidly changing world, where farming is increasingly affected by climate change and other uncertainties. Simply put, the question we must address is whether there will be sufficient nutritious food available for nine billion people by year 2050. And does Australia have a special role to play in ensuring this happens?

Australia is the driest continent. Yet, over the past half century, it has evolved a science-based agriculture that provides food for Australians and the world. Australia has maintained an overall agricultural productivity increase of 2% per year over the past 50 years. At a time of rising food prices, declining global productivity growth, climatic variability and economic uncertainty, Australia has a particular responsibility to contribute more towards world food security. We can do this by increasing our own food production and exports; and, by drawing on Australia's financial, farming, educational and scientific resources, we can help less privileged countries to improve the productivity of their food and agricultural systems and increase access for their people to sufficient, affordable and nutritious food. Sustained actions by the Australian government and by Australians will enable some of the world's poorest people to lead better lives and create new opportunities for themselves and their children.

Bold action by governments is needed

A response to the long-term decline in food productivity growth and the shorter term spike in food prices will require bold action by governments from across the development spectrum. Their actions will need to tackle the linked challenges of world food security and global climate change in a complex and shifting political, financial and biophysical environment.

In Australia's case, that will mean action on several fronts at once. Many of these are outside the Task Force's brief but inextricably linked to it. We must tackle climate change by controlling our own carbon emissions and we see how difficult that will be. We have to meet the highest standards of environmental protection—of our waterways, our biodiversity and the health of all our people. We must with others deal with the global financial crisis. While addressing these issues we must increase our own food production, sustaining our exports at least at the current ratio of exports to production.

As we burrow into each challenge we find new ones. For example, in the case of increasing food production a weakness emerges in Australia's human resources in agricultural science. Similarly, there is an apparent depletion in our research and development capacity as governments faced by other fiscal pressures reduce outlays, and institutions such as CSIRO make savings in what seem to many to be high-priority fields, to balance their budgets.

Throughout our analysis, five themes recurred:

- The crisis is serious. Left unchecked, it will get worse with climate change as advanced economies make slow progress on carbon pollution control; as growth in emerging economies increases demand for food and feed and increases pressures on their environments; and as the rural poor continue to suffer, especially in Sub-Saharan Africa and South Asia.
- Australia's capacity to increase our productivity, adapt to climate change and contribute more internationally through aid and trade will grow if Australia develops its knowledge base—especially in semi-arid and tropical agriculture and in human and animal health and nutrition in the tropics—and strengthens its strategic research capacities and human capital in agricultural sciences and climate change, including enhancing the mobility of our scientists internationally.
- Education, especially of women and girls, is pivotal to success in developing countries, and should be addressed in all aspects of aid delivery.
- Investment in rural research and development—to measurably improve the wellbeing of the increasing number of poor and undernourished people in the world—must be sharply focused on smallholder farmers who have not yet benefited sufficiently from past interventions nor from the potential of modern science. Biotechnology may have particular applications in the poorest environments, to address issues such as drought, nutritional quality, pests and diseases in crops and emerging zoonotic diseases that affect both people and livestock.
- For Australia's aid to assist the absolute poor, a greater proportion needs to be directed towards Sub-Saharan Africa and the remaining areas of extreme poverty in the Asia Pacific Region.

We propose an integrated set of measures

Within this framework, we make the following recommendations, which are elaborated in the main report, where they are accompanied by the rationale and some more detailed suggestions as to their means of implementation.

Understand the context and policy options (Chapter 1)

- Governments must recognise the need to increase investments in agriculture and rural development as one element of a comprehensive package of policy measures.
- In its foreshadowed comprehensive action plan to address world food security, the Australian government should increase the proportion of Australian aid dedicated to agriculture and rural development.
- These additional resources should be allocated to improving public policy formulation, rural development, agricultural research, emergency food aid, and post-emergency processes as recommended in subsequent chapters of this report. Attention should also be given to increasing exports of Australian food and knowledge, the geographic distribution of the aid program and more engaging of the philanthropic sector.

Improve public policy (Chapter 2)

- Sound agricultural policy provides the framework for everything else in food security. We can contribute to the wellbeing of the poorest people in the developing world by placing agricultural policy, rural development, and the discovery and delivery of new technology and improved farming practice for food production at the heart of our aid program.
- To this end developing countries can be assisted to build a cadre of policy professionals—in the short term through intensive training and joint policy research and analysis, and in the longer term through institution strengthening.

Invest in rural development (Chapter 3)

- Rural development is a massive task with multiple components, only parts of which are amenable to government intervention; and only a smaller fraction of that subset will benefit from international development assistance. An important qualification here is that good policy is at the heart of good government but policies are contested. Conflicts over policy are resolved through politics, and these are beyond the scope of international aid donors to influence in a particular country.
- Within rural development, the portfolio of interventions will vary from country to country; we identified the following key areas for Australian development assistance interventions:
  - strengthening of research and training institutions
  - primary and secondary education, particularly for girls in rural areas
  - research and innovation systems, public and private extension services and farmer education, and
  - marketing infrastructure, including information and communications.
- As bilateral aid programs are negotiated, Australia's stock of knowledge and project delivery skills will grow if we focus on key themes and priorities. As a first step, we recommend that the whole question of best practice in strengthening extension and innovation systems and in farmer education be put to study and be subject to an international conference to determine current best practices and opportunities.

Invest in science, technology and innovation (Chapter 4)

- Australia undoubtedly has the skills and expertise and an extensive track record in the conduct of collaborative agricultural research projects, especially through the work of the Australian Centre for International Agricultural Research (ACIAR). The successful ACIAR partnership model might evolve, for example, through a combination of more untying of ACIAR funding, with less emphasis on the need for mutual benefits to flow to Australia as well as to partner countries in ACIAR projects. This evolution would also enable ACIAR better access to the best of science worldwide, including access to expertise in emerging economies such as India. It could also lead to more co-financed activities with other donors, who could use ACIAR's skills in setting up research partnerships.
- We recommend that ACIAR move towards more longer-duration programs and/or focus-based partnerships between Australian, developing country and international agricultural research centres. The aim here is to build programs that can be integrated into the core business of all partners, not simply tacked on.
- We recommend increased core financial support to the international agricultural research centres within and beyond the Consultative Group on International Agricultural Research (CGIAR) network, which is linked with greater accountability for the delivery of development outcomes from the research.
- We also recommend that Australia add an international dimension to the emerging tropical science and innovation precinct and related initiatives in northern Australia, currently under consideration by the National Innovation Council and by Federal and state agencies and CSIRO.

Provide a positive policy framework for Australian exports (Chapter 5)

- Australian government portfolios should consider enhanced investment in Australian agriculture and supporting infrastructure in areas where agricultural expansion and/or improved productivity is economically feasible and environmentally sound, learning from our past failures and successes.
- We should seek to increase our knowledge-based exports, including in climate change mitigation and adaptation in agriculture, particularly in the semi-arid tropics, as our expertise grows.
- To do this we need incentives to attract young Australians to agricultural science and related disciplines, and to enable interested Australian scientists to participate in international agricultural research as a part of their life-long careers, possibly as a human resources component of strategic partnerships between international agricultural research centres and Australian centres of excellence.

- Actions will be required by Federal, state and territory governments across portfolios. International development considerations should be taken into account in these government forums.

Reform international food aid responses (Chapter 6)

- Australia should join with other like-minded countries to seek reform of international responses to food emergencies, with guaranteed funding levels for the World Food Programme (WFP) so that it is in a position to respond more quickly and efficiently in the certain event of future food crises.
- Recent initiatives by the WFP with the support of the Gates and Buffett Foundations (Purchase for Progress) deserve attention.

Improve international post-emergency responses (Chapter 7)

- On average Australia provides assistance to over 30 humanitarian situations worldwide each year. But as an emergency ends, unless appropriate inputs to secure the harvest in the immediately following planting season are at hand, another crisis will emerge.
- Support science-based post-emergency inputs of adapted seeds, breeds, fertilizers and technical advice that lead to longer term rural development investments.

Change the geographic distribution of Australian aid (Chapter 8)

- Progressively increase aid to Sub-Saharan Africa while continuing to address the areas of extreme poverty in the Asia Pacific Region. These are areas where the majority of the world's poorest people live; they farm mainly in dry areas similar to parts of Australia and where Australian interventions on improving crop/livestock-based systems, and other interventions, could have greatest impact.
- The Crawford Fund should be invited to undertake a consultative process on the engagement of Australian philanthropic organisations and civil societies in international agricultural research and rural development, drawing on Australia's technical and scientific resources, and particularly focused on Sub-Saharan Africa and remaining areas of extreme poverty in the Asia Pacific Region.

The Task Force calls for urgent action by the Australian government to implement its recommendations so that we play our full role in helping to ensure *a food secure world for all*.

1 Understand the context and policy options

Understanding the context and causes of the current world food crisis, and the long-term trends of which it is the most recent symptom, is essential to the formulation of public policy and the design of donor interventions as part of getting our policy settings right. We need to allocate more funds to agriculture and rural development in the Australian aid program. Food prices may moderate or even fall in the short term, but the decline in world food security will continue without international intervention and policy change.

Context: competing demands of a heterogeneous world society

World society is characterised by differing states of wellbeing and emerging ambition, and of differing attitudes to the profound challenges we face in relation to food security, lifestyle and the environment.

Climate change is becoming a priority for the developed world, which is also being distracted by the current financial crisis. In emerging nations people are becoming more demanding for the lifestyles of the industrial world. In all this, the task of charting a course of action will become even more difficult and the need for adaptation and response more urgent.

For the rich, issues of environment, global finance and lifestyle will dominate, and global food security, at least for the moment, will be of second order importance.

At the other extreme, the absolute poor, who are always hungry, want to be able to meet their basic needs of food, clothing and shelter, and to be able to send their children to school. They are not yet contributing to growing market demand and are not benefiting sufficiently from the applications of modern science. Nor do they, nor their animals, pollute the atmosphere by more than a fraction of total human emissions of carbon. Dependent on local produce, international price fluctuations do not affect their level of nutrition directly unless they are net buyers of food. Other factors, particularly climate variability, determine from one year to another whether food sufficiency, malnutrition or famine is their lot. The poor are getting hungrier, more demoralised and more prone to extremist influence. According to the Food and Agriculture Organization of the United Nations (FAO), their number has increased by 50 million as a consequence of the latest food crisis.

In between these two extremes of rich and poor, a growing number—hundreds of millions—have new-found, albeit modest wealth and ambition. Many live in urban areas. They have benefited from science and technology and economic growth and quite reasonably wish to see more of it, and will become more demanding, pushing up prices and greenhouse gas emissions, even if their emissions per head will remain well below those of the developed world for some time. For them, adaptation strategies rather than abatement of climate change will have priority.

These competing demands are reflected in the lack of progress in international trade negotiations, weak and demoralised international organisations, domestic political conflict and caution over carbon pollution control measures, special interest groups that lobby against the use of modern science in agriculture, food riots and other security concerns in Africa, Asia and elsewhere, and faltering advances in other areas of human endeavour.

Causes: supply and demand side factors

Within this fragile global context, most international analysts agree on the more prosaic, but equally daunting, economic supply and demand side factors that frame the current crisis and the longer term trends. This consensus was captured in a seminal study by IFPRI (2008) and confirmed for the Task Force by the CIE.

Supply side factors

Lack of investment in agricultural research, development and extension

Weak growth in the areas of major crops sown and harvested is due to a lack of investment and a fall in research and development spending (see Figures 1 and 2) following the impact of the 'green revolution' which contributed to rapid increases in yields and falling real prices of food in the 1970s and 1980s. In addition, the low real food prices experienced during the 1980s and 1990s (compared with earlier periods) reflects the price dampening impacts of agricultural support policies by developed countries and the restrictions on agricultural trade imposed by both rich and poor countries. Both of these factors are clearly amenable to policy intervention.

Poorly developed infrastructure, property rights and credit

There is a significant productivity gap between developed and developing country agriculture—as much as 80% in some cases. Modern farming techniques used in developed countries are not easily accessible or affordable for farmers in developing countries. Further incentives to produce are reduced by underlying constraints: poor rural infrastructure, inadequately specified or unenforced property rights for farmers, and limited access to inputs and credit. These constraints may forestall higher productivity being achieved even when new technologies are available. Some of these constraints are also amenable to policy intervention.

Misconceived government policy actions responsible for problems in world food markets

Some of these actions include:

- restrictions on food imports and exports through bans, quotas and tariffs
- the imposition of non-tariff barriers, such as quarantine and phytosanitary standards
- restrictions and preferences associated with regional trading blocs and bilateral trade agreements, that divert trade from where it would otherwise flow
- domestic restrictions on who can produce food, what they produce and who it can be sold to
- measures intended to protect consumers such as controlled prices, export taxes and foreign-provided humanitarian aid
- measures to support producers, notably subsidies and anti-dumping provisions
- other interventions with potentially large impacts on agricultural markets—for example environmental standards such as biofuels policies, food safety concerns such as regulatory restrictions on the use of biotech crops, and labour and investment standards applied to traded goods.

Many of these factors are amenable to policy intervention.

Climatic variability

Climatic variability is having a severe impact on agricultural productivity. The current spike in prices was caused in part by severe drought in Australia, one of the world's largest wheat exporters, and also in the Ukraine. Reduced production cut into global wheat trade, particularly in 2007, and will do so again. Food production is likely to continue to reflect climatic volatility—there may be good harvests in 2008 but weather is always variable and droughts will re-occur. Policy intervention can be effective in respect of climate: globally, through concerted action on climate change; nationally through mitigation and adaptation; and through research to identify, for example, crops, livestock breeds and farming practices, including improved water management, that are more suited to drier and more varied conditions.

Increasing energy costs, and food and energy prices becoming increasingly intertwined

High oil prices have raised the cost of mechanical cultivation, led to increased costs of fertilizers and pesticides and increased the cost of transporting farm inputs and outputs.

Demand side factors

Rising world population

A growing world population is demanding more and different kinds of food, but the absolute poor remain malnourished and have not benefited sufficiently from science. Growth rates of GDP in East Asia, South Asia and Sub-Saharan Africa have increased in the past 25 years from between 6% to over 8% in Asia, and from under 2% to around 5% in Africa. Global population growth (about 1% a year) is increasing total food demand.

Rising incomes in emerging economies

As people gain more purchasing power in emerging economies, there is a rising demand for food and also a shift away from traditional staples towards higher-value and more nutritious foods like meat and milk, fruits and vegetables. This leads to increased demand for grains used to feed livestock in areas where insufficient local feed is available. The shift also leads towards demand for more horticultural produce. Until recently this growth in demand has been matched by production increases largely arising from productivity gains delivered by new crop varieties, improved animal breeds, better farming practices and new products.

However, the absolute poor are not part of this growing demand. They are dependent on local produce, and international price fluctuations do not greatly affect their level of nutrition. They are not completely immune from happenings in international markets, if they are net buyers of food. Other factors, in particular rainfall variability, determine from one year to another whether sufficiency, malnutrition or famine is their lot. In Africa today farming is producing on a per capita basis 19% less than in 1970. The African smallholder is usually a woman who 'does not plant any modern seed varieties, applies no nitrogen fertilizer to replace soil nutrients and has no irrigation and no access to veterinary medicine' (Paarlberg 2008).

Maize and other crops diverted from food markets for production of fuel

The recent switch to biofuels has been driven by environmental and strategic concerns. United States and European governments have introduced subsidies and other policies to encourage the production and consumption of biofuels. These policies have encouraged the construction of 102 ethanol plants in the US and 185 biodiesel plants in the EU.

Production of ethanol relies on maize or sugarcane, and has been concentrated in the US (maize) and Brazil (sugarcane), which together produced 70% of the world's ethanol in 2005 (US Renewable Fuels Association 2006). Although ethanol can be made from a wide variety of feedstocks, the vast majority of ethanol in the US is made from maize, which is a much less efficient input than sugarcane. Future cellulosic production methods using grasses and woody plant material may eventually account for a sizeable share, but in the near term, maize and sugarcane remain the dominant feedstocks. Biodiesel fuels, which the EU has encouraged, use oilseeds (canola, soybean, palm and sunflower).

The magnitude of the diversion from food to fuel is substantial. The OECD (2007) estimates the US diversion at 38% of its maize crop to ethanol, Brazil will use over 50% of its sugarcane for ethanol, and the EU will consume around two-thirds of its oilseed production on biodiesel.

