



1. Introduction

In Africa millions hover near starvation in a world of plenty. Since 1990, food availability per capita in Sub-Saharan Africa has declined by 3 percent. This compares to per capita increases of more than 30 percent in Asia and 20 percent in Latin America. Almost 200 million Africans were undernourished at the dawn of the millennium compared to 133 million in 1980. Currently 33 percent of Sub-Saharan Africans and 6 percent of North Africans are undernourished. Children undernourished in Africa now number 33 million, or more than one-third of pre-school children. Almost all of these children live in Sub-Saharan Africa, the only region in the developing world where child undernourishment has been increasing.

In March 2002, United Nations Secretary-General Kofi Annan requested the InterAcademy Council (IAC) to undertake a study and develop a strategic plan by which the best of science and technology (s&t) could be harnessed to help Africa substantially increase its agricultural productivity, thereby contributing to improved food security. The Secretary-General asked the IAC to engage leading scientific, economic and technological experts in the exercise. His letter to IAC is reproduced in Box 1.1.

The InterAcademy Council appointed the Study Panel on Agricultural Productivity in Africa; 11 of its 18 members were from developing countries, 7 of whom were from Africa. Study Panel members were nominated by their respective country's academy of science through the auspices of the InterAcademy Panel on International Issues (IAP) and approved by the IAC Board. As requested by the UN Secretary-General, the report with its findings and recommendations addresses a wide community – primarily the peoples and governments of Africa – including African heads of state; ministers (of science and technology, agriculture, fisheries, forestry, livestock, finance, education and water); executive officers of international agricultural research and development agencies, international and African regional financial institutions, African national agricultural research systems, educational institutions, and the private sector; leadership of African subregional organizations, the Forum for Agricultural Research in Africa and the New Partnership for African Development (NEPAD); OECD country ministries of trade, commerce, treasury, and international cooperation; and the farmers, scientists, educators and extensionists in Africa.



Box 1.1 Letter from the Secretary-General of the United Nations





The study process

The Study Panel met on three occasions – in Kampala, Uganda (September 2002), Alexandria, Egypt (March 2003) and Stellenbosch, South Africa (June 2003) – and interacted continuously throughout the drafting and reviewing of the report via electronic communications.

After the Kampala meeting, the Study Panel conducted a series of joint consultative African regional workshops (January and February 2003) in association with subregional organizations. The subregional organizations were responsible for agricultural research coordination in three of the four regions of Africa. The Southern Africa workshop was organized jointly with the National Department of Agriculture of South Africa. Summary proceedings of these four workshops are accessible from the IAC website, www.interacademycouncil.net. Sponsors, dates, location, and participant numbers for the four workshops are as follow:

- Eastern and Central Africa (Association for Strengthening Agricultural Research in Eastern and Central Africa/InterAcademy Council (ASARECA/IAC)), 31 January-2 February 2003, Inter-Continental Hotel Nairobi, Kenya; 43 participants (Omoro and Sheikh, 2004).
- Northern Africa (Association of Agricultural Research Institutions in the Near East and North Africa (AARINENA)/IAC), 3-5 February 2003, Hassan II Institute of Agronomy and Veterinary Medicine, Rabat, Morocco; 30 participants (Besri, 2004).
- Southern Africa (National Department of Agriculture, Republic of South Africa/IAC), 7-9 February 2003, Magaliesburg, South Africa; 32 participants (Anandajayasekeram and Sebola, 2004).
- Western and Central Africa (Le Conseil Ouest et Centre Africain pour la Recherche et le Développement Agricoles (CORAF)/IAC), 10-12 February 2003, Dakar, Senegal; 45 participants (Spencer, 2004).

The aims of the workshops were twofold: (1) understand the regional constraints to improved agricultural productivity as a means of improving food security; and (2) identify explicitly the role of science and technology in alleviating constraints and exploiting opportunities.

