5

Research Links

Introduction

5.1 This Chapter examines the research links between Australia and Africa. Its focus is largely on research links that have resulted from Australia's aid program and other government to government links, and as such does not examine research links related to education in great detail. These links have been discussed in Chapter 4.

5.2 This chapter begins with a discussion of the official research links between Australia and the countries of Africa that result from Australia's aid program. It then moves on to look at other research links resulting from academic and research collaboration that is officially funded, and finishes with a discussion of a tertiary education sector connection.

Official Research for Development

5.3 Research for development is an area of significant engagement between Australia and the countries of Africa. A number of research connections have been made through the many partnerships between Australian agencies and African research institutions, government agencies, and individuals.

5.4 AusAID told the Committee that one of the main pillars of Australia's official development assistance (ODA) in Africa now and into the future is centred in increasing agricultural production with the goal of reducing food insecurity.[1] A significant part of the agriculture and food security portion of Australian ODA is managed by the Australian Centre for International Agricultural Research (ACIAR).[2] AusAID and ACIAR also work with CSIRO in boosting Africa's agricultural output via research and its application.[3]

Australian Centre for International Agricultural Research

5.5 ACIAR is a statutory authority within the Foreign Affairs and Trade portfolio, and is a 'specialist component of the Australian aid program'.[4] As such, its activities are part of Australian ODA, and its objectives are to advance 'Australia's national interest through poverty reduction and sustainable development'. [5]

5.6 ACIAR conducts this work in partnership with counterparts in the developing world through several different activities:

- commissioning research into improving sustainable agricultural production in developing countries;
- funding project-related training (postgraduate and short training courses);
- communicating the results of research;
- conducting and funding development activities related to research programs, including capacity building;
- administering the Australian Government's contribution to the International Agricultural Research Centres (IARCs).[6]

5.7 As at April 2010, ACIAR had 201 projects operating in 25—30 countries. Its total research budget is $80 million per annum.[7] Of this, between $2 and $5 million is spent on projects in Africa.[8]

5.8 As mentioned earlier in this report, Sub-Saharan Africa has some of the worst indicators in relation to the MDGs. In particular this region has registered the least progress in reducing food insecurity. Hence, ACIAR

1 This is discussed in greater detail in Chapter 3 of this report.
2 AusAID, *Submission No. 47*, p. 570.
3 CSIRO, *Submission No. 14*, p. 118.
4 Dr Simon Hearn, *Transcript 20 April 2010*, p. 60.
5 ACIAR, *Submission No. 27*, p. 207.
6 ACIAR, *Submission No. 27*, p. 207.
7 Dr Simon Hearn, *Transcript 20 April 2010*, p. 60.
8 ACIAR, *Submission No. 27*, p. 209.

has been involved in projects and has funded research in Africa – particularly South Africa – since its inception in the early 1980s. In that time, it has completed over 40 projects, ranging from reducing the impact of diseases and ticks on livestock to introducing Australian trees and low impact fertiliser strategies for African crop farmers.[9]

5.9 ACIAR functions as the 'interface' between Australia's ODA program and Australian research and innovation in agricultural research. As such, it is important to note that it always operates in 'collaboration with research agencies in developing countries'.[10]

5.10 ACIAR works with both bilateral partners, as in the case of South Africa, and multilateral partners. In common with other components of Australian ODA, these partners emphasise Australia's comparative advantages in agriculture. Some of the international agricultural research centres (IARCs) ACIAR has worked with in Africa include:

- The International Livestock Research Institute;
- The World Agroforestry Centre;
- The International Institute of Tropical Agriculture;
- The International Crops Research Institute for the Semi-Arid Tropics; and
- The International Maize and Wheat Improvement Centre.[11]

5.11 ACIAR's current activity in Africa is limited, in line with ACIAR's modest funding. It is running a small program in South Africa focused on 'income generation in crop and livestock systems for emerging and previously disadvantaged farmers'. This program is intended to 'assist farmers to develop as commercial operators to capture the benefits of improved technology'.[12]

5.12 In 2010, ACIAR launched a new program called 'Pathways to sustainable intensification of maize-legume based farming systems for food security in eastern and southern Africa (SIMLESA)'. ACIAR noted that this project is in alignment with regional research priorities set out by the Comprehensive African Agriculture Development Programme (CAADP) and SADC.[13]

9 ACIAR, *Submission No. 27*, p. 207.
10 Dr Simon Hearn, *Transcript 20 April 2010*, p. 60.
11 ACIAR, *Submission No. 27*, p. 208.
12 ACIAR, *Submission No. 27*, p. 208.
13 ACIAR, *Submission No. 27*, p. 208.