The significant investment in the industry, driven by government subsidies, probably entrenches the use of biofuels and the diversion from food uses. Only one plant in the US is set up to use sugar, a more energy-efficient input (US Renewable Fuels Association 2006). US imports of ethanol from Brazil (a cheaper and more efficient source) are blocked by a range of measures favouring and protecting US production. With 40% of US ethanol plants (by capacity) owned by farmers, it seems unlikely that either US ethanol production, or the upward pressure it puts on food prices, will soon abate.

The EU has a target for 2010 that biofuels should account for 5.75% of overall transport fuel supplies (European Commission 2008). To be achieved, this target would need to divert the entire oilseed crop of the EU and more, since the existing significant production of biofuels only provides energy equivalent to around 1% of transport fuel needs. While Australia has a small subsidy for biofuel production (in the form of excise tax relief), Australian production to date is limited and has not been sufficient to affect commodity prices. The biofuels distortion is amenable, at least in theory, to policy intervention. Developing countries can avoid the unintended consequences of the policies adopted in the EU and the US.

Over the long term, world food production productivity growth has fallen because of the failure to invest sufficiently in agricultural research and development.

Figure 1: Declining productivity growth for major cereals (illustration based on data from World Development Report 2008)

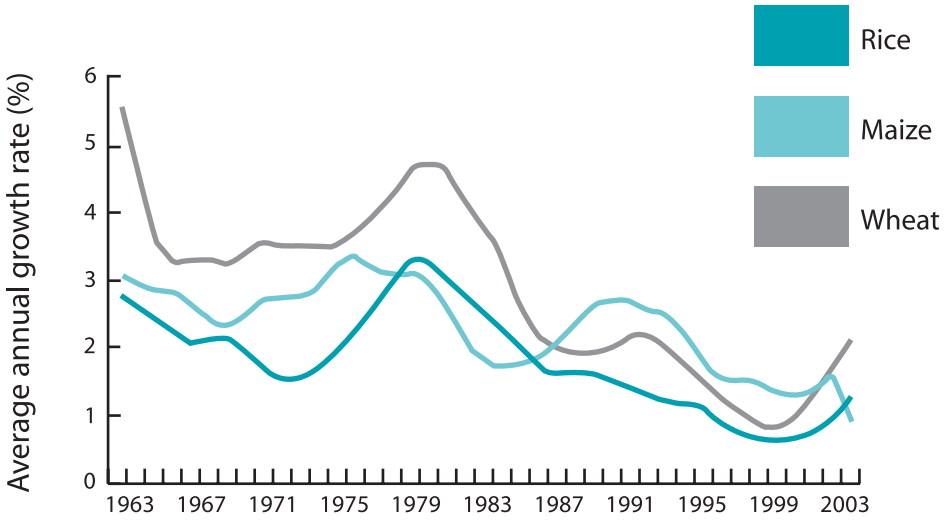
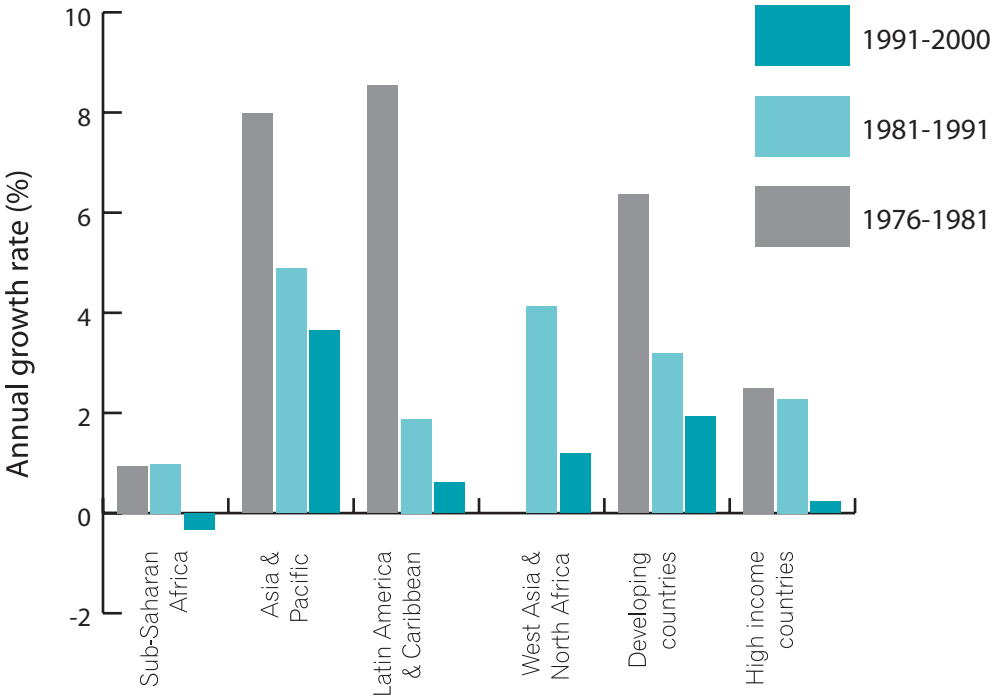


Figure 2:
Spending trends in public agricultural research and development 1976–81, 1981–91, 1991–2000 (Source Pardey et al. 2006)



Speculation creating a divergence from fundamentals

The role of speculation in creating a large divergence from fundamentals is uncertain. In its analysis, IFPRI identifies three categories of 'speculators':

- governments, households, small traders and others, probably not having much impact
- commercial traders who are hedging in futures markets and providing a useful risk management function, in effect assisting the market to operate normally, and
- non-commercial traders who are seeking profits through speculation.

IFPRI implies the actions of the last group may explain why the volatility of food prices cannot be fully explained by market fundamentals. The CIE doubts this view. Both IFPRI and the CIE agree that speculation is mainly a symptom, not a major source of the volatility.

If hedge funds were driving prices upwards, they would be doing so by buying up and hoarding stocks. For a sustained effect prices would rise, reducing demand and increasing supply leading to a steady accumulation of stocks. Thus, rising stocks and rising prices would be observed. Rather, what has happened is a steady run down in stocks and a steady tightening of the market. If it is happening to a significant degree, the cause of speculation will in many cases turn out to be poorly designed government policies, which are in turn amenable to policy intervention.

Contentions: common policy options and recommendations

There is a strong consensus among analysts from all over the world on an appropriate policy framework for the actions that could be taken by governments of developing and industrialised countries and bilateral and multilateral development assistance agencies. The many national and international reports on the world food crisis propose actions which are amenable to public policy intervention by government and assistance from international donors.

However, as yet there is no consensus for action among governments or their constituencies. Partly for this reason, constructing a policy package to enhance agricultural productivity and to deal with world food crises is fundamentally difficult.

Interventions by foreign donors can add further complexity. Any additional interventions by governments and donors need to be subject to sound benefit-cost tests to ensure they are likely to help the intended targets, especially the poor, and not have unintended consequences. The removal of known government distortions to food markets (e.g. the removal of export controls and biofuel subsidies) is very likely to generate net benefits and should be a major focus of any long-term strategy. At the same time, there are other constraints to increased productivity in developing countries (infrastructure, property rights and so on) which could be dealt with through a variety of policy measures and structural reforms.

Increase and reform funding of agricultural research and development

Public funding of research and development, through national governments and through international aid flows, will deliver long-term productivity growth in agriculture. However, the way these funds are allocated requires reform to ensure they deliver maximum benefits—especially to the poor.

Reform emergency and humanitarian assistance

Short-term measures designed to relieve immediate suffering are essential, but global arrangements for quick responses to ensure prompt delivery of emergency aid are inadequate and require reform. In the short term, existing producers in the country receiving aid can suffer greatly at times of high prices if foreign-sourced food aid reduces domestic prices. From a long-term perspective it will be important to ensure that any food aid does not adversely affect the productive capacity of the country concerned.

Eliminate agricultural trade constrictions

Removal of measures that constrict agricultural trade are consistent with structural reforms required for food markets to operate efficiently, just as reducing restrictions on food imports can enhance food security.

Implement fast-impact food production programs

The main thrust of this option is a series of targeted and short-term production subsidies to farm inputs, focused in particular on seeds, fertilizers and credit.

This is based on the presumption that high output prices themselves are not sufficient to fund or encourage additional production, and that a kick-start is necessary. This short-term policy needs to be complemented by measures to remove impediments and uncertainties unnecessarily imposed on producers. It provides the basis for a transition from short-term to medium and longer term actions if done well. There were successful short-term interventions in post-emergency situations in Rwanda (see Chapter 7) and Cambodia to secure the immediately following harvest. Cambodia is now a rice exporter.

The design of these packages has to be clever and lead as seamlessly as possible into medium and longer term policy changes and continuing donor assistance. Their design should incorporate:

- selection of seed varieties and animal breeds adapted to the agro-climatic conditions
- where they exist, established market and production capacities such as fairs and farmer seed saving and distribution systems, and
- emergency supplies purchased locally wherever possible, so as not to distort markets.

Eliminate biofuel subsidies

Biofuel subsidies should be eliminated where they exist in both developed and developing countries. Biofuel production and subsidies are well entrenched in a number of countries, so policy change may be very difficult to implement, especially because alternatives to carbon-based fuels are being sought as part of national responses to energy security, high fuel prices and climate change. In any case, with high fuel prices, ethanol production may be profitable even without subsidies, as are uses of land for other non-food agriculture. In the absence of subsidies, a moratorium on biofuel production, as proposed by some, would be an unnecessary additional market distortion.

Substantial research is under way on secondary and tertiary conversions of cellulosic materials into biofuels and to identify woody plants that might be cultivated or grown on lands not suited for agricultural food production. This should be encouraged.

Invest in social protection

The provision of a social safety net is an important element of public policy that requires ongoing refinement in many developing countries. The benefits of such policies go well beyond the current food price crisis—the most effective social safety nets are functional education and health services. Similarly, transport, roads and infrastructure assist labour mobility so the poor can pursue opportunities elsewhere, including away from rural areas. Cash payments to the poor (rather than in-kind items) are also effective if properly targeted and linked, for example, to school attendance.

Invest in sustained agricultural growth

Scaled-up investments for sustained agricultural growth are essential. This mostly involves improvements in market mechanisms and information dissemination for farmers as well as increased agricultural research and development. This form of policy reform is likely to generate net benefits. Careful consideration of new scientific approaches is warranted in any response to the world food crisis. This includes the wider use of biotech crops, in situations where these have traits that contribute to improved productivity, use of marginal lands and/or better human nutrition (see Chapter 4).

A new 'green revolution' will substantially increase yields in developing countries and help generate sustained growth. It will need to be accompanied by improved governance and infrastructure in developing countries in order to deliver maximum benefits to rural and urban poor.

Support international free trade negotiations

While the aims of the World Trade Organization (WTO) are commendable, international free trade negotiations as they are currently conducted are disappointing—as the current breakdown of the Doha Round attests. Although the WTO is the best hope for freer international trade, it has not been successful in securing reductions in agricultural protection, and without some fundamental changes in the adversarial nature of the WTO process, it is unlikely to succeed in the near future. Greater political support and leadership is needed.

Using an additional approach to trade reform, developing countries can undertake trade policy reforms that are in their own unilateral interest. An improved understanding of unilateral gains has, in fact, led to most trade reforms in recent decades.

Ways in which Australia can help

First and foremost we must increase the proportion of Australian aid dedicated to agriculture and rural development, which has steadily declined over the past two decades.

This decline may be a consequence of AusAID's bilateral program planning processes, which aim to ensure that aid investments reflect the priorities of the developing country partners. If the recipients give a lower priority to agriculture and rural development in their own plans and requests to donors, it will usually be accorded lower priority in aid programs. It may also reflect a view that the food security problem had been 'solved'—at least in South East Asia and among Australia's major aid recipients—and that continued support was being provided through ACIAR projects and the CGIAR. However, it is also likely that Australia, short of imposing its own priorities on its partners, has encouraged giving high priority to issues of governance and security.

The Australian government has recognised the need to adjust the balance of its sectoral priorities in the light of the world food crisis. In the 2008–09 Budget it announced its intention to prepare a 'comprehensive action plan to guide Australia's engagement in international efforts to address the root causes of food insecurity in vulnerable developing countries.' It has also declared itself as committed to multilateral aid efforts.

Task force recommendation

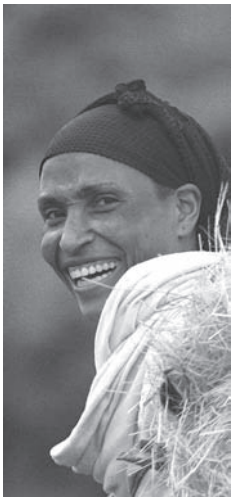
The Task Force recommends that the formulation of the Australian government's global food security plan should be predicated on a substantial increase in the proportion of Australian aid allocated to agriculture and rural development.

Subsequent recommendations are concerned with how best these increased resources might be allocated. We recommend increased funding of public policy, rural development, research, emergency aid and post-emergency processes. We also give attention to Australian exports of food and knowledge, the geographic distribution of the Australian aid program, and the scope for greater engagement of the philanthropic sector.

References for Chapter 1

- CIE 2008, CIE Review comments on IFPRI's 'High Food Prices Policy Brief', Centre for International Economics, July 2008, Canberra, www.crawfordfund.org
- RIRDC 2008, *High Food Prices: Causes, implications and solutions*, Rural Industries Research and Development Corporation (RIRDC), June 2008
- IFPRI 2008, *High Food Prices: The What, Who and How of Proposed Policy Actions*, International Food Policy Research Institute (IFPRI), May 2008, Washington DC
- Paarlberg R 2008, *Starved for Science: How biotechnology is being kept out of Africa*, Harvard University Press 2008, Cambridge, Massachusetts
- World Bank 2008, *Agriculture for Development, the World Development Report 2008*, World Bank Washington DC
- Smith and McMullan 2008, 'Budget: Australia's international development assistance program 2008–09', Statement by The Hon. Stephen Smith MP, Minister for Foreign Affairs, and The Hon. Bob McMullan MP, Parliamentary Secretary for International Development Assistance, Canberra, May 2008

2 Improve public policy



We focus here on capacity-building in policy making to enable governments to develop the tools and policy options for dealing with issues faced in an immediate future—one in which the world faces a daunting decade and potential disaster, and where difficult decisions on food security and climate change will have to be made.

Productivity growth is falling, poor policies are in place ... better policies are needed

Agricultural productivity growth in the developing world has declined over the past 20 years because public investment in rural infrastructure, education, and agricultural research has fallen—by a third in Africa and by as much as two-thirds in Asia and Latin America.

Poor policy in such areas as trade, price and subsidy in the wake of the food price crisis made matters worse. Equally, policy reform offers the scope for significant gains for developing country and global economies, but there are serious risks that poor policy decisions on water allocation, biofuels, other alternative energies and constraints to free trade will increase poverty and hunger.

Policy reform requires the formulation and adoption of sound policy options by the developing countries themselves—options that take account of their differing political economies. It cannot be won through loud-hailer diplomacy nor by adversarial negotiation, but only by facilitating governments' understanding that policy reform is in their national interests. This requires a cadre of well-trained professionals capable of devising, modelling and testing policy options and their likely outcomes. It will also benefit from strong, independent national institutions, such as universities and independent think-tanks.

The benefits of the gradual removal of anti-agricultural policy biases may be eroded if replaced with agricultural protectionism. (See Box 2.1, which describes a World Bank project being led by a member of the Task Force, Professor Kym Anderson.)

In the medium and longer terms, governments are equipping themselves with endogenous policy advisers and countries are building strong learning institutions capable of producing a critical mass of graduates with the right credentials. We propose elsewhere in this report that institution strengthening and university development should be a central focus of Australia's aid program in rural development (see Chapter 3).

The breakdown of the Doha Round makes action all the more important.

We need to help developing countries to build, for themselves, strong food security policy frameworks

The adoption by developing countries of sound food security policies and regulatory processes that they see as being in their own national interests, and that take account of climate change, is essential. These policies provide a framework for the other measures we propose in this report.

