



**AgEcon** SEARCH  
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

*The World's Largest Open Access Agricultural & Applied Economics Digital Library*

**This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.**

**Help ensure our sustainability.**

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

[aesearch@umn.edu](mailto:aesearch@umn.edu)

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

*No endorsement of AgEcon Search or its fundraising activities by the author(s) of the following work or their employer(s) is intended or implied.*

**The Road to Johannesburg: Mobilizing Agricultural Science for Sustainable  
Development**

**Ian Johnson**

*Paper prepared for presentation at the “Prosper or Perish: Asian Poverty and the  
Australian Economy” conference conducted by the Crawford Fund for International  
Agricultural Research, Parliament House, Canberra, Australia, June 28, 2001*

*Copyright 2001 by Ian Johnson all rights reserved. Readers may make verbatim copies of  
this document for non-commercial purposes by any means, provided that this copyright  
notice appears on all such copies.*

# The Road to Johannesburg: Mobilizing Agricultural Science for Sustainable Development

## GLOBAL ADDRESS

IAN JOHNSON

### Introduction

Thank you for inviting me to address this prestigious conference on the inter-related issues of poverty, economic growth, and sustainable development. It is a privilege to participate in this forum. Australia's involvement with the World Bank and CGIAR has a long and rich history, and of course, Australia's biggest contribution to the World Bank is our president, James D. Wolfensohn.

IAN JOHNSON is Chairman, Consultative Group on International Agricultural Research (CGIAR), and Vice President and Head of the Environmentally and Socially Sustainable Development Network, World Bank. His twenty-year career with the World Bank began in 1980. He was appointed as Administrator of the Global Environment Facility (GEF) in 1992, where he played a role in the restructuring and first replenishment of the GEF, putting the fund on a permanent footing. In 1995, he was promoted to Assistant Chief Executive Officer of the GEF Secretariat. He became Senior Manager of the Bank's Environment Department in 1997.

In 1998 he was appointed as the World Bank's Vice President for the Environmentally and Socially Sustainable Development Network, and as Chairman of the Consultative Group on International Agricultural Research (CGIAR) in July 2000.

Mr Johnson is an economist who studied at the Universities of Wales, Sussex and Harvard. Prior to joining the Bank, he worked for the British Government as an economist, and also spent five years in Bangladesh working with a non-government organization as a Program Officer for UNICEF.

Australia was one of the founding members of the CGIAR<sup>3</sup> and it continues to exert a strong influence throughout the system. Australians have served the CGIAR with distinction, and we have two centres that are headed by Australians: the International Maize and Wheat Improvement Center (CIMMYT) in Mexico, and the World Fish Center (ICLARM), in Penang, Malaysia. The Boards of two other Centers – International Food Policy Research Institute (IFPRI) based in Washington, and the International Livestock Research Institute (ILRI) in Nairobi, Kenya – are chaired by Australians. And of course, our host today, the Crawford Fund, is named after Sir John Crawford who I never had the opportunity to meet but who was one of the founding fathers of the CGIAR. Last year, a premier Washington event, the Crawford Memorial Lecture at the World Bank, was delivered by top genomics' scientist J. Craig Venter<sup>4</sup>, President of Celera Genomics, who led the hugely-successful private sector effort to decode the human genome. We are grateful for Australia's multifaceted contributions.

This address will be largely on global issues that fit into the theme of this conference: the notion that the business sector does have a role to play, and that the Australian economy is tied

<sup>3</sup> <http://www.cgiar.org/>

<sup>4</sup> <http://www.worldbank.org/html/cgiar/publications/icw00/venter.htm>

not only to the global economy, but also to its closest neighbors, the Asian economies.

Next year, the Republic of South Africa will host the World Summit on Sustainable Development, the Johannesburg Earth Summit. It will be a key meeting, where the world community will review what has been achieved since the 1992 UN Conference on Environment and Development and Agenda 21, its principal outcome. There is a great sense of anticipation about this meeting, and Africans take great pride about the fact that it is being hosted by South Africa. It is my hope that meetings such as this one will help define the agenda of the Johannesburg Earth Summit, because addressing the issue of poverty and development is central to our times. I will return to this theme later in my talk.

## **The challenge of sustainable development**

Reducing world poverty is not only a moral imperative – a global social good – but it is a global strategic priority for the survival of our species and the planet. Left unchallenged, poverty will both be a symptom and cause of global political, social and economic insecurity. Today:

- Well over one billion people eke out a living on less than one dollar (US) a day, the overwhelming majority live in rural areas;
- Although poverty is a global phenomenon, the bulk of the poor are concentrated in South Asia (43%), East Asia (23%), and in Sub-Saharan Africa (24%);
- One and a half billion people still do not have access to safe drinking water nor to adequate sanitation;
- Eight hundred million, mostly women and children, still go hungry every day; and
- HIV/AIDS is threatening life and development with over 36 million people worldwide already infected and rural areas being hit the hardest.