The 150 participants in these workshops, the vast majority of whom were African scientists and policy makers, showed great interest in and commitment to the IAC study. They viewed the study as timely in the light of the renewed interest being accorded to agriculture, and more particularly to the role science and technology could play in its advance. The consultative workshops provided the Study Panel with some consistent messages about



the main challenges and opportunities in science and technology on the continent. These were organized topically by (a) institutional issues; (b) policy environment and (c) science and technology strategies. The Study Panel discussed these at length in their deliberations. The priority issues that emerged from the consultative workshops are summarized in Annex A.

The Study Panel Co-Chairs and some Study Panel members also attended meetings of the Consultative Group on International Agricultural Research (CGIAR) Executive Committee and the Forum for Agricultural Research in Africa (FARA), as part of the consultative process. A Progress Report was presented at these meetings and comments and suggestions encouraged. The Progress Report was also shared with the 150 or so workshop participants.

Several background resource papers were commissioned by the Study Panel to complement the consultative workshops. Their purpose was to review the literature on subjects that the Study Panel felt was integral to the study. They covered the following topics:

- African agricultural systems and their productivity: trends, constraints and opportunities (Spencer, Löffler and Matlon, 2004);
- Constraints and opportunities in science and technology for Africa (Bindraban and Rabbinge, 2004);
- The status and potentials in African s&t institutions (Roseboom, Beintema and Mitra, 2004);
- Mobilizing and motivating the next generation of African scientists (Eicher, 2004)

These background papers are also accessible on the IAC website.

Scope of the study

As it approached its task, the Study Panel was conscious that there are many determinants of food security. Thus the focus on science and technology was kept well to the fore in defining the scope of the study at the Kampala meeting. It was agreed that the study would acknowledge the following elements:

- A continental approach that includes all of Africa;
- A consideration of crops and livestock, inland fisheries, aquaculture, and agro-forestry;
- An understanding of the challenge that recognizes agricultural factor productivity as a means to achieve sustainable food security, not as an end in itself;



- A primary focus on food commodity productivity, with recognition that commercial, non-food commodity productivity is also relevant to food security;
- A focus on both pre- and post-harvest productivity;
- A broad definition of science and technology that includes not only agricultural sciences but also related disciplines such as information and communication technologies, geographic information systems, energy, and others insofar as they influence agricultural productivity;
- A consideration of policies that affect agricultural productivity, including those related to science and technology, agriculture, macro-economics and trade;
- Sectors other than agriculture, such as health and education, would only be addressed insofar as they affected agricultural productivity – the impact of HIV/AIDS on scientific capacity and farm labour supply is but one example;
- An emphasis on bottom-up approaches to the formulation of strategies and priorities and an institutional overview that includes horizontal and vertical dimensions of the policy and institutional environments;
- An agricultural/farming/production systems approach that goes beyond cropping systems.

The focus of the report is on science and technology and the enabling environment required for science and technology to impact on productivity, profitability, sustainability and food security. It has not addressed the factors such as conflicts and other shocks which can prevent science and technology from properly expressing its full potential, although their importance is acknowledged. The Study Panel notes that while there are many countries in Africa where such conflicts and natural calamities have led to food insecurity, there are examples where food insecurity persists even though there have been no conflicts or calamities. The report also focuses only on s&t applications to improve agricultural productivity and thus the availability, affordability and accessibility of food supplies. It does not address interventions to improve access to clean water, health services and female education that are critically important complements to achieve food and nutritional security.

African smallholders are central to the report, as it is here that the real productivity and food security challenges for science and technology exist. Special efforts are needed to improve the productivity of resource-poor farmers, to help them increase their marketable surplus and thereby generate additional cash incomes. The overriding majority of African agricul-



turists will in the next decade still be on small holdings with mixed cropping systems often involving livestock. However, large commercial farming will also feature where appropriate, to generate broader economic growth of African countries.