Ways in which Australian aid can help

- **Joint research, policy analysis and training projects**, usually of two or three years duration, which use modern planning tools to devise and model food security policy options on a country-by-country basis. The projects, in which national policy researchers will collect and analyse country-specific data, will lead to the formulation and testing with policy-makers of a range of policy options. The process will provide experiential training, drawing on the world's best advisory resources and economic models from the World

Bank, IFPRI and Australian government and non-government agencies.

- **High-level training of policy analysts through formal and informal courses**, which might include short-term tertiary study at leading institutions in the developing country, regional institutions and in Australia.
- **Master classes**, which may provide an efficient means of equipping national policy-makers with principles and values they can adapt to their own circumstances, and, in the case of academics, integrate into curricula. Such classes usually take place over a period of 15 days, bringing together young and mid-career civil servants and academics from a range of countries. The World Bank's *World Development Report 2008, Agriculture for Development*, written in the context of the contemporary issues of food security and agriculture faced by developing countries, provides excellent comprehensive generic guidance and could constitute a basic text for the master classes. Some 10 or 15 such classes conducted in regional locations may be able to quickly equip participants with the tools and networks to assist them in their work and teaching.
- **Secondment and internships** of national policy staff to Australian Federal and state government departments of agriculture, finance and treasury, which may also be helpful.

Task Force recommendation

The Task Force recommends that Australian aid should help to improve public policy through building a cadre of food security and climate change policy makers in the developing world through joint research, policy analysis and training projects; and support the development of better policies, including free trade policies.

Specifically, Australia should implement this overall recommendation by the following actions.

- Help to build a cadre of highly skilled food security, science and technology and climate change policy-makers and analysts in partner countries through joint research, policy analysis and training projects. The cadre would be capable of formulating optimum food security policy options, including free trade policies and regulatory frameworks suited to the economic and social conditions in each of the countries to make farming a more profitable enterprise everywhere (see Box 2.1).
- Fund actions within the Australian aid program with technical support from government departments, universities, and not-for-profit foundations. The action could be led by international agencies like the IFPRI. Such work is under way (see Boxes 2.2, 2.3) but should take a leading role in our overall aid response to the world food price crisis.
- Dedicate substantial resources to this program—sufficient to impact on the policy-making capacities of our developing country partners in Sub-Saharan Africa and other remaining areas of extreme poverty in the Asia Pacific Region.

BOX 2.1

Benefits of gradual removal of anti-agricultural policy biases in developing countries may be eroded if replaced with agricultural protectionism

Two decades ago a major World Bank research project showed that many developing countries, post-independence, directly or indirectly taxed their agricultural sectors relative to other sectors of their economies (Krueger, Schiff and Valdés 1988). A new research project has revisited that issue to see to what extent the situation has changed in different parts of the world since the mid-1980s. It seeks to draw out lessons from those countries that have reformed successfully for others that are still discriminating against their farmers, or have perhaps 'overshot' and are now protecting their farmers from import competition. It is being led by a member of the Task Force, Professor Kym Anderson.

Based on a large sample of more than 70 countries, the project covers the full spectrum of per capita incomes and food trade positions, and covers up to 50 years of policy history. Its estimates of distortions, which are derived using a standard methodology (Anderson et al. 2008), account for more than 60% of global agricultural production and consumption. The results of the developing and transition country case studies will appear in a series of books covering four regions (Africa, Asia, Latin America and European transition economies) to be published by the World Bank later in 2008. They will be summarised, along with comparable studies of the high-income countries, in a global overview volume to appear early in 2009.

What has been learned so far includes the following:

- Since the 1980s there has been a gradual movement away from taxing farmers relative to non-agricultural producers and, during the most recent decade, positive assistance on average for developing country farmers has emerged.
- The dispersion across developing countries in nominal rates of assistance (NRA) to farmers has increased rather than diminished, suggesting there is still much scope for reducing distortions in the use of resources in agriculture through more policy reform-induced international re-location of production.
- The dispersion in NRA to farmers also has increased rather than diminished within most studied developing countries, meaning there is still scope for reducing distortions in resource use within the farm sector even in countries with an average NRA for agriculture close to zero.
- In particular, a strong anti-agricultural trade bias in assistance rates remains in place: the positive assistance for import-competing farm industries has increased over the decades studied at the same time as the negative NRA for agricultural exportables has been phased down.
- The products with the highest rates of distortion and highest gross subsidy equivalent values are rice, sugar and milk, just as in high-income countries.
- The most important instruments of farm assistance/taxation continue to be trade-restrictive measures, with domestic taxes and subsidies on farm inputs and outputs, and non-product-specific assistance making only minor contributions to the estimates of NRAs for developing countries.
- There has been comparatively little assistance provided via public investments in rural infrastructure and agricultural research and development, even though social rates of return from further such investments remain very high.
- Movements in the consumer tax equivalent closely replicate changes in farm assistance/taxation, because agricultural taxation or assistance is mostly due to trade measures.
- Rates of assistance to non-agricultural sectors have declined as much as rates of taxation of agricultural sectors, underscoring the fact that reductions in distortions to agricultural incentives have been part of a series of economy-wide reform programs and not just due to farm policy reforms.
- Food price and trade policies continue to be used to reduce fluctuations in domestic food prices and in the quantities available for consumption via fluctuations in barriers to trade—as has been evident in government reactions to the spike in international food prices in 2008, which is again taxing export-oriented farmers in developing countries and so cutting off their opportunity to contribute to economic growth and export their way out of poverty.

Source: *Distortions to Agricultural Incentives: A Global Perspective, 1955 to 2007*, K Anderson (ed.), Palgrave Macmillan, London, and World Bank, Washington DC, forthcoming early 2009.

BOX 2.2

Exploring alternative futures for agricultural knowledge, science and technology in China and India

How agricultural knowledge, science and technology reach end-users, particularly farmers, remains poorly understood. While technologies have introduced a variety of improvements and science continues to deliver new knowledge, innovations likely to help many farmers, fishers and livestock keepers have yet to reap benefits. In many developing countries the means to increasing production has failed to reach poor farmers, because knowledge, science and technology are not delivered in a suitable format.

This project being implemented by IFPRI focuses on the avenues or pathways to adoption of knowledge, science and technology. Alternative pathways will be developed, catering to likely future trends. The implications of these pathways on policy options and investment strategies, including economy-wide trade and subsidy policies, will be examined. Descriptive narratives to support these scenarios will be used, along with modelling of these scenarios. This study was undertaken in close collaboration with the International Assessment of Agricultural Science and Technology for Development (IAASTD) initiative in 2006–2008.

Objectives

To provide policymakers with options (in terms of alternative policies and investments) for agricultural knowledge, science and technology, based on the analysis of alternative development paths and their implications for food security, rural development and environmental sustainability.

Methodology

- Develop several alternative development paths or scenarios for agriculture, extending up until 2050.
- Develop alternative knowledge, science and technology (KST) policies for the different types of agriculture identified, and integrate them with different scenarios.
- Test the scenarios' plausibility and identify components that can be quantified.
- Quantify drivers and develop productivity and growth trends, and other quantifiable parts based on the scenarios.
- Adapt models as necessary to identify potential model extensions and disaggregations, and develop feedback loops if needed.
- Carry out model simulations for all scenarios including national, regional and global models.
- Re-adjust model parameters based on the modelling results.
- Analyse final model results based on final scenarios, and combine quantitative with qualitative storyline outcomes.
- Develop investment implications for the alternative scenarios and KST policies.
- Analyse (across national, regional and global models) the implications of combined trade and KST policies.

Expected outcomes

The alternative scenarios for science and technology policy—and their respective outcomes for food supply and demand, food security and natural resource use at country and regional levels—will be available for use by policymakers to develop their own country-specific long-term policies, and by international donors and funding agencies. Important outcomes will include:

- an accounting of the major shifters that influence the enhancement of KST and productivity growth
- descriptive narratives that lay out alternative types of agriculture and associated growth pathways through which KST act to influence productivity
- quantified results for the alternative scenarios, based on the suite of national, regional and global models used in the project
- analysis of implications for investment from scenario results and of the economy-wide implications of trade and subsidy policies within the scenarios
- a series of publications and policy briefs describing research methodology, results and policy conclusions
- policy workshops in China, India and Australia to discuss the results and implications.

Source: Mark Rosegrant, International Food Policy Research Institute 2008

BOX 2.3

Australia's experience in policy analysis

Australia has significant experience in food security and related energy and water policies, including some gained by policy failure. It is also developing climate change mitigation and adaptation initiatives and responses.

Australia has a strong cadre of policy-makers in Federal and state government departments, and in its universities, and is likely to emerge with robust ideas on agriculture and climate. In relation to water, Australia has had a mixed history. However, initiatives over the last few years through the National Water Commission have led to a national water security blueprint agreed across all levels of government. This includes improved water rights security for investors, systems and markets to govern water transactions, and rigorous policy development based on the best scientific advice and information available. In relation to biotechnology, Australia has a first-class regulatory framework, through the Office of Gene Technology.

Several of the leading policy analysts in the World Bank and the CGIAR system are Australians. They follow in the tradition of people like Sir John Crawford who had a sound grasp of economic principles and values and a good understanding of the conflicting pressures faced by government. Further, Australia has undertaken a number of successful policy research, analysis and training projects through both AusAID and ACIAR, which provide templates for what is proposed here.

3 Invest in rural development

We focus here on how to reverse the decline in agricultural productivity, ensure food supplies and create employment opportunities through increased investment in rural development.

If farmers can increase output from their existing, quite often limited, land holdings to meet their own needs, their wellbeing will rise. Moreover, farm surpluses for sale in the market will increase smallholder incomes and access to education and health services. Surpluses will also make the task of feeding future urban populations easier. Given access to relevant information, others on unproductive farms or with no land holdings may be attracted to jobs on more profitable farms, in support industries such as those involving processing or marketing of agricultural products, or out of agriculture altogether, moving to other productive sectors of the economy.

Food production is falling behind demand

Poor rural infrastructure, weak extension and knowledge delivery systems for existing technologies, and inadequate education and health services are constraining agricultural productivity.

- Poor communications and extension systems, and weak or poorly understood incentive structures, mean not only that essential inputs are more expensive to deliver, but also that surpluses cannot reach the market and that existing technologies are not being taken up by farmers.
- Poorly educated, undernourished and unhealthy people are caught in a poverty trap, especially in the subsistence sector where population growth rates (and infant mortality) are often highest. Moreover, farmers and their families suffering poor health and nutrition will have low labour productivity.
- Agriculture requires more and better-trained professionals. While most countries in the Asia Pacific Region have strong human resources in agriculture, Sub-Saharan Africa's human resource pool is severely depleted (*World Development Report 2008, Agriculture for Development*). According to the World Bank, among 27 African countries, half saw a decline in the number of agricultural researchers in the 1990s. Only one in four African researchers possesses a doctorate and, 'The huge potential for women professionals to upgrade farming systems remains untapped' with women making up just 18% of African agricultural scientists.

We need to help developing countries to strengthen infrastructure and extension, education and health services

There are opportunities for governments with the support of donors to intervene successfully to address each of these constraints.

Strong infrastructure and extension, education and health services will enhance the capacity of developing countries to produce more food and agricultural products for local consumption and export.

BOX 3.1

Extension and farmer education—Australia's experience

Interventions in extension and farmer information networks have a mixed history in Australia and the developing world. In Australia and elsewhere, governments have withdrawn from funding extension, leaving it for farmers to pay for extension and technical services. While this might not be a good guide for developing countries, some Australian examples may have wider application. These might include farmer associations like the Birchip Cropping Group that pioneered the idea of a farmer self-help group, and the communication strategies of Australian research and development corporations.

The Grains Research and Development Corporation (GRDC), for example, emphasises delivery as well as discovery in its mandate. It has provided leadership in the grains area in Australia and supported initiatives such as CAB International's Crop Protection Compendium funded by a consortium of donors, agro-chemical companies and research institutions. Radio and increasingly television and the internet are also important communications media for widely dispersed farming communities in Australia and in the developing world.

Ways in which Australian aid can help

Improve communications, extension and innovation

Improved communications and infrastructure are a necessary condition for rural development. In practice this means improving farm-to-market roads and complementary measures adapted to the context and setting. Decisions on aid investment in rural and particularly feeder roads must be made on a country-by-country basis.

Similarly, communication of existing knowledge and research results, and measures to scale-up the application of new varieties, breeds, practices and products on farmers' fields, are vital to enhancing productivity and should be a high priority for investment. It is also important to recognise the operating environment for smallholders who self-insure. Smallholders who operate in uncertain environments tend to be risk adverse and this affects their ability to adopt new technologies. We need a better appreciation of incentive structures.

Though extension responsibilities and incentive structures are deeply embedded in national structures and cultural systems, new international thinking on the issue is worth contemplating. It may have high payoffs. New approaches involve use of the internet to give farmers access to local and global price information, weather and farming practices. This obviously depends on the reach of tele-communications and energy services. However, in many developing countries, including some of the poorest, mobile telephony can fill much of this gap.

Farmer education tied to national education systems, and participatory research and training that helps to identify priorities on the basis of what farmers know and say they need, are attractive models because the technologies that emerge are often more readily adopted. Farmers are smart; they will attend extension presentations and make quick judgements on their value and applicability. Increasingly, much is now done by the private sector, including by small service and farming input providers. Extension systems and farmer association activities can also deliver an important social service.

Improve education, health and nutrition

As food production increases and health and education standards are raised, it becomes more likely that world population in 2050 will be closer to the lowest projection, and pressures on increased demand for food will be eased.

Rising incomes are associated with a fall in birth rates. Population decline is greatly assisted by increasing the education of children, especially—in relation to human reproduction and HIV/AIDS—of girls. Moreover, schools can be an avenue for agricultural extension and training. Experience suggests there is a particular role for NGOs and school feeding programs (to encourage school attendance). Once at school, girls and boys, who will often inherit farming duties at a young age, are able to learn agricultural science principles given the development of suitable curricula. NGOs and international agencies will have good programs in these areas.

Strengthen teaching and research institutions

Experience has shown that increasing the numbers of well-educated scientists and other specialists in food production and extension, education, health and other disciplines is essential to rural development and teacher education. There is clearly potential for projects to strengthen institutions that bring together curriculum development, better teaching practices and increasing the number of graduates in university research and teaching posts. (See Inter Academies of Science Reports [IAC 2004a, b] on the future of agriculture in Africa and strengthening science and technology capacity in Africa.)

- One innovative approach to capacity development in sciences and technology in Africa is the Biosciences eastern and central Africa (BecA) initiative. This is supported initially by the Canadian International Development Agency (CIDA) and the International Livestock Research Institute (ILRI) and a number of private foundations. It involves the establishment of an African biosciences research platform in Nairobi that hosts research projects directed at the priority problems of African agriculture and provides research services, capacity building and training opportunities for the African scientific community. In order to host the biosciences platform, the research facilities at ILRI are being expanded to cater for crops and other biosciences applications in Africa and made accessible and affordable to African scientists (Box 3.2).
- Another approach is to conduct master classes for mid-level and senior officials and academics, focusing on key disciplines that would work to upgrade existing staff and curricula, and drawing on Australian and international expertise. The World Bank's 2008 World Development Report, *Agriculture for Development*, provides a useful text for these classes (see also Chapter 2, page 19).
- A third approach would be to revisit the Australian-Asian Universities Cooperation Scheme, but with Africa replacing Asia as the focus (Box 3.3).

BOX 3.2

Biosciences eastern and central Africa (BecA)

Since its implementation in 2007–08, the BecA initiative has successfully mobilised scientific resources to address critical food and agricultural production problems in eastern and central Africa. These problems include pests and diseases attacking subsistence crops such as banana, cassava, maize and sorghum; diseases affecting livestock production and human health (such as trypanosomasis that causes sleeping sickness in people and animals and tuberculosis that affects both people and cattle); and climate change effects such as drought that limit crop production and pose a threat to future food security. The BecA initiative is addressing these issues by upgrading existing research facilities and equipment on the Nairobi campus of the ILRI. These facilities are being made available for use by the African and international scientific community, as part of building a centre for excellence, with a shared biosciences research platform and a distributed network for biosciences in eastern and central Africa. The BecA initiative is co-financed by a substantial grant from the Government of Canada and by ILRI in 2007–09.

The heart of the operation lies in Nairobi, where the BecA Hub shares the biosciences research platform being created on the ILRI campus with scientists from ILRI working on animal health and genetics, and other international agricultural research centres, particularly the crop research centres, International Maize and Wheat Improvement Center (CIMMYT), International Potato Center (CIP), International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) and Agricultural Research for Development in Africa (IITA), who are also contributing their expertise in plant biosciences towards strengthening biosciences research capacity in Africa.

