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RECORD OF A SEMINAR, 'NGOs, SCIENTISTS AND THE POOR: COMPETITORS,
COMBATANTS OR COLLABORATORS?', CONDUCTED BY THE CRAWFORD FUND
FOR INTERNATIONAL AGRICULTURAL RESEARCH AND WORLD VISION AUSTRALIA,

PARLIAMENT HOUSE, CANBERRA

8 APRIL 1997

EDITOR: JANET LAWRENCE

The Australian Centre for International Agricultural Research (ACIAR) was established in June 1982 by an Act of the Australian Parliament. Its mandate is to help identify agricultural problems in developing countries and to commission collaborative research between Australian and developing country researchers in fields where Australia has a special research competence.

Where trade names are used this does not constitute endorsement of, nor discrimination against any product by the Centre.

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This peer-reviewed series contains the results of original research supported by ACIAR, or material deemed relevant to ACIAR's research objectives. The series is distributed internationally, with an emphasis on developing countries.

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The Crawford Fund for International Agricultural Research is an initiative of the Australian Academy of Technological Sciences and Engineering. The Fund's mandate is to publicise throughout Australia the benefits of international agricultural research and encourage greater support and participation from both government and non-government organisations.

WORLD VISION

World Vision is a Christian organisation committed to the relief of suffering and advancement of community development. Its mission is to fight poverty by empowering people to transform their worlds.

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Acronyms and abbreviations

ACIAR	Australian Centre for International Agricultural Research
AusAID	Australian Agency for International Development
CGIAR	Consultative Group on International Agricultural Research
CIAT	International Centre for Tropical Agriculture
CIMMYT	International Maize and Wheat Improvement Centre
CIP	International Potato Centre
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DANIDA	Danish International Development Agency
FAO	Food and Agriculture Organisation
GHA	Greater Horn of Africa
GIS	Geographic Information Systems
GTZ	German Agency for Technical Cooperation
IARCs	International Agricultural Research Centres
ICRAF	International Centre for Research in Agroforestry
ICRC	International Committee of the Red Cross
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IDRC	International Development Research Centre (Canada)
IIMI	International Irrigation Management Institute
IITA	International Institute of Tropical Agriculture
IPGRI	International Plant Genetic Resources Institute
IPM	Integrated Pest Management
ISAR	Institut des Sciences Agronomique du Rwanda
ITDC	Intermediate Technology Development Group
NARS	National Agricultural Research Service
NGOs	Non Government Organisations
ODA	Overseas Development Administration (UK)
ORDE	Organisation for Resource Development and Environment
OSB	Overseas Service Bureau
R&D	Research and Development
SOH	Seeds of Hope
SUA	Solcoine University of Agriculture
UN	United Nations
UNHCR	UN High Commissioner for Refugees
UNICEF	UN Children's Fund
USAID	United States Agency for International Development
WVA	World Vision Australia

Preface

On 8th April 1997, the Crawford Fund for International Agricultural Research and World Vision Australia co-hosted a seminar, *NGOs, Scientists and the Poor: Competitors, Combatants or Collaborators?*

The seminar followed others organised by the Crawford Fund over the years on the interlinked issues of poverty and hunger and the role of developed countries in their eventual eradication. The Crawford Fund shares common ground with World Vision which is one of the most successful development and humanitarian aid NGOs internationally engaged in the fight against poverty. We were delighted to join together in an exploration of the issues expressed in the title of the seminar.

Despite the compelling need to invest more in poor people, resources for foreign aid are dwindling worldwide. At the same time, resources to provide research for development are increasingly difficult to attract. In light of this, how do NGOs, scientists and the poor relate as development aid is delivered to the developing world. Is the relationship one of competition, combat or collaboration? Are there examples of where NGOs and scientists have cooperated? Where do the poor fit in—as passive participants in addressing developmental challenges, or passive recipients of aid and expertise?

This seminar's purpose was to identify common ground between development NGOs and the scientific community concerned with increasing environmentally sustainable food production and food security. Special focus was given to relationships between NGOs and scientists. This volume of success stories, told by people living and working in developing countries, delivers a message of hope to readers whether they come from the scientific, NGO, government or business communities.

We hope that readers use this book as an ideas kit to initiate some collaborative projects of their own, and also that the seminar opens dialogue between the many NGOs in Australia and developing countries, and scientists working in research and development.

We are already seeing the fruits of such partnerships. Discussions for several projects are under way between government departments, NGOs, universities, and individuals who came away from the seminar convinced that much more could and should be done.

We have been privileged to work together on this seminar and gratefully acknowledge the assistance of our co-sponsors: the Australian Academy of Technological Sciences and Engineering, ACIAR and AusAID.

Jim Ingram
Chairman, Crawford Fund for
International Agricultural Research

Lynn Arnold
Chief Executive Officer
World Vision Australia



MR ANDREW THOMSON, PARLIAMENTARY SECRETARY TO THE MINISTER FOR FOREIGN AFFAIRS

Andrew Thomson MP is the Parliamentary Secretary to the Minister for Foreign Affairs and has special responsibility for Australia's foreign aid program. Melbourne born and bred, he studied law and arts at the University of Melbourne (majoring in Japanese and Mandarin). From 1985 to 1991 he worked in Japan as research assistant and tutor in common law at the Hokkaido University, and later at CS First Boston as fund manager and investment banker. He returned to Australia in 1991 to help his father design and build golf courses. Mr Thomson was elected to Parliament in 1995.

Meeting the Challenges of Poverty Alleviation

ANDREW THOMSON

PARLIAMENTARY SECRETARY TO THE MINISTER FOR FOREIGN AFFAIRS

It is a pleasure to be here today to take the opportunity to review recent partnerships between scientists and the non-government organisations we collectively label NGOs, and to debate how those partnerships can be strengthened for the benefit of the world's poor. Hopefully the day will enable us to identify the common ground and to consider the scope for closer collaboration between NGOs and scientists.

The post-Cold War world is still facing challenges on how best to meet basic human needs and raise standards of living. Agricultural research has proved a powerful tool in improving the lot of many millions in the developing world, and to this end both scientists and NGOs have much to contribute to help meet the challenge of lifting people out of poverty. But the different viewpoints of scientists and NGO practitioners have often put them at loggerheads.

Although today's program focuses in particular on agricultural science, the experiences we will hear about and the lessons learnt could well be relevant to other areas.

The Role for Agriculture in Development Today

A broad characteristic of economic development is that, as economies grow, agriculture contributes a smaller and smaller part of the economy. Initially agriculture is displaced by industry and manufacturing, and then by services. For instance, between 1970 and 1994 the share of agriculture's contribution to Indonesia's gross domestic product (GDP) declined from 45 to 17%. Rather than suggesting that good economic performance is achieved by concentrating on sectors other than agriculture, the World Bank notes that countries with rapid agricultural growth typically have also shown rapid industrial growth.

Agricultural research has proved a powerful tool in improving the lot of many millions in the developing world...

...even in a rapidly urbanising world, it is important to maintain a productive rural sector.

Agriculture is also a major employer and provider of livelihoods. In Papua New Guinea, for instance, over 80% of people rely on subsistence agriculture for their livelihoods even though agriculture accounts for only 28% of GDP.

Agricultural development is an important approach for any program concerned with helping to eradicate poverty, because the majority of the world's poor continue to live in rural areas. That balance will swing towards urban poverty by 2010, but even in a rapidly urbanising world, it is important to maintain a productive rural sector. There are many complex interactions between rural and urban areas, and the rural areas will remain important as sources of food, raw materials and labour, and also as markets for manufactured goods.

Agriculture, Science and Non-Government Organisations in Australia's Aid Program

Agriculture continues to play a vital role in Australia's overseas aid program. Expenditure on agriculture and food aid amounts to about 15% of the aid program—second only to education expenditure—and not the 3% suggested by some commentators.

That expenditure has stayed fairly constant at around \$190 million over the last five years, although during this period there has been a substantial increase in expenditure on agricultural research and a slight decline in the number of agriculture projects. As well, AusAID provides tertiary scholarships to nearly 500 students studying agriculture and related topics at Australian tertiary institutions, mostly at post-graduate level.

Scientific research is a vital ingredient in the quest to solve the many pressing agricultural and related environmental constraints on food production in many developing countries. Recognising this, the Australian Government established the Australian Centre for International Agricultural Research (ACIAR) in 1982 to promote research into improving sustainable agricultural production in such countries.

The Government currently provides \$31 million annually to ACIAR for this purpose, and also provides a further \$9 million through ACIAR to support the global network of International Agricultural Research Centres.

In addition to this direct expenditure, there are many other parts of the aid program which contribute to positive agricultural outcomes. These include activities in health and education, water resources, transport and communications infrastructure, and good governance. Support for programs that directly benefit women and girls are also vital for increased agricultural production.

Australia has also supported trade reform and improved natural resource management policies, especially in the fisheries and forests sectors in the South Pacific.

A significant proportion of Australia's assistance to multi-lateral organisations is also channelled into agriculture. For instance, 18% of World Bank expenditure in 1994 involved agriculture.

The Australian aid program also provides substantial support for non-government organisations. In 1996-97, assistance channelled through Australian and overseas NGOs is expected to be about \$100 million. This funding is recognition by Government of the particular strengths of NGOs in working at the local community level and in harnessing the support and involvement of the Australian community in overseas development.

Agricultural Assistance in Action

Today the stories of several speakers will demonstrate how the know-how of scientists and the skill and experience of community development practitioners can be a formidable combination. I am proud to note that Australian Government funding has helped some of these partnerships to succeed.

One outstanding story is the 'Seeds of Hope' program, an inspirational undertaking driven by the desperate plight of those returning to their abandoned fields in Rwanda and the realisation that all seed set aside for the next season's planting had been eaten by the starving. In this instance, the international agricultural research community knew what seed types were needed and had them stored in their seed banks ready to grow up in bulk. Then World Vision had the capacity and the network to ensure that the seed supplies reached the people needing them.

For over a decade ACIAR has funded research to produce and develop a novel vaccine to protect village chickens against the feared Newcastle disease. Today Professor Peter Spradbrow and colleague Dr Ann Foster will describe how they devised a suitable way to deliver vaccine to villages away from the normal facilities of the developed world.

These case histories demonstrate how scientists and NGOs have the capacity that enables them to work in partnership towards the common goal of reducing poverty. We have the opportunity today to examine the elements of how the partnerships worked in these particular instances and to consider how to apply them elsewhere to greater effect.

Experience gained through aid to the agricultural sector over the last few decades has also highlighted some other

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...if a country lacks appropriate agricultural and environmental policies because of inefficient subsidies and state controls, then aid will be ineffective and even counter-productive.

important lessons that should not be forgotten during the day's proceedings. The starting point for effective agricultural development is commitment of developing-country governments to appropriate policies. For instance, if a country lacks appropriate agricultural and environmental policies because of inefficient subsidies and state controls, then aid will be ineffective and even counter-productive.

Local administrations and departments must also be involved to help ensure that new and appropriate technologies are adopted and that on-going recurrent funding is provided. And we must remember that agricultural improvements depend on other government investments such as the provision of adequate infrastructure and building up human resources through education and health activities.

The private sector also has an increasingly critical role in assisting agricultural development. Key parts of this sector (such as agricultural supply, processing and distribution firms) have vital roles to play in ensuring new technologies are marketable, and therefore can provide increased incomes to farmers.

Of course, farmers and their local communities play the key role in any process of agricultural development and improvement. Local ownership and knowledge is crucial for long-term success, and it has been recognised that local farmers should participate effectively in all parts of the cycle of agricultural improvement, from the formulation of scientific research priorities through to implementation on the ground. Furthermore, by responding to supportive government actions such as improved pricing signals to farmers, better farmer access to markets through better roads, and easier availability of suitable forms of credit, the poor can often help themselves.

In the context of the importance of recipient governments, the private sector, and farmers and local communities, a critical question for today's seminar is the appropriate role for aid, for scientists and for NGOs. Clearly, care must be taken not to duplicate activities which could be more effectively performed by others. And although scientific research has made major contributions to agricultural productivity throughout the world, significant gains can still be made in agricultural output through the better use or adaptation of existing technologies, preferably low-cost ones.

Given the understandable difficulties of getting farmers effectively involved in decision-making on agricultural research priorities, NGOs can play a critical role as a bridge between scientists and local communities. The parties involved must choose carefully when deciding which NGOs to work with.

For instance, a key determinant of success in working with indigenous NGOs is that they have credibility in local communities to encourage the adoption of new technologies and also the abilities to inform the 'experts' when scientific proposals may be inappropriate for local circumstances. On the other hand, external NGOs can often take the roles of initiator, facilitator, coordinator and trainer.

There is increasing evidence that there can be significant complementarities between NGOs, scientists and the poor. But we should not underestimate potential conflicts. Derek Tribe in his book *Feeding and Greening the World* notes that "there is still some way to go before the 'greens', the 'do-gooders', the 'egg-heads' and the 'experts' fully understand each other and, while preserving their individual and distinctive philosophies and motivations, cooperate fully together for the common good".

Conclusions

In conclusion, let us remember that agriculture and science are areas of Australian expertise. Australians are particularly good at being practical and finding solutions, often in very harsh or unpredictable environments. We have a tradition in the bush of using what we have to achieve outcomes, and these often wonderful skills can be adapted to help resolve some of the difficulties facing resource-poor developing countries.

Although it is not the only way to improve the lot of the poor, especially poor farmers, building partnerships between NGOs, scientists and the poor can be a very useful and innovative way of delivering effective aid and achieving sustainable development.

... building partnerships between NGOs, scientists and the poor can be a very useful and innovative way of delivering effective aid and achieving sustainable development.



DR CHRISTIAN BONTE-FRIEDHEIM, FORMER DIRECTOR GENERAL OF THE INTERNATIONAL SERVICE FOR NATIONAL AGRICULTURAL RESEARCH (ISNAR), THE NETHERLANDS

Prior to his appointment as Director General to ISNAR, Dr Bonte-Friedheim worked with the Food and Agriculture Organisation (FAO) in Rome. During his 20-year career at the FAO Bonte-Friedheim acquired first-hand knowledge of the rural problems which face developing countries. He recently retired as ISNAR's Director General and was awarded the Nyle C. Brady award by the CGIAR for his pioneering and lifelong achievements in strengthening national agricultural research systems. Retirement from ISNAR has given him more time to donate his considerable expertise and knowledge to agriculturalists in developing countries, and is a measure of his continuing commitment to alleviating poverty in the Third World.

Overview of paper prepared by Ambassador Robert Blake,

'Farmers, Scientists and NGOs: Time to Get Moving Together', and Some Personal Reflections*

CHRISTIAN BONTE-FRIEDHEIM

FORMER DIRECTOR GENERAL OF THE INTERNATIONAL SERVICE FOR NATIONAL AGRICULTURAL RESEARCH (ISNAR)

**An abridged text of Ambassador Blake's paper is included as Appendix 1 on page 85.*

It is a special honour to be asked to review, to summarise and to comment on the paper of my friend Ambassador Robert Blake, who unfortunately cannot be here. Like this audience, I would have benefited from his personal introduction.

Since Ambassador Blake's paper has not been distributed beforehand, it will be my first task to provide you with the highlights, reflecting on his long personal experience. He develops or supports new ideas which will require some rethinking and open discussions. They deserve full consideration. Finally he is critical of several developments and issues related to rural development.

In the second part of my address, I will select some issues, which should be included when agriculture-based rural development, poverty and hunger are being discussed. They might have been expanded or included by Robert Blake. Maybe he would disagree with some priorities I have selected either in my summary or in the discussion. But I hope that I can do justice to his ideas.

First I present my summary of Ambassador Blake's paper. He has chosen a very timely sub-title. It is high time to move and to move together. As separate groups none of the three potential partners have been very successful in solving the urgent problems. Maybe even more important, there is little evidence that in the past these groups have collaborated sufficiently and effectively.

Blake is critical and disillusioned with the donors and their past development approaches. Nowhere in the developing world has rural poverty been overcome or agricultural sustainability been achieved. Blake claims and supports the obvious—unfortunately not obvious to most donors, politicians and leaders—that rural development must receive the highest priority.

Nowhere in the developing world has rural poverty been overcome or agricultural sustainability been achieved

The poor of the north and the poor of the south often seem to be competing for attention and resources.

Bob Blake defines first the limits of his contribution. He makes it quite clear that he is generalising, which should help the discussions. He concentrates on NGOs that work on rural problems in the developing countries of Africa, Asia and Latin America rather than NGOs in general. Then he deals with the challenges facing scientists that work on the agricultural and rural problems of the developing countries and specifically how well they work with NGOs and poor farmers. He explores some of the problems of liberating the poor farmers and the landless people from the yoke of poverty—and how NGOs and scientists fit in. He excludes the urban poor of the south, and the poor of the industrial countries but not the vital and valuable links between NGOs in industrial and in developing countries and among scientists north and south.

There is a limit to the linkages between south and north. Despite many common problems, there are as yet not many productive relationships between the poor of the developing and the poor of the industrial countries, except occasionally through NGOs that operate in both worlds. The poor of the north and the poor of the south often seem to be competing for attention and resources.

Just looking at the relationships between the NGOs, scientists and the poor would not give a clear enough view of the dynamics of fighting rural poverty, or of promoting better natural resource management or food security, two areas closely related. In fact, he claims the discussion should be widened to deal with 'NGOs, Scientists, Governments, International Institutions, Civil Societies, the Poor and a Thousand Ways that Working Together They Can Beat Poverty, Feed the World, and Lead Us to Heaven'. Quite a topic!

As a further introduction, there is reference to a rapidly changing world, because of the scale, the speed, the global nature, and the more than usual unpredictability of these changes. More is changing—and it is changing faster. Five different changes have been selected.

The first is the realignment of power that is taking place within every society. Governments are finding that their control over some of the resources that matter most—money, information—is decreasing. Power seems to be moving away from national centres to regional and local groups. And there is no government—not even the most powerful—nor any international organisation, that hasn't found international public opinion compelling them to move in directions they hadn't planned or don't particularly relish. The global NGO movement is both a symptom and cause of this power shift.

The second trend is the emergence of a truly global economy—where industry and agriculture move infinitely

more products in a market that everyday is more global; where the bigger companies have no national identity or loyalty and where so-called 'emerging markets' are enjoying new, though unequally distributed, affluence.

A third crucial trend: population is increasing, in absolute numbers at least, at faster rates than at any time in human history. Along with growing middle-class prosperity, ballooning population is creating a need to double food production in the next 20 years. What's more this food will have to be produced on less good land and with less water. This unprecedented challenge to food security can probably be met, at least in the short- and mid-term. This means that all farmers, at least theoretically, will have to intensify production.

Fourth, there is a growing gap in income and living standards between the affluent industrial countries plus a few increasingly prosperous countries in East Asia and Latin America on one side and the poor developing countries on the other. And within almost every country—industrial and developing—there is growing disparity between the poor and the more affluent. Most of the world's poor live in the rural areas.

Finally, with the end of the Cold War, much of the earlier interest in and concern about the developing countries was lost, except as it concerns trade and security.

The problems created by these trends will affect every aspect of rural life and rural development. The challenges they present to NGOs—globally and in every country—are enormous. Blake asks the question, 'Can NGOs respond effectively without losing the passion, the intimacy of approach, the independence of mind, and the imagination that have made them so unique and valuable?'

Farmers First: The Basis of the New Paradigm of Rural Development

Farmers' attitudes and limitations are the parameters within which NGOs, scientists and governments must act. They are the key players on the rural scene because what they decide to do with their land and their labour is the most important element in whether or not rural poverty can be defeated and natural resources managed better.

The conclusion is that promotion of participatory rural development centred on the farmer is the surest way today to equitable and sustainable rural development. According to Blake, more and more scientists, NGOs, even governments and development institutions are recognising the validity of this thesis. That is important. But more important is the growing number of farmers embracing community-based development.

Along with growing middle-class prosperity, ballooning population is creating a need to double food production in the next 20 years.