But while we must address these central issues of today, we must also concern ourselves with tomorrow. Sustainable development is both short term and long term. In essence, sustainable development means not only caring for ourselves today – already a large enough task given the numbers above – but also trying to leave the world a better place for our children, and their children.

Let us then for a moment try and look into the future:

Rapid population growth is the foremost challenge, and over the next 25 years, world population will increase by an estimated two billion more people. Almost all of that growth will be in developing countries. The planet will be increasingly urban, with 60% of the world's population living in teeming cities. Energy needs will grow, as will demands for food and basic services. And energy shortfalls that are already occurring will hobble economies, rich and poor alike.

Given the pressing and multifaceted nature of the challenges we face, it is clear that economic growth is needed. A large portion of the gross domestic product of developing countries lies in the agricultural sector. Therefore, effective poverty reduction requires a broad, holistic approach to rural development, incorporating all aspects of rural life and all components of the rural space, including giving greater emphasis to the non-agricultural components of rural livelihoods, such as job creation, infrastructure, and services, at the same time also enhancing the role of the private sector. Agricultural research for development can be a key driver of economic growth.

A vibrant agricultural sector will be essential for addressing current and future pressures. Consider the following global aggregates:

- Food production will likely need to double over the next 25 to 40 years;
- Demand for meat will increase by nearly 60% – neighbouring East Asia is already the locus of a demand-driven livestock revolution that has shown the highest rates of meat consumption; and

- Agriculture is the largest user and abuser of water, accounting for 70-80% of water withdrawals in developing countries.

The challenges are immense, and it is clear that the pressures described earlier could lead to serious geo-political and geo-social problems as the world gets smaller, and national boundaries become more porous. The costs of inaction will indeed be high. What then is to be done?

## The evolution of development thinking

The World Bank has been in existence for a little over five decades, and the CGIAR has been in existence for three decades. It is instructive to consider how development thinking itself has evolved over that period, and the roles of each institution.

Discussions early in the 1950s would have largely revolved around macro-aggregates of finance and economics. Development was largely a matter of closing financial gaps through sound macro-economic planning and prudent fiscal management. **Financial capital** and its management were felt to be the key to economic recovery and growth.

Soon thereafter, in the aftermath of the Marshall Plan for Europe, a view emerged that infrastructure was needed – roads, power plants, ports – to spur economic growth and be the engine of development. Investment in **physical capital** was seen as key. The brick-and-mortar approach was later complemented by concern for the environment and social impacts.

Beginning around the late 1960s, leading thinkers of the time – Gunnar Myrdal, Paul Ehrlich, and others – expressed serious concern that rapid population growth would outpace food supply, resulting in famines in large parts of the developing world.

In 1971, the CGIAR was founded. Its objective was simple: increase the pile of rice – in reality, food – by mobilizing agricultural science and deploying it to problems of agricultural development in tropical countries. The international response was spontaneous, and remarkably prescient. It led to the establishment of flagship research centres such as the International Maize and Wheat Improvement Center (CIMMYT) in Mexico, and the International Rice Research Institute (IRRI) in Los Baños, the Philippines. It is these institutions that would serve as the birthplace of the Green Revolution, transforming agriculture in developing countries, doubling food production, reducing poverty, and protecting the environment by curbing agricultural expansion.

Around the late 1970s, it became increasingly clear that developing sound macro-economic policies; implementing infrastructure plans, and encouraging growth in the key sectors of the economy, *including agriculture*, was not enough to increase prosperity in the developing world. Labor markets required healthy, fit and educated people. Good health and basic education were key requirements for development. Investment in **human capital** was required.

Today, I believe that we will also need to better understand two additional forms of capital if we are to have any chance of moving the world towards a long-term sustainable future.

The first is **natural capital** – the earth's natural resource base, the basis for agriculture and civilization itself. We are depleting the world's natural resource base at historical and unprecedented rates and accounting for it as if it counted for nothing. Accountants the world over would be appalled if we abolished depreciation rules for physical capital – yet we do so as a matter of course for natural capital. Our actions cost the earth and yet we value them at zero.

Four examples – of land, forests, water, and biodiversity – illustrate both the gravity and scale of the problem. Just consider:

*Land:* Most of the world's land and water is used for agriculture. Unless agricultural practices are made more benign, agriculture's 'ecological footprint' will continue to grow. Already

40% of the world's cropland is degraded to some extent, and continuing nutrient depletion, erosion and salinization are exacerbating the problem.

*Forests:* Although the global rate of net deforestation has slowed to 9 million ha per year, clearing and degrading of natural forests in developing countries continues at alarming rates. Forests are not only home to biodiversity, but also provide livelihoods for the poor.

