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Future of Agriculture: Sustaining what, where, how and by whom

Introduction

We can probably all agree that we should try to live sustainably. But what does this mean? What we want to sustain, where, how and for whom, may prove more difficult to agree! Clearly we want to meet the current growing demands for agricultural products – for food, fibres and other agricultural products – but can we do so in ways that in meeting today's demands do not prejudice the capacity of our children to meet their needs? Not everyone has the same priorities or expectations of what they expect from agriculture and landscape management.

I can remember conversations about 'sustainable agriculture' with Hugh Bunting. He was concerned that it would become a jargon-laden battleground for advocacy and poor science, rather than action.

The story so far

Development and economic growth have been based on the exploitation and often the inevitable degradation of the natural and environmental assets of the Planet, but these processes coupled with population growth could eventually combine to prove the dismal predictions of Thomas Malthus to be true.

However in 1987 the Brundtland Report – Our Common Future – concluded that with better handling of environmental and social issues, supported by the development and use of better technologies, it should be possible to have economic growth and poverty reduction without destroying the environments on which we all depend. Sustainable development would meet the needs of today without prejudicing the ability of future generations to meet their legitimate needs.

This optimistic message was the inspiration for the Earth Summit in Rio in 1992 which produced a comprehensive Agenda 21 for a sustainable future by addressing both environmental and development challenges. There followed a series of conferences, conventions, treaties and declarations aimed at addressing the threats presented by climate change, loss of biodiversity and forests, desertification and the hole in the ozone layer. A Global Environmental Facility was created to help developing countries meet the incremental costs of actions which would result in global environmental benefits. There were also Summits on education for all, limiting population growth, better water use, growing sustainable cities, promoting the



rights of women and children and finally, almost as an after-thought, assuring global food security.

But as the millennium drew to a close there was a growing concern, particularly in developing countries, that there had been too much attention devoted to environmental concerns where progress had been slow and there was a need to focus more on social issues and development. Poverty reduction became the highest priority and while agriculture was identified as having the potential to be a major contributor to poverty reduction, environmental conservation and food security, investment in agriculture and its institutions had declined.

These concerns gave rise to the Millennium Development Goals, which set a series of specific targets to be achieved by 2015. These goals focused on the halving of poverty, improving access to health services and education, empowering women and environmental restoration. Their purpose was to help focus public investment and development assistance on some specific targets and by so doing enable progress to be tracked. Interestingly there was greater emphasis on the essential role to be played by public-private partnerships. Reducing hunger was later added to the poverty reduction target, but again agriculture was not mentioned as a target for investment. Indeed with food prices at an all time low, hunger appeared to be reducing and the popular view was that hunger was more a product of poverty and access to and availability of food than a problem of production. The rhetoric was there was enough food in the world if you could afford to pay for it! Equitable economic growth would put money in the pockets of poor people and markets would deliver the food.

The Millennium Ecosystem Assessment (2005) and the International Assessment of Agricultural Science and Technologies for Development (IAASTD 2007) both concluded that agriculture had been highly successful in

meeting the growing demands of society for food and commodities, but in meeting these demands environmental assets had been seriously eroded. Current production techniques could not be sustained and business as usual was, therefore, not an option. Ironically at the same time investment in agriculture continued to decline.

As we moved into the new millennium there was a series of interrelated crises – energy, food, finance, the war on terror, SARS, bird flu, swine flu, and foot and mouth disease – and even volcanic eruptions. At the same time most of the environmental treaties and conventions stagnated, even though there seemed to be a greater urgency to mitigate and adapt to climate change, conserve biodiversity and stabilise food supplies.

In 2005 the countries of Africa developed their own ambitious Comprehensive African Agricultural Development Plan (CAADP) aimed at promoting sustainable land management, improving rural infrastructure, increasing food supplies and raised funding for research. They recognised the importance of capacity building and improving access to information. Sadly the funding for this programme has fallen short of that which is needed.

The crises inevitably spawned knee-jerk responses and short-term actions, often devoid of longer-term strategies and investments. Surprisingly the response to food shortages has been to call for more food aid and while this is understandable there should have been greater investment in agriculture and measures to increase local production. They also created a crisis of confidence in existing institutions, governance and self-regulation. There have been further rounds of summits, meetings and conferences – most of which concluded that there was an urgent need to increase investment in agriculture.

This short history does not provide much evidence that the optimism of the Bundtland report has been justified and that sustainable



development will be easily achieved; however there are promising signs that the renewed concern over agriculture will help restore investment by the public sector. It less clear where, how and on what sorts of agriculture greater investment should focus.

So what are the present and future challenges facing agriculture that will need to be met ‘sustainably’?