Can NGOs respond effectively without losing the passion, the intimacy of approach, the independence of mind, and the imagination that have made them so unique and valuable?

Much of the failure of government-sponsored and donor-sponsored rural development has come from trying to apply top-down, 'outsider knows best' methods.

I've found surprisingly little sense of urgency about food security—at least to the extent that leaders are ready to dedicate scarce funds to this end.

Farmers recognise that the production and marketing of farm produce is becoming more complicated. Old ways of farming and trading are simply not good enough.

Farmers know that they will have to take most risks and provide most of the labour to implement any new systems outsiders propose. Much of the failure of government-sponsored and donor-sponsored rural development has come from trying to apply top-down, 'outsider knows best' methods. All farmers want is just to improve their own and their families' lives.

Blake states: 'Since over half the farmers in the developing countries are women, promoting their welfare must have a much higher priority than almost anyone has so far given it, or in fact has often known how to give. Women farmers in developing countries may be the most overworked and under compensated group on this planet. Their responsibilities continue to grow as men move off the farm for full-time or part-time work in the cities... It's no wonder they welcome the extra labour that a large family provides. It's also no wonder that they tend to be suspicious of almost anything that will mean more work.'

A New Breed of Rural Leader

In spite of the attitude of a great many farmers, there are also many others with a brighter vision for their family, their community, their tribe, and their country. The best of them have moved on to the cities in search of education and a richer life, and in the process become part of the urban elite. Fortunately, there is a growing number of leaders in the developing countries outside the farming communities who also have broader visions of what rural life can be.

Another important observation in the paper, which will be shared by many: 'We must remember, though, that there is one important national goal which is not likely to enjoy a high priority with farmers, with most NGOs, or with developing country leaders. It is the promotion of national food security and the need to intensify agricultural production in order to achieve it. In developing countries where I've recently had the opportunity to sound out such attitudes, I've found surprisingly little sense of urgency about food security—at least to the extent that leaders are ready to dedicate scarce funds to this end. And as for agriculture intensification, I have detected very little interest among farmers—even farm leaders... But somehow this will have to change—and quickly—if rural farmers are to be able to feed themselves, let alone feed their cousins in the cities. National governments—and civil society more generally—are neglecting this issue at their own peril.'

NGOs and the Farmer

The most important point relating to NGOs and the farmer is that in the years just ahead, non-governmental organisations of various kinds could well do more to help the rural poor change their lives than any other 'outside element'. With the world-wide decline in the power and relevance of government, the NGO movement is beginning to fill a dangerous vacuum in the supply of rural services that governments had—or should have—offered.

There are the advocacy NGOs—national and international groups that broadly speaking seek to influence rural policy and empower rural people. Then there are community-based NGOs—groups that work directly with the farmers and the landless, delivering various kinds of services and helping farmers to organise production.

Community-based Rural Development and the NGO

The success of NGOs in promoting community-based farming among the poor is already substantial.

Techniques of problem evaluation, called increasingly often 'participatory rural appraisal' are developed. Other important tasks are to help farmers learn how to process and sell their agricultural products for greater returns. Another fascinating new area deserves attention, the production and sale of organic tropical products, foregoing the application of chemical inputs.

Providing farmers with rural credit is another place where NGOs have already made a big contribution. Similarly they are active in the provision of inputs. It is a complicated task for which most NGOs tend not to be very well prepared. However, buyers' cooperatives provide an example of where NGOs do sometimes have a competitive advantage.

Can NGOs help with infrastructure? Farmers and their NGO partners can and often do have a voice about infrastructures, by making their views known to governments about where and how roads and markets should be built, and storage of food products to be provided.

The Scaling Up Challenge

The central challenge of rural development today is the scaling up of the kinds of projects that have already proved successful: scaling up of community-based farming; scaling up of new ways for co-operation between farmers and scientists; scaling up of NGO participation in the dissemination of more productive plants and technologies, and yes, scaling up of rural micro-credit lending—scaling up to the point where not only a few

The central challenge of rural development today is the scaling up of the kinds of projects that have already proved successful.

thousand farm communities are affected, but millions. This is a complex task, obviously requiring a different approach depending on what is scaled up. And decentralisation is moving slowly ahead.

Helping the Farmer: the Role of Advocacy NGOs

The rural-oriented advocacy NGOs try to influence rural policy, try to make rural life more equitable, or work to empower the farmers and the landless.

Will governments then oppose NGO-promoted change? The speed of this change is likely to be a function of how well and how quickly democracy, and civil society more generally, evolve.

International coalitions tend to come and go—and to vary greatly in their strength and ability to work with national NGOs. But the trend towards more and stronger international NGO action is indisputable and very welcome.

The Scientists, the Farmers and the NGOs

The singular gap NGOs can hope to fill may be to act as a channel between organised farming communities and the scientists. In theory all the CGIAR's international agricultural research centres accept the need to work more closely with farmers and NGOs. Necessary improvements will require changes of attitude, mutual confidence building and information exchange by both the international centres and the NGOs. In the NGOs' case, it will also require a substantial upgrading of their technical capacity.

There remains another huge scientific and technical problem for the farming communities: who is going to help them adapt potentially useful advanced research results to the thousands of ecological and economic situations farmers face? In theory, this is the job of the research systems of the developing countries. There must be stronger national—or at least regional—research systems.

Can the private sector be expected to handle the problems of local adaptation? While the private sector will pay some attention to the needs of the small but increasing number of more prosperous and 'modern' farmers, they can be expected to pay little or no attention to poor smallholders.

Many of the Government extension services exist in little more than name. And when they are active, they tend to be bureaucratic, under funded, and largely interested in the more prosperous and politically powerful farmers—seldom in the poorer smallholders. Once external donors stop supporting

The singular gap NGOs can hope to fill may be to act as a channel between organised farming communities and the scientists.

these services, which indeed they want to and must, then these systems tend to go down hill rapidly. Here again NGOs can try to create new links between agriculturally-oriented NGOs and the international centres to help with research dissemination.

Do We Need a New Kind of NGO?

A report from the Asian Development Bank suggests that perhaps the principal NGO weakness is the failure to effectively communicate with rural people on their own level of understanding. Other potentially negative characteristics are their typically small size and a financial base too small to fund large-scale endeavours; their limited managerial and organisational abilities, plus a tendency to focus only on their own priorities and outlooks rather than those of the people they seek to serve. NGOs can suffer from tunnel vision, judging every public act by how it affects their particular interests.

Some NGO limitations will probably persist until a larger, more experienced, and better financed NGO leadership cadre is developed. Certainly the movement's sophistication and breadth of vision is increasing as it grows and gains political power. NGOs will have to take responsibility for remedying their own weaknesses.

Robert Blake's concluding thoughts are:

- getting rural development moving on a sustainable and more equitable basis in the years just ahead is crucial;
- some of the earlier organisations now badly need reform.

He asks, 'Where will the impetus for a new period of organisational invention come from?' He is hopeful that the answer will be the NGO movement, particularly NGOs in the developing countries, and he looks for a new wave of organisational creativity that will spring from the same circumstances that brought about this new economic dynamism—creativity that will not only embrace such problems as trade and industrialisation but also the problems of rural people and poverty. More equitable and more productive rural societies must emerge—for the good of the farmers and for the good of the countries concerned.

Comments and Personal Reflections

That concludes the summary of Robert Blake's main points. I now turn to the second part of my contribution to this seminar. I have three types of comments on his observations. Some of his points could be strengthened, there are some on which I may disagree, and finally there are points which are not, but should be, included when discussing such a topic.

...the Asian Development Bank suggests that perhaps the principal NGO weakness is the failure to effectively communicate with rural people on their own level of understanding.

All over the world and in every discipline, at the national as well as at the international level, it seems to have become customary to create a new institution, design a new system and new organisation, if the old one is not performing to expectations.

To start with: all over the world and in every discipline, at the national as well as at the international level, it seems to have become customary to create a new institution, design a new system and new organisation, if the old one is not performing to expectations.

Implicitly and explicitly Blake states that the national research system and extension services are not effective. For many countries this may even be an understatement, but can this not be a challenge to the NGOs?

It is proposed that NGOs should take over some of the traditional functions of the national extension services. Furthermore the CGIAR system should assume some of the responsibilities of the national agricultural research systems. Is such a change meant to be a short-term measure or a long-term solution for support to farmers and general rural development? Is such an institutional adjustment and innovation sustainable? Nobody has ever looked at the total costs and benefits. More importantly, we have never honestly studied the option of collaborating with NGOs to increase the effectiveness and the efficiency of both the extension service and the national research system. Instead we seem to prefer parallel institutions—will these not be confusing to farmers?

There can be little doubt that in most developing countries—dare I say all developing countries?—the extension services are not performing in accordance with the expectations and needs of the farmers. To generalise: the services are underfunded, use old and outdated approaches and techniques, and have limited linkages to research. The extension officers feel themselves not up to other professions in agriculture. Farmers do not use them sufficiently as middlemen or as linkages with researchers, research organisations do not involve them in setting priorities or transmitting the new technologies.

There is a lot that can and must be done to improve agricultural extension services, especially since NGOs will not be able to cover all countries, all regions, all districts and villages. The question of resource requirements for more NGO involvement with enlarged tasks is not covered by Blake. Neither does he mention the fact that national NGOs are known to be a brain drain for some of the best professionals from the public service.

It seems as if a clarification is needed on participatory rural development. There will be little disagreement that promotion of participatory rural development centred on the farmer is not only necessary, but also sustainable. The next recommended step seems to be a community based development which does not differ from community based farming. There can be little doubt that communities must lead the planning work, but it is

doubtful that this will evolve into community based farming—if this is to be joint farming.

The past experience with ujama villages in Tanzania, or collective farming in Eastern Europe and Asia is not convincing. There are some positive examples of joint farming in developing countries, but there are considerable differences between producing cash crops and food crops. In nearly all cases successful joint farming depends on outstanding village leadership. We are still searching for examples of successful community farming extending to the second or third generation. Robert Blake, on account of his paper, can be interpreted (but maybe misinterpreted) as insisting on organised farming communities as preconditions for NGO involvement.

Regarding the national agricultural research systems, the NARSs, Blake's statement can easily be misinterpreted to say that the International Agricultural Research Centres should bypass the national research systems, should seek direct contact with the farmers. Such an approach would not strengthen the national institutions nor would it be sustainable. Furthermore, at the present time of severe budget reductions for international agricultural research, the International Agricultural Research Centres—the IARCs as they are widely known—do not have the human and financial resources to establish and keep linkages with farmers. Which farmers will be selected? Are they representative of all farmers?

It is my contention that the IARCs should first and foremost strengthen the capacity of the NARSs to do their jobs, and to do them better. The paper deals quite exclusively with international scientists, but national scientists are the closest research partners farmers have, and they and their problems, including the brain waste due to insufficient research funds, are hardly mentioned.

When we discuss hunger and poverty in the rural areas, we seem to forget some of the lessons learned in other countries. One of the most limiting factors in the rural areas is the lack of education, especially for women. Education will allow farmers access to knowledge, and knowledge is becoming a very important production factor in agriculture. Knowledge is also becoming an important factor for the willingness of farmers to accept changes. Resistance to change is still the greatest obstacle to progress. Education helps to face risks, farmers' greatest fears, allowing them to react better. It opens the door for other employment opportunities. This point leads to my next concern.

Many speakers and papers on the subject of rural poverty give the impression that poverty and landlessness are not only

In nearly all cases successful joint farming depends on outstanding village leadership.

One of the most limiting factors in the rural areas is the lack of education, especially for women.

closely related but that both problems can be solved through redistribution of land. In some, but relatively few, countries this is certainly a solution. But there are not only farmers in the rural areas, and rural development should encompass more than just the farming community. We should stress joblessness as the overriding problem in the rural areas. Agriculture or farming and the ministry of agriculture alone cannot solve this problem. Yes, land, or more land, can provide jobs for some time, but governments must recognise that rural development needs more than jobs in order to increase agricultural production and overcome poverty by raising incomes.

Rural people should leave agriculture but not the rural areas, and people should enter the non-agricultural sectors, not only the industrial sector, but should not enter the cities. The earlier the different policy makers recognise the need to create jobs in the rural areas, the smoother the process of change over time will be. Small farms can be a short term solution, but in two or three generations and in a growing global economy, few small resource-poor farms will survive.

The point is seldom made that rural areas and their farmers not only suffer from lack of income, but also a well known and often described financial POVERTY. There are other forms of poverty where NGOs are active, but could be even more active. The lack of jobs or employment, of social services, of education, of housing, of electricity, of communication and transport are all poverty indicators and place the rural areas at a growing disadvantage. Migration of many of the best rural people is the result. NGOs can and often do see farmers as part of the larger rural community. More can be done in this respect.

The importance Blake gives to scaling up needs is fully shared. But scaling up requires human and financial resources, requires training and education. Where will the resources come from?

One other factor which Blake did not mention relates to the effects of the different globalisation movements. As he has pointed out, there are big changes ahead of us. These changes will find many countries, governments and the farming community unprepared. Will the small subsistence farmers be able to survive in a global economy? What are the programs for the losers of globalisation? What will be the effects of globalisation of agricultural research, what can be done to support national agricultural production and research? NGOs must also get involved to create as much as possible a 'win-win' situation from these changes and the globalisation efforts.

Let me close with a positive note, pointing to where I think NGOs must play a major role for some time to come. At this

...scaling up requires human and financial resources, requires training and education. Where will the resources come from?

time of rather severe and widespread hunger and poverty in the rural areas, there is another task for agriculture which is either not fully appreciated or just forgotten. Agriculture must protect and safeguard the environment and the natural resources. National agricultural research in most developing countries has no resources or experience to deal with issues other than production related to food and export crops and commodities.

The international system is slowly adjusting to this new priority of saving the environment and the need to think in terms of sustainable production systems and sustainable resource management systems. Both systems aim at saving vital natural resources for future generations.

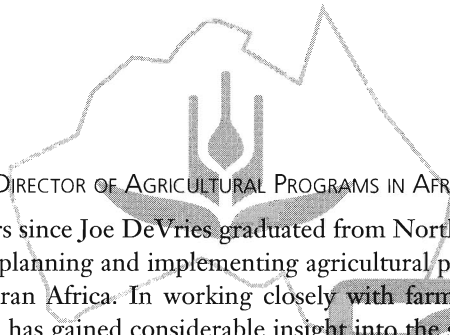
But again at the national as well as at the international level, there is a lack of additional resources for this new priority to undertake research and development, follow up with tests under different cultural, natural and economic conditions and to accomplish implementation. Using the ecoregion as the basis, we are searching for relevant methodologies. Are these new priorities not a field of linking sustainable development with resource conservation, giving special emphasis to the management factor? It may be possible that both partners—traditional agricultural research institutions and NGOs—can determine and develop their own priorities, show their competence and cooperate closely. It is also possible that in this special field the NGOs as well as the NARSs will seek necessary cooperation with universities.

In my own experience, the NGOs are as heterogeneous as the countries and their NARSs. We will not succeed if we try to find one solution to the problems of rural poverty, of hunger and of protection of the endangered environment. Farmers are advised to take risks and to find new solutions to old and new problems, when the price of failure is at best more hunger and poverty and at worst their life and the life of their families. Should we not be brave enough to take more risks and face possible failures in our search for different solutions? What is the price we will have to pay for failure, why will we be ashamed of failing?

I have enjoyed studying and commenting on Ambassador Blake's paper. It deserves wide discussions. I thank him for his stimulating contribution.

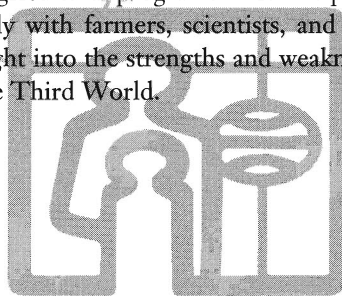
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We will not succeed if we try to find one solution to the problems of rural poverty, of hunger and of protection of the endangered environment.



DR JOSEPH DeVRIES, DIRECTOR OF AGRICULTURAL PROGRAMS IN AFRICA, WORLD VISION INTERNATIONAL, GHANA

In the fourteen years since Joe DeVries graduated from North Carolina State University, USA, he has travelled the world planning and implementing agricultural programs which help the poorest farmers, mainly in sub-Saharan Africa. In working closely with farmers, scientists, and national agricultural research centres, he has gained considerable insight into the strengths and weaknesses of all parties as they struggle to enhance rural development in the Third World.



NGOs, Scientists and the Poor: Competitors, Combatants or Collaborators?

JOSEPH DEVRIES

DIRECTOR OF AGRICULTURAL PROGRAMS IN AFRICA, WORLD VISION INTERNATIONAL

In order to answer the above question I would pose several others, but before I do that I would like to give the issue itself a bit of background. In so doing, I will try to define the role of each group of actors within the context of a rapidly changing world.

We are living in truly extraordinary times. For the first time in history, democracy is becoming the prevailing form of governance of the world's peoples. News, information and cash which once was transported on board sailing ships can now be transported around the planet in seconds. Goods and services are being sold and purchased in a single, global market. Total world trade has increased several-fold in recent years.

Humankind is achieving some remarkable things. More and more people are being allowed to benefit from the goods and services (which form part of these achievements) every day. The role of technology and information in making this all possible is indisputable. And the technology and information revolution stems primarily from the advances made by scientists.

Scientists play a role of servants to humanity—or whoever cares to pay the bill. But history reveals that unless discoveries and advancements are shared in a more or less equitable manner, serious problems occur. Wars break out. Disruptive population shifts occur. So the world has a distribution problem. It must have a means of getting the advancements out to users in the most efficient manner. For the time-being, at least, capitalism has been chosen as the primary means of distribution, but the limitations of that strategy—at least in the all-important short term—are well known.

The failure of the market to distribute goods and services adequately to large segments of the world population has given

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rise to agencies which pick up this responsibility, at least to the extent that those individuals and governments in a position to share their surplus with others continue to do so. It is to this sector of institutions which belong today's non-governmental organisations (NGOs). In this sense as well, NGOs also play the role of servant to humanity.

This background leads us to our first important conclusion: scientists and NGOs both occupy positions of worldwide importance within the world's present political economy.

NGOs today have become almost too diverse to define. For a large segment of the NGO community, however (and this includes the majority if not the totality of large, international NGOs), a fundamental question which has to be resolved is: in carrying out its role as a redistributor of goods and services, will it prefer to be primarily a handler of bulk products (goods, personnel, etc.) originating in the developed part of the world, or will it choose instead to develop potential for local generation of these products in less developed nations.

The most basic human need is food. Accordingly, there are NGOs which distribute food to needy people and there are NGOs which assist needy people to produce more of their own. My own organisation is in the process of evolving from one which did primarily the former, to one which is more heavily involved in the latter. Nevertheless, there remain circumstances in which it is more expedient to exclusively do the former, and some circumstances in which it makes good sense to do both simultaneously.

NGOs, then, can serve one of two primary purposes: they can distribute goods produced in one part of the world where supplies are adequate to another where they are not, or they can distribute ideas and start-up capital in order for people to begin generating their own systems. Clearly, the second alternative is far more preferable. Happily, NGOs are no longer limited to handout services. In fact, one of the more intelligent applications of NGOs has been that of generating economic growth which will then extend the global market to those areas where it is not presently functioning.

As such, NGOs have begun initiatives aimed at enterprise development and the creation of improved marketing systems. But even more strategic than this, I believe, is the opportunity for NGOs and scientists to team up in transferring science and technology to the poor. And it is in this last sector where I feel that World Vision International and its diverse group of science-based collaborators has positively excelled.

We have done so most deliberately in the context of the global fight for food security. My last visit to Australia was in

Happily, NGOs are no longer limited to handout services.

connection with a global conference on agricultural science policy for the 21st century. At that gathering a lot of economists and other very learned people presented a wide array of ideas which for me all pointed toward one resounding conclusion: if we are to avoid some very serious problems in the very near future, we have to become much better at sharing science and technology with the poor.