As an indicator of the demand for modern biosciences facilities able to be accessed through a shared research platform in Africa, in the first year of implementation in 2007–08, 35 new African postgraduate scholars have commenced their research studies using the shared biosciences facilities in Nairobi. A further 15 postgraduates are part of ILRI's biotechnology program, making a total of 50 postgraduate scholars on the Nairobi campus who are studying and conducting research on various applications of biosciences in Africa.

There are also an increasing number of visiting scientists coming to use the biosciences facilities from national research programs and African universities. In 2007, the platform hosted 12 visiting scientists. They included scientists from national research institutes in Somalia and Uganda, who were supported by their governments to study particular animal health diagnostic techniques and then apply these in their own situations, as part of livestock disease control programs (Uganda) or livestock export certification programs (Somalia).

The broadly based support for research projects and postgraduate scholars that has developed in the first full year of platform operations demonstrates 'proof of concept' in terms of the demand for the shared research platform and research-related services coming from the African scientific community. It also bodes well for the initiative's long-term scientific and financial sustainability. The challenges now are:

- to continually strengthen the core competencies and scientific capability, and pro-actively make these available to scientists at universities and research institutions across Africa, and
- to mobilise a critical mass of researchers and resources around key problems, to deliver science-based solutions to some of the development issues facing African agriculture and its intersections with human health and the environment.

For further information:
www.africabiosciences.org/network.php?network1=hub

BOX 3.3

Australia's interventions in strengthening institutions

There are excellent examples of successful Australian aid interventions in institution strengthening, beginning with the Colombo Plan. Evidence from a series of university development projects funded under the Australian aid program in the 1970s, 1980s and 1990s indicates high returns from such investments.

The Australian–Asian Universities Cooperation Scheme (AAUCS), introduced on the initiative of Sir John Crawford in 1969, contributed significantly to university development in Singapore, Malaysia, the Philippines, provincial Indonesia and Thailand. Major bilateral aid activities such as the National Agricultural Research Project in Thailand (funded by adding an Australian component to a larger World Bank Project), with its legacy of high quality agricultural faculties in Thai universities and a strengthened national agricultural research system, and the Institut Pertanian Bogor, an Australia project in Indonesia, have also made valuable contributions. The absorption of AAUCS into the International Development Program (IDP) of Australian Universities and Colleges and its withdrawal from institution-strengthening aid projects over the last decade—a natural evolution for the organisation given the relative strength of universities in its target countries in Asia—and the decline in the priority of agriculture as an aid sector, has led to a decline in such programs, with a few notable exceptions. However, this experience could be the basis for developing a similar program of institution strengthening for African universities in the future.

Task Force recommendation

The Task Force recommends that Australian aid should increase investment in rural development.

Specifically, Australia should implement this overall recommendation by the following actions.

- **Undertake an expert study and lead an international conference** on innovations in extension and communications to identify a global approach to delivering local applications of research outcomes, products, technologies and best practices. The agenda would include the use of modern communication and information technologies, incentive structures, scaling-up of existing small-scale trials and the application of new knowledge, including research outcomes from ACIAR projects in AusAID bilateral aid programs. Pilot projects involving Australian self-help farmer associations such as the Birchip Cropping Group could be considered.
- **Begin to identify interventions in human health, nutrition and education** that would complement a progressive improvement in agricultural productivity in the world's semi-arid tropics, especially in Africa. AusAID could also explore the scope for more broadly based support for primary and secondary education, possibly through multilateral organisations and NGOs. Similarly, primary health care investments in partnership with WHO and UNICEF should be considered.
- **Explore the scope for new activities to strengthen tertiary institutions** within bilateral aid programs, especially in countries known to suffer from a severely depleted appropriate human resource base. These programs would be directed at strengthening national capacities to produce better-trained researchers and agricultural professionals. Urgent action should be taken to upgrade national and regionally important universities, especially in Africa.

References for Chapter 3

- AusAID 1997, *One clear objective: poverty reduction through sustainable development*, AusAID 1997, Canberra
- AusAID 2006, White paper, 'Australian Aid Program AusAID', May 2006, Canberra
- IAC 2004a, *Realizing the Promise and Potential of African Agriculture: Science and technology strategies for improving agricultural productivity and food security in Africa.* Inter Academy Council 171pp, www. interacademycouncil.net.
- IAC 2004b, *Inventing a better future: A strategy for building worldwide capacities in science and technology*, Inter Academy Council, www.interacademycouncil.net
- Schmidhuber J and F N Tubiello 2007, 'Global Food Security Under Climate Change', *Proceedings of the National Academy of Sciences of the United States of America*, Vol. 104, No. 50, 11 December 2007, pp. 19703–19708

4 Invest in science, technology and innovation

By increasing its investments in international agricultural research and technology—specifically the discovery and delivery of new technologies, practices and products —Australia can help to increase agricultural productivity, reduce poverty and enable developing countries to adapt to the uncertainties of climate change.

Returns on investment in international agricultural research are high

Continuous productivity growth in the major cereals through the 1970s to the 1990s reflected strong national and international public investment in agricultural research. When linked with investment in rural infrastructure, education and agricultural inputs, this led to the 'green revolution', especially in Asia. The dynamic growth in the agricultural sector in Asia in the 1970s and 1980s underpinned the economic expansion in all sectors of the economy in the next decades and led to millions of people moving out of poverty in China, India and South East Asia especially.

Research by itself will not ensure agricultural productivity growth. It needs to be linked with other investments in education, infrastructure, extension and innovation systems, and a favourable policy environment, as discussed in Chapters 2 and 3. Conversely, these other investments will not lead to productivity gains without a supply of new knowledge and useful innovations that are made available to farmers, to help them cope with new challenges, including those now associated with climate change.

Returns on investment in international agricultural research are in the order of 20–80% (ACIAR 2006; Pardey et al. 2006). This is illustrated by impact assessment studies conducted by ACIAR on its project portfolio and by the international agricultural research centres.

But investment in international agricultural research is faltering

Despite the high returns, investment in international agricultural research by Australia and other countries has fallen in real terms over the past decade as governments became complacent in an era of cheap and apparently plentiful food. This trend is reflected in the flat level of funding provided to ACIAR in recent years, and in declining support in real terms for the CGIAR. Australian core support to the CGIAR declined from more than 7% of the total CGIAR budget in the early 1980s to about 2% today. In order to redress these trends, reinvestment in agricultural research is urgently required—both in Australia and in national and international agricultural research systems in the developing world.

As investment has faltered, growth of crop productivity has declined

The levelling-off in agricultural productivity gains in recent years follows the decline in investment growth in the agricultural sector in general, and in public sector agricultural research and development in particular, over the past decade (von Braun 2008; Fan and Rosegrant 2008; Pardey et al. 2006). Research by IFPRI and others confirms the direct relationship between public sector investment in agricultural research and increasing agricultural productivity, as shown in Figures 1 and 2, Chapter 2. Simply put, as investments in public agricultural research have declined, so crop productivity gains have also declined.

We need to help developing countries to increase agricultural productivity

Investments of the kind described in Chapter 3 will not lead automatically to productivity gains without a continuing supply of new knowledge and useful innovation made available to farmers.

Ways in which Australian aid can help

Increase support through the Australian Centre for International Agricultural Research

ACIAR, and its model of funding partnerships of mutual interest and benefit between Australian and developing country research institutes, has been a highly successful aid delivery mechanism, as independent impact assessments of ACIAR-supported projects attest (Box 4.1).

ACIAR is a uniquely Australian approach to international agricultural research. It is based on partnerships between Australian research institutions and national agricultural research systems in developing countries, and, in some instances, also involving one or more international agricultural research centres. A few other countries have similar arrangements (e.g. International Development Research Centre [IDRC] Canada) but none have the shared agro-climatic conditions that Australia has with many developing countries; nor do they have the comparable need to manage crop and animal agriculture in dry and otherwise stressed environments; and they do not have to cope, as Australia and the developing countries must, with uncertain climatic effects and emerging diseases, albeit under different social circumstances.

An appropriate level of ACIAR funding is a matter for government, but a reference point might be the original intention, as announced at the time of ACIAR's establishment in 1982 (in the Minister's second reading speech), for the budget of the organisation to grow to AUD $25 million a year when fully operational. When translated into 2008 dollars, this would amount to approximately AUD $100 million per year, which is about twice the current allocation to ACIAR.

Expand ACIAR's mandate

An expansion in ACIAR's budget could be linked with expanding ACIAR's mandate, as well as considering an evolution in the ACIAR model and modus operandi. In terms of its mandate, options include:

- expanding the scope to include commissioning research on managing agricultural systems in relation to the environment, water and climate change adaptation
- expanding the scope of support to extension and scaling-up of successful technology interventions, and/or
- commissioning human health and nutrition research, given the interrelationships between human health, zoonotic diseases and agricultural productivity.

Further untie ACIAR funding

ACIAR's establishment was predicated on using Australian research capacity for development, for the mutual benefit of Australia and our developing country partners. However, it follows from modern development assistance policies that aid should wherever possible be untied. This would increase the benefits of competition and increase the array of scientific and human resources available to ACIAR for its work with developing countries. More untying of ACIAR funding would also address the inability of some Australian research agencies to divert sufficient human resources from their national or state responsibilities to ACIAR projects in the developing world. It would also enable ACIAR to take on a more international role, including potentially managing multi-donor funded projects on behalf of other donors. An analogy is IDRC Canada, which manages joint IDRC/DFID (UK Department for International Development) funded projects in Sub-Saharan Africa, for example.

More closely link AusAID and ACIAR activities

There are also opportunities to more closely link AusAID and ACIAR activities, with AusAID supporting strengthening of the agricultural technology development and dissemination systems of developing country partners, and to scale-up findings emerging from ACIAR supported research projects to increase food production. Similarly, ACIAR could be asked as a matter of practice to screen all AusAID agricultural development projects for research opportunities and technology solutions.

BOX 4.1

Impact of ACIAR-funded agricultural research projects

Some 65 ACIAR-funded projects have been subject to impact assessments. They have delivered benefits that total AUD $6.4 billion to developing country partners and Australian agriculture for an aid expenditure of AUD $134 million (and a total cost of AUD $248 million when contributions from participating institutions are included). Around 88% of the benefits accrued to the developing country partners; the remaining 12% to Australian agriculture.

For example, an independent assessment of an ACIAR project entitled 'Biological control of the banana skipper by the larval parasite *cotesia erionotae*' calculated the value of damage at over AUD $200 million. The assessment noted that reducing the abundance of banana skipper correspondingly reduced the chance of the adults invading not only Australian islands but also the Australian mainland. Benefits to Australia in terms of damage prevention were estimated at $223 million to the year 2020. The internal rate of return for the project was 190%.

Sources: ACIAR submission to the Productivity Commission, August 2006; ACIAR Impact Assessment Series Number 12.

Restore Australian funding levels to the CGIAR

The CGIAR system has experienced several years of flat or declining funding, especially declining core funding. Most international agricultural research centres in the CGIAR system now have less than 50% of their budget as core funding from the CGIAR, and mobilise the remainder through specific project or program support and other sources of income. Consequently, the system as a whole has not been able to implement an integrated strategy to identify and tackle a set of priority research issues in as coherent a way as it did in the 1970s–1990s (when most centres received approximately 80% core funding through the CGIAR system). While excellent research and results have continued to emerge from individual international agricultural research centres, the whole is significantly less than what could be achieved with renewed investments in core contributions to well-performing centres and cross-system programs and initiatives.

Australia has the opportunity to help revitalise the CGIAR system, in partnership with other donors. The CGIAR system is now well-advanced in addressing the need for a more cohesive research agenda, improving its governance and looking for efficiencies in the international agricultural research network. Ms Kathy Sierra, World Bank Vice President and current Chair of the CGIAR, described progress in reform of the CGIAR system during the Round Table discussion of this report in Canberra on 2 September 2008. Australians are closely involved in the reform and review process through ACIAR and other avenues. Several Australians are in leadership positions on the Boards of Trustees and in senior research and management roles at the CGIAR centres.

Support system reform in meaningful ways

In regard to developing an agreed CGIAR research agenda, the current CGIAR Science Council has prepared a comprehensive set of system priorities for CGIAR research 2005–15 (CGIAR 2005). However, the current CGIAR system for monitoring and reviewing the implementation of research priorities appears complex and excessively bureaucratic. In future management and governance arrangements, greater focus on assessing the delivery of research outputs leading to development outcomes and the longer term social and economic impact of the centres' research and technology development work is essential as part of the reform process. The decentralised character of the system should be retained.

In terms of evolving priorities, there is a growing body of science on the interactions between agriculture and climate change that will have implications for the international agricultural research agenda. An up-to-date review is provided by the 'Crawford Fund Parliamentary Conference on Agriculture and Climate Change; the new international research frontier', held in September 2008. The presentations made at this conference are available at www.crawfordfund.org/

Centres believe rightly that they are over-reviewed. Not only are they subject at present to quinquennial reviews by the CGIAR system, but, in relation to program and project specific grants, they are also reviewed by individual donors. The review overload was acknowledged at the Round Table by Ms Kathy Sierra, Vice President of the World Bank. Some integration and streamlining of the review processes must be possible.

A number of donors, notably the UK's DFID and the World Bank, have indicated an intention to increase their core funding to the CGIAR system, subject to evidence of system reform and similar actions by other donors. A substantial increase in the Australian core commitment to the CGIAR centres and other international agricultural research centres could thus help to leverage additional funding by others towards the CGIAR centres.

The level of the Australian contribution to the CGIAR centres is a matter for government. As a guide, and taking account of the real fall in Australian core funding of the CGIAR centres over the past decade, we calculate that Australia should set itself a target of an annual contribution of between AUD $30 million to AUD $50 million a year within five years or between 3% to 5% of the target of US $1billion for the total CGIAR budget that is being discussed during the CGIAR reform process.

Build strategic partnerships between Australian centres of excellence and international agricultural research centres

The international agricultural research centres face increasing challenges in recruiting and retaining suitably qualified scientific staff. This is due to a variety of reasons, including:

- security concerns for families
- competition for staff from better-resourced advanced research institutes in industrialised countries, and
- the lack of a career path in international agricultural research for younger and mid-career scientists.

Also, as new issues emerge, the research centres need to retain flexibility in staffing so they can respond quickly to new issues and recruit people with new skills. Investing in and maintaining first class research facilities and modern equipment in developing countries is also a continuing challenge (see Box 3.2).

One contribution Australia could make towards resolving these constraints would be to establish stronger, more formal, better resourced and enduring partnerships between Australian research institutions and the CGIAR centres and other international agricultural research centres.

The focus of such strategic partnerships would be on:

- enhancing the scientific capability available to the CGIAR centres via various enduring partnerships, mentoring, and staff exchange mechanisms
- giving the CGIAR centres better access to Australia's scientific resources (both human capability and scientific infrastructure)
- enabling better access to scientific progress being made within the CGIAR centres for Australian agricultural science on matters of mutual interest, and
- developing a strong 'global challenge' focus for agricultural science education and early career development in Australia, and, by doing so, increasing the attractiveness of agricultural science as a career for young scientists in the 21st century.

The partnership might involve a group of international agricultural research centres with close alignment to Australia's research expertise and geographic or agro-ecological priorities. Some aspects of this approach happen now—facilitated by ACIAR linking Australian institutions to CGIAR activities receiving Australian funding. These have been valuable but they are project-based and largely disconnected from organisational strategy within both the CGIAR centres and the Australian institutions such as CSIRO. A more strategic alliance between Australian agricultural research and development and the CGIAR centres would be about fostering

institutional partnering on a broad-scale, long-term basis for a common purpose.

While it is desirable that the overall programs of the CGIAR centres and related research institutions such as CAB International should become less dependent on the priorities of individual donors, given Australia's geography and agro-ecological zones of interest such as the semi-arid tropics, there would remain scope for intensive promotion of research linking directly with Australian research organisations and international centres. Rather than restrict these linkages to a project-by-project basis, there are advantages in longer-term programmatic links through more strategic alliances.