The demands for goods and services derived from agriculture and the management of land- and water-scapes are set to rise, and in many developing countries are likely to double over the life-span of our children. The rising demands will be driven by unique and possibly unstoppable combinations of population growth, economic growth, people escaping from poverty, urbanisation, education and globalisation. These drivers will not only increase demand but also raise expectations of having greater choice, with consumers making their preferences known through their impact on markets and the ballot box. In addition markets will diversify as cultural and ethical values change. The demands for greater production and choice will have to be met in the face of uncertainties arising from climate change, the cost of energy, the switch to more renewable sources of power, loss of biodiversity, competition for water, political instability and the fall-out from the global financial crisis and ‘war on terror’.

Climate change will present a wide range of challenges for agriculture such as droughts, salinity, extreme weather events. However I am concerned that insufficient attention is being paid to outbreaks of pests and diseases. It is more than likely that climate change and trade will result in more frequent or more severe outbreaks of new and old pests, diseases and invasive species. Agricultural practices will also be expected to make greater

contributions to the mitigation of, and adaptation to, climate change through using less energy, lower greenhouse gas emissions, sequestering carbon in the soil and significantly reducing forest degradation and loss.

Over recent years there have been significant structural changes in the agricultural sector as was shown by the recent outbreak of foot and mouth disease in the UK. The closure of local slaughter houses had resulted in a complex movement of animals for slaughter to fewer and larger abattoirs; in consequence the movement of sick animals around the UK contributed to the rapid spread of the disease.

In most countries the proportions of people who earn their income as full-time farmers are declining and political power has shifted to urban communities who want cheap food, now. The average age of farmers is increasing and greater numbers of farm households are headed by women. In addition, fewer educated children see farming as their occupation of choice. This has increased urban drift, precipitated shortages of agricultural labour at critical times and had an inevitable impact on the timeliness and quality of essential farm operations. I see no reason why these trends will not continue. Gains in agricultural production and productivity will therefore have to be achieved by fewer people.

Consumers are increasingly interested in sources of supply, environmental impacts of production techniques used, the distance products have travelled, ethical consideration and fairness and equitable distribution of benefits in the market chain. This has resulted in the rise in fair and ethical trade initiatives.

There have also been significant changes in the distribution of income and power in the value chain. Food processors now dominate the food chain, with the producer getting less than 10% of the price that will ultimately be paid by the consumer. In the Venezuelan coffee industry there are over half a million producers and over 5 million consumers, but



only 4 roasters and processors – this is typical of many commodities where there are relatively few food processors. Consumers like a consistent product, buy by brand and are increasingly concerned about food source and food safety. Food processing often requires considerable investment in plant and processing equipment and this leads to there being relatively few food processors. With only 4 coffee roasters it is easy to understand where the power lies to control prices to the consumers. Figure 1 shows the share of the consumer price taken by various players in the banana food chain. It helps to demonstrate the value of fair trade which seeks to increase the farm gate price paid to farmers by either reducing the numbers of players in the value chain or by reducing the margins taken by other parties in the value chain. However these illustrations do not show the waste that takes place in many food chains which have been estimated to be as much as 50% with many fresh foods.

In summary the challenge for sustainable agriculture will be for fewer farmers to deliver more food, by producing more and losing less; assure the supply of eco-system services; increase rural incomes and employment and by so doing reduce poverty; provided a greater range of choice and opportunities – and to do

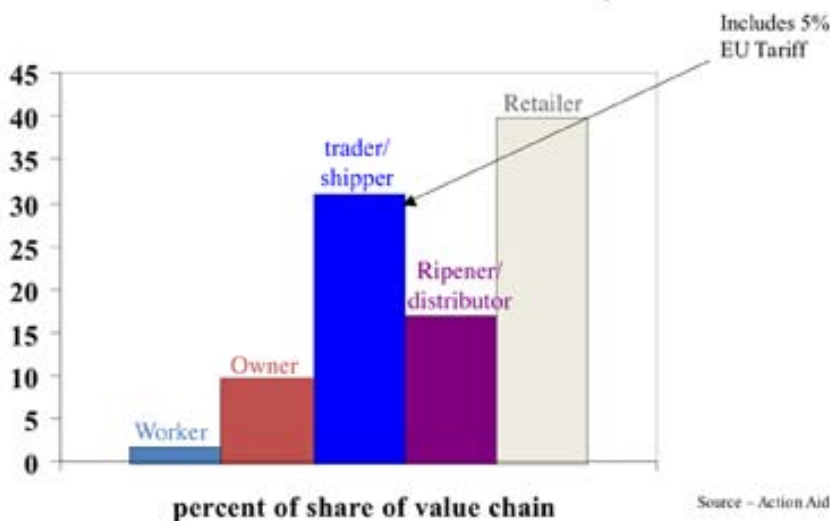
so for more people. Agriculture will have access to less land, less water and less energy. It will be expected to use less pesticide and be more efficient in its use of fertilizers. It will be expected to meet rising demands at a time of greater uncertainty and change.