In fact, some groups of NGOs and scientists are way ahead of the game. For example:

- Cornell University has seconded one of its faculty members to World Vision Ghana to develop ideas in direct collaboration and contact with local communities;
- in Angola, World Vision is working in collaboration with five international agricultural research centers (IARCs¹) and four other international NGOs to rapidly develop new seeds and other planting material for use by Angolan farmers during the transition from war to peace;
- in 1995 and 1996, World Vision and Purdue University teamed up to transport, test, and disseminate varieties of sorghum resistant to the parasitic weed *Striga* simultaneously in nine different countries, and follow-on phases of the work in Ghana, funded by British ODA, will allow World Vision to lend support to national scientists who wish to transfer the trait from these varieties to their own genetic stocks;
- recently in Washington, DC, talks were concluded with USAID and a consortium of US universities whereby World Vision will become the outreach facility for work on the genetic improvement and conservation of cowpea in six west African countries;
- in May this year some 30 senior agriculturalists representing 21 African countries and other parts of the world will meet on the campus of the International Institute of Tropical Agriculture to discuss strategic initiatives for increasing agricultural productivity in Africa.

In this context, World Vision has specialised in what I have termed the 'systems management' role for the learning process. Indeed, in some ways it is not just making use of positive imagery to describe a 'wonderful, borderless university' which is being created as a result of the organisation's ability to bring together scientists, managers, technicians and the poor in the spirit of resolving the terrible problem of hunger in this world.

In fact, due to the problems of economies of scale, in the future, I believe some consolidation will even occur. From the

....if we are to avoid some very serious problems in the very near future, we have to become much better at sharing science and technology with the poor.

¹ ICRISAT, IITA, CIAT, CIMMYT, and CIP

From the present point to one where World Vision is employing its own scientists to develop new discoveries with the poor is not too far at all ...

present point to one where World Vision is employing its own scientists to develop new discoveries in collaboration with the poor is not too far at all. In fact, with 15 PhD-level and roughly 30 MSc-level agriculturalists working full-time in 29 countries in Africa, I can assure you that significant backlot research along these lines is already under way.

The NGO/scientist/poor collaboration has become a model initiative for World Vision wherever the necessary elements can be brought together. One of the most common contexts for application of the model has been recovery/rehabilitation programs, where concerted efforts are made to use international assistance for the poor in the most unbiased of circumstances. But in reality, it is a model which could be applied throughout Africa to great gain of the people.

World Vision is currently preparing to launch a major initiative for food security in Africa based largely on the NGO/scientist/poor collaboration model. As a first phase of this major push, we are initiating crop improvement and seed supply projects in 15 new countries of Africa this year alone through a regional initiative known within World Vision as the 'Year of the Seed'. World Vision Australia, I am happy to announce, is the principal supporter of the Year of the Seed, using private funds raised from the Australian public.

But does it work? And if such claims are being made, where is the proof? The table shows several examples where World Vision's collaborations with national and international research institutes and the poor have significantly increased the productivity levels of small-scale farmers in Africa:

Country	Crop Species	% Increase in Yield
Angola	Maize	46%
Mali	Sorghum	24%
Mozambique	Sweet Potato	61%
Mozambique	Maize	71%
Mozambique	Sorghum	133%
Senegal	Cowpea	100%
South Sudan	Maize	53%
Zaire	Maize	18%
Zaire	Cowpea	108%

Funding for such initiatives is still a major question. The Year of the Seed is an exciting start, but we still have a long way to go. As is so often the case, funds for unbiased types of collaborations such as these which genuinely pay benefits to the poor are often the biggest problem they face. I feel this is a mistake. In a world where scientific and technological advancement is

World Vision believes that at least adequate resources should be reserved for all peoples of the world to attain an acceptable level of security.

progressing so fast at times it even becomes frightening, World Vision believes that at least adequate resources should be reserved for all peoples of the world to attain an acceptable level of food security.

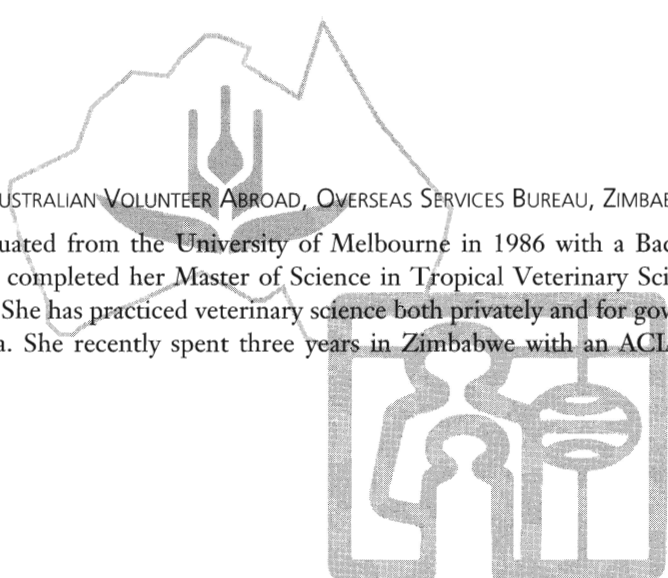
As the saying goes, we are not talking about rocket science here. We are merely exploring ways to derive maximum sustainable benefit from a mix of land, sunlight, plants, and water. Moreover, these projects are not that expensive. They provide a very positive venue for interaction of the world's people. Bilateral agencies eager to develop a positive, vibrant showcase for the application of their resources should take note.

The Australian presence in this work is significant. Australian scientists form a vital part of the IARCs with which World Vision works. Moreover, discussions are ongoing with several Australian universities for increased participation in World Vision-sponsored activities.

If previously the argument was that methods of humanitarian assistance were ineffective, I believe the evidence presented herein gives some assurance that this is no longer the case. Are NGOs, scientists, and the poor competitors, combatants, or collaborators? As we have seen, two of the three groups are servants of our society. I would therefore respond that the three are what we make them to be. Given the right environment for peace, stability, and prosperity on earth, NGOs, scientists, and the poor are natural collaborators.

The dignity of all peoples of the world is dependent upon the level of dignity afforded to each of us, of which the first measure is access to adequate food for a healthy and active life. In this on-going struggle, World Vision is looking for partners.

Given the right environment for peace, stability, and prosperity on earth, NGOs, scientists, and the poor are natural collaborators.



DR JENNY TURTON, AUSTRALIAN VOLUNTEER ABROAD, OVERSEAS SERVICES BUREAU, ZIMBABWE

Jenny Turton graduated from the University of Melbourne in 1986 with a Bachelor of Veterinary Science degree and completed her Master of Science in Tropical Veterinary Science at James Cook University in 1993. She has practiced veterinary science both privately and for government agencies in Australia and Africa. She recently spent three years in Zimbabwe with an ACIAR-funded livestock project.

Talking to Both Sides: A Personal Experience

JENNY TURTON

VETERINARIAN, AUSTRALIAN VOLUNTEERS ABROAD (OVERSEAS SERVICE BUREAU)

I would like to start by stressing that I am certainly not an expert on aid issues, but will merely be speaking about my personal experience. I have worked in Africa for 5 years, two as a Veterinary Officer in Swaziland under the AIDAB Australian Staffing Assistance Scheme and three as an Australian Volunteer Abroad (AVA), as a Veterinary Research Officer in Zimbabwe from 1993 to 1996. I will be concentrating on my recent experience in Zimbabwe for this presentation.

The project I was involved in was entitled 'ACIAR Project 9118: Improved methods for the diagnosis and control of bovine babesiosis and anaplasmosis in Zimbabwe and Australia'. These diseases are passed to cattle through ticks that feed on the cattle, and result in loss of productivity and even death. In the past the diseases have been controlled by controlling tick populations by dipping cattle with chemicals. This method is not desirable due to economic, environmental and residue concerns, and the preferred method now is to use vaccines combined with reduced dipping. The aim of this project was to improve control of these diseases through improved vaccines in Zimbabwe, and to improve diagnostic procedures for these diseases in Australia and transfer these procedures to Zimbabwe.

This project was funded by the Australian Centre for International Agricultural Research (ACIAR). ACIAR funds collaborative projects between Australia and developing countries in areas in which Australia has knowledge and expertise, and which are of concern to both countries. Relevant Australian organisations undertake the research on the Australian side and are also involved in bringing training and technology transfer to the recipient country.

Zimbabwe thus wanted assistance with quality control procedures to ensure safe and effective vaccines.

In this case the commissioned organisation was the Queensland Department of Primary Industries, and in particular the Tick Fever Research Centre and the Animal Research Institute (ARI), both in Brisbane. The Australian project leader is Dr Bob Dagleish from ARI. These institutes pioneered tick-borne disease vaccines, and thus are in an ideal position to offer assistance to Zimbabwe.

The collaborative organisation in Zimbabwe is the Central Veterinary Laboratory (CVL) in Harare, which is part of the Department of Veterinary Services. The CVL had recently run into problems with accidental contamination of vaccines with an infectious virus. Zimbabwe thus wanted assistance with quality control procedures to ensure safe and effective vaccines, which could then be used to reduce dependence on dipping. The head of CVL and the project leader in Zimbabwe is Dr Unesu Ushewokunze-Obatolu.

The Overseas Service Bureau (OSB) became involved in this project to recruit and manage an Australian Volunteer Abroad to work on the Zimbabwean side of the project. Traditionally OSB has been involved in recruiting AVAs who then work in government ministries in developing countries and are paid by the government in the host country. OSB is branching into other areas including projects such as this ACIAR one, and with local NGOs in developing countries.

I was recruited by OSB to be the AVA based in Harare. I was certainly not a project leader, but rather worked alongside local counterparts: initially Charles Katsande, but later Morgan Matingo, both of whom were Zimbabwean veterinarians. The important thing was to assist the local team in planning and in problem solving, and to be a link between the local team and the Australian scientists.

The project has been approved to undergo a second phase, and another AVA has now replaced me in Harare. I believe the project has been successful to date, and OSB and ACIAR are now working in partnership in other countries and in other areas.

I would like to outline what I perceive to be some of the benefits of an NGO such as OSB being involved in a project such as this, and particularly for an Australian volunteer to be based in the developing country:

- from an economic viewpoint it is cheaper to employ a volunteer rather than pay expatriate salaries;
- linked to the above, an NGO worker is likely to have a different motivation to somebody at least partly influenced by the attraction of a large salary, and is thus likely to feel greater personal involvement in the project;

- the NGO worker is based in the developing country, and can better determine whether advice based on the developed world is applicable to the developing world, compared to an Australian-based scientist having sporadic and short-term visits to the developing country and trying to determine what will work from a limited exposure;
- the NGO worker is working in partnership with local scientists, so there is local direction and ownership of the project;
- the above points are all likely to result in colleagues of the NGO worker and the wider public in the developing country having a better attitude towards the donor country;
- the locally based NGO worker can be a key communicator between the developing country and Australia.

I would also like to highlight some provocative issues, which need to be considered in the whole area of aid in rural development. These are personal viewpoints, which I have determined to be important from my experience in Africa.

- Who decides on projects, and why?
- The developing country should have a key role in decisions about its high-priority projects because Australian donors/scientists may have too much of a vested interest, or the recipient country project leader may place career advancement ahead of the best interests of the country.
- The overall aid ethic can be debilitating in developing countries and projects should try to involve local planning, cooperation and funding as much as possible to avoid this overdependence on the developed world.
- Sustainability is one of the most important considerations in projects of this nature, and the developing country should not rely too heavily on aid finance.
- Personalities and attitudes can make or break a project.
- Australian scientists and NGOs involved in developing-country projects need to acknowledge local concerns and cultural attitudes and not impose their own value judgements.
- Different aid organisations need to work together effectively so that duplication doesn't occur.

In conclusion, my experience has convinced me that increasing links between NGOs and scientists is successful and that NGOs, scientists and the poor can indeed be collaborators. However, we need to be aware of, and try to avoid, the potential problems and concerns such as those I have highlighted.

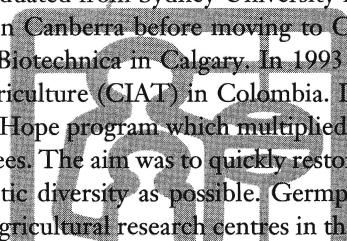
...the NGO worker can better determine whether advice based on the developed world is applicable to the developing world.

The developing country should have a key role in decision-making of projects.



DR WILLIAM R SCOWCROFT, VISITING FELLOW, CENTRE FOR RESOURCE AND ENVIRONMENTAL STUDIES,
ANU, CANBERRA

Bill Scowcroft is an agricultural scientist who graduated from Sydney University in 1961. He spent 20 years at the CSIRO Division of Plant Industry in Canberra before moving to Canada where he was Vice-President (Research and Development) of Biotechnica in Calgary. In 1993 Bill became Deputy Director General at the Centre for Tropical Agriculture (CIAT) in Colombia. During the Rwandan civil war, Dr Scowcroft coordinated the Seeds of Hope program which multiplied the seeds of six food crops, native to Rwanda, for distribution to refugees. The aim was to quickly restore post-war domestic food production while preserving as much genetic diversity as possible. Germplasm for this special program was collected from seven international agricultural research centres in the CGIAR.



Seeds of Hope:

The Emergency Response to Restore Seed Security in Rwanda

BILL SCOWCROFT

VISITING FELLOW, CENTRE FOR RESOURCE AND ENVIRONMENTAL STUDIES,
THE AUSTRALIAN NATIONAL UNIVERSITY

The Rwandan Seeds of Hope initiative established a new paradigm to rehabilitate agriculture and restore food security following disaster. Rehabilitation was achieved by assembling, multiplying and delivering seed of adapted crop varieties and associated technology to farming communities.

The 1994 Rwandan civil war devastated agriculture and food security. War and genocide killed an estimated 800 000 people, 2 million had become refugees and upwards of 700 000 people were internally displaced. Only 4.25 million or 53% of the pre-war population were able to farm and produce food as best they could.

In August 1994, grain (bean, maize, sorghum) harvests were down by 60% and production of root crops (potato, sweet potato, cassava) and plantains by 30%. These crops together provide 73% of food consumed in Rwanda and represent 79% of both calorie intake and dietary protein. The spectre of widespread famine in Rwanda loomed large.

The Seeds of Hope (SOH) initiative brought together agricultural research from neighbouring countries, centres of the Consultative Group on International Agricultural Research (CGIAR), non-government organisations (NGOs), inter-governmental organisations and donors to assist restoration of agriculture and food security in Rwanda.

Objectives

The key objective of SOH was to help restore food security in Rwanda by:

- re-introducing crop varieties adapted to the agroclimatic regions of Rwanda;

Rehabilitation was achieved by assembling, multiplying and delivering seed of adapted crop varieties and associated technology to farming communities.

- providing seeds of adapted varieties and technical support to relief organisations;
- rehabilitating agricultural R&D by retraining, restoring crop research and repairing basic facilities.

A socioeconomic assessment of the impact of SOH in restoring crop diversity and seed security to Rwandan farmers was undertaken. The results will also improve planning and implementation of future emergency responses to disaster.

Implementation

The national agricultural research systems (NARSs) of Uganda, Kenya, Tanzania, Zaïre, Burundi, Malawi and Ethiopia provided seed samples, facilities and expertise for initial seed multiplication and assisted in the retraining of Rwandan scientists. These NARSs worked closely with CGIAR Centres (IARCs) including CIAT, CIMMYT, CIP, ICRISAT, IITA and IPGRI. CIAT was the implementing agency. Full names are listed in the acronyms list on page iv.

The IARCs and the NARSs also collaborated with NGOs and UN agencies, particularly World Vision, CARE, ICRC, Swiss Disaster Relief, Catholic Relief Service, Austrian Relief, FAO, UNHCR, UNICEF and the World Bank.

The donors who provided incremental funds of \$US1.07 million were USAID (USA), AusAID and World Vision (Australia), ODA (UK), SDC (Switzerland) and IDRC (Canada).

Achievements and Impact

Reintroduction of crop diversity

Many varieties and land races of the important food crops adapted to Rwandan conditions were assembled, multiplied in neighbouring countries and reintroduced into Rwanda for further multiplication as soon as conditions allowed. These included:

beans—15 tonnes of 275 adapted varieties, local races and advanced lines;

maize—148 tonnes of the three major varieties grown in Rwanda;

sorghum—7 tonnes of varieties adapted to low, medium and high elevations;

potato—20 tonnes of seed potato, mini-tubers and true seed of eight varieties;

cassava—several million cuttings of 18 varieties and clones.

From February 1995 SOH provided support for seed multiplication at ISAR stations (Institut des Sciences Agronomique du

...important food crops adapted to Rwandan conditions were assembled, multiplied in neighbouring countries and reintroduced into Rwanda for further multiplication as soon as conditions allowed.

Rwanda) in Rubona, Ruhengeri and Karama. SOH also supplied NGOs with seed to multiply in Rwanda through farmer contracts.

Rehabilitation of crop variety and agronomy trials

SOH gave technical and financial support to ISAR to evaluate yield, agronomic performance and disease resistance in beans, sorghum and maize. Trials of improved lines began in 1995 and included farmer trials with beans. Fertiliser and inter-cropping trials were also begun for beans, sorghum and maize.

Technical support to NGOs

SOH provided technical advice to many emergency relief NGOs and UN agencies about adaptation of varieties, where to obtain appropriate varieties, evaluation of seed quality, seed multiplication under phytosanitary conditions, seed storage and packaging, crop production and disease evaluation.

Rebuilding scientific and technical capacity

Training Human resources were decimated by the war. Of the 55–60 scientists at ISAR fewer than five were left after the war. Training and familiarisation with Rwandan agriculture were priorities for newly recruited scientists and technicians. Training activities included group training courses on maize, potato, sorghum and cassava; comprehensive research and management training for newly recruited leaders of beans, sorghum, maize and potato research programs; and technicians received hands-on training in seed multiplication and in impact assessment survey.

Regional networks Regional research networks which had suspended operations during the 1994 civil war have restored research projects in Rwanda for potatoes (the PRAPACE network) and beans (RESAPAC network). Regional research on maize and sorghum will shortly include Rwanda.

Re-establishing facilities and infrastructure Looting and wanton destruction of facilities occurred during the war. ISAR was assisted by SOH to rehabilitate the tissue culture facility at Ruhengeri, repair laboratories, offices and houses at stations in Rubona, Karama and Ruhengeri and to acquire a few vehicles, computers and some furniture.

Impact of the war on crop diversity

The socioeconomic impact assessment had two phases. Phase I dealt with the immediate post-war seasons (October 1994–July 1995) and the Phase II involved a nation-wide survey of 1200 households. Highlights of the assessment are:

- diversity had been restored but some regions were still vulnerable to variety erosion;

Training and familiarisation with Rwandan agriculture were priorities for newly recruited scientists and technicians.

SOH achievements mean that restoring seed and food security will be easier in the event of future disruption.

- farmers managed to keep significant amounts of their own seed stocks;
- distribution of mixtures allowed farmers to select favoured types;
- distributing varieties based on source and adaptation gave higher yields;
- the impact of the war on crop diversity across the country differed, depending on intensity and length of fighting, displacement of people and weather conditions;
- farmers recovered 'lost' varieties because local seed distribution channels began to function quickly; improved varieties that were 'lost' were difficult to recover;
- the average time away from the farm during the war was about four months;
- female-headed households had increased by 3–4%;
- lack of farmer resources to acquire seed is also a major constraint; the concept of 'varietal erosion' must take account of this;
- potato and cassava production had fallen significantly;
- use of fertilisers and fungicides was significantly reduced;
- fewer than 25% of farmers had tried new varieties of sorghum or cassava.

Lessons

The intensity of the war and the associated genocide made the sequence of events unpredictable. SOH had to be flexible but focused on its objectives. While future stability in Rwanda is uncertain, SOH achievements mean that restoring seed and food security will be easier in the event of future disruptions.