Structure of the report

At its second meeting in Alexandria, the Study Panel agreed on the major issues to be addressed in the report. These are explored in Chapter 2, Food security in Africa; Chapter 3, African agricultural production systems and productivity in perspective; Chapter 4, Science and technology options that can make a difference; Chapter 5, Building impact-oriented research, knowledge and development institutions; Chapter 6, Creating and retaining a new generation of agricultural scientists; and Chapter 7, Markets and policies to make the poor income and food secure. In the final Chapter 8, the Study Panel has drawn together strategic recommendations and action agendas that respond to these issues under five major strategic themes. Together these represent an operational strategy for science and technology in Africa, aimed at improving agricultural productivity and food security. The relevant recommendations for each of the target audiences are identified in Annex B.



References

- Anandajayasekaram, P. and R. J. Sebola. 2004. Summary, Conclusions, and Recommendations: Southern Africa Workshop on Science and Technology Strategies for Improving Agricultural Productivity and Food Security in Southern Africa. Magaliesberg, North West Province, Republic of South Africa, February 7-9, 2003. National Department of Agriculture, Republic of South Africa and InterAcademy Council. Accessible at www.interacademycouncil.net
- Besri, M. 2004. Summary, Conclusions, and Recommendations: North Africa Workshop on Science and Technology Strategies for Improving Agricultural Productivity and Food Security in North Africa. Rabat, Morocco, February 3-5, 2003. Hassan II Institute of Agronomy and Veterinary Medicine (IAV HASSAN II), Association of Agricultural Research Institutions in the Near East and North Africa and InterAcademy Council. Accessible at www.interacademycouncil.net
- Bindraban, P. S. and R. Rabbinge. 2004. Technologies That Can Make a Difference: Enhancing Agricultural Productivity in Africa. Background Paper No. 2 commissioned by the InterAcademy Council (IAC) Study Panel on Science and Technology Strategies for Improving Agricultural Productivity and Food Security in Africa. InterAcademy Council. Accessible at www.interacademycouncil.net
- Eicher, C. K. 2004. Rebuilding Africa's Scientific Capacity in Food and Agriculture. Background Paper No. 4 commissioned by the InterAcademy Council (IAC) Study Panel on Science and Technology Strategies for Improving Agricultural Productivity and Food Security in Africa. InterAcademy Council. Accessible at www.interacademycouncil.net
- Omoro, A., and D. Sheikh. 2004. Abstracts of Presentations and Synthesis of Discussions: Workshop for Eastern and Central Africa on Science and Technology Strategies for Improving Agricultural Productivity and Food Security in Eastern and Central Africa. Nairobi, Kenya January 31-February 2, 2003, Association for Strengthening Agricultural Research in Eastern and Central Africa and InterAcademy Council. Accessible at www.interacademycouncil.net
- Roseboom, J., N. Beintema, and S. Mitra. 2004. Building Impact-Oriented R&D Institutions. Background Paper No. 3 commissioned by the Inter-Academy Council (IAC) Study Panel on Science and Technology Strategies for Improving Agricultural Productivity and Food Security in Africa. InterAcademy Council. Accessible at www.interacademycouncil.net
- Spencer, D. 2004. Summary Report CORAF/IAC Consultation Workshop on Science and Technology Strategies for Improving Agricultural Productivity and Food Security in West and Central Africa (WCA). Dakar, Senegal, February 10-12, 2003. Le Conseil Ouest et Centre Africain pour la Recherche et le Développement Agricoles and InterAcademy Council. Accessible at www.interacademycouncil.net
- Spencer, D.S.C., P. J. Matlon, and H. Löffler. 2004. African Agricultural Production and Productivity in Perspective. Background Paper No.1 commissioned by the InterAcademy Council (IAC) Study Panel on Science and Technology Strategies for Improving Agricultural Productivity and Food Security in Africa. InterAcademy Council. Accessible at www.interacademycouncil.net