Recent history has shown that there will continue to be shocks – the unexpected does happen! Ideally we should be able to predict, detect and cope with these events as and where they occur. Over the last 20 years we have not been good at predicting these unwanted events – nor particularly adept at responding to them. Zoonoses such as bird flu, and more recently swine flu, have tested our health systems. They have caused governments to take extraordinary and expensive measures, which in retrospect may not have been justified. Yet despite the spread of soyabean rust (Figure 2) and Ug99 wheat rust effecting millions of lives, it has proved difficult to raise funding to develop resistant lines or early warning systems. There has been inadequate public investment in agricultural research, and essential agricultural institutions – such as those responsible for phytosanitary controls and animal quarantine – have been neglected.

Uncertainty arising from trade disputes and the lack of progress with the Doha round will continue to distort markets and result in protectionist behaviour.

Figure 1

The banana split



So what is sustainable agriculture and what are we trying to sustain?

The difficult task is to define what sustainable agriculture looks like and who will decide or judge whether or not it is sustainable. I do not intend to try! However different communities or interested businesses will use different criteria and indicators to judge sustainability.

It is probably easier to recognise what is non-sustainable agriculture. There are many historical examples – dustbowls, failed



civilisations, spread of deserts, migration, forest loss and exhausted fisheries. All these have been the result of resource management and extraction practices that exceed the ability of production systems to recover. There are also examples of droughts or where the arrival of new pests and diseases can cause famine and migration – such as the Ethiopian famines and the Irish potato famine. The question is whether those who were responsible were aware that the technologies or practices they were using were degrading the resource assets, or had the means to detect or predict drought or the arrival of new pests and diseases? And if they had – would they have behaved differently?

Farming is a business. There can be no sustainability unless those who practice agriculture can earn a reasonable living, either through what they produce or how they are able to combine farming activities with other income generating work. It is primarily a private sector activity but is highly susceptible to public sector policies and interventions. Most of the richer countries subsidise their rural sectors, which can result in distortions in domestic or international markets. While this support is declining generally the most distorted forms still dominate and reform remains uneven and a cause for the deadlocked Doha Round of trade negotiations. The level of producer support was less than 1% in New Zealand, 4% in Australia, 9% in the United States, 12% in Mexico, 17% in Canada, 23% in the European Union, 34% in Turkey, 47% in Japan, 52% in Korea, 53% in Iceland, 58% in Switzerland and 61% in Norway. The trend is away from price support towards rural income and environmental services payments.

The greatest concentrations of real poverty in developing countries are in the rural areas. This poverty is the product of either having no or too little land, poor climate, lack of access to water, credit, technologies or inputs – such farming is unsustainable. A farmer in Mali once told me that his definition of sustainable agriculture was the ability to feed

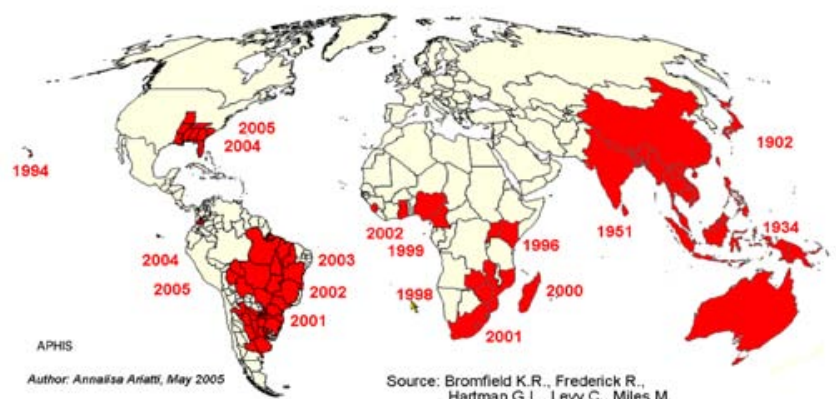
and educate his family; he confided that the only way he could do this in a zone of climatic uncertainty was through remittances from family members working in Bamako and elsewhere.

For the farming community sustainability should be defined in terms of livelihoods; however for the urban dweller it might be defined in terms of the affordability and sustainable supply of food, availability of charcoal, access to leisure facilities and environmental services such as clean water. Food processors are more interested in sustainable supplies of high quality ingredients at reasonable prices and this lies at the heart of the '*Sustainable Agriculture Initiative*' supported by the leading food processors such as Nestlé, Kraft, Pepsico and Unilever. There are other examples of industries that have established 'sustainable' initiatives through production to market chains of custody that establish criteria and standards at each stage in the market/value chain, such as the '*Sustainable Oilpalm Initiative*'. Environmentalists might be more interested in the ability of agriculture to sustain biodiversity or to mitigate or adapt to climate change.