5.13 The research emphasis of SIMLESA will focus on improving the use of technology and the latest, improved strains in maize-legume farming to maximise income without endangering sustainability. It also aims to 'contribute to building agricultural research capacity in partner countries and regional organisations'.[14]

5.14 As mentioned, ACIAR's budget is limited. For example, the SIMLESA project has a total budget of $20 million, to be spent over four years. A further $0.5 million is currently being spent on the projects in South Africa in the 2010—11 financial year.[15]

Commonwealth Scientific and Industrial Research Organisation

5.15 CSIRO is the Australian national government science agency under the Department of Innovation, Industry, Science and Research (DIISR).[16] The international strategy of CSIRO emphasises 'research for development'. As such its efforts in Africa over the last 25 years have focused on 'building partnerships in the African region focused on research that can help support African development'. So far, most of its research activity in Africa has been in land based agriculture, and increasingly aquaculture as well.[17]

5.16 CSIRO told the Committee that:

> CSIRO deploys its research principally through partnerships with Australian and international development agencies and in-country government, non-government and agribusiness organisations. Our key partner in much of the past and current activities is [ACIAR]. Other partners have included AusAID and donor organisations ...[18]

5.17 One example of such collaboration can be found in a program which ran from 1999 to 2009. This program focused on 'improving livestock integration into cropping systems via improved forage and marketing strategies', and built on Australian expertise and experience in this area. It

14 ACIAR, *Submission No. 27*, p. 209.

15 ACIAR, *Submission No. 27*, p. 209.

16 DIISR and its other research activities in Africa are dealt with in a later section of this Chapter.

17 CSIRO, *Submission No. 14*, p. 118.

18 CSIRO, *Submission No. 14*, p. 118.

was funded by ACIAR, led by CSIRO, and conducted in Zimbabwe and South Africa.[19]

5.18 Other agricultural research projects that CSIRO has been involved with in Africa include:

- 'Fertilizer- augmented soil enrichment strategies', designed to increase the use of fertilizer by smallholders;
- 'Farming systems research to enhance the effectiveness of agricultural change agents in Africa'. For example, one project in this area was partly designed to help NGOs and agribusiness better tailor their services to meet the needs of smallholder producers;
- 'Improved integration of livestock within cropping systems', designed to maximise the performance of both livestock and crops;
- 'Improved crop varieties and their distribution'. Sub-Saharan Africa has a very low rate of adoption of improved crop varieties, and this research was intended to capitalise on Australia's experience and success in 'the process of breeding, releasing and distributing new varieties'.
- 'Lifting water-use efficiency in rain-fed and irrigated agriculture in the semi-arid tropics'. Australia is a world leader in water-use efficiency (WUE) given its climate and geography, and this research was intended to help improve semi-arid Africa's 'disappointingly low' WUE.
- 'Coping with increasing vulnerability due to climatic change'. Given the effect of crop failure on the rural poor in Sub-Saharan Africa, CSIRO has developed partnerships with African researchers to help support smallholders adapt 'their agricultural practices to current' and projected climate variations.
- 'Food security in coastal Africa from aquaculture'. Aquaculture is increasing in coastal African communities, and if developed effectively could become a sustainable source of both food and export income for coastal African countries. CSIRO has developed aquaculture systems with 'ultra low-cost inputs' and 'high value outputs', and these systems are being applied in some East African countries in association with other research agencies.
- 'Delivering improved tree germplasm for African agroforestry systems'. CSIRO has collaborated with a number of research agencies in Africa to assist with the integration of Australian tree species — particularly the

19 CSIRO, *Submission No. 14*, p. 121.

> Australian Silky Oak — into African farming systems. This helps to increase the timber yield of African farmers for use both in farming and building and for commercial timber sales.[20]

5.19 CSIRO emphasised that its activities in Africa were providing a real contribution to Africa, in terms of increasing regional stability through prosperity and economic security, solving regional problems that could then be applied to similar geographic settings, and building technical agricultural capacity.