*Water:* This is emerging as a binding constraint for growth – in 1995, 29 countries experienced water stress or scarcity. By 2025, 48 countries will be water stressed and 1.4 billion people, mostly in the least developed countries, will be adversely affected. By 2035, an estimated 3 billion people will be living in water stressed countries.

Research at the International Rice Research Institute shows that it takes 2 tons of water to produce one kilo of rice. New farming techniques being developed already allow water savings of 25%, and new varieties can further decrease water use. Research is essential to develop less thirsty crops.

In many countries, it costs more to produce a gallon of water than it does a gallon of oil. In virtually every developing country, water is under-priced – often provided free to the agricultural sector. Farmers are the largest users of water and irrigation its largest abuser.

While on the matter of subsidies, I would be remiss if I did not bring up the role of subsidies in the rich countries. According to a recent estimate, for the OECD as a whole, total support to agriculture amounted to US\$ 327 billion, or close to \$1 billion a day. This is an enormous amount that jeopardizes the competitive ability of developing countries to benefit from trade and exports.

*Biodiversity:* We are losing biodiversity at historic rates and with unknown, but potentially catastrophic consequences. Some 25 locations around the world, occupying only 1.4% of the world's earth, contain more than 60% of the earth's plant and animal species. The FAO estimates that 60% of the world's marine fisheries are either over-exploited or in decline.

On the agricultural biodiversity side, the CGIAR has an impressive track record in conservation: CGIAR genebanks hold in public trust 600 000 accessions of plant samples. These are freely available to one and all, and represent one of the world's largest and most valuable collections of plant germplasm maintained in viable form.

The effective management of the earth's natural resource base is essential. The final form of capital – **social capital** – is one that we are still beginning to understand and appreciate. It relates to the ways in which societies interact; how social relations at the community level shape and influence development outcomes. Indeed there is an increasing appreciation that an understanding of the intricate web of the social and cultural fabric of communities can contribute considerably to our understanding of economic development.

## **Some important global themes and their impact on sustainable development**

Let me now turn briefly to some themes that cut across our efforts. Themes that are worldwide in nature and act as defining and forcing factors in our understanding of global change. Harnessing them will be central to our goal of a sustainably managed future:

### **1. Growth in private investment and the role of the market place**

Private investment flows have increased significantly to developing countries over the past ten years and now outstrip official development assistance by a factor of between seven and nine. In developed countries, private investment has broadened into areas previously considered the domain of the public

sector – health, electricity, transportation to name a few. The market dominates and is no longer the preserve of wealthy and informed-city stock-brokers.

Overall, the market has been a friend of development. However, for the environmentalist and observer of sustainable development, the market, unfettered, is not always the truest of friends. Markets also find it hard to recognize and price the non-monetized benefits of environmental management (such as the value of *in situ* biodiversity, watershed protection, etc.). We must embrace, not reject, market-based solutions but seek new ways of making markets longer, more capable of capturing non-market benefits, and more attuned to social realities. In short, we need a new public-private compact.

If, in addition, we could get politicians to think longer term than their next election, and if economists could revisit their mantra of positive discount rates, advocates of sustainable development could all sleep a lot easier at night!

How might this be achieved and how might partnerships between the public and private sector be enriched? Three illustrations come to mind:

*Value of carbon:* To date we have no fully functioning market for carbon although we know intrinsically that it must have a value to society. Project-to-project deals for carbon offsets look promising, as do carbon investment funds such as the one we have recently created in the World Bank in partnership with several major industries—this is called the Prototype Carbon Fund. Put simply, if we could find a way of ‘tweaking’ the market such that the price of carbon would be sufficiently high to transform a logging company into a sustainable forest management company without affecting the bottom line of profitability we would be meeting both public and private expectations.

Agricultural activities – especially agroforestry – can play a crucial role in sequestering carbon, by transforming low-productivity croplands to agroforestry systems. The International Centre for Research in Agroforestry (ICRAF) has shown that agroforestry has high potential to soak up maximum amounts of atmospheric carbon, at rates of 3 tons of carbon per hectare per year. These developments also open up tremendous opportunities for small farmers, and conceivably, the day is not far when we can begin to pay farmers for providing ecosystem services such as carbon sequestration.

*Value of partnerships:* In the World Bank we have begun a series of partnerships with the corporate sector with the goal of learning about the dimensions of good practice in corporate social and environmental responsibility. We have created a bi-annual forum with CEOs of the more forward-thinking logging companies; we are in discussions also with the oil and mining industry. In the challenging area of agricultural science and technology, under Jim Wolfensohn’s leadership, we hosted a major meeting of 13 CEOs of top biotechnology companies last fall. At subsequent sessions, we met with civil society representatives to see how the debate can be moved forward. A creative partnership with the private sector will be essential, especially in the area of intellectual property rights.

