SUMMING UP, AND THE WAY FORWARD

Dr Colin Chartres

CEO, The Crawford Fund

This year I have volunteered to summarise the conference, and as I have sat here making notes and then condensing them I have realised that it is very difficult to do justice to all the speakers and all the matters raised. One risks forgetting points, forgetting people, and forgetting nuances. Therefore, this summary merely pulls out a few key themes that have emerged from today's talks for me. It is a personal and idiosyncratic summary, and the take-home messages for others of you may be different.

We started by acknowledging that it is the Crawford Fund's 35th anniversary and the 40th anniversary for ACIAR. That means we have had a good many years of making very sound progress in dealing with food insecurity around the world. Two papers today have given an overview of progress through work that the Crawford Fund and ACIAR have done, with returns in the order of $10 for every $1 invested. Similarly, we heard of a total benefit coming from the CGIAR of $600 billion from $60 billion investment, which makes a very positive argument that money invested in international agricultural research is well spent.

In the years from 1960 to 2000, the focus was mainly on productivity, and there were phenomenal numbers of new crop varieties, from which not only has the developing world benefited but also US farmers, Australian farmers and the world's consumers – an overall outstanding success. The world's population in about 1950 was between 2 billion and 3 billion people. It is now close to 8 billion, and yet farmers and agriculture in general have managed to feed those increasing numbers of mouths reasonably, over that period.

Nevertheless, we know that even over the last 30 years one in every nine people is still hungry, largely, as I think John Anderson said, because of inequalities in access to food, because of conflict and so on. I suspect that as the world population rises to 10 billion – which it is projected to reach before it declines – we will still be able to feed most of the people, although there will be increasing externalities. Some of these externalities are the critical things we've been grappling with since at least the year 2000 and perhaps before that.

Externalities

Tony Fischer made the point, at the end of the Conversation 'Looking to the future' session, about Africa being a focus of concern. The data show that while there was a fourfold increase in value of agricultural production in 1980–2016 around the globe, the increase was much smaller in Africa, where the value of production went from 5.7% to 7.5%. Yet sub-Saharan Africa has the greatest rate of population growth in the world. Africa is going to be one of the hotspots that international agricultural research will need to continue to focus on in the future. However, there is light there, as Tony said, from the successes in Ethiopia.

Another major concern, which has come up several times today, is that in spite of all the phenomenal success in agricultural production, women are still disadvantaged in many countries, even though it has often been women who have driven agricultural productivity in many of the countries we have been talking about. There is still much work to do on that issue.

Today's talks have also shown that the types of challenges we are facing are changing. My first job was doing a soil survey in part of Somalia. It was quite a simple scientific task. These days, the tasks are much more complex, as we have heard. Now researchers face both continuing biophysical challenges as well as much more complex transactional challenges – about how we do research, how it's funded, how we get the research adopted. There are many people who are questioning what to me seems to be highly valuable research – into fortification of rice, GM work, and so on. Although that work seems to add tremendous value, it is questioned, and we have to deal with that when interacting with other members of the community.

Another critical challenge for us, from my understanding, is climate change. I was in National Water Commission back in 2004–2007 when we commissioned CSIRO to do some work on the expected impacts of climate change on the Murray-Darling Basin and eastern Australia. That was 16 years ago, and they predicted higher incidences of heavy rain in northern NSW and southern Queensland. We are seeing that now. They said that flows into the southern Murray-Darling were going to be at least 11% less, on average. We are seeing that now. In other words, there has been the capability of modelling climate change for some considerable time. I think it is important that we do not just throw our hands in the air and say we don't know what to do. There are good models. We know they are not precise, but they show the direction the climate is moving in. So, to me, the challenge of climate change is critical. Another challenge is water scarcity, which is becoming increasingly serious. The reduced flows we have seen in the Murray-Darling Basin are being repeated in major river catchments around the world. For example, Lake Mead on the Colorado River is a shadow of its former self, and many other rivers around the world are facing the same closure of their basins, with very limited water flowing out to sea.

The world is faced with ongoing biosecurity threats, which are probably getting worse because of the increased ease of travel, particularly after the lull caused by COVID-19, and it has been pointed out that there are likely to be new types of zoonotic diseases every five or eight years. Although we don't know exactly what they will be, we know they are likely to affect agriculture and human health – in many cases, both at the same time.