The knowledge and experience about Rwandan crop agriculture gained by the CGIAR centers and neighbouring NARSs during the previous decade of R&D underpinned the success of SOH. Without this experience, knowledge and the will to apply it to restore food security, Rwanda would have suffered further serious food deprivation.

Locating an SOH Coordinator in Rwanda improved coordination of SOH activities and liaison with Rwandan authorities, NGOs and other agencies, helped identify training needs, assisted the impact assessment and helped restore R&D in ISAR.

The extent of disruption to agriculture and food production because of war damage was initially underestimated. A larger budget was needed for basic rehabilitation of facilities, equipment for seed multiplication, and to restart R&D.

The impact of the war and genocide on human resources was more traumatic than anticipated. Most of the scientists and technicians were killed, went into hiding or exile, or became refugees. Many of the new scientists and technicians are expatriate Rwandans. 'Institutional memory' about agriculture in Rwanda following the war was at a low level. More extensive and intensive training is required.

Action Plan for Response to Disaster

The success of the response to the Rwanda emergency focused attention on the need for a regional strategy to respond to disaster wherever and whenever it should occur. Disaster resulting from natural causes, military conflict and/or civil strife is always possible on the Greater Horn of Africa (GHA) region which includes Burundi, Djibouti, Eritrea, Ethiopia, Kenya, Rwanda, Somalia, Sudan, Tanzania and Uganda. USAID funded an analysis and action plan for a strategy to 'provide a continuing technological response to disaster by re-establishing food security through rapid replenishment of adapted varieties of major food crops in the Greater Horn of Africa'.

The Seeds of Hope project on the GHA resulted from the US 1994 Presidential Initiative, *The Horn of Africa: Breaking the Cycle of Despair*, and the need to integrate emergency relief and agricultural development. The project's main aspects, which needs multidonor funding for the GHA for at least 7 years, are:

- *Crop environment domains* Spatial maps and databases which integrate descriptions of crop variety diversity and adaptation with GIS-based agroecological zones of the GHA. The maps and databases help relief organisations acquire seed of the best adapted varieties outside the disaster area and target the distribution of adapted seeds in appropriate agro-climatic zones of the disaster affected region.
- *Seed storage, multiplication and regulations* Documentation of germplasm collections in the region; develop and apply low technology conservation and multiplication capacity; actively promote harmonisation of seed regulations in the region for efficient and rapid transfer of seeds and cuttings in the event of disaster.
- *Partner integration* Coordination and information networking among national agricultural research programs, international agricultural research organisations, NGOs, developed country agencies, regional seed companies and farmers; provide a clearing house and distribution centre for scientific and technical information relevant to seed security and response to disaster.

The success of the response to the Rwanda emergency focused attention on the need for a regional strategy to respond to disaster.



DR C M WIJAYARATNA, INTERNATIONAL IRRIGATION MANAGEMENT INSTITUTE, (IIMI), SRI LANKA

Dr Wijayaratna (Wijay as he is known) received a PhD in Agricultural Economics from Cornell University and a master's degree in Agricultural Economics from Leeds University. Since 1979 he has worked for the United Nations in Somalia and for the FAO. He joined IIMI in 1989 and in 1995 led IIMI's Global Program on Social and Environmental Analysis. He is currently leading IIMI's Watershed Research (Global) Activities and the project on the Shared Control of Natural Resources (SCOR) in Sri Lanka.

Shared Management of Watershed Resources

C.M. WIJAYARATNA

LEADER, WATERSHED RESEARCH (GLOBAL) ACTIVITIES, INTERNATIONAL IRRIGATION MANAGEMENT INSTITUTE, (IIMI), SRI LANKA

The Concepts of Shared Management of Watersheds

This paper examines a participatory action research project which has brought together the resource users (mainly poor/small farmers), government agencies, NGOs and scientists. The project, the Shared Control of Natural Resources (SCOR), funded by the United States Agency for International Development (USAID), is being implemented by the International Irrigation Management Institute (IIMI) in collaboration with the Government of Sri Lanka.

Sri Lanka has an urgent need for more intensive, but environmentally appropriate utilisation of its natural resources base, particularly land and water resources, for profitable and sustainable agricultural and related industrial production. There is evidence from Sri Lanka and other countries in the region that farmers, even with very small holdings, make production responses to the economic environment within which they carry out their farming activities. These responses are influenced by the degree of control the users can exercise over their means of production, the availability of information on market conditions and opportunities, and the necessary support services.

For example, enhanced group action by the users and participatory management of irrigation have resulted in significant increases in water use efficiency and crop yields in many irrigation systems. Increasing the user's share of control over natural resources through group action and active participation in making management decisions are, therefore, widely recognised as vital prerequisites to improve management of those resources. Interventions aimed at improving natural resources management through local control are known to yield high rates of return.

...enhanced group action by the users and participatory management of irrigation have resulted in significant increases in water use efficiency and crop yields in many irrigation systems.

... concepts and strategies were developed through a unique participatory project design process.

The SCOR design team hypothesised that the natural resources base, particularly land and water, can be conserved and productivity could be sustained if environmental and conservation concerns are incorporated into the production process of the users. The SCOR concepts and strategies were developed through a unique participatory project design process spearheaded by a core group of experts including senior government officials closely associated with the management of land and water resources of Sri Lanka. The design process included a review of past experiences in the management of natural resources in Sri Lanka and elsewhere, along with a series of consultations with a cross section of resource users, government officials at various levels, development banks and representatives of nongovernment organisations (NGOs).

The SCOR design is built on the progress already made in Sri Lanka and elsewhere in participatory irrigation management and social forestry. It combines an organisational approach with appropriate integrated land and water resources management on a watershed basis. The approach is being tested and demonstrated in two pilot watersheds of Sri Lanka, chosen for their different social, agricultural and environmental characteristics. In these pilot areas, appropriate production and conservation techniques and technologies are being used to augment and sustain the resource base and its productivity through a participatory processes, novel modes of tenurial arrangements, and state–user partnerships.

SCOR Goal

The SCOR goal is to develop and test methodologies to increase sustainable productivity of natural resources—mainly land and water—in a watershed context. The SCOR strategy is to catalyse a process to motivate partners to use an integrated package of technology, organisation, resources and policies through collaborative initiatives.

SCOR Objectives

SCOR has the following objectives:

- to develop conceptual and analytical frameworks to improve land and water resources management in watersheds, focusing on the integration of environmental concerns with production goals;
- to conduct action-research to develop, test, and disseminate strategies and methods to ‘reconcile social and environmental concerns with production goals in a watershed context, facilitating sustainable development’.

The SCOR is a participatory watershed management project aimed at developing and testing a holistic, interdisciplinary approach to integrate environmental and conservation concerns with production goals. The conservation strategy being tested in the SCOR is different from traditional approaches. The SCOR hypothesises that a package of measures—such as type of vegetation/crops, appropriate land and water saving and conservation practices, user rights to earn economic and other benefits from the (participatory) conservation of natural resources—is more effective in protecting environmentally fragile lands in water basins and watersheds. The ‘package’ is selected jointly by the professionals and users, and both conservation and production or other profitable uses of natural resources are incorporated into it. Figure 1 illustrates the SCOR action-research process.

The SCOR hypothesises that a package of measures..is more effective in protecting environmentally fragile lands in water basins and watersheds.

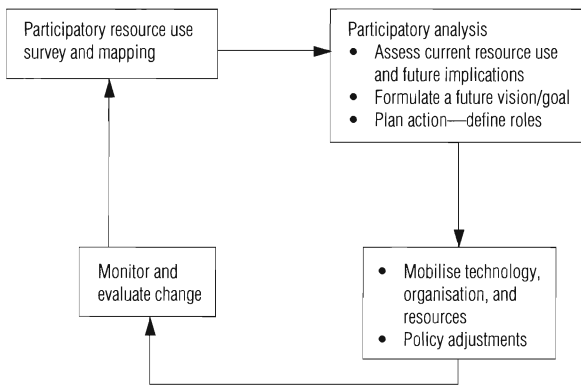


Figure 1. SCOR action-research process in watersheds.

SCOR *activities* can be summarised as follows:

1. integrated water management, focusing on water management in highlands and upstream-downstream linkages;
2. soil and water conservation, especially in uplands, including precision irrigation practices and testing different crops and farming systems;
3. integrated planning and coordination of activities related to land and water resources management;
4. institutional/organisation development;
5. policy achievements including state–user partnerships and shared control;
6. developing, testing, and institutionalising monitoring and evaluation systems,
7. conducting special research studies related to items 1–5 .

...much of the emphasis and activity of the project is at the field level in the selected watersheds.

The strategy is designed to be user-oriented and participatory. This means that much of the emphasis and activity of the project is at the field level in the selected watersheds. As constraints to group activities are identified, the project assists in their removal. When the constraints are the result of policies, rules, regulations, or actions of a higher level, the project targets that level. Demand-driven changes are likely to be more rapidly addressed than recommendations for change from above. The project structure, including steering committees in each of the provinces and at the national level, facilitates the process of inducing change.

The project's participatory mode has facilitated the identification of problems and constraints and their removal. It is being implemented primarily by the user groups with the help of catalysts, a multidisciplinary team of IIMI professionals (specialists in conservation farming, agriculture/agroforestry, institutional development and enterprise development/marketing) stationed on-site; the Watershed Resources Management Team (WRMT) comprises IIMI professionals, concerned government officials, representatives of user organisations and NGOs.

Provincial steering committees chaired by the provincial chief secretaries and the national steering committee chaired by the Secretary to the Ministry of Forestry and Irrigation and represented by the relevant government bodies, WRMT, etc., help recommend policy changes, provide guidance, help resolve conflicts, and monitor the progress of SCOR. A rigorous monitoring and evaluation program and a special research study program are also included in the SCOR.

In all 25 pilot sub-watersheds the SCOR is being implemented in close collaboration with all the partners. Two activities in the Nilwala watershed in the Southern Province illustrate the collaborative effort of the government, NGOs, scientists, and small farmers in the SCOR implementation.

In the first example, leadership from the environmental NGO Dothalugala Heritage is assisting the development of Aninkanda Sub-Watersheds through collaboration with government agencies, the private sector, scientists, SCOR and catalysts. Action is being taken to demonstrate an ideal land-use pattern with due emphasis on production and protection. A model enables illustration of various production-conservation elements while defining the intimate relationships needed for a sustainable land and water resources base.

The study also appraises the characteristics of resource users and uses and maps out current resource use. The data and map were the basis for all parties to participate in planning for future use of natural resources for the watershed.

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Some of the actions envisioned from the study include:

- effort to improve poorly managed tea lands;
- open forest areas to become dense forest;
- maintenance of good ground cover and preservation of stream reservations;
- transformation of unproductive to productive ricelands;
- improvement of production and protection techniques around homesteads.

In a second example the SCOR catalysed a process of mobilising resource users, NGOs, and government agencies to develop a micro-hydroelectric power plant (MHPP) and to establish a participatory conservation program in the catchment.

Illukpitiya villagers are the primary beneficiaries of the MHPP. The village is located in the Bovitiya Dola Sub-Watershed (BDSWS) of the Nilwala watershed/basin and consists of about 100 families.

In 1994, the SCOR facilitated a participatory appraisal of natural resource use in the BDSWS. As in the first example participatory appraisal of the characteristics of resource uses and users as well as mapping of current resource use were done by groups comprising resource users/farmers, NGOs, local officials of government agencies such as the Tea Small Holdings Authority, the Departments of Agriculture, Forestry and Agrarian Services, IIMI-SCOR professionals, and catalysts. The SCOR catalysts took the lead role in preparing the resource use maps and recording information.

Subsequently, a participatory planning exercise was conducted and a resource management plan formulated. This aimed to change the land and water use pattern to a more diversified resource use combining production (including hydroelectric power generation) and conservation, using appropriate technologies and novel shared control arrangements.

Because of its remote location and difficult accessibility, villagers did not have much contact with government departments and projects. Even though the villagers were aware of micro-hydroelectric power generation, they did not have the technical know-how, financial resources, etc. There was no government agency directly responsible for micro-hydroelectric power generation.

Formation of User Organisation

As decided during the planning sessions, the villagers were organised into a cohesive group to develop and use the waterfall/stream as the source of electricity without having adverse

...several sub-watersheds are being transformed into an efficiently managed buffer-zone system.

effects on the existing minor irrigation deliveries. The IIMI/SCOR catalyst facilitated this process. The organisation, among other things, devised action-plans to:

- act collectively to conserve and maintain the catchment;
- construct the hydroelectric power plant and supply electricity directly to 48 families;
- establish a 'battery-charging centre' and supply electricity indirectly to another 22 families;
- invite the NGO, Intermediate Technology Development Group (ITDG) to provide the major technical assistance;
- share a considerable portion of capital costs of construction in the form of (limited) capital and offer voluntary and organised labor;
- plan, and assume responsibility for, operation and maintenance of the hydroelectric power plant;
- undertake necessary post-project rehabilitation.

Similar activities are being implemented by the SCOR Project in the dry zone watershed as well. In addition, in one of the sub-watersheds in the dry zone an environmental NGO is involved in testing the SCOR model without much IIMI inputs. This NGO, the Organization for Resource Development and Environment (ORDE), entered into an agreement with IIMI to proceed with the implementation of SCOR strategies as from October 1996. Through this effort several sub-watersheds are being transformed into an efficiently managed buffer-zone system where the communities play a major role in the ultimate goal of optimising and diversifying the land use and water use in a sustainable manner. This goal is designed to be achieved by the application of appropriate technology in market-oriented production diversification within a framework of self-governance. These interventions, which uphold the best of traditions in moral, material, and economic spheres in the region, are as follows :

- conservation farming and agro-/analogous forestry
- integrated water management
- self-governance in entrepreneurship and marketing
- buffer-zone management and conflict mitigation between human beings and wildlife in the watershed
- moral development of the communities through spiritual development programs.

ORDE's vast experience in community-based resource management (CBRM) projects is being liberally infused into the SCOR implementation. In this effort, this NGO is enjoying the liberty of experimenting with new ventures which

were not included in the SCOR. Buffer-zone management and conflict mitigation between human beings and wildlife in the watershed could be cited as an example.

Some Important Characteristics of Participatory Appraisal

Several important characteristics of Participatory Appraisal could be highlighted as follows:

- (a) Resource users/NGOs, local officers and SCOR professionals including the institutional organisers undertake appraisal.
- (b) Information from the secondary data and participatory mapping is used to stimulate dialogue on resource use.
- (c) Interactions and dialogue focus on three major aspects: description, analysis and prediction. The current use of land and water resources in the sub-watershed is described. How such resource use patterns evolved is described to analyse processes and trends. Future projections are made, including implications if the current use patterns continue. For example, the Aninkanda Sub-Watersheds participatory appraisal described the land use categories and appraised reasons for denudation of forest areas in the past and in the present, analysed and revealed processes motivating users to encroach state lands for expansion of tea lands and predicted the possibility of future land slides and continued dryness and absence of stream flows that would force users to leave the area.
- (d) A desirable and feasible future resource use is mapped, based on the analysis as a shared vision.
- (e) Action planning is undertaken collectively with activities included to actualise the mapped vision .
- (f) Information is extracted to prepare a ‘mini-project’, with balanced disposal of activities to ensure equity and investment in areas for conservation-based production to mobilise financial resources from local banks and other resources from local agencies.

Interactions and dialogue focus on three major aspects: description, analysis and prediction.



MR JOE SIEGLE, PROGRAM DIRECTOR, WORLD VISION INTERNATIONAL, ERITREA

Joe Siegle has a master's degree in Agricultural Economics from Michigan State University, where his studies focused on food security issues. He joined World Vision in the United States in 1990 where he was responsible for the design and development of international emergency assistance programs before taking a special interest in programs in East Africa. In 1995 he was appointed Director of World Vision Eritrea where he manages programs in agriculture, health, environmental recovery, women's business development, and water.

Forestry Recovery in Eritrea

JOE SIEGLE

PROGRAM DIRECTOR, WORLD VISION, ERITREA

Emerging from 30 years of war for independence, Eritrea is facing an environmental disaster. Intensive tree cutting to expand area for cultivation, to gain timber for fuelwood and construction, and to remove positions of cover during the war has led to rapid deforestation of the land area. This has been further exacerbated by a land tenure system that discouraged tree planting. Surveys indicate that at the turn of this century, Eritrea was 30% forested. Today, assessments reveal less than 1% of land area with forest cover.

This dramatic decline in vegetation has led to massive topsoil loss. Only the rock foundation remains in many locations of the country's central highlands. During rains, streams and rivers are filled with chalky brown water carrying the silt into the Red Sea and Nile River basins. The results of this environmental disaster are reduced soil fertility and forest product availability. Eritrea currently produces about one third of its food needs with yields approximately one half of the East African average for its major crops of sorghum, pearl and finger millet, and barley. The search for firewood consumes several hours of each day for many rural Eritrean women.

In response, an estimated 90% of households have resorted to cow dung to supplement their source of fuel. Likewise, the high cost of wood for construction adds considerably to the expense of any building activity undertaken—limiting the availability of resources for other development.

Program Description

Since independence in 1991, the Eritrean Ministry of Agriculture (MOA) has given high priority to environmental recovery efforts through extensive tree planting and physical conservation measures such as terracing. To contribute to this

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process of recovery, World Vision, in unison with various Australian foresters, has worked with the MOA to develop and pursue a forestry strategy that can mitigate the loss of top soil in the short term and generate a sustainable forestry resource for the long term.

Forestry sector review

The first requirement was to conduct a baseline survey so that an assessment of the current situation and priority needs could be identified. Such a survey was facilitated and sponsored by Eritrea's Ambassador to Australia, Fessehai Abraham and World Vision in 1993. This involved Australian foresters Chris Harwood of the Australian Tree Seed Centre (of CSIRO) and Doug Boland of the International Centre for Research in Agroforestry (ICRAF). These scientists worked with the MOA to develop the first strategic review of the forestry sector in Eritrea. They produced a valuable document that the MOA has used as a framework on which to base its policies and activities since that time. The document has also guided the efforts of other donors and researchers and is still used daily by the MOA.

Infrastructural capacity building

With this as a basis, World Vision has given focus to the rehabilitation of the MOA Forestry Division's capacity from the nursery centres up. This started in 1995 as infrastructural support, has evolved into technical strengthening, and will increasingly involve community outreach and education. The physical infrastructure has focused on building seed stores and reservoirs, and installing water pumps for the zonal nurseries so as to improve the quantity and quality of tree seedlings produced.

Of the 73 MOA forestry nurseries around the country, World Vision has been involved with 60. The nurseries are producing some 50 different tree varieties with the majority of seedlings being *Acacia* and *Eucalyptus* species, olive wood (*Olea africana*) and *Juniperus procera*.

Development of technical expertise

The technical support has involved training nursery foremen, forestry supervisors and national foresters in general forestry principles and in nursery management practices—in all over 110 MOA staff. For some this is the first formal training they have ever had. This was supplemented with basic research equipment for the MOA at the central level, to begin the process of more systematically assessing the quality and appropriateness of the tree species currently grown in Eritrea.

In addition, World Vision has collaborated with the Overseas Service Bureau (OSB) to make available an experienced Australian forester with considerable exposure to arid

lands forestry—particularly important in Eritrea where annual rainfall typically ranges from 400–800 mm. The forester, Dr Chris Palzer, is seconded to the Forestry Division of the MOA to help institutionalise sound nursery management, seedling selection and planting practices.

During his first year in Eritrea, Dr Palzer has made numerous practical recommendations. One of the more far-reaching has evolved out of some functional research trials he undertook. These have helped him to demonstrate that reduced shading and reduced watering of tree seedlings at the nurseries actually increased their survival rates when planted, because of the more developed root structure and hardier plant that is generated. In short, the reduced nursery attention helps prepare the tree seedling for the harsh conditions on planting, where it will likely face a 7–8 month dry season. In such circumstances, the plant's developed root structure makes the difference in its survival.