In establishing strategic partnerships, there would need to be an efficient process for re-examining priorities so as enable quick responses to changing circumstances. For example, research priorities to enable farmers to adapt to climate change effects need to be elaborated in both Australia and developing country regions, such as in Sub-Saharan Africa. Similarly, the advent of biofuels as an energy source to reduce carbon pollution may increase the priority of cellulosic conversion research. Increased climatic variability and any divergence in season-to-season crop yields would have clear implications for plant breeding and farm practices research. The priority of grain storage may re-emerge. Emerging priorities in relation to agriculture and climate change were discussed at the recent Crawford Conference in Canberra, the proceedings of which are available at www.crawfordfund.org/publications/conference08ppps.htm

Add an international dimension to an initiative on tropical agriculture, science and technology in northern Australia

The FAO Conference on the Food Price Crisis in June 2008 recommended that it is 'essential to address the fundamental question of how to increase the resilience of present food production systems to challenges posed by climate change'. Doing so will be particularly important in the semi-arid tropics because these areas support millions of smallholder crop and livestock producers who are increasingly vulnerable to climate change effects on marginal lands. In its recent report on progress toward the Millennium Goals, the Africa Steering Group noted that the effects of climate change are already being felt in Africa:

> *'Precipitation patterns are changing, crops are reaching the upper limits of heat tolerance, and pastoralists spend more time than before in search of water and grazing grounds. Urgent investments are needed to 'climate proof' water management for agriculture, develop new production systems such as conservation farming, promote drought and high temperature-tolerant crops and livestock.'*

In the Australian statement to the Rome Conference, Hon. Stephen Smith, Minister for Foreign Affairs and Trade, expressed support for a

> *'long-term action plan for food security which will draw on our (Australia's) expertise in semi-arid agriculture research, production and adaptation'.*

Therefore, the Task Force recommends active investigation of an international dimension in the development of a tropical agriculture, science and technology initiative that is in early planning stages within Australia.

Such an international tropical science program, based in Australia and with strong research and education partnerships in the developing world, would also add a cadre of people with experience in the applications of science and technology in tropical climates to the human resources on which ACIAR and AusAID could draw for the design, implementation and monitoring of their ongoing and expanding programs.

Initial emphasis could, for example, be on improving the productivity of crop and livestock systems in the semi-arid tropics, especially in Africa where some of the world's poorest people survive in dry areas of low crop and livestock agricultural productivity and where climate change effects are causing increasing uncertainty.

The geography and climate of Africa and its semi-arid regions have many similarities with Australia's semi-arid tropics. Australia also offers a stable location for conducting long-term research and a strong base for capacity building in science and technology related to improving agricultural productivity and environmental sustainability that could benefit many countries facing similar challenges.

A tropical science, health and nutrition initiative based in northern Australia (with a possible focus in Townsville) is currently in the early stages of discussion between Federal and state agencies, CSIRO, universities and by the National Innovation Council. The recent Cutler report on innovation in Australia recommends consideration of establishing a Tropical Innovation Council with responsibility for setting overall research and innovation priorities and strategies and allocating funding sourced from both state and Federal governments. It also recommends creation of a Tropical Innovation Precinct to build capacity, expertise, critical mass and connectivity in tropical research and raise its profile both nationally and internationally. (Further details are given in the September 2008 innovation review, available at www.innovation.gov.au/innovationreview)

By adding an international dimension to this initiative, it would be possible to systematically link Australian research and practical expertise in managing agricultural systems in harsh environments—while also coping with the uncertainties of variable climates, emerging diseases and other biosecurity threats—with those countries facing similar challenges in the developing world.

To carry this idea further, a feasibility study should be commissioned (possibly by ACIAR, AusAID, CSIRO and/or the Office of the Chief Scientist) to:

- prepare an inventory of relevant programs in Australia and internationally
- identify where synergies could be built between Australian and international priorities for research in the tropics
- identify gaps
- assess the advantages and disadvantages of various institutional models
- recommend funding needs and possible institutional modalities, and
- identify potential Australian and international partners.

One approach would be to link the proposed tropical innovation initiative with a subset of the international agricultural research centres—those with particular interests and expertise in dry areas, for example.

Recognise the role of biotechnology in food security

An exception to declining agricultural productivity growth is where countries have adopted the use of biotech crops, now grown on approximately 115 million hectares in 23 countries, including the major agricultural countries of Argentina, Australia, Brazil, Canada, China, India, South Africa, and the United States. Biotech crops (mainly cotton, maize, rapeseed and soybean) have demonstrated improved pest resistance and productivity gains, and are largely driven by private sector investments and proprietary technology. Their more widespread use is limited by regulatory hurdles and public concerns about their safely for human health and the environment. As biotech crops are becoming more widely cultivated without any demonstrated negative effects on the environment, and millions of people and animals have consuming food and feed derived from biotech crops for over a decade without any ill effects on human health, now is the time to reconsider the future role of biotech crops as a component of future food security. The current global status of biotech crops is summarised in Box 4.2.

One of the most important constraints to the adoption of biotech crops in most developing countries is the lack of appropriate, cost-effective and environmentally responsible regulatory systems that incorporate the lessons of a decade of development of regulations in over 20 countries. With the accumulated knowledge of the last decade in the widespread use of biotech products, it is now possible to design appropriate regulatory systems that are responsible and rigorous, requiring resources that are within the means of most developing countries. Today, unnecessarily stringent standards are denying developing countries timely access to new biotech products, such as ‘golden rice’, with improved nutritional content and increased productivity.

Australia can help in the design of appropriate cost-effective regulatory systems. This would be a valuable contribution towards the deployment of the new technologies in environmentally sustainable ways.

BOX 4.2

Biotech crops—current status

In 2007, 114.3 million hectares (282.4 million acres) of biotech crops were cultivated in 23 countries worldwide, an increase of 12% on 2006 figures. The countries planting biotech crops comprised 12 developing countries and 11 industrial countries. They were, in order of area of biotech crops planted, USA, Argentina, Brazil, Canada, India, China, Paraguay, South Africa, Uruguay, Philippines, Australia, Spain, Mexico, Colombia, Chile, France, Honduras, Czech Republic, Portugal, Germany, Slovakia, Romania and Poland. The first eight of these countries grew more than 1 million hectares each. The strong growth across all continents in 2007 provides a broad and stable foundation for future global growth of biotech crops.

More than half (55% or 3.6 billion people) of the global population of 6.5 billion live in the 23 countries where biotech crops were grown in 2007 and where biotech crops generated significant and multiple benefits worth US $7 billion globally in 2006. Also, more than half (52% or 776 million hectares) of the 1.5 billion hectares of cropland in the world is in the 23 countries where approved biotech crops were grown in 2007. The 114.3 million hectares of biotech crops in 2007 represents 8% of the 1.5 billion hectares of cropland in the world. In addition to the 23 countries who planted commercialised biotech crops in 2007, a further 29 countries have granted regulatory approvals for biotech crops for import for food and feed use and for release into the environment.

Source: International Service for the Acquisition of Agri-biotech Applications (ISAAA) 2008. Further information is available at www.crawfordfund.org/worldfoodpricetaskforce/biotech

Task Force recommendation

The Task Force recommends that Australian aid should increase its investments in international agricultural research.

Specifically, Australia should implement this overall recommendation by the following actions.

- Increase investments via the ACIAR partnerships model to fund research of mutual interest between Australia and developing country research institutions.
- Link increased funding with incentives for ACIAR to respond more quickly and with larger programs when developing new partnerships with institutions in Australia and developing countries.
- Expand ACIAR's mandate to embrace the environment, water and climate change mitigation and adaptation.
- Open access to ACIAR funding globally, and thereby increase ACIAR's access to science and technology resources worldwide.
- Encourage ACIAR to take on a more international role, including managing multi-donor funded projects.
- More closely link AusAID and ACIAR projects.
- Increase Australian contributions to the CGIAR centres and other international research centres and global challenge programs, from the current AUD $11 million in 2008, progressively towards AUD $50 million per year over the next five years (thus increasing contributions from approximately 2% to 5% of the total CGIAR budget).

- Provide the majority of Australian funding as multi-year, core contributions to the international centres, focused on an agreed research agenda and matched with the centres' accountability for delivery of development outcomes.
- Support new Australian-funded programs to establish long-term, strategic partnerships between Australian centres of excellence and international agricultural research centres. Programs could address issues in priority geographic areas and/or agro-ecological zones of mutual interest to Australia and the developing world.
- Support programs for seven to ten years, subject to a mid-term review.
- Add an international dimension to a proposed Australian Tropical Innovation Precinct, an initiative on tropical science and technology, agriculture, health and nutrition that is in early stages of planning by the National Innovation Council, Federal and state agencies, CSIRO and universities. A feasibility study on the international dimensions of the Australian initiative is a required next step.
- Recognise the future role of biotech crops as a component of world food security including through aid in the design of appropriate, cost-effective regulatory systems in developing countries.

5 Provide a positive policy framework for Australian exports

Australia can grow and export more food and expand trade in related knowledge services as a major contribution to world food security. But our ability to do so is variously affected by climate variability especially drought, government policy, agricultural productivity, and the availability of well-trained people.

Australia is one of the world's largest food exporters

Australia is one of the world's largest exporters of wheat, wool, meat and sugar. In years of good rainfall, Australia can significantly expand crop production in response to market signals. Latest estimates suggest, for example, that wheat and barley production in Western Australia could reach 10 million tons in 2008 and the state has set itself a target of 25 million tons by 2020. Growth in beef exports has been the most dramatic. By 2000 Australia exported 15 times as much beef as it did in 1950, about 66% of its total production up from 12% in 1950 (Henzell 2007).

Currently Australia produces about five times as much food and fibre as it consumes. In 2006-07, for example, Australian food and agricultural exports were approximately 80% of total production (DAFF 2008). Our goal should be to at least maintain that ratio as our population grows and if possible increase it. Another way of defining the challenge is to aim at maintaining and increasing Australia's position in global trade of various farm commodities.

The drought of 2007 resulted in a substantial fall in Australian wheat exports. The shortfall in Australian production is cited in analyses by IFPRI and others as one of the factors in the current world food price crisis. Rainfall limits Australian food production and more frequent droughts in Australia will seriously impede our capacity to grow and export more food, especially as our own population grows.

However, there are other factors that impede increased food and agricultural production in Australia, many of them amenable to government policy intervention.

We need to help world food security by exporting food and knowledge

Australia needs to grow more food and export its surplus to maintain the stability of the world food supply. We need to give developing countries the capacity to do the same, by sharing our expertise with them.

Most of what we have recommended in foregoing chapters is for actions within the Australian aid program. There is, however, significant scope for an Australian contribution to world food security well beyond the framework of the Australian aid program. Most obviously we can help by growing and exporting more food. In addition, through trade in agriculture-based knowledge services, we can help developing countries to grow more food in more sustainable ways themselves. As Australia continues to build its expertise in climate change mitigation and adaptation in agriculture we could become a global centre of excellence for research and training in this field.

Ways in which Australia can help

Provide a positive policy framework and appropriate infrastructure to increase food exports, and expand trade in related knowledge services.

Australia's contribution to world food security through exports of food and trade in related knowledge services may provide a greater benefit to developing countries than can be provided through aid programs.

It is beyond the terms of reference of the Task Force to offer detailed policy advice on food production in Australia beyond pointing to the policy options in Chapter 1. In general, however, we can urge the Australian government to provide a positive policy framework and appropriate infrastructure for increased food exports. Of particular interest to the Task Force, are areas of policy in which there are interconnections between domestic and international food security policies. For example, increased investment in research in Australia will not only enhance agricultural productivity here but it will also contribute to the global knowledge base. The development of a tropical agriculture science and technology precinct in northern Australia would, if it goes ahead, help to build a cadre of Australians with expertise in the application of science and technology throughout the tropics globally. By encouraging more young Australians to study agricultural sciences, we would be building our capacity to meet Australian and international demands for such skills.

One interface of particular concern is the shortfall in graduates in agriculture. According to the Australian Council of Deans of Agriculture (ACDA 2008), there is an estimated demand in excess of 2,000 a year but graduate completion rates are below 800 a year. Workforce planning at the graduate level will be a major issue for the agriculture sector for the next five years at least. This situation is set to worsen and without some dramatic action will impact significantly on the ability of the industry to improve productivity and address issues of climate change and environmental sustainability. If current trends continue, this also means that Australia will be unable to sustain its intellectual and human resources contribution to international agricultural research.

During the review of the penultimate report at the Round Table discussion in September 2008, several participants raised this issue.

Again, it is beyond the terms of reference of the Task Force to explore this question in any detail. However, this is a matter of interest given that the supply of future graduates is likely to affect crop and animal productivity in Australia and our ability to increase exports and, more importantly in terms of international agriculture, to contribute to increased global food production. The export of knowledge embodied in Australian professionals, including through employment in the CGIAR centres and in agricultural production abroad, may be just as significant as food exports in terms of impact on future food security.

Encourage more young Australians to take up a career in agricultural science

The solution to the shortfall in graduates may lie in the restructuring of the university product (such as through a more general science degree to attract more urban dwellers into agriculture). For example, in 2007, a business case was developed with support from the then Department of Education Science and training (DEST) for a Primary Industry Centre for Science Education (PICSE). It considered:

- the need for a nationally coordinated approach to rolling out the Russell model across the nation; this was developed by University of Tasmania and trailed in Tasmania and Western Australia in 1998–2001
- alternative arrangements for national coordination of the rollout, including the PICSE model, and
- investment and budget.

This model should be examined along with others as it was in place at a number of Universities and was demonstrating success in attracting school students to science.

Another way of encouraging more young Australians to consider a career in agriculture would be to add the prospect of an international component to their careers. This might be achieved by offering agricultural students an internship at CGIAR or related international centres as part of their study. Similarly, mid-career agricultural scientists might be offered attachments to the international centres for an extended period on secondment from Australian research institutes and universities.

Export knowledge about food production

The success of virtually every initiative suggested in this report will depend on people—farmers, technicians, entrepreneurs, researchers, teachers, extension workers, diplomats, trade negotiators and policy-makers—in Australia and in the developing countries. For this reason, returns on investment in human capital are assumed to be very high and there is wide recognition that capacity building and training are prerequisites to economic and social development. Similar human resource requirements will underpin the success of any global response to climate change.

Look to trade in educational services as well as aid as a means of building human capital in food security

In Chapters 3, 4 and 5 of this report, we have recommended substantial increases in human resource development activities within the Australian aid program: by helping developing countries build a cadre of policy professionals through master classes, and joint research and training activities; and in the longer term through investment in strengthening research and training institutions as part of bilateral rural development programs. We have also recommended support for primary and secondary education.

But Australia's contribution to global human resource development should not be limited to what we can do through the aid program. In particular, there may be opportunities to increase the numbers of international students studying agriculture, science and technology in Australia funded by themselves or their families, by their employers or by private and philanthropic sources. There may also be scope for Australians to participate in government, international and corporately funded activities as consultants and specialist advisers. An Australian contribution to world food security through trade in services in these ways might be most successful in the emerging economies no longer eligible for Australian aid or for whom we have recommended lower priority as aid recipients.

Australia has more than 50 years' experience in the education and training of international students, including its major contribution to post-war reconstruction and development in Asia through the Colombo Plan, and in Africa through the Special Commonwealth African Assistance Plan. Scholarships still constitute a major proportion of aid expenditure. More recently, through trade in educational services, Australia has been training about 100,000 international university and other scholars a year to the point where the value of our so called 'education exports', at $12 billion, exceeds the value of exports of our wool, wheat and meat combined. Most of these students are drawn from the more advanced developing countries.

So far, however, this success has mainly been in courses in accounting, business studies, information technology and commerce, where students or their sponsors meet the full cost of their studies. Only a small proportion of international students in Australia are enrolled in agricultural science, agricultural economics and related disciplines.

The new and higher priority now being given to agriculture and climate change in the public and private sectors, and in aid programs, and the increasing interest in modern biology may well be reflected in a growing future demand for university places in agriculture, biosciences and economics, by both Australian and international students.

Some Australian universities may take the initiative, either collectively or individually, to enhance their services and marketing efforts in these disciplines (including the character of course offerings in agriculture which might emphasise advanced technology, mechanisation, management and international marketing and the environment). Marketing might be focused on urban dwellers not just those living in the countryside.