5.20 These activities also provide benefits for Australia, including its international reputation, opportunities for future collaboration and 'demonstrable returns' for Australian agriculture.[21]

Committee Comment

5.21 Australia is a leader in agricultural production and its expertise provides opportunities for expansion of research and the creation of agribusiness joint ventures.

5.22 The Committee notes that the work of ACIAR and CSIRO in Africa is mutually beneficial for both African countries and Australia, in that it both assists in progress towards MDG 1 and increases the agricultural expertise of Australia.

5.23 The Committee supports these activities and encourages continuing Australian agricultural research in Africa.

Other Official Research Connections

5.24 Research for development between Australia and the countries of Africa aside, other Australian agencies are involved in fostering research connections between Australia and Africa. At the intergovernmental level these links are the responsibility of the Department of Innovation, Industry, Science and Research (DIISR), which manages these relationships and their funding programs so as to:

> Provide the platform for supporting the activities that give substance to the commitments made under various science and technology treaties and MOUs.[22]

20 CSIRO, *Submission No. 14*, pp. 119-23.

21 CSIRO, *Submission No. 14*, pp. 123-4.

5.25 The criteria under which these links are created are:

- the anticipated benefits (social, economic and scientific) of cooperation with other countries;
- the expected benefits that accrue to Australia as a result of collaboration; and
- 'broader strategic, whole-of-government considerations'.[23]

5.26 Some of the ways in which the DIISR fosters collaboration are:

- Through the ARC and its Discovery Projects, Australian Laureate Fellowships, and ARC Centres of Excellence schemes. In all of these, 'international collaborations is specified as an objective in the funding rules'.
- The Cooperative Research Centre Program Guidelines, which strongly encourage international research collaboration.
- 'The International Science Linkages program managed by the Department ... due to expire in 2011'. This program provided funding not only in support of research collaboration internationally, but also 'to support relationship-building events that lay the essential groundwork for future collaboration'.[24]

5.27 One of the primary criteria on which the anticipated benefits both ways are quantified is by examining the research output of potential partner countries through the number of scientific publications produced.[25]

5.28 As a continent, Africa's research output as measured by the number of publications is very modest. According to the DIISR, Africa accounts for 0.9% of research and development investment, and just 1.5% of scientific publications each year. This is especially marked considering Australia accounts for '1.4% of investment and 3% of publications' annually.[26]

5.29 Given this modest research and scientific capacity, Australia's research collaboration with the countries of Africa has been extremely limited. To the extent it does exist, most of this collaboration takes place with South Africa, which accounts for more than one third of both the investment in and output of scientific research in Africa.

22 DIISR, *Submission No. 8*, p. 74.
23 DIISR, *Submission No. 8*, p. 74.
24 DIISR, *Submission No. 8*, p. 75.
25 DIISR, *Submission No. 8*, p. 75.
26 DIISR, *Submission No. 8*, p. 76.

5.30 The actual current collaboration between Australia and Africa in science and research is broken down into several organisations and programs and one project. These are:

- Australian Research Council;
- Australian Nuclear Science and Technology Organisation;
- Cooperative Research Centre Program;
- International Postgraduate Research Scholarship Program; and
- The Square Kilometre Array.