Such a finding, while reasonable in retrospect, was counter-intuitive to the past management practices in Eritrea where the assumption was that greater care would lead to healthier plants. In fact, such practices actually only led to taller seedlings with very lightly developed root structures. While attractive in the nurseries, they were ill-equipped for the arid conditions encountered in the natural environment.

Moreover, such a lesson would have been difficult to instruct in a classroom. Instead, it required a first-hand demonstration (provided by the trials), followed up by explanation and analysis from an informed resource person. In this way, the program was very fortunate to have the qualities of Dr. Palzer, who could link his strong technical background with the social skills needed to communicate the new message in an understandable and constructive manner.

Naturally, there was some resistance to the new concepts, some of which continues today out of habit. However, for the most part, once convinced of the effectiveness and practicality of the suggestions offered, the nursery foremen have quickly applied the new management practices. This openness to change and constructive feedback has been modelled by the head of the Forestry Division, Semere Amlesom (a senior figure in the MOA), who upon seeing the trial results immediately organised a training for nursery foremen from around the country, which he himself attended.

Community outreach and education

Starting this year, World Vision is working with the MOA to begin the process of privatising some of the nursery activities as a means of encouraging woodlot and fruit tree production and

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A major problem currently faced is the encroachment of livestock into newly planted areas—severely reducing the survival rates of the seedlings.

...the increase in survival rates observed will generate enough additional fuel to support the needs of some 86 000 families.

to encourage sustainability. Experience in some neighbouring African countries has shown that small-scale, private woodlots are very well managed and generate 400% of the income individual households were earning from their farming activities on the same land area.

Moreover, increased attention on community environmental education and protection of forest areas is required so as to ensure that tree seedlings planted have the opportunity to mature. A major problem currently faced is the encroachment of livestock into newly planted areas—severely reducing the survival rates of the seedlings. To address this, more time and attention will need to be given to talking with communities so as to understand how best to integrate the needs of the livestock and tree seedlings within finite land areas.

As part of this educational effort, World Vision and the MOA will train 28 000 high school students who participate in the national tree planting campaign undertaken every summer as part of the government's emphasis on environmental recovery. In addition to leading to better survival rates for the trees planted, it is hoped this effort will raise awareness among the youth of the importance the environment plays in the development of the country.

Collaboration

Another major recommendation made in the initial baseline report by Harwood and Boland was the importance of creating a national seed centre, whereby quality seeds from all viable indigenous and appropriate exotic species could be identified, tested, and multiplied. Under the direction of the MOA, this component has been financially and technically supported by DANIDA. As such, the strategic guidance provided by the initial forest sector review has led to a complementary institutional relationship whereby World Vision is working with the MOA from the bottom up, while DANIDA, in collaboration with the MOA, focuses on national seed development from the center out.

Results

While impact from such initiatives take time to realise, the initial results are promising. Production of seedlings at program nurseries has increased by 23%. When this is calculated at a household level, the increase in survival rates observed will generate enough additional fuel to support the needs of some 86 000 families once the trees are mature.

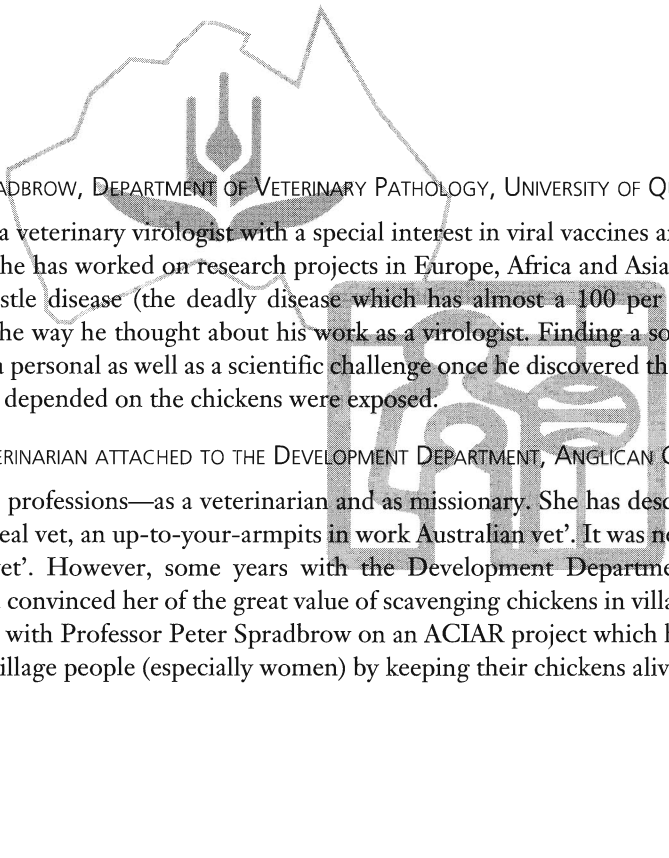
Conclusion

In summary, while much more work needs to be done, the collaborative efforts of the Ministry of Agriculture, Australian Tree Seed Centre, OSB, AusAID, the Eritrean Ambassador in Australia, and World Vision have had a positive impact on the direction and quality of forestry efforts in Eritrea as it recovers from a century of neglect. Some of the characteristics that have made this collaboration successful include:

- strong technical guidance appropriate to the context
- commitment to impact
- appreciation of the unique contribution provided by each of the involved parties
- flexibility from all partners to adjust to changing circumstances
- on-going funding support.

Accordingly, the Forestry Recovery Project provides a positive case study of how scientists, government, and NGOs have worked together in a way that benefits the poor.

...collaborative efforts...have had a positive impact on the direction and quality of forestry efforts in Eritrea.



PROFESSOR PETER SPRADBROW, DEPARTMENT OF VETERINARY PATHOLOGY, UNIVERSITY OF QUEENSLAND

Peter Spradbrow is a veterinary virologist with a special interest in viral vaccines and viral cancers. For more than 20 years he has worked on research projects in Europe, Africa and Asia. An ACIAR-funded project into Newcastle disease (the deadly disease which has almost a 100 per cent kill-off rate in chickens) changed the way he thought about his work as a virologist. Finding a solution to combating the disease became a personal as well as a scientific challenge once he discovered the levels of poverty to which villagers who depended on the chickens were exposed.

DR ANN FOSTER, VETERINARIAN ATTACHED TO THE DEVELOPMENT DEPARTMENT, ANGLICAN CHURCH, TANZANIA

Ann Foster has dual professions—as a veterinarian and as missionary. She has described the veterinary half of herself as ‘a real vet, an up-to-your-armspits in work Australian vet’. It was never her intention to become a ‘chook vet’. However, some years with the Development Department of the Anglican Church in Tanzania convinced her of the great value of scavenging chickens in village lifestyles and she later began working with Professor Peter Spradbrow on an ACIAR project which helps to improve the living standards of village people (especially women) by keeping their chickens alive.

Counting Your Chickens

PETER SPRADBROW

PROFESSOR OF VETERINARY VIROLOGY, UNIVERSITY OF QUEENSLAND, AND

ANN FOSTER

VETERINARIAN ATTACHED TO THE DEVELOPMENT DEPARTMENT, ANGLICAN CHURCH, TANZANIA

The authors have collaborated in a segment of an ongoing project, developed as an Australian initiative, that seeks to improve the living standards of village people by keeping their chickens alive. In effect this involves the control of a devastating viral disease called Newcastle disease.

Some 12 years of vaccine research in Asia, extension of this research to Africa, and the present collaboration in Tanzania have all been funded by the Australian Centre for International Agricultural Research (ACIAR). FAO has also now invested in the project, and various Governments and NGOs are adopting the ACIAR vaccines.

The Poor and the Newcastle Disease Problem

Many aid projects with an animal focus concern themselves with ruminant animals. These are usually the obvious animals in a village. However not many rural families can afford to keep cattle or buffaloes, goats or sheep. Most poor rural families will try to maintain flocks of scavenging chickens. These are kept at almost no cost for food, husbandry or housing. They find most of their own food and in many climates they need not be supplied with water. They are rarely provided with special housing, but roost in trees, shelter under human dwellings or even share the houses of their owners.

Chickens supply animal protein as meat or eggs, or more commonly they are items for sale or barter, serving as a source of savings in communities that have little access to cash and no access to banks. They are often the only resources of poor rural families that are available for disposal when seed rice or school books must be purchased, or when poll taxes become due. In

Most poor rural families will try to maintain flocks of scavenging chickens.

No human disease matches the virulence of Newcastle disease in chickens, which frequently leaves no survivors in village flocks.

...conventional vaccines have proved inappropriate for use in village chickens.

many cultures chickens are also used in traditional healing and to meet social obligations.

Village chickens rarely produce to their full potential. The main restraint on efficient production is Newcastle disease. This is a viral disease that is constantly present in developing countries. No human disease matches the virulence of Newcastle disease in chickens, which frequently leaves no survivors in village flocks. When Newcastle disease comes, there are no chickens to count. Because of the depredations of Newcastle disease, village people pay little attention to their chickens. The birds are harvested opportunistically if they survive, but the young chicks rarely receive supplementary feed or artificial shelter to aid their survival. Consequently there are catastrophic losses during brooding, caused by starvation, exposure and predation. Often only 10 or 20% of the eggs and chickens produced are ever harvested.

The remainder, if they survive, are required to maintain the population. The system is inefficient, although any product is virtually free. The control of Newcastle disease would break this cycle of loss and neglect, increasing the population of chickens and providing an incentive for improved husbandry. Once chickens are housed, eyedrop vaccination is possible and this is more effective than oral vaccination.

Many NGOs working with women's groups are attracted to projects based on the rearing of chickens. These projects require little capital and are technologically simple. They offer a rapid method to improve the content of animal protein in the diet. These projects are often not initiated because of the fear of Newcastle disease, or fail because of outbreaks of Newcastle disease.

Scientists and the Need for Different Vaccines

In many countries Newcastle disease is also a potential problem in commercial chickens. The problem is usually controlled by the use of vaccines but these conventional vaccines have proved inappropriate for use in village chickens. They are relatively unstable unless kept cold from time of manufacture until delivery to the chicken (a 'cold chain'). Cold chains cannot be maintained in developing countries. Chickens kept in small, multi-aged flocks are difficult or impossible to catch, and vials with 1000 doses are wasteful and expensive for a family with a flock of 10 chickens.

Australia has no problems with Newcastle disease and vaccines are not required at present. However strains of Newcastle disease virus that lack all virulence for chickens are

present. One of these viruses, strain V4, has been developed as a commercial vaccine. It is produced in Australia and a stockpile is held for possible use should virulent strains of Newcastle disease virus enter Australia. V4 vaccine also finds a market in Asia and Africa. The original V4 vaccine had the virtue of being relatively resistant to heat, compared with other Newcastle disease vaccines.

The initial ACIAR project on Newcastle disease vaccines was shared between the University of Queensland and the Universiti Pertanian Malaysia, with Professor Peter Spradbrow and Professor A. Latif Ibrahim as project leaders. They decided to test strain V4 as a village vaccine, first selecting the virus for enhanced heat resistance and then testing systems for delivering the vaccine on food to unconfined chickens. Selection for heat resistance was successful, so there was no longer a total reliance on refrigeration. Oral vaccination was also successful, but only on some types of food. As a bonus, vaccinated chickens shed the vaccine virus and would infect and vaccinate other chickens in the flock.

The vaccine was tested extensively over a period of nearly 10 years. This involved laboratory trials, trials in pilot villages and finally tests in large control areas. Workers in Thailand, Sri Lanka, Indonesia and the Philippines joined the ACIAR trials and repeated the successes that had been obtained in Malaysia. Further trials were undertaken in African countries, sponsored by ACIAR or FAO. The success of vaccination has been monitored by measuring the antibody response, by artificial challenge and by collecting mortality data in the field. Many of our trials have been done with 'official' cooperation, from Government departments or from universities. Ann Foster describes a very successful village trial in Tanzania, undertaken by an NGO. Some NGOs have developed a high level of interaction and collaboration with villages that officialdom is unable to match.

However, problems remain. V4 is effective, but it is a commercial vaccine. The seed stock is the property of the producer, the 1000 dose vials are intended for commercial chickens and the vaccine costs foreign exchange. Except in Malaysia and Vietnam, large scale vaccination projects in village chickens have required international financial support, and the projects have not been sustained when the financial assistance ceases. At present we see no sustainable way to vaccinate village chickens except by producing vaccine locally and by having the vaccine applied by farmers.

ACIAR has supported our exploration of this concept. We have isolated a new seed virus called strain I2. It resembles

At present we see no sustainable way to vaccinate village chickens except by producing vaccine locally and by having the vaccine applied by farmers.

The purists amongst our peers disapprove of the whole process.

strain V4 in thermostability, ability to spread and ability to protect. It is available without cost to laboratories in developing countries that wish to test and possibly to produce the vaccine. It is not our intention, nor ACIAR's, that anyone should benefit financially from the production or sale of the vaccine. We have conducted workshops in Pretoria and Dar es Salaam explaining the vaccine to people from various African countries and demonstrating the relatively simple laboratory techniques that are required to produce and test vaccine.

We are testing this concept in Tanzania. For each of the six Veterinary Investigation Centres in that country ACIAR has provided a small egg incubator, a candling light and, where necessary, a small refrigerator. Vaccine will be made in fertile eggs from local chickens and stored in liquid form. An incubator with a capacity of 20 eggs should produce at least 50 000 doses of vaccine every fortnight. These doses would need to be distributed to chickens within a few weeks. A liquid vaccine can be apportioned in quantities that exactly match the requirements for individual flocks. Persuasive lobbying by the NGO assisted greatly in having these trials accepted.

The purists amongst our peers disapprove of the whole process. They advocate the use of commercial vaccines produced in specific-pathogen-free eggs. They offer no solutions to the problem of placing these vaccines in villages. As long as we derive the conventional eggs locally, we will not introduce into the village flocks any agents that are not already there. Another colleague has referred to our efforts as 'barefoot virology', a term we willingly acknowledge. He was not being disparaging—he offered to help.

Another colleague sent an e-mail chiding the author for not making sufficient effort to have our authorities supply the vaccine to developing countries in large quantities. 'After all', he concluded, 'it is cheaper and easier to vaccinate a chicken than bury a child.' Hard words, but he did work in a country where children die of protein deficiency. We reflect on this when we advocate the use of a vaccine that might not meet current international standards.

We have to do something.

The NGO and a Successful Vaccine Trial in Tanzania

This section considers the transfer of the ACIAR vaccine technology to Tanzania, through a trial carried out by an NGO (the Development Department of the Anglican Church) in cooperation with the Tanzanian Government and the Sokoine University of Agriculture (SUA). The aim was to assess

whether heat-resistant V4 vaccine (HRV4, Websters Pty Ltd, Sydney) would provide an acceptable level of protection under village conditions in central Tanzania.

The chosen villages were Nkulabi, Chibelela and Msisi, all about 40 km from Dodoma. Newcastle disease was known to be a problem in these villages, which were already participating in an animal husbandry extension project conducted by the NGO. This assisted in the vital extension procedures which must precede any successful project. First it was necessary to gain the Tanzanian Government's permission and then to obtain cooperation at all levels—national, regional and village.

Extension work began with the village leaders and the village livestock officer. Meetings were then held with the selected villagers to explain what the trial involved, how it would benefit their country and to modify the trial design in accordance with their suggestions. It was explained that after the trial, the villagers would have the opportunity to revaccinate their chickens using the best method of vaccination.

The three village livestock officers were taken to SUA to learn more about Newcastle disease. They observed the signs of the disease, studied post mortem technique, and observed post mortem lesions. This enabled them to diagnose if deaths of chickens during the trial were due to Newcastle disease or other poultry diseases. Villages were paid a small sum for access to the carcasses of dead birds. These were then returned to the owners.

Within each village four recorders were taught the methods of weekly data collection. This included production data, sales, purchases and losses of birds.

The villagers were provided with string and sacks and taught how to construct cages to house the chickens on vaccination days. The chickens were routinely confined in the houses of the owners overnight and released at dawn, except on vaccination days.

Each village was divided into four separate areas and in each area about 100–150 birds were wingtagged with numbered tags and received vaccine by one of four different routes:

- eyedrop vaccination
- drinking water vaccination
- oral vaccine mixed with boiled sorghum
- control (no vaccine).

The vaccination was repeated four times at monthly intervals and at each vaccination a blood sample was collected to determine the bird's antibody response to the vaccine. After the fourth vaccination 10 or 11 birds from each trial group were

It was explained that after the trial, the villagers would have the opportunity to revaccinate their chickens using the best method of vaccination.

The trial was carried out entirely under village conditions.

Newcastle disease is the one disease which everyone can recognise and even predict the months in which it generally occurs.

purchased from the villagers and housed together at SUA. They were artificially challenged by Newcastle disease virus to see if the vaccination program had successfully produced a protective immunity.

After the completion of the trial, the three villages were revisited to inform the villagers of the trial results and to invite their feedback and questions. The villagers were given vaccine to vaccinate their own chickens.

Measuring the antibodies in the serum is one of the indicators of immunity. The initial serum samples revealed that very few village chickens had Newcastle disease antibodies before the trial. In the three vaccinated groups the geometric mean titre (GMT) indicating antibody levels rose progressively over the series of four vaccinations. The control group remained consistently low. The final serum sample showed that vaccine mixed with boiled sorghum produced a moderate level of protection, whilst eyedrop and drinking water both had a very good level of protection. Similarly with the birds exposed to live virus challenge, the drinking water and eyedrop groups both showed a survival rate of greater than 70%.

About 90% of the birds that died during the trial were presented for examination—a much higher percentage than has been achieved in previous trials. Newcastle disease was diagnosed in about two thirds of these chickens.

The trial was carried out entirely under village conditions to determine the ability of V4 vaccine to protect poultry from Newcastle disease. The vaccine was diluted with well water and the food carrier used was readily available in the villages. Water and food were placed on the ground where they were susceptible to the depredations of other animals.

The serological results from both the eyedrop and the drinking water vaccination show a very good protection. Over all, about 70–80% of the birds vaccinated by these methods were protected from Newcastle disease. This was confirmed when the purchased birds were challenged artificially with a local strain of virus. The vaccine on the boiled sorghum food carrier showed a moderate response in serology and challenge.

Further work is needed in Tanzania to find a suitable, locally available food carrier. Subsequently the NGO encouraged the Government to set up its own trial, and assisted with vaccination. The results of the first village trial were confirmed.

The villagers were not just passive recipients of this technology. They had identified the problem in the first place. Newcastle disease is the one disease which everyone can recognise and even predict the months in which it generally occurs. 'Mdonde' is the name for it in the local tribal language. The

villagers participated in the trial; making cages, holding and vaccinating birds and providing the production data.

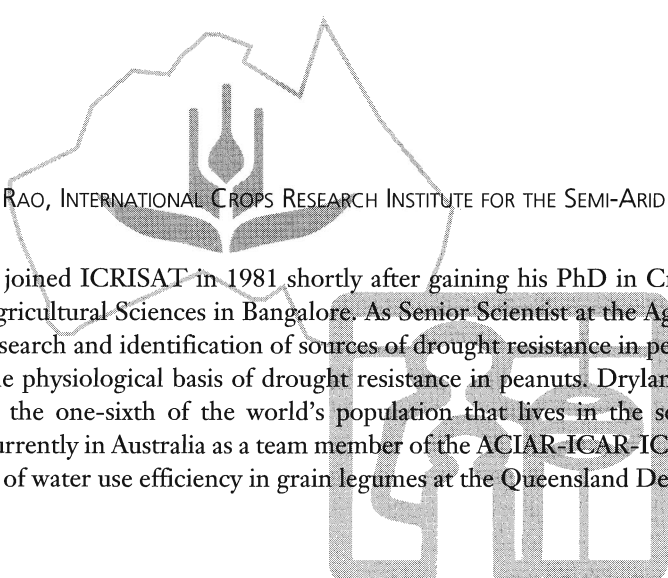
The follow-up work in the villages enabled villagers to discuss the relative advantages and disadvantages of vaccinating with eyedrop or drinking water method. They could then choose the route of vaccination they would use with their own flock. As eyedroppers are not readily available in villages, they decided to use their local technology to deliver a drop of vaccine to the eye—the tip of a chicken feather.