There have been several attempts to manage agricultural production, forests or fisheries through establishing sets of criteria and indicators. In the case of the Forest and Marine Stewardship Councils there has been

Figure 2

Spread of Asian soybean rust





some success, but those for agriculture have proved disappointing – simply because of the difficulty managing fields to deliver several outputs.

Agriculture essentially manipulates field conditions in favour of one species and one product of the life-cycle, e.g., starch, protein, milk, meat, fibre or oils. It is only at the landscape level that a range of goods and services can be supplied. The reality is that the sustainable supply of all the goods and services that society wants from agriculture cannot be supplied by a single field, farm, landscape, country or continent. Trade and trade-offs must be integral components of the sustainable supply of agricultural goods and services.

More recently the imperative to address climate change has resulted in greater attention to agriculture as a source of greenhouse gas emissions or a means by which to sequester carbon in soil profiles or as semi-permanent vegetative cover in forests and plantation crops. The growing market in carbon trading and carbon finance to support activities aimed at reducing carbon emissions and to sequester carbon in soil profiles should provide new sources of investment in conservation agriculture and zero-tillage. Initiatives aimed at reducing emissions from deforestation or forest degradation (REDD) are receiving considerable attention in the climate change negotiations, and finance is being made available for REDD initiatives focused on forests and for REDD+ activities in agriculture and agro-forestry. These initiatives are in their infancy and more productive agricultural practices will be an essential component in any strategies aimed at reducing forest loss. It may be hard for small-scale resource-poor farmers to benefit from these initiatives.

Organic farming is often promoted as truly sustainable agriculture but organic farmers continue to struggle to make a living and seem to be dependent on the availability of labour and markets that are prepared to pay a

premium for organic produce, and the yields from organic production are often lower and more vulnerable to pests and diseases.

I was struck by two recent statistics. The first was that there are roughly equal numbers of hungry and obese people in the world, a billion of each. The second was that we lose over 50% of agricultural production to combinations of pre-harvest losses cause by the predations of pests, diseases and weeds and post-harvest through spoilage, processing waste and over purchasing and the impact of 'sell-by' dates which have little or no scientific basis. It strikes me that the sustainability debate should aim to strike a balance between the emphasis on increasing production, over consumption and the need to reduce waste.

How?

I am led to the inevitable conclusion that it is unlikely that there will be a universal or stable model of sustainable agriculture. The potential threats and uncertainties point in the direction of having alert and responsive institutions and reliable monitoring and detection mechanisms that can detect problems and react quickly to counter stresses and strains. It takes from 5-10 years to develop, test and deliver new technologies – and longer if those technologies are likely to be controversial. The products of research are knowledge, technologies, information and trained people but to assemble these and convert them into products and solutions requires effective communication and further investments in time and resources.

New technologies will play an important role in the future development and maintenance of sustainable agricultural systems, but they will only be used if there are supportive policies and incentives, healthy and responsive institutions in both the public and private sectors and that these players have access to objective information and surveillance systems. The scale and complexity of the issues will frequently be



beyond the resources and competences of single individuals, businesses or institutions and so solutions and sustainability will require partnerships across sectors and institutions. The neglect of and under-investment by governments and aid agencies in essential agricultural institutions and training of human resources has damaged the ability of these institutions to support sustainable agriculture – and it will take several years to rebuild that capacity.

While I do not believe in panaceas, conservation agriculture, ethical trading, integrate pest and crop management, reducing waste, organic production systems, new technologies, transgenics and changing attitudes and values, all have important roles to play. They can be powerful tools and provide approaches that can be used to sustain agricultural production. We should not be surprised that there are and will be failures. However, it is important that we understand why systems have failed and avoid repeating old failures. *‘Experience is recognising a mistake when you are about to make it again!’*

Where?

As agriculturalists we should accept and understand the limitations and opportunities presented by the biotic and abiotic environments that occur in different parts of the world. It would be nonsensical to believe that the sustainable production potential of the Sahel could be the same as that which supports the intensive rice production systems of Bali. Nor do the people of those lands have the same cultures, priorities, values or diets.

It is because of this that I believe that the development of more sustainable agricultural systems can only be done at a local level, recognising that external and policy factors will have a considerable influence on the opportunities available. I often worry that those who advocate small-scale production of food grains are condemning those farmers to

a life of poverty and uncertainty as the elasticity of demand for those crops is often poor, such that in good seasons the price collapses and in poor seasons the crops fail. However producing higher value crops carries with it higher risk and market dependence.

There are many who believe passionately in the viability of the small family farm. I am not sure that this is the most sustainable way forward. I agree that for the next few years the small family farm will play a key role in sustaining rural communities and in helping to reduce poverty. However small farms might not be the best way to realise the provision of environmental services nor meet the aspirations of better educated children.