Universities will have to make business judgments about the extent to which they are prepared to rebuild their agricultural science capacities, redesign courses and invest in marketing them abroad. Government could provide some leadership and surety through an expanded scholarships program and the initiative in science and technology in tropical Australia described elsewhere in this report.

Task Force recommendation

The Task Force recommends that Australia should grow and export as much food as it can, and seek to significantly expand its international education and training programs in agricultural and veterinary science, the biosciences, agri-business and agricultural economics through trade in educational services.

Specifically, Australia should implement this overall recommendation by the following actions.

- Design a positive policy framework and make appropriate public sector infrastructure investments to support efficient agricultural production and exports.
- Increase Federal and state government investment in research and research capacity to maintain the productivity of our food and agricultural industries.
- Encourage young Australians to consider a career in agriculture and agricultural research. This could include conducting a survey in schools of attitudes to agriculture and exposure to agricultural opportunities, for example by offering agricultural students internships at CGIAR or related international centres as part of their study.
- Offer mid-career scientists attachments to the international centres for an extended period on secondment from Australian state and Federal research institutes and universities.
- Encourage the Australian tertiary sector to seek increased overseas student enrolments in areas related to food, agriculture, and climate change—perhaps by adjustments to export incentives; and
- Consider initiatives through Australian Education International and peak marketing bodies, and as part of the Australian government's overall response to climate change and emissions control.

References for Chapter 5

- DAFF 2008, *Australia's Agricultural Industries*, Department of Agriculture, Fisheries and Forestry (DAFF), 2008, pp 8, 10
- Henzell, E F 2007, *Australian Agriculture: Its History and Challenges*, CSIRO Publishing, 2007, Canberra
- ACDA 2008, 'Agriculture in decline at Australian Universities', Pratley J E and Leigh R, Australian Council of Deans of Agriculture, Charles Sturt University and University of Adelaide, September 2008

6 Reform international food aid responses

The world food crisis has revealed the fragility of the international response to food emergencies arising from natural disasters and human conflict, and the necessity for significant improvement.

At times of greatest need, support for safety nets and emergency relief is often curtailed

The recently concluded High-Level Conference on World Food Security made two recommendations in relation to food aid:

- Relevant United Nations agencies should be assured resources to *'expand and enhance their food assistance and support safety net programs to address hunger and malnutrition,'* and
- Efforts should be made to *'ensure that emergency food assistance is delivered as quickly and efficiently as possible to populations in distress*'.

  ['Declaration of the High-Level Conference on World Food Security: The Challenges of Climate Change and Bioenergy', paragraphs 5 (a) and 5 (d)].

The Task Force formulated its recommendations on the appropriate future role of food aid in the light of these conclusions.

While indispensable for the relief of famine due to natural or man-made disasters, and for succouring displaced persons dependent on international support for an indefinite period, food aid has always been controversial on account of its potential to distort international markets and markets in recipient developing countries. As a consequence, throughout its history efforts have been made to regulate its use. The present time, when food surpluses are essentially non-existent, provides an opportunity to complete the reform process. The opportunity for reform was missed during the 1995–96 period of tight cereal markets which was followed by a return of surpluses in 1998–99. That situation could repeat itself because there is no consensus about how permanent the current spike will turn out to be. Certainly, by maintaining in the new United States Agricultural Bill all current instruments for exporting US food surpluses Congress remains committed to tied international food aid.

As part of the Doha Round considerable progress was made in reaching agreement on detailed 'disciplines' which, if adopted, would go far to ridding food aid of its potential for market distortion. To build on the progress made, it has been proposed that the draft food aid modalities form the basis of a renegotiated Food Aid Convention. The proposed Doha changes are consistent with the major changes identified by IFPRI to bring the Convention up to date.

A major impediment to best practice in the management of food aid is that its availability is counter cyclical with respect to grain supplies. When prices are high, as at present, supplies are insufficient. With low prices and high grain stocks food aid is abundant. This has meant that even for emergency relief there has often been insufficient food available from donors at times of greatest need. Moreover, donors have undue influence to decide which disasters should enjoy priority in the allocation of their contributions. The consequence sometimes has been to base allocations on political considerations rather than need.

Much food aid is used to promote development, but fluctuating availability has diminished the developmental benefits of food aid. In the heyday of using food aid in support of development projects, structural food surpluses were the norm. Even so, fluctuations in donor contributions made it difficult to ensure that, for example, in food-for-work projects the food paid as a wage is available at the time when the work is scheduled. Aid agencies like WFP—that make

long-term commitments to projects, or to feeding refugees and displaced persons for many years—are in a situation akin to that of credit providers who lend long while borrowing short.

The United States has always been WFP's principal donor and the main provider of food aid globally in all its uses. Its contributions to WFP are mainly in the form of food in kind. It effectively determines the beneficiaries of its aid and its insistence on delivery by US flag vessels further complicates and adds to the cost of management. It has been recognised for decades that when the direct provision of food to beneficiaries is the most appropriate way to provide social protection or promote human investment, the food should preferably be purchased from within the country affected or on international markets. Other major donors to WFP, including Australia, recognise this and provide cash donations, in some cases fully untied as to countries to be assisted.

A very recent initiative, supported by the Gates and Buffet Foundations, deserves attention. It seeks to explore different ways to use the purchasing power of the WFP and others—including the two Foundations—to maximise gains for small farmers while minimising distortions to local markets. The initiative, which is known as Purchase for Progress, builds on the already very large purchases of food from the developing countries by the WFP. *

The Safe Box concept

The new Doha food aid article establishes what it calls a 'Safe Box' governing food aid for emergencies. As part of a revised Food Aid Convention that is now due for renegotiation, it would be appropriate to define a quantitative floor for a minimum amount of food for emergencies and for long-running refugee or displaced person feeding programs, both to be funded from cash contributions only. Donor commitments would be defined and binding. Management of the Safe Box should, if feasible, rest with WFP as would responsibility for needs assessment and the launch of special appeals for major emergencies such as the 2008 Myanmar floods emergency. In short, the time has come to transform 'food aid' into 'aid for food' and to make its management to the greatest extent feasible on a multilateral basis.

Reforming food aid policy

A high-level task force, set up by the influential Centre for Strategic and International Studies under the chairmanship of Senators Lugar and Casey, has recently made a series of far-reaching recommendations for a comprehensive United States response to the global food crisis. It is recognised that United States food aid policy is in need of comprehensive reform. Of most importance, the task force proposes a progressive movement to 75% of emergency funds to be used for local and regional purchases and a 're-constituted' Food Aid Convention.

IFPRI has proposed parallel, more far-reaching reforms. It calls for the establishment of an 'independent emergency reserve' of around 300,000 tonnes of basic grains to be managed by WFP. That proposal fits well with ours but they go further, arguing for 'a virtual global food commodity exchange' intended to enable, if necessary, concerted intervention in global futures markets.

Other than emergency aid and support for long-running refugee and displaced person situations, WFP today mainly supports school feeding and mother and child health. If well-managed and using locally purchased traditional food, these can play a useful role in encouraging parents to send children to school and improving the nutrition of children and mothers. If located in poor countries afflicted by frequent natural disasters, their infrastructure provides a framework for more effective and quicker responses to natural disasters by WFP and others. Although it may be desirable to expand safety net programs to populations most adversely affected by the current food price rises, the sorts of programs run by WFP and UNICEF do not unfortunately readily lend themselves to rapid, useful expansion despite the rhetoric of United Nations agencies at the Rome summit. Instead the agencies should help governments design and implement well thought-out permanent schemes that can be readily expanded in exceptional circumstances.

*For much of its history, food aid in kind could be justified by the 'additionality' factor, i.e. at a time of structural surpluses there was little prospect that if food aid was discontinued it would be replaced by additional financial aid.

WFP is skilled in food aid needs assessment and in large-scale logistical management. Food emergencies are likely to become more frequent and more devastating with increasing human population and climatic volatility. The international response to emergencies remains poorly coordinated by the United Nations despite a number of improvements. Further reform is unlikely unless the United Nations rationalises its own role, which is fragmented between a number of agencies. A single relief and logistics agency should be created. Food is the main relief item and given WFP's current central functions it could provide the foundation for a dedicated United Nations organisation. The relief work of UNICEF, UNHCR and other agencies would be vested in the new agency though they would of course continue to exercise their fundamental functions. A lot of work would be needed to translate these principles into a detailed proposal and it will be difficult to get agreement. But a start must be made.

We need to help developing countries in crisis by making international food aid emergency responses more effective

WFP reports food aid deliveries in 2007 fell by 15% to 5.9 million tonnes, their lowest level since records began in 1961. The rise in the price of rice, wheat and maize, the principal food aid cereals, meant that aid agencies had no option but to reduce their purchases. At times of greatest need, support for safety net and emergency relief food aid programs was significantly curtailed. Following special substantial grants to WFP from donors, including Australia, its capacity to purchase the quantity of food necessary to meet priority emergency needs materially increased. While prices remain high it will be essential that the aid budgets of donors provide for the purchase of sufficient food to address urgent needs which show no signs of diminishing globally and are likely to increase in future years.

Ways in which Australia can help

Establish the facts and test the prospects for genuine reform

The first step would be for Australia to review, with a few other key governments, the substance and effectiveness of the United Nations inter-agency relationships for relief needs assessment and response management. Such a review should establish the facts and then ascertain whether there is sufficient agreement among governments on a reform agenda and the will to seek change.

Seek the cooperation of the UN Secretary-General

The vested interests of existing agencies in the current set-up means that change will be resisted. The current United Nations Secretary-General shows willingness to give stronger leadership than his predecessors. Once influential governments can agree on the outlines of reform it would be open to them to seek the cooperation of the Secretary-General to establish a formal expert commission to develop firm recommendations for consideration by governments in the United Nations General Assembly and its subsidiary bodies.

Task Force recommendation

The Task Force recommends that Australia should review, together with like-minded countries, the impediments to a more effective, unified response to food emergencies by the United Nations system, with a view to encouraging the United Nations Secretary-General to provide the necessary leadership to bring about appropriate reforms.

Specifically, within this review Australia should:

- Recommend that, as the Doha Round of trade negotiations has not reached a comprehensive agreement, the new Article 10.4 of the 'Agreement on Agriculture' negotiated in the course of the Round should form the basis of a renegotiated Food Aid Convention.
- Recommend that the 'Safe Box' concept for emergency food aid proposed in new Article 10.4 be incorporated within a revised Food Aid Convention. A minimum quantified floor should be defined, funded from cash contributions only. Management of the Safe Box should, if feasible, rest with WFP as would responsibility for needs assessment and the launch of special appeals for major emergencies.

References for Chapter 6

- Clay 2008, 'World Food Programme: thinking beyond the current funding crisis', Edward Clay, (Written evidence submitted to the House of Commons International Development Committee in connection with its inquiry: The World Food Programme and Global Food Security, May 2008)
- CSIS 2008, *A Call for a Strategic U.S. Approach to the Global Food Crisis*, Center for Strategic and International Studies, Washington DC, p 7, July 2008
- IFPRI 2007, *Renegotiating the Food Aid Convention*, J Hoddinott and M J Cohen, International Food Policy Research Institute (IFPRI), April 2007
- IFPRI 2008, *Physical and Virtual Global Food Reserves to protect the Poor and Prevent Market Failure*, J von Braun and M Torero , IFPRI Policy Brief 4, June 2008
- WFP 2008, 'Purchase for Progress Initiative', World Food Programme press release, 24 September 2008, www.wfp.org
- WTO 2008, Possible New Article 10.4 to replace the current Article 10.4 of the Agreement on Agriculture (TN/AG/W/4/Rev.2), World Trade Organization, May 2008

7 Improve international post-emergency responses

The immediate provision of seeds and fertilizer to the most affected countries for the upcoming planting season was the third point of the G8's ten-point plan for 'A New Deal for Global Food Policy'. Australia has already made a substantial contribution in this regard through the World Bank, but we can do more.

On average, Australia provides assistance to over 30 humanitarian and protracted emergency situations worldwide each year. As an emergency ends, unless appropriate essential inputs are at hand, another will emerge

Emergency situations result from a combination of food price crises, natural disasters or man-made strife.

Providing planting seed in order to successfully restore food security as soon as possible after an emergency was first demonstrated by the Seeds of Hope (SOH) project in Rwanda in 1994–95. SOH broke new ground by providing an emergency response to help restore food security in a country torn by civil strife and environmental calamity. There are valuable lessons to be learnt from the SOH project, not just for the set of emergencies that are emerging from the world food price crisis, but for future inevitable emergencies fuelled by an unstable climate and the competing demands of heterogeneous global and national societies. The Seeds of Hope project is described in Box 7.1 below.

Since the Rwandan SOH initiative, similar projects have been developed to restore seed security in countries such as Angola, Somalia, Sudan, Uganda, countries of West Africa, Afghanistan, Iraq, Palestine, Cambodia, East Timor, North Korea, Sri Lanka, Brazil, Cuba and El Salvador. Australia has supported several of these SOH-styled initiatives. Support for Cambodia by AusAID included funding for seed supply from the International Rice Research Institute (IRRI) and subsequent training of Cambodians. Many of the CGIAR agricultural research centres maintain and conduct research on seed collections, including characterisation and long-term seed storage, and could well take a lead in respect of their mandated crops. ILRI could coordinate similar services in relation to restocking livestock breeds. The FAO embraced the concept of seed security and commissioned the development of pre-emptive strategies for seed security separately for West Africa and South East Asia, and convened an international conference on seed security in Italy in 1997. WFP also has become a promoter and collaborator in projects to restore seed security as a basis for rebuilding food security in countries whose food supplies have been threatened by civil strife or environmental disasters.

We need to help developing countries

We need to help developing countries by providing immediate help in the aftermath of emergency situations with packages of seeds, breeds, fertilizer and advisory services to secure the upcoming planting and harvesting seasons.

Ways in which Australia can help

Assess existing pre-emptive strategies and programs

A first step would be an assessment of existing pre-emptive strategies and programs to ensure seed security for countries soon to emerge from crisis. Each of the CGIAR centres may be in a position to advise or take a lead in the case of their mandated crops and/or livestock. The Crop Diversity Trust, which has been strongly supported by Australia, could be asked to undertake an overarching analysis.

Study the value of Crop Environment Domain maps

Part of the assessment could be a study of the value of Crop Environment Domain (CED) maps. CED maps integrate crop variety characteristics with agro-climatic regimes. This technology would assist development assistance organisations and NGOs to acquire seeds of the best adapted varieties outside the disaster area, and to target the distribution of seeds into similar agro-climatic regions in the affected region. CED technology can also incorporate information on biotic and abiotic constraints to production, local and regional seed suppliers, seed testing and certification facilities, consumer preferences and marketing trends. CED map technology is even more compelling with expansion of the internet and development of global positioning technology. Similar technology is becoming available in relation to the geographic distribution and environmental adaptation of livestock breeds worldwide. It would also be useful for restocking areas where animal numbers have been devastated by drought, natural disasters or civil unrest.

Task Force recommendation

The Task Force recommends that Australia should strengthen the international community's post-emergency responses to future harvests.

Specifically, Australia should implement this overall recommendation by the following actions.

- Work with others to develop and finance quick-response packages of agricultural inputs for countries where floods, drought, conflict or neglect have ruptured national food production capacities and limit smallholders' potential to grow more food and other agricultural products.
- Ensure that the seeds and breeds, fertilizers, micro credit and technical advice that constitute these packages are science-based and appropriate, and adapted to the circumstances prevailing.
- Work with other countries to ensure that international response mechanisms for future post-emergency situations are well prepared, based on the best science available and capable of leading to medium and longer term rural development programs.

Reference for Chapter 8

- Crawford Fund 2005, *Healing Wounds—An Australian Perspective*, The Crawford Fund, June 2005

BOX 7.1

Seeds of Hope in Rwanda

In 1994 the civil war in Rwanda devastated agriculture and food security. Farmers' seed stocks were eaten, lost or destroyed. By August of that year the production of grain and root crops was down by 60% and 30% respectively. These crops provided 75% of food consumed in Rwanda, produced mostly on-farm by subsistence farmers who constituted 93% of the population.

The key objectives of Seeds of Hope (SOH) were to:

- assemble and multiply seed of crop varieties adapted to the various climatic regions of Rwanda
- deliver those seeds to farmers
- in the near term, strengthen agricultural research and development by training local scientists and technicians, and
- promote agricultural research and help over time to rebuild research and development facilities and infrastructure.

