

Global mutual interests in scientific collaboration to achieve sustained equitable development

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The current concern about climate change is a dramatic illustration of the global impacts of local actions. There are daily horrific pictures of what people are prepared to endure to leave one country or continent in search of a better future in another. These and the problems that they are causing for their new hosts are further illustrations of the fact that we all live on the same tiny planet and our neighbour's problems are sooner or later likely to cause us problems.

The fact that Africa has more internally displaced persons and people trying to leave the continent by whatever means is indicative of grave shortages of capacity that go well beyond those that could be improved by, the admittedly much needed, improvement in governance. With measures such as the unprecedented NEPAD peer review mechanism Africa aimed at improving governance and rising commodity prices African economies have in the past decade started to make real progress. However, there is far more to be done to reach the MDG 1 of eradicating extreme poverty and hunger and MDG 7 of ensuring environmental sustainability than Africa can do by itself, at least in the short to medium term.

Left to its own devices it is likely that a significant number of African nations will continue to be unable to protect their forest, water catchments and biodiversity from the ravages of agricultural production systems that can only meet the demands of increasing populations by expanding the area under cultivation or increasing stocking rates. This will be a calamity of global proportions because there are no substitutes for Africa's forests and biodiversity. There are also few markets with the growth potential of Africa which developed nations need for their own economic growth.

Africa loses about 23,000 professionals a year, many of whom are agricultural scientists, potential agro business entrepreneurs or administrators, through emigration. If it costs say US\$100,000 to bring one professional up from youth through qualifying and early experience that amounts to aid-in-kind worth over US\$ 2 billion per annum from Africa to the developed economies. It is thus not only in their self interest but also equitable that the donor countries should honour their pledges of increased aid made at Seaisland, Gleneagles and elsewhere and research by IFPRI has shown that there is no better investment than in agricultural and natural resources research, development and capacity building.

The three factors of agricultural research, development and capacity building are separated only for convenience. In reality they are inextricable linked to each other.

Doing more of the same is not going to lead to the same ends, i.e., development failing to get ahead of the population curve. AU-NEPAD has calculated that it is necessary to achieve an annual 6% growth in agricultural production to make meaningful

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and sustained improvements in the lives of the majority of Africans who live on less than a dollar a day. This will not be achieved without research. Indeed it will not be achieved without world-class research in productivity enhancing technologies, new markets and market systems, and enabling policies. And it will not be achieved unless Africa develops sufficient of its own institutional and human capacity for agricultural innovation.

Achieving 6% annual growth in agricultural productivity is itself a huge challenge but Africa must get there from a state in which, it is not just losing the professionals referred to above, but also many others to HIV and AIDS. A state in which its agricultural research institutions have been under staffed and under funded, often since the 80s and 90s era of structural adjustment. A state in which the number of universities and the number of places at existing universities have been dramatically increased but without commensurate increases in funding leaving them too ill equipped to turn out the kinds and qualities of scientists that Africa must have to achieve the goals set in AU-NEPAD's Comprehensive Africa Agriculture Development Programme (CAADP).

Japan's contribution to the development of the New Rice for Africa (NERICA) points the way out of Africa's dilemma. African rice (*Oryza glaberrima*) is hardy and drought resistant but it is prone to falling over - lodging - and losing its grain before it can be harvested through grain shattering. Asian varieties (*Oryza sativa*) are less prone to lodging and are higher yielding. Conventional breeding was applied to try to raise the yields of glaberrimas but with limited success because despite their adaptations they are limited by the environmental stresses in the poor conditions in which they are grown. Attempts to cross the African and Asian species to combine their best traits failed because the crosses were sterile.

In the early 1990s, with support from Japan, rice breeders at WARDA were able to employ biotechnology to produce fertile crosses. This produced plants that were fertile but only poorly so and it took several cycles of back-crossing with the sativa parent to produce progeny with robust fertility. After that scientifically advanced anther-culture techniques were used to double the gene complement of male sex cells (anthers) and thus produce true-breeding plants. The field testing confirmed that the new plants combined the traits of the different parents with sufficient diversity for selection and fortunately some were found to have inherited the best of both parents. The yield ceiling had been raised from 4 to 6 tonnes per hectare creating new goals for rice cultivation. The new varieties called NERICA's were as well adapted as their glaberrima parent but had the high yield potential of their sativa parent.

Achieving impact with a multi-institutional collaboration

The research on NERICA involved the participation of 17 national agricultural research and extension systems of member states of WARDA; Benin, Burkina Faso, Cameroon, Chad, Côte d'Ivoire, The Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone and Togo, supported by the Japanese Ministry of Foreign Affairs, The Rockefeller Foundation and the United Nations Development Programme (UNDP).

Other collaborators included (alphabetically) Cornell University, the International Centre for Tropical Agriculture (CIAT), the International Rice Research Institute (IRRI), l'Institut de recherche pour le développement (IRD) the Japan International Centre for Agricultural Science (JIRCAS), the John Innes Centre, United Kingdom's Department

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In 1999, about 3 million tonnes of rice equivalent to 16 per cent of world rice trade was imported by WARDA member states. This cost US\$ 850 million out of the limited resources of some of the poorest countries on earth. It was estimated that a 10% adoption rate of NERICAs in only three countries, Côte d'Ivoire, Guinea and Sierra Leone would save nearly US\$ 8 million per year. At 25% adoption rate, which would be similar to the trend in Guinea, would realise savings of nearly US\$ 20 million per annum.

Transforming Africa's food production

Fortunately, NERICA is only one of the new technologies that is coming on stream for African smallholders. A survey by the International Food Policy Research Institute (IFPRI) reveals other emerging successes in African agriculture, particularly breakthroughs in maize breeding across Africa, sustained gains in cassava breeding and successful combat of its disease and pests, booming horticultural and flower exports in East and Southern Africa, and increased cotton production and exports in West Africa (Gabre-Madhin and Haggblade 2003²). Available data from FAO clearly endorses this assessment.

However, much more is needed and that will not be possible unless Africa has greater endogenous capacity for agricultural innovation. But in that too Africa is looking for collaboration with non-African partner universities to be able to strengthen its capacity to build capacity. This extends to improving the quality in the scientific disciplines but also in new systems and personal mastery skills that are essential for graduates to become effective change agents and for the universities themselves to become learning institutions with the capacity to spearhead their nations' development as in Japan and all leading innovative nations of the Americas, Asia and Europe.

Conclusion

International collaboration in agricultural research, development and capacity building works and pays very good dividends but there is massive underinvestment. The consequence of under performing scientific, developmental and tertiary education institutions is a threat not just to Africa. Through the negative impacts on global environmental and human health and the failure of Africa to be a strong trading partner it presents a potent threat to the global community and international collaboration which could, and must be addressed through international collaboration.

² Gabre-Madhin, E.Z.. & S. Haggblade. 2003. Successes in African agriculture: results on an expert survey. Markets and Structural Studies Division Discussion Paper No. 53. International Food Policy Research Institute, Washington D.C.