The recent so-called ‘land grabs’ in Africa are an indication that external investors interested in securing supplies of primary commodities, see managing land and water on a larger scale as a better way of sustaining production and reducing risk. This could be seen as a repeat of the ‘colonial’ agricultural model, which has become discredited amongst aid practitioners. The question is whether working to perpetuate small-scale farming to meet local markets is the way forward?

This raises the issue of policies and land tenure which are intensely political issues and can only be addressed at local and national level. Global and regional institutions and international agreements can support – or hinder – local solutions, but cannot substitute for the need for competent local institutions. Sadly it is these institutions that have suffered most at the hands of neglectful governments and the fads and fashions of aid agencies.

By whom?

It is interesting to consider who is responsible for sustainable agriculture. As I said above, farming is a business and there can be no sustainability if farmers, landscape managers and rural communities cannot make a living.

There are also debates about the separate roles



of the public and private sectors. The private sector must make money or go out of business. It is viable businesses that pay taxes and employ people. This makes it very difficult for them to work with the very poor as their customers and survive. They must inevitably target the commercial farmers and paying markets. The private sector is best suited to such activities as inputs supply, credit, marketing, processing and insurance, which are fields where governments and the public sector have a dismal record of achievement and sustainability. The private sector will fund research to sustain their business and competitiveness. It is unlikely that they will fund research aimed at providing public goods unless required to do so by law, to build their brand or as part of their corporate social responsibility. The public sector is best able to regulate, set and enforce enabling policies and by raising taxes provide incentives, fund social safety nets, develop human capital and build effective institutions and surveillance systems.

Civil society can play critical roles in filling gaps and working with communities. However it is unfortunate that animosities and doctrinal differences have emerged between civil society and the business sector. These tensions are inevitable but not very productive, and some NGOs raise funding on those differences. These have stimulated lively but not necessarily productive debates and have contributed to the stagnation of some of the international treaties and agreements. There can be no sustainability without both businesses and NGOs working together, doing what they do best.

These debates have created a series of false dichotomies around the merits of large versus small farms, the rights and wrongs of public goods versus intellectual property protection, market subsidies and free trade, molecular sciences, biotechnology, biosafety, the dangers of nanotechnology, organic versus intensive farming, pesticides, local sourcing and so on. These debates are not in the interests of sustainable land-use systems and the absence

of local fora whether these issues can be resolved is a limiting factor. The tendency to globalise issues that should be resolved locally is expensive and unproductive.

The media also have an essential role to play – but gloom and doom and controversy sells more papers and absorbs more audiences than systematic and methodical problem-solving. The discrediting of institutions and political systems coupled with the celebrity culture puts huge influence and power in the hands of people who do not necessarily have the time or knowledge to guide opinion – or to make a living from farming.

One essential element for building and maintaining sustainable agricultural systems is the forging of alliances and partnerships between competent institutions.

Role of TAA and Partners

The TAA through its membership has shown that it can play important and practical roles in helping to identify important issues, build alliances to promote sustainable agricultural practices through better production systems. Over the last few years TAA members, through its Land Husbandry Group and partners have been very successful in taking the lead raising awareness on some neglected but important issues such as soil health, sustainable rice intensification, zero tillage and conservation agriculture. They deserve our thanks and congratulations.

Working with the FAO and the All Party Parliamentary Group on Agriculture and Food for Development (APPGAD) members have extended their influence through creating communities of practice and through assembling supporting evidence. The TAA has members with the energy, networks and commitment to support the development of sustainable agricultural systems.

However significant progress will not be made unless there is more and better investment in agriculture, healthy and relevant institutions and human resources.



The All Party Political Group on Agriculture and Food for Development (APPGAD) Report – ‘Why no thought for food?’ – reached some interesting and useful conclusions:

- ▶ Aid donors had neglected agriculture and had over recent years reduced their investments in agriculture and that this reduction has been mirrored by investments made by many developing countries.
- ▶ There had been a lack of political leadership in promoting the critical role of agriculture not only in reducing poverty and sustaining food supplies but also in environmental protection.
- ▶ There had been insufficient emphasis on the role of the private sector and public / partnerships

The report highlights UK’s degraded institutional capacity, which has been the product of a thousand cuts, competitive tendering and the untying of aid.

The Report makes several recommendations:

- ▶ Agriculture and food should be placed at the centre of DFID’s fight against poverty, by rebuilding capacity and increasing investment in agriculture.
- ▶ There should be a refocus on, and higher investment in, agricultural education and extension – with particular emphasis on women and the building of centres of excellence.
- ▶ Legislate for change – through greater support for the World Food Programme, reduction of damaging and distorting subsidies, promoting ethical trade and other measures to increase investment in agriculture, and support the development of agriculture and food systems in developing countries.