Benefit of the Work in Tanzania

The importance of poultry in the Tanzanian rural economy has already been mentioned. To prevent losses from Newcastle disease, the villagers need a reliable supply of viable vaccine at a price they can easily afford. It was proposed to the Tanzanian Government that, following the successful laboratory and field trials in Tanzania, it would be possible to produce wet Newcastle disease vaccine in the six small regional veterinary laboratories. The advantages are that the vaccine would be cheap, it would be available in the rural areas and the production could be tailored to seasonal demand. Permission was obtained from the Government to import ACIAR strain I2 seedlot virus and to hold a workshop in Dar es Salaam to train laboratory workers to produce a wet vaccine using simple technology and equipment. ACIAR has purchased a small egg incubator and a candling lamp for each laboratory to facilitate this process. Lobbying by the NGO was essential for this initiative.

Of equal importance to vaccine production was a discussion on the accompanying extension message of how to supply the vaccine to the village chickens and make the process sustainable. Often the owners of chickens are women, so discussion focused on formation of women's groups to organise vaccinations, use of female extension workers and the need for some cost recovery to enable the process to be self sustaining.

The implications of Newcastle disease vaccination are increased survival of chickens and hence more birds available for sale or consumption. It can, and it is our great hope that it will, make a considerable difference to the nutrition and income of poor rural families.



DR R C NAGESWARA RAO, INTERNATIONAL CROPS RESEARCH INSTITUTE FOR THE SEMI-ARID TROPICS (ICRISAT), INDIA

Dr Nageswara Rao joined ICRISAT in 1981 shortly after gaining his PhD in Crop Physiology from the University of Agricultural Sciences in Bangalore. As Senior Scientist at the Agronomy Division he is involved in the research and identification of sources of drought resistance in peanut germplasm and understanding of the physiological basis of drought resistance in peanuts. Dryland crops like peanuts are vital to life for the one-sixth of the world's population that lives in the semi-arid tropics. Dr Nageswara Rao is currently in Australia as a team member of the ACIAR-ICAR-ICRISAT collaborative project on selection of water use efficiency in grain legumes at the Queensland Department of Primary Industries.

ICRISAT's Collaborative Research with NGOs in India

R.C. NAGESWARA RAO

SENIOR SCIENTIST, AGRONOMY DIVISION,

INTERNATIONAL CROPS RESEARCH INSTITUTE FOR THE SEMI-ARID TROPICS (ICRISAT)

It gives me great pleasure to participate in this seminar and present the initiative of the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) on collaborative research with NGOs in India. At the outset I would like to acknowledge scientists from ICRISAT who carried out the work that I will be presenting here to day. They are Drs Eva Weltzein, M.L. Whitaker, M.M. Anders and Dhamotharan—on farmers' participatory research in pearl millet improvement for marginal environments in Rajasthan—and Drs G.V. Ranga Rao and J.A. Wightman—on integrated pest management (IPM) technology to manage insect pests on peanut.

ICRISAT, based in India, has a mandate to improve and sustain the yields of the six most important subsistence crops, i.e. sorghum, pearl millet, finger millet, pigeonpea, chickpea and peanut in the semi-arid tropical (SAT) regions, on which one sixth of the world's population depends. Many of the countries in SAT are among the poorest in the world. The semi-arid tropics are characterised by erratic rainfalls, harsh and marginal crop production environments and poor infrastructure facilities.

ICRISAT's mission is to conduct research designed to enhance sustainable production of its mandate crops, which can in turn lead to improved nutritional and economic well being of the resource-poor farmers living in these marginal environments. The present scenario—increasing human population, steadily rising demands for food, fibre and fuel, degradation of the environment together with dwindling resources for agricultural research—makes it essential to develop appropriate strategies to sustain food production for these disadvantaged groups.

The semi-arid tropics are characterised by erratic rainfalls, harsh and marginal crop production environments and poor infrastructure facilities.

ICRISAT has initiated a few methods to bring farmers and scientists closer together

Our understanding of the situation is that single-commodity-focused research cannot always make a significant impact in meeting the needs of marginal and more complex farming systems, particularly in situations where farmers' needs are not well understood by the researchers and where there are strong interactions between subsystems. We believe that a better understanding of farmers' needs, priorities and resources in complex farming systems is needed to provide them with the best range of options.

ICRISAT has initiated a few methods to bring farmers and scientists closer together to achieve research outcomes with more relevance in specific and targeted environments. This concept requires strong interaction between researchers, local extension experts and farmers if the research has to be undertaken in the target environments involving specific farming communities. Local extension experts play a key role in the transfer of technologies from research labs to farmers' fields.

The choice of local extension partners in developing countries is increasing with the introduction of Non-Government Organisations (NGOs). There are numerous NGOs working on a wide range of issues related to socioeconomics, health, primary education, agriculture, afforestation etc. NGOs can have much better access in the local system and can function as effective conduits of information exchange between researchers and target communities. Thus, on-farm or farmer participatory research with active and motivated partners can be facilitated and the target communities can explore and harvest the fruits of improved technologies generated by researchers. ICRISAT recognised that transfer of technology occurs more efficiently when NGO's supplement the efforts of the usually over-committed (government-supported) extension services.

Two Case Studies

Pearlmillet improvement in Rajasthan

Pearlmillet (*Pennisetum glaucum*) is the major cereal and staple food crop grown on 5–6 million hectares in the drier western part of Rajasthan state in India. This region represents 45% of the total area planted to pearlmillet in India, and approximately 20% of the world coverage. The average productivity of pearlmillet in this region rarely exceeds 500 kg/ha and in drier tracts the yield levels are frequently below 100 kg/ha. Pearlmillet is grown as a sole crop or mixed with short-season legumes. Pearlmillet and legumes are also important sources of livestock feed.

The productivity of pearl millet in this region has been static for the last three decades despite increasing demand for food. For unknown reasons, adoption of improved cultivars has

been very low. In contrast, improved cultivars of pearl millet are widely grown in better endowed environments in India and have contributed to significant increases in productivity. This situation suggested that specially targeted crop improvement efforts were required for this region.

In Rajasthan, where pearl millet farming is frequently subsistence rather than market-oriented, farmers' strategies for coping with large seasonal variations are not well understood. To have an insight into the problem, ICRISAT initiated a diagnostic research program to determine farmers' preferences for genotypic traits, and the major constraints, market trends and anticipated changes in pearl millet production in selected regions.

An interdisciplinary team (involving ICRISAT scientists, contact persons from local government and non-government organisations, and farmers) participated in the diagnostic studies in the four target districts in which pearl millet is a predominant crop. Local government and non-government organisations in the target districts were identified to act as local links between ICRISAT researchers and farmers. The local NGOs were chosen on their interest in participatory research, experience in agricultural development and access to the target farming communities. The survey results revealed that the farmers in marginal areas of pearl millet cultivation had not been exposed to the wide range of variability available for specific traits in the newly released and pre-released genotypes.

To expose the farmers to a wide range of options for specific traits available in the new improved genotypes, on-farm trials were organised in selected villages with the support of local organisations. Selection of villages was done jointly by ICRISAT researchers and the NGOs contact persons. Farmers were encouraged to grow trials with new cultivars under their normal crop management conditions. During the on-farm trials, open days were organised and several methods were used to understand the farmers' criteria for evaluating cultivars and their preferences for individual traits.

Farmers used a wide range of traits to distinguish between the experimental varieties and their own cultivars. In addition to important requirements like grain and stover quality and the ability to perform in low fertility and marginal environments, earliness was an important criterion. In the experiments, it was apparent that the differences between experimental varieties and farmers' own varieties were more pronounced. Two of the experimental varieties, HHB 67 and RCB-IC 911, flowered and matured distinctly earlier than the commonly grown cultivars. Farmers in this area had no previous experience with this degree of earliness and perceived it as an advantageous trait.

...specially targeted crop improvement efforts were required for this region.

The majority of farmers were interested in having a cultivar that would give some assured grain and fodder yield in bad years

During the second year of testing rainfall was low, crop failures were common, and the cultivar RCB-IC 911 produced better grain and stover yields than the commonly grown cultivars. The majority of farmers were interested in having a cultivar that would give some assured grain and fodder yield in bad years and they seemed willing to sacrifice grain yield in the good years.

The genotype RCB-IC 911 attracted the attention of a large number of farmers as being better than the commonly grown cultivars. In response to the strong interest shown by the farmers on the issue of seed availability, ICRISAT handed over 2500 kg of seed of this genotype to a local NGO for further distribution to farmers in 14 villages. The seed sold out and demand could not be met. In the next season, the RCB-IC 911 performed very well and local seed production by farmers was seriously pursued with the help of NGOs.

Unfortunately, follow up action planned by the ICRISAT scientists in this project had to be deferred due to recent funding constraints. We hope that local government and non-government organisations in Rajasthan will continue with the farmers participatory work, to deliver the fruits of research to the needy and most deserving resource-poor farmers.

Integrated management of peanut pests on India's eastern coast

India is the largest producer of peanuts in the world, with this crop grown on 7 million hectares under rainfed conditions and on 2 million hectares with irrigation during the post-rainy season.

In Indian agriculture during the past 30 years three fundamental changes have taken place which had either a direct or indirect influence on commercial crops and their growing environments:

- proliferation of irrigation systems;
- new products, such as synthetic fertilisers, pesticides and farm machinery available to farmers, often at subsidised rates;
- release of high yielding varieties.

Although the overall benefits of the Green Revolution in terms of increased production, productivity and self sufficiency are undeniable, accompanying changes in agricultural practices have led to some less desirable outcomes. Farmers were led to believe that applications of pesticides would result in increased profits from commercial crops. Indiscriminate application of insecticides has become a regular practice in high-input cultivation, and peanut crops growing under irrigated conditions are no exception.

Indiscriminate application of insecticides has become a regular practice in high-input cultivation.

Many farmers have over-invested in this notional insurance in certain areas. The resultant destruction of the natural control processes has often resulted in pest resurgences causing damage more severe than would have happened if pesticides had not been applied. Repeated and indiscriminate applications of insecticides have inevitably resulted in build up of resistance in two major insect pests of peanut in certain areas. This situation led to reduction in crop productivity and profitability as a whole, affecting the health of farm families and livestock and the quality of adjacent and downstream environments.

During 1993, ICRISAT entomologists organised a set of on-farm experiments on irrigated peanut to demonstrate the effect of integrated pest management packages on farmers' fields in collaboration with the Andhra Pradesh Agricultural University in Guntur District, which is a major cotton growing area. In essence, these experiments showed that careful implementation of IPM practices could reduce input cost with little loss in yield and a combination of improved pest-tolerant genotypes and minimal application of pesticides could increase the yields 0.4–2 times.

During 1995, ICRISAT scientists organised experiments on farmers' fields in collaboration with local NGOs to demonstrate IPM technologies on peanut in five districts in Andhra Pradesh state. The selected contacts from NGOs were offered training in the implementation of IPM. NGOs have played a key role in encouraging farmers to implement the IPM packages. Several methods and media were used to raise awareness in the farming communities about the benefits of IPM technologies in protecting the environment, which could not be quantified in 'dollar' terms.

In 1996, ICRISAT scientists initiated a project to test IPM on chickpea, pigeonpea and peanut in collaboration with the Indian national programs and NGOs in Maharashtra and Andhra Pradesh states.

Conclusions

These studies showed clearly that involving farmers in research targeted at improving the food security and overall livelihoods in risk-prone environments is extremely important in order to focus on the 'right' issues and materials. This approach can directly improve the efficiency of research, even though it is expensive and often cumbersome for scientists.

If effective involvement of farmers in the evaluation and selection of improved genotypes is sought, the most acceptable varieties can be rapidly identified and the time span between variety testing, release and seed dissemination shortened

In essence, these experiments showed that careful implementation of IPM practices could reduce input cost with little loss in yield

It is imperative that such success stories be repeated over and over again to provide similar benefits in many other parts of the world.

dramatically. Our results and observations indicate that local non-government organisations can be effective links between researchers and farmers at various stages of technology development and its transfer.

There is no doubt that appropriate targeting will help to maximise the returns from such a program. However, new varieties can only be grown if farmers have adequate and timely access to good quality seed. Availability of seed of preferred varieties is a problem in regions with highly variable demand for seeds or poorly developed infrastructure. Supplementing efforts of GOs with NGOs can be of great help in the supply of seed in time to farmers.

The two case studies presented are the direct outcomes of a team effort, involving scientists, farmers and extension agencies (GOs and NGOs). It is imperative that such success stories be repeated over and over again to provide similar benefits in many other parts of the world.

It is the call of the day, to scientists and donor agencies, to consider tapping into the available vast pool of human resources, experience and local knowledge in the Third World, to make the dream of 'the upliftment of the resource-poor people thriving in risk-prone environments' a reality.

Acknowledgments

I thank Dr Eva Weltzein and Dr G.V. Ranga Rao for their involvement in the preparation of this address.

I also thank Dr Jim Ryan, Director General of ICRISAT, for giving me this opportunity and I am grateful to Dr Alex Buchanan of the Crawford Fund and other organisers of this seminar for readily accepting my participation.

The farmers' participatory research on pearl millet was supported by the Watershed Development of the State Government of Rajasthan, India and the German Agency for Technical Cooperation (GTZ). The on-farm research on IPM in India is supported by the U.K. Overseas Development Administration (ODA).



MS BERIS GWYNNE, GROUP EXECUTIVE, INTERNATIONAL AND INDIGENOUS PROGRAMS, WORLD VISION AUSTRALIA

Since graduating from Queensland's James Cook University in 1971, Beris Gwynne has worked with the Department of Foreign Affairs and Trade serving in Vietnam, Poland, Mexico and Nauru. She joined the Australian Agency for International Development (AusAID) in 1989 where she was at one time responsible for Australia's aid relations with Japan, before she took responsibility for AusAID's technical co-operation program in China. She began to take a wider interest in non-government organisations working in aid development programs and joined World Vision Australia in 1993.

Friends or Foes? A Summing Up

BERIS GWYNNE

GROUP EXECUTIVE FOR INTERNATIONAL AND INDIGENOUS PROGRAMS,
WORLD VISION AUSTRALIA

It is indeed a difficult task to sum up what has been an extraordinarily interesting and very educational day for me. As Alex Buchanan has said, it should come as no surprise to many of you that the germ for today's seminar originated in conversations with Derek Tribe, which led to the involvement of Alex, myself and other colleagues.

I would like to pay particular tribute to the organisation undertaken by the Crawford Fund. We at World Vision Australia were delighted to be a partner in this exercise but it's largely the Fund's expertise in arranging a seminar of this kind that is evident today.

My role today is to review the program and to extract a number of themes that have emerged. I may not capture everything that you have picked up individually but hopefully I'll be able to give a short summation.

We began our day with two very useful presentations which provided us with not only a context but also a large number of challenges, which we face both individually and collectively. We talked about the impact of globalisation and how we are increasingly the victims of speed of technological change which is quite mind boggling. We spoke about globalisation in terms of world economic and political developments and how we as organisations are often not in positions to influence the turn of events.

We talked about the rise or ascendancy of economic rationalism, and how the end of the cold war has led to more and more people being concerned with economic development objectives but less and less concerned, it seems, about the 800 million people who go to bed hungry every day.

Even within our own country, while we have our own poor and disadvantaged, the emphasis is still on less government

...we as organisations are often not in positions to influence the turn of events.

...we will continue to fail if we do not seek to work together.

intervention and more private sector engagement. This is so even in circumstances where, as has been pointed out today, we are naive to presume that the private sector will be the engine for progress.

We've looked at the reduced investment in aid. While this is true for the Australian aid program, I was delighted to hear the Minister confirm that agricultural development is still a major sector of interest and priority. Nevertheless over time in a diminishing aid budget it would be fair to say that agricultural investment, although constant, has declined relative to the need and relative to expenditure in other areas outside the aid program.

We see these somewhat negative trends against a background of extraordinary need. As has been pointed out, not only are we facing an increase in absolute numbers of poor, we are facing increases in the gap between those who have and those who have not, which are growing exponentially.

Against that background I don't think any of us can escape the need to review our own position as individuals and the attitudes and activities of our respective organisations. As Chris Bonte-Friedheim pointed out to us, if we look back it is evident that, despite the enormous and very satisfying achievements we are able to identify around the world, we are in fact losing ground. None of us can take a great deal of satisfaction because we have failed to reverse this trend, and we will continue to fail if we do not seek to work together.

If anything, we have proven again today that competition and combat are not only inhibiting our collaboration, but are probably causing real damage. Against this background we need to challenge our stereotyping of one another. It's possible I'm speaking here already to the converted. As session chair Janet Hunt pointed out we have scientists working among NGOs, we have NGO staff working with scientific organisations. Collectively we have a group of people who see beyond the short term, who see beyond national borders, to a global environment which is in crisis.

What are the implications for us then at the conclusion of this day's discussion?

It has been pointed out to us that we sit here in relative comfort. I think it is time for us to reacquaint ourselves with the needs that exist.

Many of us have travelled, many of us have experienced situations in countries which are less privileged than our own, but our sensitivities seem to have become dulled. We need to confront one another, our governments, the general public, and our co-workers with the needs that exist and the urgent need for action.

We must promote the involvement of those of us who see civil society and participatory development as providing the key both in Australia and overseas. We need therefore to challenge our donor agencies, both national and international, the inter-governmental organisations, the foundations who support the scientific fraternity, non-government agencies and the community at large.

Australia has a comparative advantage in the agriculture/food security field. Somehow we have failed to exploit that to full effect. We need to review our strategies together to maximise our resources for this work.

How do we go about selecting partners? World Vision is not the only non-government agency working in this field. There are many. And its not necessarily the case that big is better because in some respects, as we've just discussed, scaling up is not about size but professional capacity, technical expertise and a willingness to think outside the box—something we have tried to do in moving from a discussion of agricultural technology or development to food security issues.

We have to find people who are sympathetic. Hopefully, like me, you have been busily networking today, because here we have people who have already recognised the need to work together in an integrated approach, both horizontally and vertically.

We need the sort of horizontal integration that reflects the complex human development dynamics that we deal with, because it is impossible for us to work in one area without identifying needs in other sectors that will impact on our success both in the short and long term. During the course of the day we heard people speak of employment, we heard people speak of water, we heard people speak of health. I was especially gratified to hear a number of references to the role played by women and endorsement of an inter-generational approach that reflects our concern for today's children and young people, because they are the future.

Horizontal integration is summed up in Joe DeVries' assertion that it is the ability to live a healthy and active life which should be the primary focus of our attempts to measure the beginnings of economic development.

Vertical integration refers not only to the need for awareness-raising through education and advocacy but also to the integration of activities from the community development aspect, through local, provincial and national administrative levels. I identify strongly with Chris's point about building national infrastructure, incorporating intergovernmental and international linkages.

Australia has a comparative advantage in the agriculture/food security field. Somehow we have failed to exploit that to full effect.

...it is the ability to live a healthy and active life which should be the primary focus of our attempts to measure the beginnings of economic development.

...I have found that it is people-focused assistance that will bring sustainable transformational development through attitudinal change.

In this context, it is imperative that we deal with the issue of brain drain, that we work as World Vision does with national offices that are largely staffed by nationals of the countries concerned, building local capacity. We must look at whether our organisations are contributing to the depletion of recipient government resources, particularly in rural areas, and find ways to ensure that these resources remain in-country.

Finally, on the operational level, we've heard about the importance of people-focused development. From my dealings with the rural poor and the agricultural sector I have found that it is people-focused assistance that will bring sustainable transformational development through attitudinal change, and through popularisation of low-cost technologies that are accessible and readily available.

One aspect which didn't receive a lot of attention today was that of evaluation.