Australian Research Council

5.31 DIISR informed the Committee that there were '85 new and ongoing ARC-supported research projects with funding allocations in 2009 that involve collaboration with the countries of Africa'. This included intended collaboration with 25 countries, and South Africa accounted for 58% of intended collaborations.[27]

5.32 ARC told the Committee that these research links and collaborations took two basic forms:

- 'Formal' linkages, wherein the projects involve formal collaboration between research partners in Australia and an African country.
- 'Informal' linkages, wherein intent to collaborate internationally is specified, but no specific participant is identified. The types of collaboration can range from conducting fieldwork in another country to 'the training of PhD or Masters students' from another country.[28]

5.33 The research fields most prominent in these 85 projects were Historical Studies (with ten projects), Ecology and Evolution (eight) and Geology (seven) 2009. The ARC funding commitment for the 85 projects was $67.7 million.[29]

Australian Nuclear Science and Technology Organisation

5.34 ANSTO entered into a formal collaborative agreement with the Nuclear Energy Corporation of South Africa (NECSA) in 2007. This agreement 'seeks to take advantage of the similarities between the research reactors

27 DIISR, *Submission No. 8*, p. 76.
28 DIISR, *Submission No. 66*, p. 747.
29 DIISR, *Submission No. 8*, p. 76.

in each country to increase their safety and reliability'. This is done largely through cooperation and exchanges of personnel and experience.

5.35 ANSTO has also:

> Coordinated the placement of fellows and scientific visitors from a number of countries in Africa, including Sudan, Zambia, South Africa and Madagascar ... at various laboratories, hospitals, universities and institutes around Australia, including ANSTO.[30]

Cooperative Research Centre Program

5.36 The Cooperative Research Centre (CRC) Program links researchers with industry 'to focus efforts in deployment and commercialisation'. As of 2010, there were 47 CRCs operating in six sectors.[31]

5.37 DIISR informed the Committee that:

> Since 1998 there have been 43 education and training, commercialisation or research collaborations between CRCs and African organisations in Kenya, Namibia and South Africa.[32]

5.38 Currently, 11 CRCs are involved in 38 collaborative links with African countries. As is the case with ARC projects, most of the collaborations take place in South Africa. Furthermore, these links take advantage of both Australia and Africa's comparative advantage in research, focusing on areas such as agriculture, rural based manufacturing, mining and energy sectors, environment, and medical science.[33]

International Postgraduate Research Scholarship Program

5.39 In addition to the scholarships offered by AusAID (discussed in Chapters 3 and 4), DIISR also funds and administers the IPRS program. This program allows international students to undertake higher degrees by research at Australian institutions.[34] In 2008, 37 recipients of IPRSs were African, which represents four per cent of the overall scholarships allocated.[35]

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30 DIISR, *Submission No. 8*, p. 77.
31 DIISR, *Submission No. 8*, p. 77.
32 DIISR, *Submission No. 8*, p. 77.
33 DIISR, *Submission No. 8*, p. 77.
34 DIISR, *Submission No. 8*, p. 78.
35 DIISR, *Submission No. 66*, p. 753.

The Square Kilometre Array

5.40 The Square Kilometre Array (SKA) radio telescope project is essentially a huge new-generation radio telescope, which has a 'discovery potential 10000 times greater than the best present-day instruments'.[36] It is being built by an international consortium of 15 countries, including Australia and South Africa, with both Australia and Southern Africa being shortlisted as potential sites for the SKA's construction. A final decision on its location is expected in 2012, with construction expected to commence in 2016.[37]

5.41 The SKA, rather than being just an area of scientific and research collaboration, instead sees Australia and New Zealand competing with a group of eight African countries. The African bid for the location is being led by South Africa.[38]

5.42 DIISR informed the Committee that there are 'two broad future opportunities for Australia-Africa collaboration' in relation to the SKA.

> The first opportunity lies with working more closely together at the governmental and senior official levels to build momentum and support for the SKA project around the world. The second, and perhaps more important future opportunity, relates to the scope for developing mutually beneficial programs of science and research collaboration based upon the framework developed for SKA cooperation.[39]

Non-Official Research Connections

5.43 Most of the non-governmental research connections between Australia and Africa have resulted from African students studying in Australia, (this is discussed in Chapter 4), and Australian researchers with an interest in Africa. This section discusses evidence provided on legume research and a university research connection that is focused more on research excellence than education.

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36 Australia and New Zealand Square Kilometre Array website, <http://www.ska.gov.au/about/Pages/default.aspx> Accessed March 2011.