The success of SOH rested on four pillars:

- seed technology know-how within the international agricultural research centres
- support from national agricultural research organisations in neighbouring countries
- funding support from international donors, and
- resource and financial support from aid agencies and NGOs.

The SOH initiative secured global support. The US $1.2 million required for the initiative was provided by international aid agencies in the United States, Canada, the United Kingdom, Switzerland, and in Australia by ACIAR, AusAID and World Vision. The FAO, United Nations agencies and the World Bank endorsed the initiative. The project was implemented by the Colombia-based International Centre for Tropical Agriculture (CIAT) which provided significant human and in-kind resources of US $800,000. CIAT is a member of CGIAR. The project was initiated by Dr William Scowcroft, an Australian who was Director of Research at CIAT at the time.

Project implementation and on-ground delivery of seed depended on support from other centres within the CGIAR, national agricultural research organisations of neighbouring countries and many NGOs and relief agencies. The seeds that were distributed included:

- beans – 15 tonnes of 275 different varieties
- maize – 148 tonnes of the three main adapted varieties
- sorghum – 7 tonnes of varieties adapted to different elevations
- potato – 20 tonnes of potato seeding material, and
- cassava – several million cuttings of 18 varieties.

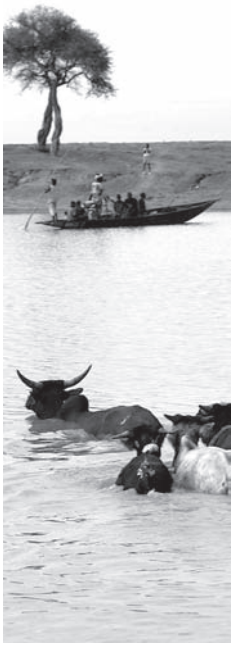
Seed, fertilizer and planting implements, such as hoes, were delivered to farmers as 'AgPacks' by NGOs and relief agencies, often in parallel with food aid deliveries. AgPack seed was clearly distinguished from grain destined for food. SOH worked with the international centres to train new Rwandan agricultural scientists to replace the many Rwandan agricultural scientists killed or lost as refugees during the civil war. There was also a tree seed recovery component of the project with the objective of collecting, packaging and delivering seeds of tree and shrub species in order to re-establish local plantations for the supply of fuel, construction materials and livestock feed. This involved CSIRO's Tree Seed Centre and the World Agroforestry Centre in Nairobi, a member of the CGIAR.

A socio-economic analysis surveyed some 1,200 households. It found that SOH had successfully introduced seeds of the many adapted varieties to a sufficient number of Rwandan farmers to prime the seed distribution system; that it significantly reduced the looming risk of starvation; and that the numbers of varieties of seeds distributed enabled farmers to re-establish seed stocks of varieties they considered desirable.

The civil war also resulted in widespread destruction of seed storage and research facilities, and in the loss of scientists and technicians with seed and agricultural expertise. Many more millions of dollars were required to rebuild these infrastructure needs.

Source: Dr William Scowcroft, Canberra

8 Change the geographic distribution of Australian aid



For Australia's aid to assist the absolute poor it needs to be progressively increased in Sub-Saharan Africa while continuing to address the remaining areas of extreme poverty in the Asia Pacific Region. These are areas where the majority of the world's poorest people live; they farm mainly in dry areas similar to parts of Australia and where Australian interventions on improving crop/livestock based systems, and other interventions, could have greatest impact.

The bulk of Australia's aid is distributed to just three countries

The bulk of Australia's bilateral and regional aid is distributed to just three countries: Indonesia ($462 million in 2008–09), Papua New Guinea (around $390 million), and the Solomon Islands ($240 million). All have a GNI per capita above $680. A second tier of recipients includes Afghanistan ($122 million), the Philippines ($97 million), East Timor ($96 million), and Vietnam ($93 million). A third tier includes Cambodia ($55 million) and Bangladesh ($53 million). An East Asian regional program attracts $141 million. A finance tranche of debt relief for Iraq at $238 million, scheduled to be recognised in 2008–09, places it high among recipients on a one-off basis.

The whole of Africa receives just $116 million, although the Australian government has indicated an intention to significantly increase its aid to the continent. A report by the Crawford Fund has recommended increased aid in international agricultural research for Eastern Africa. This report is available at www.crawfordfund.org/

Most of ACIAR's expenditures are on South East Asia (57%) followed by Papua New Guinea and the South Pacific (19%), South Asia (6%) and Southern Africa (1%). In its support to international agricultural research centres ACIAR gives priority to IRRI, CIMMYT and ICRISAT and lower priority to African-based centres.

Multilaterally, it is estimated that in 2008–09 funding for UN, Commonwealth and other international organisations will total $175 million. Humanitarian, emergency and refugee programs in 2008–09 will receive $320 million through such organisations as the International Committee of the Red Cross, UNICEF emergency responses and Australian non-government organisations. On average Australia provides assistance to over 30 humanitarian and protracted emergency situations worldwide each year.

Australia gives priority in its aid program to its neighbours in the Asia Pacific Region. And as indicated, ACIAR largely follows this pattern including by giving preference to international agricultural research centres with a mandate in the Asia Pacific Region. Decisions on geographic priority are a matter for government and largely outside the terms of reference of the Task Force. However, if the single objective of the Australian aid program were poverty reduction, its geographic distribution would be much different from what currently prevails.

Sub-Saharan Africa has a high concentration of poverty, a continuing dependence on agriculture, often in marginal environments, and climatic similarities with parts of Australia. Additional investments in agriculture and rural development are predicted to yield substantial productivity increases. Along with South Asia, Sub-Saharan Africa is likely to suffer most from climate change in areas where Australia may be positioned to help. For example, spatial crop and pasture modeling systems seen as an

important tool in forecasting climate change impacts have been in operation in Australia since 1990 (e.g. AussieGRASS) and provide operational forecasts to farmers as a matter of course.

If climate fluctuations become more pronounced and more widespread, droughts and floods—the dominant causes of short-term fluctuations in food production in semi-arid and sub-humid areas—will become more severe and more frequent (Schmidhuber and Tubiello 2008). In semi-arid areas, droughts can dramatically reduce crop yields, livestock numbers and productivity. Most of this land is in Sub-Saharan Africa and parts of South Asia, meaning that the poorest regions with the highest level of chronic undernourishment will also be exposed to the highest degree of instability in food production. How strongly these impacts will be felt will depend on whether such fluctuations can be countered by investments in water conservation and irrigation, better storage facilities or higher food imports. In addition, a policy environment that fosters freer trade and promotes investments in transportation, communications, irrigation and water management infrastructure can help address these challenges early on.

In our view this combination of need and capacity should lead, progressively over the next decade, to a move away from South East Asia as the primary focus of our bilateral development assistance and more towards Sub-Saharan Africa, while also continuing to support work in the Asia Pacific Region (including parts of South Asia) where there remain large numbers of people living in extreme poverty. Given the rapidity with which our geographic neighbours have now gained the wealth and expertise to further their own continuing growth in productivity, this would be an appropriate evolution of our relationship with our near neighbours. Indeed, as we have suggested in Chapter 5, to the extent that Australia's expertise can continue to make a contribution, this might be delivered through trade in educational and technical services. Further, advanced developing countries such as India and China might prove a valuable resource for expertise for Australia's aid programs in poorer countries.

Papua New Guinea, the small island nations of the South Pacific and East Timor are clearly special cases requiring separate consideration. In these cases a holistic development assistance policy should incorporate issues of migration and seasonal work visas as being the most promising pathway for many people living in the South Pacific islands.

Engaging philanthropic organisations and NGOs in world food security

To a certain extent, the focus of Australia's official aid program on the Asia Pacific Region can be balanced by the activities of non-government organisations that give higher priority to Sub-Saharan Africa and South Asia. A number of international philanthropic organisations provide significant support to rural development and international agricultural research, and many of them now give priority to Africa.

- The Rockefeller and Ford Foundations were, for example, instrumental in the establishment of IRRI and CIMMYT and the formation of the CGIAR.
- The Bill and Melinda Gates Foundation, through its Global Development Program, is now a major investor in improving human health and agriculture, including through investments in research and development. It has, for example, provided substantial funding to support an Innovative Nutrition Program for Poor Countries led by IFPRI. It provides significant support to A Green Revolution for Africa (AGRA), and research on drought-tolerant maize for Africa through the African Agricultural Technology Foundation, CIMMYT and IITA. With the Buffet Foundation, it is supporting the Purchase for Progress initiative described in Chapter 6.
- Other foundations involved in international agricultural research include the MacArthur Foundation through its Conservation and Sustainable Development Program which seeks to conserve biodiversity especially in the tropics, enhance natural resources management, and ensure those living in or near sensitive areas benefit from conservation efforts.
- The Mellon and McKnight Foundations are involved in crop improvement programs in Africa.

- The Partnership for Higher Education in Africa (Carnegie, Ford, Rockefeller, MacArthur, Hewlett and Mellon Foundations) provides funding to higher education in seven African nations. The partnership believes that African universities are re-emerging as critical engines for economic, social and development progress in Africa; that they have become a primary locus for innovation and are providing essential training for future leaders. It also believes universities are offering African women unprecedented access to opportunity, expanding the pool of African experts who will contribute to the continent's efforts to reduce poverty and other crucial challenges.

There is scope for increasing the level of Australian involvement and room for expansion in these international programs, including through investments in them by the growing number of Australian private philanthropists.

Civil society organisations have made a major contribution to Australia's international development assistance effort. They have been particularly active in emergency assistance, post-emergency reconstruction and in 'grass roots' development projects. In Rwanda, Cambodia, East Timor, post-tsunami relief in Indonesia and parts of South Asia, and after the recent floods in Myanmar, their efforts have been remarkable. As indicated in Chapter 3, we believe that given the complexities and sensitivities of official foreign involvement at the school level, and the experience a number of them already have, NGOs might be the best vehicles for an expanded Australian effort in primary and secondary education. They have also been successful fundraisers for relief and development efforts, drawing on the generosity of many Australians. There is potential for such organisations to make a major contribution in supporting and using Australia's engagement in international agricultural research and rural development, and in enhancing Australia's contribution to a food secure world.

There is another group of non-government organisations that may have a role to play in building a food secure world: the range of farmers' organisations throughout the country that have played a significant role in Australia's rural development. They have skills in cooperative development, farmer education, advocacy and extension that may have global application.

Further thought and study is required as to:

- How can Australia's engagement in the programs of the major international philanthropic foundations be increased?
- How can the Australian philanthropic and civil society sectors be encouraged to contribute more substantially to and benefit more extensively from the outcomes of international agricultural research?
- How can the many other civil society organisations in Australia be mobilised towards the cause of building a food secure world?

We need to help the poorest developing countries

To do this, we should progressively move Australian aid away from South East Asia more towards Sub-Saharan Africa and remaining areas of extreme poverty in the Asia Pacific Region.

Ways in which Australia can help

- Consider how Australia's aid might be distributed more equitably
- Seek a better balance between bilateral and multilateral aid.
- Consider how much more could be done by non-government resources.

Task Force recommendation

The Task Force recommends that Australia should change the geographic distribution of its aid activities to ensure it assists the absolute poor.

Specifically, Australia should implement this overall recommendation by the following actions.

- Progressively increase aid to Sub-Saharan Africa while continuing to address the areas of extreme poverty in the Asia Pacific Region. These are all areas where the majority of the world's poorest people live; they farm mainly in dry areas similar to parts of Australia and where Australian interventions on improving crop/livestock-based systems, and other interventions, could have greatest impact.
- Invite the Crawford Fund to undertake a consultative process on the engagement of Australian philanthropic organisations and civil societies in international agricultural research and rural development, drawing on Australia's technical and scientific resources, and particularly focused on Sub-Saharan Africa and remaining areas of extreme poverty in the Asia Pacific Region.

9 Recommendations for action

This chapter provides a full list of the recommendations for action, cross-referenced to the relevant chapters and boxed items, and suggestions as to their means of implementation.

1 The formulation of the Australian government's global food security plan should be predicated on a substantial increase in the proportion of Australian aid allocated to agriculture and rural development.

Chapter 1
Understand the context and policy options

2 Australian aid should help to improve public policy through building a cadre of food security and climate change policy makers in the developing world through joint research, policy analysis and training projects; and support the development of better policies, including free trade policies.

- **Help to build a cadre of highly skilled food security, science and technology and climate change policy makers and analysts** in partner countries through joint research, policy analysis and training projects, The cadre would be capable of formulating optimum food security policy options, including free trade policies and regulatory frameworks suited to the economic and social conditions in each of the countries to make farming a more profitable enterprise everywhere (see Box 2.1).
- **Fund actions within the Australian aid program** with technical support from government departments, universities, and not-for-profit foundations. The action could be led by international agencies like the IFPRI. Such work is under way (see Boxes 2.2, 2.3) but should take a leading role in our overall aid response to the world food price crisis.
- **Dedicate substantial resources to this program**—sufficient to impact on the policy-making capacities of our developing country partners in Sub-Saharan Africa and other remaining areas of extreme poverty in the Asia Pacific Region.

Chapter 2
Improve public policy

BOX 2.1
Benefits of gradual removal of anti-agricultural policy biases in developing countries may be eroded if replaced with agricultural protectionism

BOX 2.2
Exploring alternative futures for agricultural knowledge, science and technology in China and India

BOX 2.3
Australia's experience in policy analysis

3 Australian aid should increase investment in rural development.

- **Undertake an expert study and lead an international conference** on innovations in extension and communications to identify a global approach to delivering local applications of research outcomes, products, technologies and best practices. The agenda would include the use of modern communication and information technologies, incentive structures, scaling-up of existing small-scale trials and the application of new knowledge, including research outcomes from ACIAR projects in AusAID bilateral aid programs. Pilot projects involving Australian self-help farmer associations such as the Birchip Cropping Group could be considered.
- **Begin to identify interventions in human health, nutrition and education** that would complement a progressive improvement in agricultural productivity in the world's semi-arid tropics, especially in Africa. AusAID could also explore the scope for more broadly based support for primary and secondary education, possibly through multilateral organisations and NGOs. Similarly, primary health care investments in partnership with WHO and UNICEF should be considered.
- **Explore the scope for new activities to strengthen tertiary institutions** within bilateral aid programs, especially in countries known to suffer from a severely depleted appropriate human resource base. These programs would be directed at strengthening national capacities to produce better-trained researchers and agricultural professionals. Urgent action should be taken to upgrade national and regionally important universities, especially in Africa.

4 Australian aid should increase its investments in international agricultural research.

- **Increase investments via the ACIAR partnerships model** to fund research of mutual interest between Australia and developing country research institutions.
- **Link increased funding with incentives for ACIAR** to respond more quickly and with larger programs when developing new partnerships with institutions in Australia and developing countries.
- **Expand ACIAR's mandate** to embrace the environment, water and climate change mitigation and adaptation.
- **Open access to ACIAR funding globally**, and thereby increase ACIAR's access to science and technology resources worldwide.
- **Encourage ACIAR to take on a more international role**, including managing multi-donor funded projects.
- **More closely link AusAID and ACIAR projects**.
- **Increase Australian contributions to the CGIAR centres and other international research centres and global challenge programs**, from the current AUD $11 million in 2008, progressively towards AUD $50 million per year over the next five years (thus increasing contributions from approximately 2% to 5% of the total CGIAR budget).
- **Provide the majority of Australian funding as multi-year, core contributions to the international centres**, focused on an agreed research agenda and matched with the centres' accountability for delivery of development outcomes.
- **Support new Australian-funded programs** to establish long-term, strategic partnerships between Australian centres of excellence and international agricultural research centres. Programs could address issues in priority geographic areas and/or agro-ecological zones of mutual interest to Australia and the developing world.
- **Support programs for seven to ten years**, subject to a mid-term review.
- **Add an international dimension to a proposed Australian Tropical Innovation Precinct**, an initiative on tropical science and technology, agriculture, health and nutrition that is in early stages of planning by the National Innovation Council, Federal and state agencies, CSIRO and universities. A feasibility study on the international dimensions of the Australian initiative is a required next step.
- **Recognise the future role of biotech crops** as a component of world food security including through aid in the design of appropriate, cost-effective regulatory systems in developing countries.