I would like to suggest that both scientific, NGO and other members of the development constituency need to be far more rigorous and frank with one another in evaluations of work to date, and be willing to share lessons learned so that we can move forward.

In the paper so ably presented on behalf of Robert Blake there was a reference to 'surprisingly little concern about the food security-agricultural development issues on a global scale and little sense of urgency'.

Against the needs previously discussed, we remind ourselves that resource allocation is a matter of choice.

Australians spend half a billion dollars on weight loss programs every year; we spend another \$350 million on health supplements; we spend a billion dollars on sports equipment and running shoes; we spend \$1.4 billion on icecream—\$60 per capita per year—we each spend \$700 a year eating out, making a \$12 billion industry; \$5 billion in fast food sales, \$1.1 billion dollars in take-away, \$6 billion in revenue for beer sales. Australians in 1994-95 spent a total of \$61 billion on all forms of gambling. Our losses through gambling in 1995-96 totalled \$9.4 billion.

When confronted with these facts, the reference to risk-taking takes on a different meaning. Our risk is small when the resources are within our reach. And the challenge posed to us was to assess the price of failure if we don't respond adequately. People are dying for lack of safe water, food, access to education and basic health services and so on. We need to be proactive.

I would like to close by thanking the Crawford Fund again, particularly for their generous-spirited collaboration. They

took us on as a well-intentioned and certainly very committed partner but it has been their extraordinary professionalism which has been demonstrated in the organisation of this seminar. I would like to thank all of our speakers and the chair-people. I'd like to thank the sponsors who've contributed financially, and also those who've helped behind the scenes, because events like this don't happen without the many unnamed people putting in long hours to draw things together.

I'd like to conclude by once more quoting Chris Bonte-Friedheim who reminded us that 'the bad guys will win if the good guys don't fight', and to quote Robert Blake who said, 'We neglect this issue at our peril. It's time to get moving'!

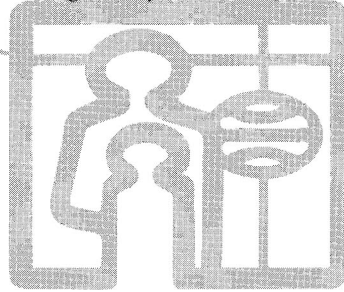
Thank you very much for your presence and participation. I look forward to much closer collaboration in the years to come for the sake of the world's poor.

'the bad guys will win if the good guys don't fight'.



DR CHRISTIAN BONTE-FRIEDHEIM, FORMER DIRECTOR GENERAL OF THE INTERNATIONAL SERVICE FOR NATIONAL AGRICULTURAL RESEARCH (ISNAR), THE NETHERLANDS

FARMING FOREVER is the transcript of an address given by Dr Bonte-Friedheim to the National Press Club in Canberra on 9 April 1997.



Farming Forever: Research Challenges for Food Production for the 21st Century

CHRISTIAN BONTE-FRIEDHEIM

FORMER DIRECTOR GENERAL, INTERNATIONAL SERVICE FOR NATIONAL AGRICULTURAL RESEARCH

Australia's Contributions to Global Food Issues

In a national context and on a comparative basis, Australia has relatively few problems, if any, in feeding its people now and for decades to come. Food security is as high in Australia as in almost any country. Yet, during the last 55 years, no other country has produced leaders who, in an international context, have been concerned more, and have had greater influence on long and medium term food security issues than two Australians.

First it was Frank McDougall who successfully convinced President and Mrs Franklin Roosevelt during the final years of World War II that the war would result in widespread hunger. A common front was needed and the Food and Agriculture Organisation (FAO) of the United Nations was founded in 1946. There can be little doubt that the FAO has always been concerned first and foremost with hunger.

About 25 years later it was Sir John Crawford, who can be regarded as the founder of international agricultural research, funded as a system through the Consultative Group on International Agricultural Research, the so-called CGIAR. Sir John Crawford's vision, expertise and persuasive powers led the rich countries to jointly support international agricultural research. The CGIAR has now become an association of more than 50 private and public sector members, including developing countries, supporting a network of 16 international agricultural research centres.

Of the 16 international agricultural research centres of the CGIAR, four have Australians as their Directors General. The two International Agricultural Research Centres dealing with major food grains, rice as well as wheat and maize, have

Sir John Crawford's vision, expertise and persuasive powers led the rich countries to jointly support international agricultural research.

Australians as their leaders. The centre in Hyderabad in India, working mainly on pulses for and in the dry areas, and the centre for aquatic resources in Manila also have Australian Directors General. Another centre is directed by a New Zealander. In addition there are four international agricultural research centres, which for different reasons do not belong to the CGIAR, but are of similar importance. One of these four centres, concentrating on soil research, is headed by an Australian.

The successes of the work of the CG centres are manifold. Best known is the Green Revolution. For his scientific achievements with high-yielding cereals, the American research leader, Norman Borlaug received the Nobel Peace Prize, the first and only agriculturalist ever so honoured.

I have worked for international agricultural development and research institutions for almost 30 years. They would not exist in their present form without the contributions of outstanding Australians. Past and present, Australia has provided valuable leadership in international agricultural research.

Future Challenges

In a global context and on a worldwide basis, we, that is the past, present and future generations, are all challenged in the following ways:

- to overcome hunger and malnutrition and to feed a still-growing world population;
- to protect the endangered environment and shrinking natural resources;
- to contribute solutions to growing poverty and rising tensions between rich and poor, urban and rural people.

While there are numerous challenges to research, in the final analysis, when we talk about necessary, sustainable food production increases, we talk about a war against HUNGER. We must fight today's hunger, while at the same time ensure that our current actions will not increase, but rather reduce future hunger in the world. It is our greatest challenge and responsibility to eliminate hunger permanently from the globe.

There are many factors contributing to present and future hunger. To repeat, they are: population growth, depletion of the environment, shrinking of the quantity and quality of our natural resource base, growing unemployment and different forms of poverty. These factors influence the hunger situation not only currently, but also in the future.

Every generation is responsible both for its actions and for its inability or unwillingness to act, and to act at the right time.

It is our greatest challenge and responsibility to eliminate hunger permanently from the globe.

The challenges posed by the hunger problem are not restricted to agriculturalists, or to people in a few countries, or to the older generation, or to any specific group. The challenges concern all of us, especially our leaders and policy makers.

There can be little doubt, we must also do better than previous generations. To do just as well as they did is no longer sufficient for the survival of our children born now, and for the children living in the second half of the next century. Most of our grandparents or great grandparents at the end of the last century faced a much more favourable outlook. Then, the world population grew by about 30 000 people per day. Now every day there are more than 215 000 additional mouths to feed, necessary social services to provide, and sufficient work places to create. It is sciences related to natural resources and the environment, to agriculture, forestry, and fisheries which face the greatest challenges in the future.

If we want to prepare ourselves for worldwide research challenges in all the decades of the next century, then we must start with a diagnosis or an inventory of the present global issues and developments.

Population Growth

To begin with there is the population growth of this century. The facts are easy to remember. In the first three decades of the 20th century the world population rose by about 25%, during the next three decades, and in spite of the great human losses in World War II, the population grew by about 50%. During the three decades from 1960 to 1990 there was a 75% increase. It is only now that the rate of growth seems to be decreasing. There is hope!

It is well known that the world's population is not growing evenly, some regions have faster growth than others. The population density distribution provides a mostly unfamiliar picture of our world.

While population growth seems to decrease slowly, the expected income growth will not only increase the total demand for food, but for higher quality cereals like wheat, fruits, vegetables, and for livestock products.

Another factor of concern to us for the next century is the very fast growth of urban areas. It can be expected that in less than 20 years, more than half of the world's population will be living in cities.

This development will have repercussions on national and local food preferences, on food habits and food marketing. Many countries will become dependent on imported food,

There can be little doubt, we must also do better than previous generations.

There can be little doubt that poverty alleviation reduces social disruption, political destabilisation and environmental destruction.

mainly grains, which they cannot produce in sufficient quantities locally. The further increase of political support for expanding urban areas will lead to a continuing neglect of rural development. In relative terms this will weaken social and economic conditions outside the cities. Furthermore, national, regional and global land and water requirements will be greatly affected through urbanisation.

If the world does not produce sufficient food for all in the future, then consumption patterns and eating habits will have to change. Fewer animal products, but more plant calories will be required.

Poverty

Similarly, another great concern should be the growing poverty problem. There can be little doubt that poverty alleviation reduces social disruption, political destabilisation and environmental destruction. The world's GNP is certainly very unevenly distributed. This problem exists and grows within countries and between countries.

Australians, like people in other industrialised countries, are part of the top 20% of the present world population in terms of per capita GNP. The rich especially must accept certain responsibilities, not only for other people but also for future generations. Most rich people believe in globalisation, in free trade, free movement of capital, of information and of knowledge, but not in free movement of labour. If the present uneven distribution of wealth and hunger cannot be changed, then tensions will grow and the pressure for free movement of labour will rise. The Roman philosopher Seneca was certainly aware of the issues when he stated:

'A hungry people listens not to reason nor cares for justice, nor is bent by any prayers.'

As indicated, world-wide there is at present no shortage of food or of the capacity to produce sufficient food. There is, however, a distribution problem. There is a serious shortage of income to buy food—a poverty problem. Today there are about 800 million people undernourished. They each need an additional 200–300 calories per day. The calories required by the 800 million undernourished are equal to the total consumption of the annual population increase of 80 million people.

Until November last year, it was expected that there would be an additional 90 million mouths to feed each year. In the global farming community this was not considered a real problem.

Now it is expected that there will be at least 10 million less people to feed each year. The food needs of these 10 million people would suffice to reduce 100 million undernourished from the group of hungry. From a production point of view, in 8 years there need not be any hungry people, if everyone were serious about the need to find a solution for every hungry woman, man and child. The financial resources to purchase the necessary food for 800 million hungry would only be a small share of what is spent each year on arms.

This rather optimistic view of a potentially quick solution of the food problem of the hungry is not widely shared by world leaders. They are only convinced that it may be possible to reduce the number of hungry by half in about 17 years. At that time there will then be 400 million people, most of them children, suffering from malnutrition and disease, and unable to lead a normal, productive life. Africa continues to be the region with the most serious food production, malnutrition and hunger problems.

The additional food required during the next 10 years could come from raising the average yields of the better farmers, to bring them closer to the yield level of high producing countries. Such productivity would still be far below the yields of the best farmers, or of the land productivity in the research stations. Such necessary yield increases require inputs, technologies, and knowledge.

Land

If the world's growing population requires sufficient food, then more food must be produced. The production increases can come by putting more land into cultivation, as has been man's traditional response, not only during the last 200 or 300 years but since farming began. However, there are many countries as well as whole regions which have no reserves of agricultural land. Reserves of yet uncultivated land are restricted to a few countries, especially in the Americas, Sub-Saharan Africa and Central Asia.

The land carrying capacity for people and livestock has already been exceeded in many places, not only with the use of traditional farming methods, but even with improved and better management practices. Little new land can be cultivated for food crops. Another, but widely unacceptable option, would be to clear more land of forest.

There can be no doubt that on a per capita basis, life-supporting resources like forests, cropland and irrigated areas will decrease constantly. We know that on a worldwide basis productive agricultural land, often of high potential, will not

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We know that on a worldwide basis productive agricultural land, often of high potential, will not increase but will shrink faster and faster.

For many countries, national water security will be equal to, or even more important than, food security.

increase but will shrink faster and faster. If land needs are to be met for a growing population to develop its infrastructure, industries, social services and recreation facilities, only two approaches seem feasible. Where there is no additional new land, then the productivity of the already cultivated land must be increased; and presently under-used high-potential as well as low-potential land must become more productive and must produce more food. In addition, less land must be used to produce non-food crops.

Farmers have complained for decades about industry's success in using non-renewable raw material instead of agricultural commodities. It started with dyes, but included fibres, rubber, sugar, drinks and other plant and also animal products, like wool or casings. Successes so far achieved by industry are impressive. New sources of raw material can and will be identified through industry's profit-driven research and development work.

Water

There is another, so-called minimum factor which will greatly affect not only agricultural production, but also human life. This most vital life-sustaining resource is water. It must be stressed that over 1 billion people have no access to clean water. Water, like agricultural land, is also unevenly distributed on our globe.

Irrigated land is the most productive land. Further irrigation expansion is mainly limited due to high costs. At the same time the water storage capacity is decreasing. Many dams are silting up due to soil erosion. Less irrigation water will be available in future in many countries. Some countries are concerned about the need for necessary international water agreements to share water resources.

There are many countries, especially in the Near East region, where water resources are insufficient for national food security. For many countries, national water security will be equal to, or even more important than, food security. Water scarcity has been and will in future lead to tensions between countries, but also between agriculture and industry, between urban and rural sectors.

Deep groundwater reserves are already being depleted, endangering the survival of future generations. At the same time water is still being wasted. All aspects of research related to water, its preservation and use, as well as its management aspects seem to be ideal for international cooperation and collaboration. This is a special challenge for Australia.

Most calories produced for human consumption from high quality foods use more high-potential land. Even more important, they require more water.

Energy and Plant Nutrients

Of the various natural resources which are needed to overcome hunger, there are two important ones that must be managed at the national as well as at the international level. They are the reserves of non-renewable energy and plant nutrients, especially phosphates. Until now little attention was given to them. International agricultural research and resources management have hardly been involved with non-renewable energies, as agriculture is a relatively small consumer. Research on the production of renewable energy from agriculture has only started on a small scale.

With regard to phosphates: the standard planning horizon is in years and decades and not in centuries. Phosphate as a very basic plant nutrient is likely to become a problem in the 22nd or 23rd century. It is not known if and how plants will grow without phosphates. Where, outside the bottom of the oceans, will the necessary reserves be found, or how will phosphate be recycled in sufficient quantities?

Research Tasks

Global food production research requires more international resource management than ever before. The management or mismanagement of many natural resources can have regional or even global effects. There must be more cooperation between the strong countries, and more international support for the weak countries. A common strategy, and coordinated action at all levels, is likely to ensure some success in natural resources management.

If farmers must produce more with less environmentally damaging pollution and degradation, then national and international agricultural research has major medium- and long-term tasks.

Why are short-term food production problems less important for agricultural research? Agricultural research requires about one decade to produce generally applicable results and technologies. Therefore, in order to solve the present problems, already existing technologies must be more widely adapted and adopted.

For the period beyond 2010 research priorities must be set now, and very soon the necessary resources (financial as well as human) must be obtained and committed. Many, mostly multi-

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disciplinary, programs must be initiated to increase the chances of success. Without additional resources, without improved collaboration, but especially without better public understanding of the problems, without a wide support in our society for the need to apply modern scientific knowledge and technologies, especially biotechnologies, the chances are not very bright to secure the necessary support, to attract the required brains and to obtain the financial resources.

In most countries there is a lack of open debate with the opponents of the use of science-based technologies for food production. Biological, organic production can provide food for the very rich, but can neither feed all the poor nor the world's total population. What options will we have to solve the hunger problem, without the application of modern sciences for agricultural production? Medical research benefits all people, especially the sick—not the doctors. Agricultural research benefits all consumers, especially the hungry—not the farmers.

Agricultural research must be used to decrease the limitations and effects of natural negative stress factors on plants. Cold and heat stresses, moisture stresses, and stresses related to low soil fertility must be diminished. Similarly, research must develop technologies to reduce losses. Diseases and pests, coupled with competition between food plants and weeds, waste scarce resources and reduce yields. Since there are wild plants and different species which can live, and often do live well under different stress factors, the genetic make-up and structure of food plants must be changed accordingly.

There can be little doubt that with access to knowledge for all, with sufficient brains, funds and programs, success is possible. One day the genetic make-up of major grain plants will be redesigned. They will survive in brackish or salt water, grow on poor soils and produce in cooler temperatures. They will absorb nitrogen from the air, thereby not only reducing costs of production but also providing some very positive environmental effects. One day sorghum, millet and rice will produce the amino acids and vitamins required for good health and growth. Food plants will become more tolerant to high ozone concentration and ultra violet radiation.

Smarter Farming

There needs to be a new approach to natural resources management and food production. Research must be much more interdisciplinary than before. Research on natural resources management in the past was mainly site-specific. Generalisation and identification of spillover effects proved

difficult, unless related to ecoregions. Such regions are homogeneous, agroecological zones that are regionally defined, either ecologically, economically, or politically. With better knowledge of the resource base, with integrated knowledge at all levels of plant biology, and possible integration across commodities, the ecoregional approach is a useful tool that will optimise the use of natural resources for food production.

Natural resource management research, as the basis for increased food production, has a great future. In the past all countries had smart farmers. But smart farming is not sufficient for the future, it must be smarter, research-based precision farming. The means already exist to use the available smarter precision farming technologies better and to develop new ones. The basis is detailed knowledge and its full application.

Today's farmer should know the farm as grandmother used to know her vegetable garden, i.e. for every square metre she knew the soil and its fertility, fertiliser requirements, the weed situation, the pests. In the past such knowledge for farm paddocks was lacking and far too expensive to collect, to store and to use for all paddocks. With today's existing and steadily improved technologies, it can be done.

Farmers have always used paddocks as their management units. They have measured or perceived the farming conditions, the soils, the plants, and then acted accordingly. They have always tried to measure, but then they have averaged the yields and the inputs. Certain parts of the paddocks got too much irrigation water or too little, and too much or too little fertiliser or pesticides. Some parts of the paddocks were harvested too early—other parts too late. As a result the yields were only average.

With the application of modern remote sensing and computer technologies the agroecological conditions of each paddock can be characterised in detail. The variability in space and time needs to be defined and requires new technologies and expertise. The paddocks will be subdivided, not with straight lines but each time with different and shifting internal boundaries, in accordance with the existing situation and specific field work. Industry, not science, seems to lead the way. The results of applying smarter, precision farming methods will be cost savings, with less waste of labour, water, fertilisers and other inputs. There will also be much lower pollution levels, as only part of the field will be sprayed and the doses will change in order to optimise results.

All smarter, precision farming approaches will have two aims: to increase the average yield to match the high yield level of small plots within the paddock, and to approach the genetic

Today's farmer should know the farm as grandmother used to know her vegetable garden...

The results of applying smarter, precision farming methods will be cost savings, with less waste of labour, water, fertilisers and other inputs.

large parts of the world's former gene pool are lost forever, others do not exist any longer outside the gene banks.

production limit of each plant. Such approaches will allow a doubling of the yield level of most paddocks.

Few farmers will be able to master all new technologies, nor will farms be large enough to afford all the required equipment for smarter precision farming. A new farming service industry will develop, providing data, supplying equipment and imparting knowledge and thus ensuring that smaller farmers can also benefit.

The wide application of smarter precision farming technologies will push the hunger problem back by at least 10–15 years, will provide time for agricultural research to improve the natural conditions and farming systems, and for biotechnologists to breed and design new plants to fight hunger.

Save the Globe's Genetic Resources

Research must also produce vital environmental benefits for science-based as well as traditional farming, not just for the rich and the larger producers, but desirable, affordable and profitable for every farmer. However, in spite of such an optimistic view, there are some specific future problems linked to natural resources and the environment. This generation, and especially the CGIAR system, has been able to collect most of the genetic resources of important food crops. This great achievement cannot be repeated. The costs of such an exercise would be prohibitive. In addition, large parts of the world's former gene pool are lost forever, others do not exist any longer outside the gene banks. We are losing plant and animal genetic resources, as well as other forms of life, at an ever increasing speed. Their value to future generations cannot be estimated, as we are not sure either of the quality nor of the quantity of each day's losses. Research must start now on an increasing scale to save samples of all forms of life, especially those which are endangered.

Closing Remarks

From now on, there will be fewer natural resources for more people. We will therefore require more production from a shrinking resource base.