Sadly this valuable report was buried in the excitement of the General Election, changes in the membership of the APPGAD and the establishment of the Coalition Government. I hope that APPGAD can return to these issues once the fundamental expenditure review is completed.

So?

Agriculture that sustains an increasing volume of goods and services to growing populations and faced with climate change and other uncertainties will need to be informed and responsive. It will not be a Utopian Plateau, which once attained will remain easily maintained; nor will it be achieved by a return to Arcadian bliss, populated by subsistence farms. It will be a dynamic and possibly turbulent process of trial and error, compromise, negotiation and trade-offs. It will be intensely location specific, governed by the biotic and abiotic realities that prevail, accessibility and market opportunities. New technologies and processes will be needed and society will necessarily need to adapt its values and lifestyles to cope with the rising costs of food and environmental services.

Revitalising agricultural institutions and education will be essential as will improving access to information and technologies. Advances in information and communication technologies can play an important role.

Sustainable agriculture will only be achieved through purposeful partnerships and alliances between the public and private sectors and with civil society.

There is an urgent need to establish surveillance and early warning systems as there will be shocks along the way. There are relatively good systems in place for climate, biodiversity, human and animal diseases, but there is a serious gap when it comes to plant pests and diseases and invasive species.

Finally none of this will happen if we cannot continue to train and motivate young people to take careers in agriculture. Many of us have enjoyed such careers and Hugh was active in educating and encouraging successive generations of young people but the task is not yet done and will continue to be a challenge. I hope that the TAA can continue to be not only a forum where we can meet but also a source of energy and expertise – but to do so I think that we also need to look for allies who share our vision and objectives.

Remembering A H Bunting

An abridged version edited from the text of Edward Bunting's address at the Fifth Hugh Bunting Memorial Lecture

In June 1929, a year before the photo of the family was taken, Arthur's father Sidney Bunting and his wife Rebecca spent five months campaigning for the Parliamentary Election. Sidney was the Communist candidate in Thembuland, a rural constituency in the Transkei. Although they were arrested and prosecuted on civil unrest charges, Sidney, who was a lawyer, made his own defence and the pair escaped conviction. Sidney taught Arthur and Brian his love of the countryside and walking. Once in the UK Arthur always wanted to get out into the countryside and he had a particular interest in evidence of ancient civilizations. His interest in human societies of ancient times may have arisen out of his curiosity about tribal peoples

The Buntings 80 years ago: Brian, Sidney, Rebecca, Arthur



in Africa who lived a life untouched by modernity, still in the 1960s.

He lost his father Sidney in June 1936. He had seen how Sidney was expelled from the Communist Party of South Africa by an extremist leadership in 1931 and his health was to decline during the next five years until he died of a stroke at the age of 63. Arthur arranged his father's funeral, and he could not forgive those communists who had done nothing to defend Sidney while he was alive, but seemed to want a place of honour at his funeral. This event may have led to the sense of disenchantment that was a feature of Arthur's personality. He was always quite receptive to any original idea or book, and he approved of imaginative thinking, both in art and science, but the keynote with him was his famous phrase "the realities of life".

Arthur did his honours degree in 1936 and his master's in 1937 at the University of the Witwatersrand. In 1938 he came to the UK for the first time, as a Rhodes Scholar to Oxford, where he did his D.Phil. He was still a communist and he presumably joined the Oxford party branch, for this is where he came to know Muriel his future wife. They were married in September 1941 in the Methodist chapel in Nelson, East Lancashire. In October 1941 Arthur took a job at Rothamsted in the Soil Science department. This was headed by Dr E M Crowther and Arthur kept a photograph of him in his room at Reading University.

After the war Arthur looked for a way to help with the development of Africa and by 1947 was working on the Groundnut Scheme in Tanganyika where he was the head of the Scientific Department. The headquarters were at Kongwa and consisted of a tented



encampment in the bush with a population of a few thousand including expatriate staff with families and many African workers with theirs.

Arthur left the Communist Party in March 1947 and this was a big step to take, for he had been brought up in the party by Sidney and Rebecca, and during the war it had been acceptable enough for a young scientist and researcher to be a comrade. His father's last pamphlet had been about the prospects for developing Africa (under communism) so that it could become a global power strong enough to negotiate with the imperial nations. Arthur felt that he should find an alternative way to fulfil his father's dying wish since he was not suited to doing this by political means. He might well have considered the Groundnut Scheme to be of sufficient potential benefit to justify his big political decision. Perhaps he felt he was now entering into the full authority that had been handed down to him by Sidney and this to be the meaning of his change of name, from Arthur to Hugh. As a result of this, the family and anyone else who knew him from before 1947 refer to him as Arthur, while friends and colleagues since 1947 call him Hugh.