We recognize that not all companies take on social responsibility with equal seriousness, but increasingly many are adopting the triple bottom line (profit, society, environment).

*Value of non-priced goods and services:* Analytical techniques are now available to assess the economic and monetary value of goods and services previously left unmeasured. Analysis of the Catskill Mountain watershed in upstate New York showed that watershed degradation resulted in an incremental cost to the city of around US\$6 billion annually in water purification. For a modest investment of about US\$1 billion, the city of New York could have purchased the upstream watershed, protected it, and allowed nature to freely cleanse the water.

## **2. Globalization**

This is an obvious fact of life for all of us. It takes many dimensions but all point to a smaller, more connected world; a growing concern for issues related to the global environmental commons; and a greater urgency to find world-wide solutions. Globalization is affecting us in profound ways – it is shaping cultural assimilation; providing unprecedented opportunities for common learning, and for elevating local actions to the global stage.

New global institutions – e.g. the Global Environment Facility – have been developed to deal with common issues such as the protection of the environment. They offer hope of common (but often differentiated) actions and provide a forum for the world to cooperate. The conventions on climate change, biodiversity and desertification are all of direct relevance to the issues of this conference. To date, these conventions have been inter-governmental in nature – a challenge for the future will be to find effective ways of including all stakeholders – government, NGO, and private sector.

## **3. The issue of science and technology**

There is little doubt that economic development will become more science-based in the future. Returning to our earlier theme of food security provides a useful illustration. The doubling of food production in the next forty years will require the application of science and technology. Our options are not free of significant tradeoffs: *Extensify*, with high ecological costs unless managed in a scientific and prudent manner; *Intensify*, through increased inputs (hopefully with technological applications that limit resource use such as water-saving technologies) and through biotechnology, an issue which has become controversial to say the least.

Modern science is an expensive endeavor. In 1998, 22 countries of the OECD spent more on research and development than the total economic output of the world's 61 poorest countries (the low-income countries, excluding China and India). Scientific advance may well be a metaphor for our times, but increasingly advances in science are concentrated on the problems of industrialized agriculture, or those who are willing to pay the costs as in human health. The example of transgenic crops is illuminating.

In 2000, the estimated global area of transgenic crops was nearly 45 million ha, an area twice the size of the United Kingdom, and representing a 25-fold increase compared to 1996 when global area was 1.7 million ha. During the same period, countries growing transgenic crops more than doubled (from 6 in 1996 to 9 in 1998, to 12 in 1999, and 13 in 2000). However, the growth was confined to crops (e.g. soybean and corn) and cropping systems mostly common in industrialized agriculture. Given these trends, it is clear that a major effort – anchored in the common good – is needed to widen biotechnology research for crops of concern to the poor, and for the small-scale farming systems common in most developing countries.

This point was made tellingly in the 1999 Crawford Memorial Lecture by Michael Lipton<sup>5</sup>, who noted that over the past decade agricultural research has shifted in both nature and ownership. There has been a huge shift of crop science to the private, for-profit sector. But as the example of transgenic crops has shown, the private sector does not face incentives to invest in science dedicated to eliminating world poverty. Much more needs to be done so that the market can be reoriented toward addressing the problems of subsistence farmers in developing countries.

## **Conclusion**

In the long span of history, no country has been able to tackle the scourge of hunger and poverty without focusing first on agricultural development. Agriculture is the cornerstone of development.

---

<sup>5</sup> <http://www.worldbank.org/html/cgiar/publications/crawford/lipton.pdf>

Over the 30 years of its existence, the CGIAR has made major contributions in the fight to reduce hunger, poverty, and environmental degradation:

- More than 300 CGIAR-developed varieties of wheat (bread and durum) and rice, and more than 200 varieties of maize, are being grown by farmers in developing countries. Food production has doubled, improving health and nutrition for millions of people;
- New, more environment-friendly technologies developed by CGIAR have 'saved' between 230 and 340 million ha of land from cultivation worldwide, helping to conserve the land and water resources and biodiversity; and
- CGIAR works with developing country partners to strengthen their scientific capacities. More than 75 000 scientists and technical experts have received training at the Centres.

While the challenges of sustainable development and poverty reduction are formidable, we have greater human capacity and ingenuity than at any time in our common history. With the right policies, investments and political will to reach into poor communities we will meet the challenges of this century. Partnerships will be a key.

Times are changing; opportunities to make a difference have never been so great. We have a very real chance of reducing world poverty and doing so in a manner consistent with a clear social and environmental conscience. It is only by joining together that we can hope to lay the foundations for sustainable development. The Johannesburg Earth Summit will be an important milestone in that journey.