37 Square Kilometre Array website, <http://www.skatelescope.org/pages/page_genpub.htm> Accessed March 2011.

38 DIISR, *Submission No. 8*, p. 80.

39 DIISR, *Submission No. 8*, pp. 80–1.

Legume research in Africa

5.44 Professor John Howieson, Director of the Crops and Plants Research Institute, Murdoch University, described to the Committee his work on the application of legumes to improve soil fertility.

5.45 In 1997 the Institute had assisted the University of Cape Town to develop an African network in the discipline of research into legumes and their associated nitrogen fixing rhizobium bacteria. As well as providing ongoing assistance, the Institute was also engaged in delivering workshops in Ethiopia and South Africa. It also had links to the Eastern Cape Department of Rural Development and Agrarian Reform.[40]

5.46 In working with African communities, Professor Howieson emphasised that it was important to gain a good understanding of the sociology:

> Before we got involved with either of those communities we got the Eastern Cape Department of Agriculture to employ their first sociologist and we got her to engage the communities, to make them understand that what we were doing would be of benefit, as long as a set of rules was abided by. That related to when you grazed and who had ownership of the land for grazing. … Because their language was Xhosa and it did not have a word for legume in it, we had to introduce the legume concept. … If we had gone there and put some legumes into a patch of land, walked away and they had grown, then every animal within three kilometres would have grazed it. But by engaging with the community beforehand and obtaining their agreement to participate in the work—in that agreement there was an undertaking not to overgraze or graze at the wrong time—we had a chance of improving their standard of living.[41]

5.47 Professor Howieson commented that the legume and rhizobium genetic resources of Africa could also assist Australian agriculture to become more resilient to climate change because they grew in similar soils and conditions.[42] In using African genetic resources, Professor Howieson was cognisant of international biodiversity governance:

> We have a memorandum of understanding. We own that material in Australia. If we develop it for Australia, we will give it back to the South Africans for them to develop in Africa, for them to own

40 Prof. John Howieson, *Transcript 10 March 2011,* pp. 49, 51.

41 Prof. John Howieson, *Transcript 10 March 2011,* p. 53.

42 Prof. John Howieson, *Transcript 10 March 2011,* p. 49.

> if they want to use it. If we commercialise the legume I talked about in Australia, we will give a royalty to the … Agricultural Research Council in South Africa, in exchange for us having taken that material out.[43]

Consortium for Advanced Research Training in Africa

5.48 The Consortium for Advanced Research Training in Africa (CARTA) is an 'initiative of nine African universities, four African research institutes, and selected' partners in the developed world.[44] It aims to 'improve the well-being of Africans through policy-relevant research', by training African research academics in Africa itself, and by strengthening the training and research infrastructure of African universities.[45]

5.49 Monash University in Melbourne is one of the partners in the developed world.[46] As such, Monash undertakes many activities to support and strengthen African research capabilities and output. Such activities include:

- sending staff to African CARTA-member institutions;
- training African staff and faculty members; and
- engaging with 'a wide range of specialists to support research and academic capacity strengthening efforts at participating African institutions'.[47]

43 Prof. John Howieson, *Transcript 10 March 2011,* p. 57.

44 CARTA website, <http://www.cartafrica.org/about-us> Accessed March 2011.

45 *Exhibit No. 38,* pp. 2—8.

46 The other developed world partners are the Canadian Coalition for Global Health Research, Swiss Tropical Institute, University of Colorado, University of Warwick, World Health Organisation Special Program for Training and Research in Tropical Diseases, and the Sahlgrenska Academy Gothenburg University. CARTA website, <http://www.cartafrica.org/about-us/member-institutions> Accessed March 2011.

47 *Exhibit No. 38,* p. 26.

Committee Comment

5.50 The Committee recognises the value of the research connections which currently exist between Australia and Africa, and particularly with South Africa.

5.51 Indeed, there is significant value in such initiatives as CARTA. Given the relative paucity of research coming out of Africa at present the Committee recognises CARTA's potential to increase the output of research in Africa.

5.52 Initiatives such as CARTA will be of immense value to Africa in building its research capacity into the future.