By January 1948 groundnuts were growing well and it seemed that once the problems of mechanizing agriculture in this part of Africa had been solved, it would only be a matter of time, say twenty years, before like-minded workers could start to apply the same method throughout Africa's vast area. World poverty would be knocked out like some bacteria that had been treated with penicillin. This was made all the more credible by the fact that one member of the Scheme's senior management was Prof. John F V Phillips, under whom Arthur had studied at the University of the Witwatersrand.

In May 1948 he travelled round Northern Rhodesia where the management of the Scheme (the Overseas Food Corporation, or OFC) had ordered some trials for the possible extension of groundnut growing to that

country. Here he met Colin Trapnell another of the men to whom he looked up as "giants who walked on the African earth". He was a geographer and explorer turned ecologist who spent ten years studying the environments in Northern Rhodesia and produced an authoritative work, *Soils, Vegetation and Agricultural Systems of Northern Rhodesia*. Trapnell was commissioned to study the conditions in certain areas of Northern Rhodesia, so as to ascertain whether groundnuts would do well there. His report was in the negative and the OFC accordingly rejected plans to expand into Northern Rhodesia. It might have been a good idea if they had sent him to Kongwa as well!

Arthur left Kongwa in June 1951 and later started on his fourth job, which was to set up and lead the "Central Rainlands Research Station" in a remote part of the Sudan which he did until April 1956. The site of the station came to be known as Tozi, named after a local hill with twin peaks, called Jebel Tozi. It lay in the Blue Nile Province between the Blue Nile in the East and the White Nile in the west 7 miles west of Wad en Nail a port on the Blue Nile and 230 miles upstream (or south) from Khartoum. The plain was almost completely uninhabited as outside the rainy season the climate is too dry to sustain lakes or ponds. The only people to be found in the Tozi area

Arthur with Professor Erik Åkerberg at Shinfield, Reading 1960



were transhumant herders who passed through grazing their animals on the pastures that became available in different places at different times of year. During the wet season the improvised roads (“traces”) became so muddy as to be impassable so that for three months of the year the zone was cut off from the outside world. Therefore women and children left Tozi from July to September.

His job was to investigate possibilities for introducing mechanized farming to this area. The research station had about 200 hectares of land and two combine harvesters, and they researched about eight crop species with sorghum being the most widely used. Research done at Tozi opened the way to some 5,000 Sudanese investors farming about 2 million hectares in the area. These farms were still running successfully in 1989, after 35 years. It is possible that they continued for many years more.

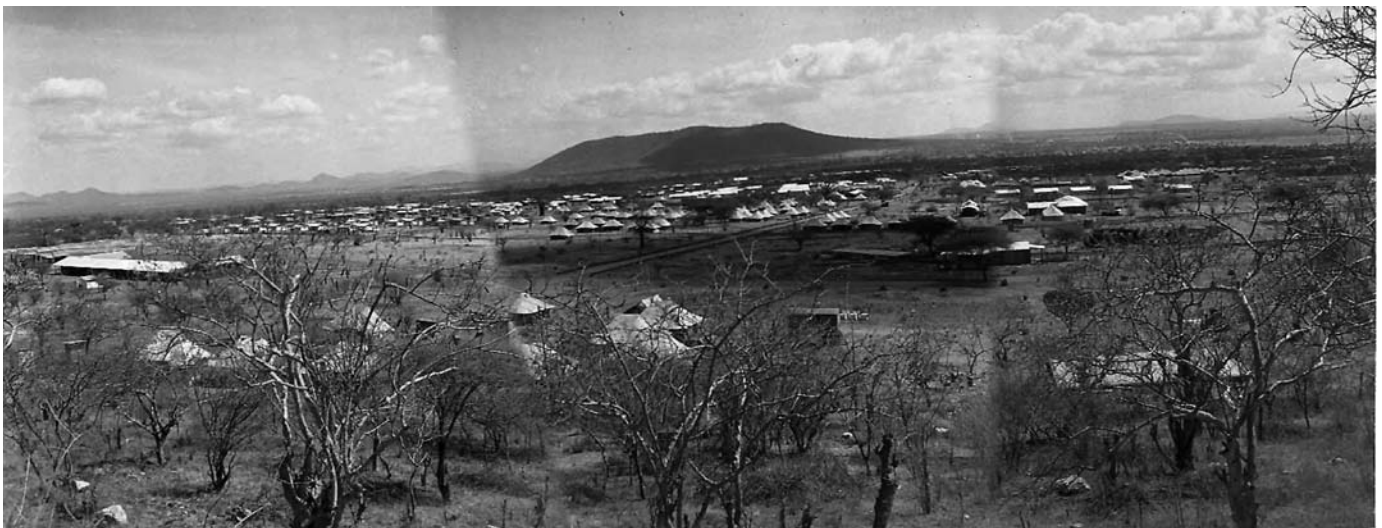
Arthur’s interest in music continued while in Tozi. He listened most of all to cantatas and passions of J S Bach, and Beethoven symphonies and concertos on 78 rpm records. There was a species of tree in the area whose thorns served as replacement styluses, until steel ones could be got from the outside world. There was a piano in the house at Tozi on which he and his wife played.