We are seeing the linear model of adoption of international agricultural research is changing, becoming much more participatory, involving the kinds of partnerships that Andrew Campbell talked about. In these, we do not just go into a country and say, 'We'd like to do this research in an area here'. Instead, we ask about the types of problems people are experiencing, and whether we have collective experience and knowledge that can tackle them jointly. Many of those problems overseas will teach us how to tackle similar problems in Australia.

Another aspect of researchers' increasing awareness was touched on by the participants in the Conversation 'Looking to the future', following similar points made by earlier speakers including Ravi Khetarpal, Regina Bi Nukundj and David McGill: namely, that we can no longer

work in a country without a strong understanding of the local policy framework, and how our science fits with it. Who do we need to influence, and how? Although some scientists will have the luxury of working free of those constraints, it is up to the research leaders to make sure that we are understanding that need, and that we do have a good theory of change, and that we do know who to approach, whether it's the local communities, whether it's the Minister, etc. Whilst high quality science depends on peer-reviewed papers in good quality journals, it also has to be about impact on people and making their lives better.

More traditional foci

Another key point from today is that, alongside all the emerging challenges, we must not forget about maintaining and increasing spending on crop varieties, the new germplasm, which will be so vital in tackling some of the future diseases, and helping deal with increasing temperatures and aridity, or the opposite. That is vital, and therefore it needs a bigger slice of the investment pie – which was big in, say, 1980 but is not anymore.

I was fascinated by the talk on biopesticides – a real innovation and surely more acceptable than some of the pesticides that we are already using that are causing major problems among insect and bird populations. The possibility of climate change mitigation in rice is another fascinating topic, as is the ongoing challenge of improving nutrition – something we all should look at. And another vital topic is how to sustainably intensify agriculture with no net loss of natural capital.

Talking about this with Shaun Coffey earlier today, we agreed this is not just about not developing land that isn't yet under agriculture. That may have to be done as climate change impacts affect current agricultural land. Consequently, we need to think about land that may go out of agriculture, and about restoring it for other natural and ecological-service purposes.

This is a complex and challenging area and we need to think about that very carefully. Combined with that are issues around water use, water reuse, and also the reuse of human waste, animal manure and compost, which can help sustain agriculture into the future.

Someone mentioned the loss of water in food thrown into landfill in Australia. About ten years ago, Jan Lundqvist from the Stockholm International Water Institute calculated that globally, in about 2010, we were throwing away 1300 cubic kilometres of water in wasted food. That was water that could have been used to expand agriculture if we hadn't wasted it. I know we cannot capture it all back, but this is a real and large issue, in terms both of food wastage and of wastage of other resources with the food.

There is also the role of uncertainty. We probably live in much less certain times now than when I was undertaking research 45 years ago, and the discussion during the Conversation, 'Looking to the future' has reinforced the message that these are challenging times. Clearly, the declining global role of the West and the USA and the potential breakdown of the liberal rules-based order is going to have profound implications on trade, on fertilisers and on food security. We are already seeing the food crisis arising from the Ukraine–Russia conflict. Ongoing geopolitical uncertainty could have profound effects on food security and the world's

poor. Increasing fertiliser costs are associated with the current energy crisis, and that will make the sustainable use of wastes even more important, I suspect.

I am also concerned about advanced policies relating to meat production and organic agriculture, developed recently particularly in Europe, and the European Union's wish to impose them on other countries. We touched briefly on this, in Andrew Campbell's Q&A early today, in relation to the keeping and eating of animals. As was said then, there is a big difference between large feedlots in Europe and a small family somewhere in Africa with only a few animals. We need to make sure that the solutions we are looking at will be fit for purpose, and not imposing Western standards on other cultures.

And I want to reinforce a very key point made in the Conversation session, about the time wasted by researchers in having continually to reapply for funds every few years. I think we need a better model, which allows for longer-term research, for the longer-term problems that many of you are dealing with.

Dr Colin Chartres

Recognising the importance of social understanding

Linked to the opportunities and challenges I have mentioned already, is the incorporation of socio-economic research – not just on gender but on the whole gamut of issues around how communities respond and behave; how we look at economic development as well as physical development. I think these issues are critical.