Chapter 4
Invest in science, technology and innovation

BOX 4.1
Impact of ACIAR-funded agricultural research projects

BOX 4.2
Biotech crops—current status

5 Australia should grow and export as much food as it can, and seek to significantly expand its international education and training programs in agricultural and veterinary science, the biosciences, agri-business and agricultural economics through trade in educational services.

Chapter 5
Provide a positive policy framework for Australian exports

- **Design a positive policy framework** and make appropriate public sector infrastructure investments to support efficient agricultural production and exports.
- **Increase Federal and state government investment in research** and research capacity to maintain the productivity of our food and agricultural industries.
- **Encourage young Australians to consider a career in agriculture and agricultural research**. This could include conducting a survey in schools of attitudes to agriculture and exposure to agricultural opportunities, for example by offering agricultural students internships at CGIAR or related international centres as part of their study.
- **Offer mid-career scientists attachments to the international centres** for an extended period on secondment from Australian state and Federal research institutes and universities.
- **Encourage the Australian tertiary sector to seek increased overseas student enrolments** in areas related to food, agriculture, and climate change—perhaps by adjustments to export incentives.
- **Consider initiatives through Australian Education International** and peak marketing bodies, and as part of the Australian government's overall response to climate change and emissions control.

6 Australia should review, together with like-minded countries, the impediments to a more effective, unified response to food emergencies by the United Nations system, with a view to encouraging the United Nations Secretary-General to provide the necessary leadership to bring about appropriate reforms.

Chapter 6
Reform international food aid responses

- Recommend that, as the Doha Round of trade negotiations has not reached a comprehensive agreement, **the new Article 10.4 of the 'Agreement on Agriculture'** negotiated in the course of the Round should form the basis of a renegotiated Food Aid Convention.
- **Recommend that the 'Safe Box' concept for emergency food aid** proposed in new Article 10.4 be incorporated within a revised Food Aid Convention. A minimum quantified floor should be defined, funded from cash contributions only. Management of the Safe Box should, if feasible, rest with WFP as would responsibility for needs assessment and the launch of special appeals for major emergencies.

7 Australia should strengthen the international community's post-emergency responses to future harvests.

- **Work with others to develop and finance quick-response packages** of agricultural inputs for countries where floods, drought, conflict or neglect have ruptured national food production capacities and limit smallholders' potential to grow more food and other agricultural products.
- **Ensure that the seeds and breeds, fertilizers, micro credit and technical advice** that constitute these packages are science-based and appropriate, and adapted to the circumstances prevailing.
- **Work with other countries to ensure that international response mechanisms** for future post-emergency situations are well prepared, based on the best science available and capable of leading to medium and longer term rural development programs.

Chapter 7
Improve international post-emergency responses

BOX 7.1
Seeds of Hope in Rwanda

8 Australia should change the geographic distribution of its aid activities to ensure it assists the absolute poor.

- **Progressively increase aid to Sub-Saharan Africa** while continuing to address the areas of extreme poverty in the Asia Pacific Region. These are areas where the majority of the world's poorest people live; they farm mainly in dry areas similar to parts of Australia and where Australian interventions on improving crop/livestock-based systems, and other interventions, could have greatest impact.
- **Invite the Crawford Fund to undertake a consultative process** on the engagement of Australian philanthropic organisations and civil societies in international agricultural research and rural development, drawing on Australia's technical and scientific resources, and particularly focused on Sub-Saharan Africa and remaining areas of extreme poverty in the Asia Pacific Region

Chapter 8
Change the geographic distribution of Australian aid

Appendix 1: Task Force members

Mr James Ingram AO (Chair)

James Ingram is a former career diplomat who served as Australia's Ambassador to the Philippines and as High Commissioner to Canada and the Caribbean before heading Australia's overseas aid agency. In that latter role he was instrumental in enhancing the contribution of science and technology in the aid program and in the establishment of the Australian Centre for International Agricultural Research (ACIAR). In 1982 he became Chief Executive of the World Food Programme (WFP) where he served until 1992. Since then he has continued to contribute to efforts to improve and strengthen the United Nations system and international and development assistance. He was Chair of the Crawford Fund from 1996 to 1999. In 2002 he established the Ingram Fund for International Law and Development at the University of New South Wales.

In 1992, Brown University conferred the Feinstein World Hunger Award on Mr Ingram. In 2000 WFP made him and one of the founders of WFP, Senator George McGovern, its inaugural 'Food for Life' awardees. He is author of *Bread and Stones*, published in 2007, an account of the struggle to reform the WFP and to make it an effective instrument for battling hunger and poverty.

The Hon. John Anderson

John Anderson was elected as Member for Gwydir in 1989. Following the 1993 General Election, Mr Anderson was elected Deputy Leader of the National Party and appointed Shadow Minister for Primary Industries.

Mr Anderson was sworn in as the Minister for Primary Industries and Energy in March 1996, following the Coalition election victory. Following the Coalition's election victory in 1998, Mr Anderson was sworn in as Minister for Transport and Regional Services in 1998.

Mr Anderson was sworn in as Deputy Prime Minister and Minister for Transport and Regional Services in 1999, after the resignation of The Hon. Tim Fischer.

Professor Kym Anderson

Kym Anderson is George Gollin Professor of Economics and Foundation Executive Director of the Centre for International Economic Studies (CIES) at the University of Adelaide. From May 2004 to August 2007 he was on extended leave at the World Bank's Development Economics Research Group in Washington DC as Lead Economist (Trade Policy). He is also a Research Fellow of Europe's London-based Centre for Economic Policy Research.

His research interests and publications are in the areas of international trade and development, agricultural economics, and environmental and resource economics. He has published more than 20 books and 200 journal articles and chapters in other books. He has been a consultant to numerous national and international bureaucracies, business organisations and corporations.

During a period of leave Kim spent 1990–92 at the Research Division of the GATT (now WTO) Secretariat in Geneva, and subsequently became the first economist to serve on a series of dispute settlement panels at the World Trade Organization (concerning the EU's banana import regime, 1996–2008). He has been extensively involved in technical assistance and capacity building in numerous developing and transition economies in the area of trade-related policies, especially as they relate to WTO accession.

In 1996–97 he served on a panel advising the Ministers for Foreign Affairs and Trade in their preparation of Australia's first White Paper on Foreign and Trade Policy.

Kim's latest edited volume is *Agricultural Trade Reform and the Doha Development Agenda, 2006* (with W Martin, recipient of the AAEA 2006 Quality of Communications Award and the AARES 2007 Quality of Research Discovery Prize).

Kim is currently leading a major new World Bank research project involving around 90 consultants and country case studies aimed at assessing the evolution, causes and effects of national distortions to agricultural incentives over the past half century.

Dr Terry Enright

Terry Enright is a Western Australian primary producer who, for 25 years, has played a leading role in the administration and management of agricultural research in Western Australia, and latterly, Australia-wide. In 1991 Terry became a member of the Grain Research and Development Corporation's (GRDC) Western Region Panel responsible for the allocation of research funds drawn from levies on all broad acre crops produced in Western Australia. Terry was Chair of the GRDC Western Region Panel from 1996 to 1999. His tenure on the Western Panel, from 1991 to 1999, was one of tremendous expansion in agricultural research.

Terry was appointed Chairman of GRDC in 2002 and in this role his influence has been far-reaching. GRDC has strongly supported international initiatives to conserve genetic resources, and strong links have been forged with the international agricultural sector including research collaboration with CIMMYT ICARDA and the Global Crop Diversity Trust. From 2004 to 2007 he also held the position of 'Chair of Chairs' of the Commonwealth's research and development corporations. Terry also served as a member of the National Research Priorities Standing Committee, chaired by the Chief Scientist, and tasked with the responsibility of monitoring and reporting progress against national innovation goals.

In October 2007 Terry was appointed a Commissioner on the Export Wheat Commission and in November accepted an invitation to join the Board of Governors and Chair the WA program of the Crawford Fund. In April 2008 Terry was awarded an Honorary Doctorate of Science in Agriculture from the University of WA.

Dr Tony Fischer AM FTSE

Tony Fischer is an Honorary Research Fellow at the CSIRO Division of Plant Industry. He has engaged in agronomic and crop physiological research at the NSW Department of Agriculture, CSIRO, and the International Maize and Wheat Improvement Centre (CIMMYT) Mexico. Later he directed the Wheat Program at CIMMYT for 7 years, and worked for ten years as a Program Manager at the Australian Centre for International Agricultural Research (ACIAR). Tony has travelled widely in the developing world, visiting agricultural projects, research institutes and farmers. He continues to publish in scientific journals, with interests ranging from wheat crop physiology to agricultural development.

Tony has been awarded the Donald Medal and William Farrer Memorial Medal for contributions to agricultural research. He is a Fellow of the American Society of Crop Science and the American Society of Agronomy, as well as of the Australian Institute of Agricultural Science and Technology and the Australia Academy of Technological Sciences and Engineering.

Dr Tony Gregson FTSE

Tony Gregson is a chemist with PhD and DSc degrees from the University of Melbourne. From 1971 until 1973 he held an ICI post-doctoral research fellowship at the Inorganic Chemistry Laboratory and St Edmund Hall, Oxford. He then worked at the Atomic Energy Research Establishment at Harwell, UK, before returning to Australia to a lectureship in chemistry at the University of New England in 1974. During 1979 he was Visiting Professor of Chemistry at the University of North Carolina at Chapel Hill. In 1981 he resigned as Associate Professor of Chemistry and returned to his family farm (2,100 ha) in western Victoria where he now grows wheat, barley, canola, a variety of pulses such as lentils, faba beans and chick peas and wool.

Since returning to the farm Tony has been a member of numerous organisations, for example: inaugural member of the Barley Research Council (1986–90), inaugural Board member of the CSIRO (1986–95), inaugural Board member of the Grains Research and Development Corporation (1990–96), Board member of the Rural Finance Corporation of Victoria (1991–2001), Board member of the Australian Nuclear Science and Technology Organisation (1993–98), Chairman of Dunlena Pty Ltd, a joint venture company between CSIRO and DuPont (1994–96), Chairman of the Cooperative Research Centre for Plant Science (1995–98), member of the Board of Trustees of CIMMYT (1996–2002), as well as a member or chairman of numerous advisory and review committees.

Tony is currently Chairman of the Molecular Plant Breeding Cooperative Research Centre, Chairman of Bioversity International based in Rome (one of the 15 International Agricultural Research Centres of the CGIAR) , Chairman of Plant Health Australia, Chairman of the Victorian Committee of the Crawford Fund and a member of the Board of Governors of the Crawford Fund, Chairman of the University of Ballarat Water in Drylands Collaborative Research

Program, and a Director of Rural Industries Skill Training based in Hamilton, Victoria.

Tony was elected a Fellow of the Academy of Technological Sciences and Engineering in 2003.

Dr Gabrielle Persley

Gabrielle Persley is an advisor on biotechnology-related matters to several international organisations including the World Bank, the Consultative Group on International Agricultural Research (CGIAR), the Asian Development Bank (ADB), CAB International and the International Council for Science (ICSU). She is currently based in Nairobi, as senior adviser to the Director General of the International Livestock Research Institute, focussing on the establishment of an African biosciences platform, shared by the African scientific community, ILRI and its sister CGIAR centres and their partners. Gabrielle is also the founder and Chair of the Doyle Foundation, a Scottish based charity that advocates the role of science and technology in development.

Gabrielle received her doctorate in microbiology at the University of Queensland and worked for several years as a plant pathologist in Africa and Australia. She was the first scientific staff member of the Australian Centre for International Agricultural Research, actively involved in the foundation of ACIAR in 1982. Her work in recent years has focused on the role of biotechnology in developing countries, including spending several years in Washington as the World Bank's biotechnology advisor during the 1990s. She has published widely on biotechnology and biosafety and is editor of a CAB International (CABI)-published series of books on agricultural biotechnology.

Dr Bruce Standen

Bruce Standen is an agricultural economist based in Sydney. He is a director of several companies associated with primary industry and natural resource management. These include Sydney Fish Market Pty Ltd and OceanWatch Ltd. Since 1998 he has also advised and undertaken assignments for national and international companies and agencies.

Bruce was Managing Director of the Australian Meat and Livestock Corporation for almost a decade to 1998 and previously held other senior positions with AMLC and the NSW Department of Agriculture. His specialty is livestock production, marketing and international trade.

Bruce is a graduate of the University of New England where he earned Bachelor (with honours) and Master's degrees in Agricultural Economics, and the London School of Economics where he earned his PhD in Economics.

He has served on the national Trade Policy Advisory Council (1994–95), the Executive of the Australian Committee of the Pacific Basin Economic Council (1989–98), the University of New England Foundation (2001–08), and the University of Sydney Veterinary Foundation (2001–06). He is Coordinator for the NSW program of the Crawford Fund.

Professor Beth Woods OAM

Beth Woods worked in Northern Queensland before completing her PhD in Agricultural Economics as a Rhodes Scholar at Oxford University. She then worked with the Department of Primary Industries as an agricultural extension officer in South-eastern Queensland and Northern Queensland in the dairy, broadacre cropping and potato industries, as Manager Farming Systems, and as Acting General Manager Horticulture. She was the inaugural director of the Rural Extension Centre (UQ) and became the Suncorp Metway Professor of Agribusiness at the University of Queensland Gatton Campus in late 1997.

Beth's academic interests include the concept of supply chain management as a tool to improve innovation and competitiveness in agribusiness, and the rapid change occurring in supply chains of developing countries with which Australia has major trade interests.

In May 2004 Beth took up a secondment as of Executive Director Research and Development Strategy in the Department of Primary Industries and Fisheries (DPI&F). She has served on committees of Grains Research and Development Corporation, the Policy Advisory Council of the Australian Centre for International Agricultural Research, the CSIRO Board, the Gatton College Council, the Rural Adjustment Scheme Advisory Council and the Queensland Planning Group for FarmBis. She was Chair of the Rural Industries Research and Development Corporation, and the Australian Centre for International Agricultural Research, and she chaired the Drought Review Panel. Beth has been on the Board of the International Rice Research Institute since 2004 and elected Chair from January 2008. Her DPI&F position is now Executive Director, Innovation and Biosecurity Investment.

Dr Denis Blight AO FRSA (Secretary)

Denis Blight took up appointment as Executive Director of the Crawford Fund in February 2008. Throughout his career he has lived and worked in Asia, Africa and Europe, travelling extensively for over 30 years, engaging with leaders in government, academia and business. In 2004 he was awarded the Order of Australia for services to the community in international education, bioscience and development. At the end of 2005, Dr Blight concluded a six-year term as chief executive of CAB International and served as a consultant to CABI throughout 2006. Dr Blight is Chair of the Board of LIS Pty Ltd (operators of StudyLink), an advisor to the Graduate Insight Group and a member of the UK's Commonwealth Scholarships Commission.

As deputy executive director of IDP Education Australia (1986–90) and then Chief Executive (1991–2000) he was associated with major changes in Australia's international student program; the establishment of IDP's international office network and its international student counselling services; he established the partnership between IDP, the British Council and the University of Cambridge Local Examinations Syndicate that created the International English Language Testing System; and helped to turn IDP from a subsidised arm of the Australian aid program into a self-sustaining not-for-profit enterprise.

From 1984 to 1986, Denis was Assistant Director General of AusAID, responsible for Australia's aid programs to South East Asia and China. From 1982 to 1984 as Centre Secretary he helped to establish the Australian Centre for International Agricultural Research under the chairmanship of Sir John Crawford.

From 1971 to 1982, Dr Blight served as an Australian diplomat in Turkey, Kenya and the United Kingdom as well as in the Department for Foreign Affairs in Australia and AusAID.

Appendix 2: Further information and web-based resources

- Background briefing 1:
  'Analysis of causes of world food prices',
  Centre for International Economics, June 2008,
  www.crawfordfund.org/
  worldfoodpricetaskforce/CIE
- Background briefing 2:
  'Biotech crops—benefits and future trends',
  www.crawfordfund.org/
  worldfoodpricetaskforce/biotech
- Background briefing 3:
  'Australian aid to east Africa—future options',
  Crawford Fund, February 2008,
  www.crawfordfund.org/
  worldfoodpricetaskforce/Africa
- Background briefing 4:
  'Proceedings of the Crawford Fund Conference
  on Responding to Climate Change in Agriculture',
  Parliament House, Canberra, September 2008,
  www.crawfordfund.org/
  publications/conference08ppps.htm

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