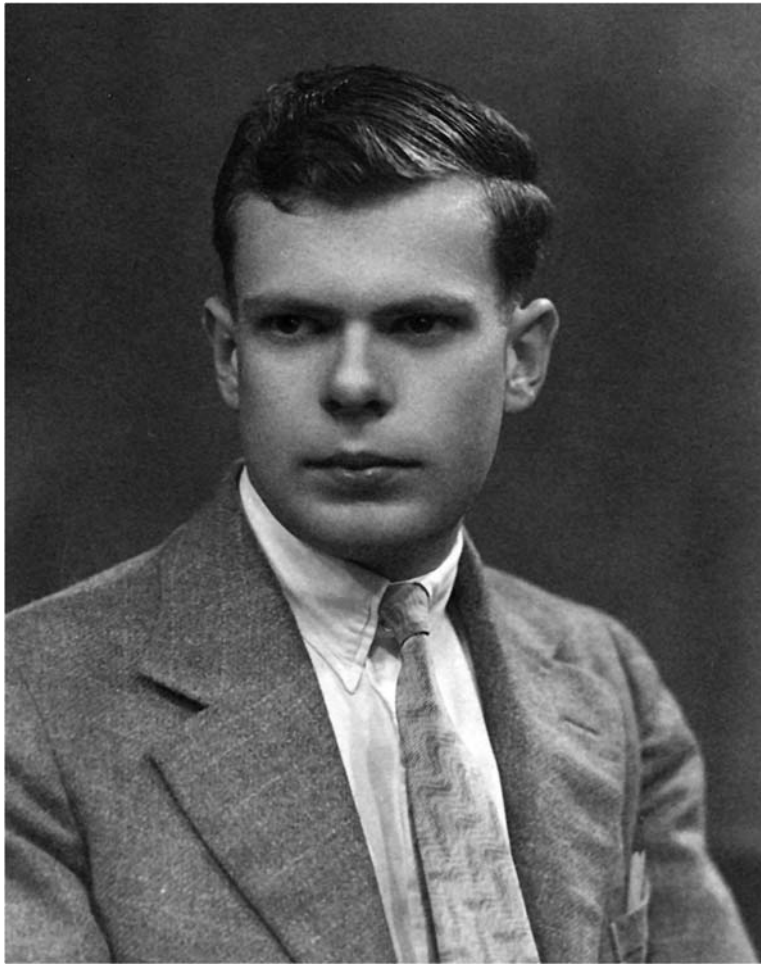
In 1956 Arthur became a Professor at Reading University and settled here for the rest of his life. This was the beginning of an intensely active and fruitful phase in which he was

often away from home, working in places such as Nigeria, Ethiopia, India, China and South America, while on the other hand welcoming visitors from all over the world to his home in Caversham. When at home, if not listening to music or working in his study, he would be in the garden, methodically digging one bed after another. He grew roses a lot, and had other plants that were of botanical interest, but might not be well known to the general public. Arthur regularly took his family into the country to look at plants, some of which were collected and carried home in a vasculum to keep the cuttings fresh until they could be examined indoors. Dad’s ambition was to master the English flora. When on holiday he would set up an incentive scheme so that whoever found a plant that he couldn’t identify received sixpence.

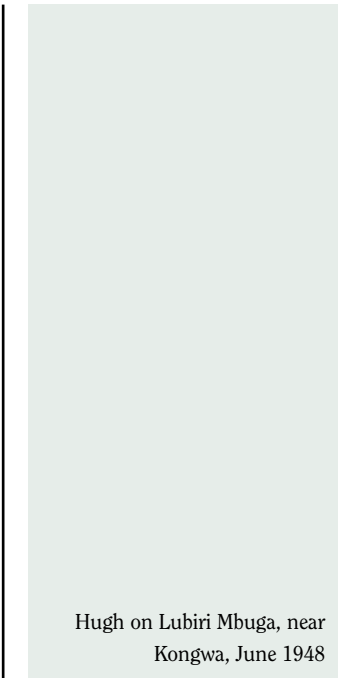
As well as being a scientist, Arthur was proficient in making Dry Martinis. He would use good quality gin, a homeopathic dilution of Vermouth, and glasses that have been chilled to the correct temperature and whose rims have been brought into the correct degree of contact with lemon rind that had been cut in the correct fashion. All this having been accomplished, he was then ready to relax in the garden with his grandchildren.

Kongwa (composite photo),
1949, by Peter Le Mare





Arthur at Oxford,
perhaps 1939



Hugh on Lubiri Mbuga, near
Kongwa, June 1948



Arthur and Muriel at their
wedding, September 1941