When I was at IWMI [International Water Management Institute; formerly IIMI, International Irrigation Management Institute], at least a third of the staff were socio-economists. That was probably not enough, because water issues, such as water pricing, involve tremendous debate about how they are taken up, and their impacts on people. In a conversation I had with the head of the irrigation department in Sri Lanka, to do with the Mahaweli scheme – a very large irrigation scheme in the 1970s–1990s in Sri Lanka – he said, 'We have the best engineers in the world in Sri Lanka. They can build dams just as good as you've got in Australia, in Europe and in the US. We don't need any advice on building dams.' But initially they had not put any

investment into the socio-economics; into making sure that the new models of delivering water and the use of water were understood by the populations they were serving. So, there was water running to waste from the scheme, and the farmers were relying on their own wells and tanks that had been there since time immemorial, because the authorities had not invested appropriately in the uptake of the new irrigation technology.

Understanding the sociology is vital: spending time understanding how people will respond to innovations, and involving them in the research from the very beginning. I think that is one of the most vital messages that has come out of today's meeting.

Way ahead for the Crawford Fund, and thanks

All this information sets some challenges for the Crawford Fund, to make sure we can incorporate much of what we have discussed today into our training and capacity-building programs. We are doing our best to do this around sustainable intensification, in terms of leadership and management, but there will be other areas we need more focus on, including the gender equity issues that were raised, and some of the other socio-economic areas, as well as maintaining interest in the more traditional areas of agricultural science, which we must not overlook.

The other challenge for the Crawford Fund is that – being a not-for-profit organisation and not part of government – we have the opportunity to lobby strongly for increasing some of the funding in this area. There has been excellent evidence presented during this conference and coming also from recent revisions to our report 'Doing well by doing good', and we will be using that information over the next year or so to try and at least compete with some of the very skilful lobbyists in Canberra and in the state capitals. We need to make sure that people understand the value they are getting out of investment in international agricultural research. As John Anderson said today, it is the type of investment which clearly is for a better tomorrow, both for poor people overseas and for their economies, and also for Australia and our economy, through improved access to varieties and yields.

Today's talks have been incredibly stimulating and they have all been of very high quality. They have raised a range of very important topics that we need to think about, absorb, distil and build into the Crawford Fund's programs, and we will certainly be doing that.

I want to end by thanking all the speakers and Chairs for leading us through such an interesting and dynamic exercise. Particular thanks also to the sponsors who make it possible to hold this conference.

The Crawford Fund's organising committee ensures these conferences present topics in order and that they flow well from speaker to speaker, and that takes much thought. Tony Gregson leads the organising committee, which includes Gabrielle Vivian-Smith, Tristan Armstrong, Shaun Coffey, Dan Walker, Tim Reeves, Cathy Reade and myself. For this year's conference, we were gambling that COVID-19 would not prevent it, and fortunately infection numbers are now going down, but there was always the risk of cancellation. The organising team have done a wonderful job: Cathy and Larissa ably abetted by Sarah and Sue, from the Crawford Fund, assisted by the Conference Solutions team.

Finally, I want to thank the audience for your attention and stimulating questions. I hope you, like me, go away with a lot of food for thought, and keen to pass on to your colleagues some of what we have heard and learnt today. I short, to everyone who has contributed, thank you very much indeed.

Dr Colin Chartres has had a long and successful career in the private sector, academia and government roles. Before joining the Crawford Fund in 2014 he was Director General of the International Water Management Institute (IWMI), a CGIAR Research Centre headquartered in Colombo, Sri Lanka, from 2007 to 2012. Previously, he was Chief Science Adviser to the National Water Commission and held senior management roles in the Bureau of Rural Sciences and Geoscience Australia. He worked with CSIRO Division of Soils from 1984 to 1997 where he focused *inter alia* on soil acidity, soil structure and salinity issues and their impacts on agriculture, and from 2002 to 2004 in the Land and Water Division, where he was involved in business development and international science linkages. Colin has a strong interest in the key nexus between science and policy and, through his work with IWMI, specialist interest in water scarcity and its impact on global food security and on science leadership and management best practice. Colin currently Chairs the Expert Review Panel for the Australian Water Partnership and is an Honorary Professor in the Crawford School of Public Policy at ANU.