Only with more basic, strategic, applied and adaptive research, and closer links between all researchers, and between researchers and producers, can the optimistic view of a future with more food per person be achieved. In all countries researchers and farmers need access to knowledge, which has become a very important production factor for their work. Education and training need to be improved, especially in the

developing countries and in rural areas. Poverty is not only a lack of income, of food and clean drinking water. Poverty is a widespread lack of employment opportunities, and good health and social services. Poverty is expressed in bad roads and transport, poor communication linkages, inadequate housing and energy, and in substandard or non-existent recreational facilities. If urban areas have less of such poverty, there will be a migration from the rural areas. In all developed and developing countries this will have far-reaching consequences.

Are our governments giving the necessary priority at home and abroad to rural development, to food and the environment?

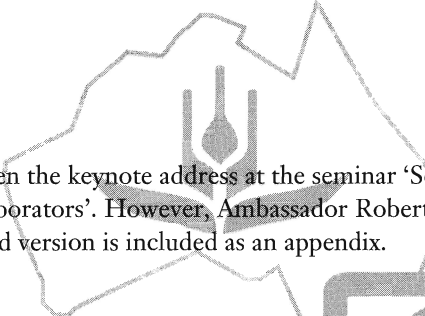
A hundred years ago in April 1897, some concerned people sat together in Europe. There were less than 1000 days until the beginning of the 20th century. Militarisation of the European powers, the colonial aspirations of these powers, and the status of women in society were their main concerns. Their actions were insufficient to prevent two world wars. Many millions of people were killed by Bolshevism, and through the actions of Hitler, Stalin and others.

We, not just a few but many people in all countries with outstanding technologies, should be concerned and communicate together about the next century, about unemployment and poverty, about hunger and the suffering environment, and about the well-being of the globe.

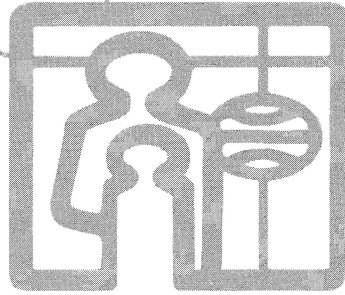
Let us act and act now—not too little and not too late. Let us be able to face in 100 years in 2097, one thousand days before the 22nd century, the judgement of our grandchildren, and let us not be found guilty or even wanting.

The tasks to overcome hunger and for FOOD FIRST are becoming ever more difficult and require new national and international policies. At the same time there is the beginning of a new era of globalisation of the economy, of science, including agricultural research. It must be guaranteed that the changes will provide benefits to most, if not to all, people. The losers will need support programs, and the winners must not take all.

Let us act and act now—not too little and not too late.



This was to have been the keynote address at the seminar 'Scientists, NGOs and the poor: competitors combatants or collaborators'. However, Ambassador Robert Blake was unable to present it. For information, this abridged version is included as an appendix.



APPENDIX

Farmers, Scientists, and NGOs: Time to Get Moving Together

ROBERT O. BLAKE

CHAIRMAN, US COMMITTEE ON AGRICULTURAL SUSTAINABILITY, WASHINGTON DC

I am honoured to contribute to the Crawford Fund–World Vision seminar on NGOs, scientists, and the poor. Let me start with my interpretation of the title of the seminar and—more to the point—define what parts of this potentially boundless topic I will try to address.

I will consider NGOs that work on rural problems in the developing countries of Africa, Asia and Latin America, but not NGOs in general. I will discuss the challenges facing scientists that work on the agricultural and rural problems of the developing countries and specifically how—and how well—they work with NGOs and poor farmers. And I will explore some of the problems of liberating the poor farmers and the landless people of Africa, Asia and Latin America from the yoke of poverty—and how NGOs and scientists fit in.

But I will not say much about the urban poor of the south, and nothing about the poor of the industrial countries. I will note some of the vital links between NGOs in industrial and in developing countries and among scientists north and south—and I will try to show how valuable they are. The commentator Jessica Matthews recently pointed out that NGOs and international cross-border NGO networks have already bridged north–south differences that in earlier times paralysed cooperation among countries. I hope we can count on this in the future.

But in my view, just looking at the relationships between the NGOs, scientists and the poor would not give a clear enough view of the dynamics of fighting rural poverty—or, for that matter, of promoting better natural resource management or food security—two areas so closely related that we must think about all of them together. In fact, if the name weren't so clumsy, I would be inclined to call the seminar *NGOs, Scientists, Governments, International Institutions, Civil Societies, the Poor and a Thousand Wings that by Working Together They Can Beat Poverty, Feed the World, and Lead Us to Heaven*. Although I won't inflict that on readers, I will try to bring some of these other elements into our discussion—including heaven!

A Rapidly Changing World

Before exploring all these relationships, I want to examine them in the context of the very different phase of our planet's history that we're just entering. Of course, the

world has always been in transition, and the chroniclers in every period have claimed that they were living through times of exceptionally rapid change. Are we who live at the turn of another century really any different? I think so. We're different because of the scale, the speed, the global nature, and the more than usual unpredictability of these changes. *More* is changing—and it is changing faster. Changes are interconnected and are communicated further afield.

In more concrete terms, I want to suggest several trends that should be of special interest or concern in today's world. The first is the realignment of power that is taking place within every society. Governments are finding that their control over some of the resources that matter most—money, information—is decreasing. It's growing clearer that no power centre can hope at this stage to control money *or* information.

At the same time power is moving away from national centres to regional and local groups. And not even the most powerful government nor any international organisation can avoid being moved in unplanned, unchosen directions by international public opinion. The global NGO movement is both a symptom and cause of this power shift. In country after country, NGOs have power they've never enjoyed before. All of this is related to the communications revolution we're now entering, but it goes much further.

The second trend is the emergence of a truly global economy: where industry and agriculture move infinitely more products in a market that every day is more global. Connected to this is the fact that big parts of what we call the developing world—now significantly referred to in today's language as 'the emerging markets'—are enjoying new affluence, albeit unequally distributed.

A third crucial trend: population is increasing, in absolute numbers at least, at faster rates than at any time in human history. Around 90 per cent of this growth is in Africa, Asia, and Latin America. Along with growing middle-class prosperity, ballooning population is creating a need to double food production in some 20 years.

This unprecedented challenge to food security can probably be met at least in the short- and mid-term. But it will be hard to produce enough food in parts of Africa, South Asia and Latin America—especially for the poor. This means that all farmers, at least theoretically, will have to intensify production. The need for agricultural intensification is a theme that will occur in all today's discussions.

Fourth, there is a growing gap in income and living standards between, on one side, the affluent industrial countries plus a few increasingly prosperous countries in East Asia and Latin America, and the poor developing countries on the other. And within almost every country—industrial and developing—there is growing disparity between the poor and the more affluent.

Finally, with the end of the Cold War, the United States and many industrial powers have—unwisely, I believe—lost much of their earlier interest in and concern about the developing countries, except as it concerns trade and security.

The problems created by these trends will affect every aspect of rural life and rural development. The challenges they present to NGOs—globally and in every country—are enormous. If power is gravitating at the same time both down and out, and if national governments are losing their power and ability to cope, to what extent

can NGOs—that now tend to operate on a small scale—fill the gaps left by faltering governments? Especially in the countryside, can NGOs aspire to create the elements of a system for defeating rural poverty from a thousand disparate elements? Will there be NGOs that will want to tackle these very dynamic, very complex problems? And can NGOs respond effectively without losing the passion, the intimacy of approach, the independence of mind, and the imagination that have made them so unique and valuable?

A New Paradigm of Rural Development

In my view farmers must be central players in my strategy for defeating rural poverty and meeting the food needs of an increasingly crowded world. Their attitudes and limitations are the parameters within which NGOs, scientists and governments must act. They are the key players on the rural scene because what they decide to do with their land and their labor is the most important element in whether or not rural poverty can be defeated and natural resources managed better. Farmers, after all, decide what and when to plant, when to water and weed, when to harvest, whether to leave the farm for part-time work or, as is happening increasingly in every part of the world, whether to abandon rural life entirely and move to the city.

You can have good government policies, more effective incentives and even good rural infrastructure. You can also have good agricultural technology to offer for the farmers' adaptation. But if their attitude towards new opportunities and old risks is not favourable, these other factors seldom come into play, at least in any decisive way.

All this has led me to the conclusion that promotion of participatory rural development centered on the farmer is the surest way today to equitable and sustainable rural development. More and more scientists, NGOs, even governments and development institutions are recognising the validity of this thesis. That is important, but more important is the growing number of farmers embracing community-based development.

Not that community-based farming is so very new. It's been around almost as long as the organised cultivation of plants and animals that we've come to call agriculture. What is new is the farmers' sense that old ways of organising farming are simply not good enough. I find that rural people everywhere are beginning to see this as a fact of life, even though most of them are yet to embrace some form of community-based farming.

Most farmers don't particularly like change. They know that they will have to take most of the risks and provide most of the labour to implement any new ways that outsiders propose. In fact, experience shows that farmers don't willingly change unless and until they believe it will be in their interests and in line with their own aims and limitations to do so.

Much of the failure of government-sponsored and donor-sponsored rural development has come from trying to apply top-down, 'outsider knows best' methods. Even in the recent past it was the expatriate rural 'expert' who called most of the shots. But once the outside 'expert' and the outside financing disappeared, most farmers would resume their old ways.

If the problems of rural poverty had been easy, they would have been solved long ago. The average dirt farmer is not Thomas Jefferson's ideal 'man of the soil'. Poor farmers are survivors and they know their land. We must not idealise them.

Since over half the farmers in the developing countries are women, promoting their welfare must have a much higher priority than almost anyone has so far given it, or in fact has often known how to give. Women farmers in developing countries may be the most overworked and under compensated group on this planet. Their responsibilities continue to grow as men move off the farm for full-time or part-time work in the cities. It's no wonder they welcome the extra labor that a large family provides. It's also no wonder that they tend to be suspicious of almost anything that will mean more work.

A New Breed of Rural Leader

I'm afraid that the above picture of farmers' lives could be considered too negative because it seems to emphasise farmers' desire to avoid risks and change. This does reflect the attitude of a great many farmers. But there are also many others with a brighter vision for their family, their community, their tribe, and their country. Given the right circumstances these are the leaders that most other farmers follow. Many have also become leaders in the NGO movement. It is such people who, with a little outside encouragement, have given impetus to the kind of community-based farming that in many developing countries is the most dynamic aspect of rural life today. Of course, there are always other people with ambitions that go well beyond the farm. Over the years, the best of them have moved on to the cities in search of education, and a richer life, and in the process become part of the urban elite.

Fortunately, there is also a growing number of leaders in the developing countries outside the farming communities who also have broader visions of what rural life can be. Most tend to be people with rural backgrounds. Many of these 'new style' leaders are fighting to entrench democratic values, to secure the rights of people to participate in deciding issues of concern to them, and to hold politicians more accountable for what they do and don't do.

These efforts should logically lead to greater rural empowerment. But rural empowerment is a cause that has not drawn much enthusiasm from urban elites or from the politicians that depend on those elites for support. There are, of course, countries where rural empowerment has moved briskly ahead and where farmers are politically active. The world's largest democracy, India, comes to mind—talk about feisty, politically active farmers and landless people!

There is one important national goal, however, which is not likely to enjoy a high priority with farmers, with most NGOs, or with developing country leaders. It is the promotion of national food security and the need to intensify agricultural production in order to achieve it. In developing countries where I've recently had the opportunity to sound out such attitudes, I've found surprisingly little sense of urgency about food security. And as for agriculture intensification, I have detected very little interest among farmers—even farm leaders. But somehow this will have to change quickly if rural farmers are to be able to feed themselves, let alone feed their cousins in the cities. National governments—and civil society more generally—are neglecting this issue at their own peril!

NGOs and the Farmer

Talk of farmers and their instincts leads me to ponder the instincts of other key players towards the farmer, towards change, and towards rural cooperation. Perhaps my most important point is that I'm convinced that in the years just ahead, non-governmental organisations of various kinds could well do more to help the rural poor to change their lives than any other 'outside element'. With the world-wide decline in the power and relevance of government, the NGO movement is beginning to fill a dangerous vacuum in the supply of rural services that governments had—or should have—offered. Where thousands of NGOs are already working in the countryside, their number is likely to double and triple in the years just ahead.

For the purposes of this paper I will divide NGOs working with or for farmers into two groups: first, advocacy NGOs, national and international—groups that broadly speaking seek to influence rural policy and empower rural people; and second, community-based NGOs—groups that work directly with the farmers and the landless, delivering various kinds of services and helping farmers to organize production. Some NGOs fall into both categories.

Community-based Rural Development and the NGO

As much as I'm intrigued by advocacy NGOs, national and international, I am much more attracted by the potential of NGOs working at the farm level. I believe that more than any other group except perhaps the scientists, NGOs will play a key role in helping farmers achieve productivity levels that will not only raise rural living standards, but will also provide enough food for urban consumers.

But the ability of NGOs to influence independent-minded farmers must never be taken for granted. I return to my basic premise that it is what farmers think is in their own interests and within their own limitations that will determine how they react to NGOs—or anyone else. They tend to be suspicious of outsiders' motives. Like common people everywhere, they are not particularly motivated by what we call national interests—or even to any great extent by humanitarian instincts that go much beyond their village or tribe.

Let us take a quick look at what NGOs have already done to help farmers and the landless better organise their lives. The success of NGOs in promoting community-based farming among the poor is already substantial. However, it's clear that the number of successful community-based efforts must increase from the thousands to the millions. The necessary inspiration and drive for this expansion is not likely to come from the villages, but I am convinced that NGOs—perhaps even new kinds of NGOs—can increasingly step in to fill this gap.

Some pioneering work in organising successful community farming was done by the Ford Foundation through the Sukhramaji project in the Himalayan foothills in India in the 1970s. While the Ford Foundation was proud to have helped build a model, they were not in a position to help spread it. The provincial governments and several development agencies, working with and through the Indian Government, were given that assignment. Unfortunately, in most villages where the new model was tried it failed, largely because none of the responsible government agencies had enough people with the time and the patience to help the villages slowly define their problems and work out solutions.

Since then, however, Indian NGOs have made great progress in promoting community-based farming by building on local traditions of communal cooperation. There are more success stories on the subcontinent than anywhere else I know. Quite often these efforts have been led by village women. In Pakistan, the Aga Khan Foundation has done outstanding work along similar lines.

Some important help in South Asia and elsewhere came from two distinguished British social scientists, Dr. Robert Chambers and Dr. Gordon Conway; I'm proud to say that both now belong to the US Committee on Agricultural Sustainability. The techniques of problem evaluation they use, called in one case 'participatory rural appraisal', are at the same time simple and sophisticated. In one part of the process villagers are encouraged to make rather complicated maps showing how the village land is cultivated, using stones and colored objects to illustrate their points. This allows them to see what resources they have in common and then decide how they can use them better.

NGOs like OXFAM, CARE, and as I noted the Aga Khan Foundation, have helped spread these techniques to some other villages. However, none has had the resources to do this on any large scale. I believe further spread has been limited in no small part by the lack of a different—probably middle level—organisational framework designed specifically to promote scaling up—more on this later.

Another place where NGOs are already assisting farm communities, but can do more, is in helping farmers learn how to process and sell their agricultural products for greater return. Several of our committees' members—Appropriate Technology Incorporated, and World Vision, one of the seminar cosponsors—have done good work here. Better processing is particularly important for tropical products—coffee, tea, cacao, and coconut—where global competition is fierce and where quality control and reliability of delivery are both crucial and often lacking.

Another fascinating new area deserving attention is the production and sale of organic tropical products. Several NGOs that I work with are helping farming cooperatives break into the growing markets for organic products. NGO-sponsored organic coffee cooperatives in Mexico are a good example.

Providing farmers with rural credit is another place where NGOs have already made a big contribution, as was well documented by the micro-credit summit held in Washington in February. I recently saw a directory listing thousands of micro-credit NGOs at work in developing countries. And that is as it should be, because until now the big development agencies have had little success in promoting viable rural credit operations. Farmers everywhere have to depend on credit to keep their families going between harvests. I'm intrigued by the good reports I hear about micro-credit. But we must not allow today's fascination with micro-lending to become a passing fancy or to be seen as an all-around solution to rural problems.

NGOs can help with two other problems that need solving to make rural development more productive; how to provide farmers with crucial inputs and how to ensure that farmers have the rural infrastructure to get their produce to market profitably. NGOs working in countrysides have long recognised that to increase production farmers need access to reasonably priced inputs—fertilisers, improved seeds, and farm equipment. Government supply or subsidy of inputs does not work very well. Reliance on the private sector—usually on small traders that have the incentives to work with small farmers—is usually the best bet.

Providing inputs when the private sector can't or won't is a complicated task for which most NGOs tend to be unprepared. NGOs are essentially non-profit organisations—usually, for better or worse, led by kinds of people very different to the business entrepreneur. However, buyers' cooperatives provide an example of where NGOs do sometimes have a competitive advantage.

Second, infrastructure: without adequate all-weather roads, rehabilitated irrigation systems, and proper market places, storage, and transport, it has proven very difficult for farmers to move from the subsistence or barter phase of development into a market economy. But where this infrastructure does exist, rural development can often move ahead rapidly. For example, I recently visited a previously cut-off area in Cameroon where farmers were able to make a lot of money selling tomatoes to the capital city several hours away, simply because a local politician, as a matter of patronage, succeeded in getting 10 miles of feeder roads upgraded for trucks to pass to a main highway.

A brief note about storage of food products: in recent years, NGOs working in villages have helped substantially reduce postharvest losses. But if production intensifies as it must, a lot more storage space will have to be built. And this job is one that is special enough in each area for NGOs to be able to help.

Can NGOs help with infrastructure projects? With major, expensive projects probably only marginally. Rarely do they have resources or time to help build much more than a few markets or storage facilities—or perhaps help villages build some minor roads. It's just too expensive. This is a job for governments, although in a few places like India the private sector is experimenting with financing roads. At another level, however, farmers and their NGO partners can and often do have a voice about infrastructure projects, for example, by making their views known to governments about where and how roads and markets should be built. And NGOs can at times help persuade governments to make new investment in rural infrastructure.

The Scaling Up Challenge

To my mind the central challenge of rural development today is the scaling up of the kinds of projects that have already proved successful. That encompasses the scaling up of community-based farming, of finding new ways for cooperation between farmers and scientists, of NGO participation in the dissemination of more productive plants and technologies, and yes, scaling up of rural micro-credit lending—scaling up to the point where not only a few thousand farm communities are affected, but millions. This is a complex task, obviously requiring a different approach depending on what is scaled up.

Who is going to take the lead? Developing country governments? So far they haven't. In fact, most governments don't seem to have the will, the money, the right kinds of people, or the necessary confidence of the farmers. How about the bilateral donors? Some like the American and the Australian aid agencies could—and I hope will—help. But as far as I can determine the aid agencies haven't done much on this score yet.

How about the World Bank or the regional development banks? Again, if they will, they can help with financing and by promoting and defending the scaling up

process with developing-country governments. As yet, however, none of the banks has demonstrated the will or the capacity for the detailed work with the thousands of farm communities that such an effort will demand. This will require constant, detailed attention of a lot of people ready and willing to live and work in the countryside for long periods and under conditions that most bank people don't welcome. The kind of people that I think will be most successful will be men and women who have had 'hands on' experience working in the countryside, people like 'graduates' from our American Peace Corps or similar programs, but preferably drawn where possible from developing countries.

True, the World Bank in its new rural and development strategy *is* showing interest in scaling up. To some the degree, decentralisation of World Bank programs to the field will help. And decentralisation is moving slowly ahead. For instance, most Bank programs for Mexico are now run from Mexico City. However, there are limits to how far a highly centralised organisation like the Bank can go.

This leads me to conclude that for the foreseeable future the best bet may be to turn to NGOs, to a series of NGOs, or to a new type of NGO to do the job. Could and would, for example, a large NGO like CARE or World Vision, working with their local allies, be willing to take on this challenge? I have my doubts. I've proposed just this possibility to several of our committee's most conscientious and risk-taking member organisations. While not rejecting my suggestion, each has pointed out the same difficulties. They see real risks, because of the scale of the job, of becoming so bureaucratic as to compromise their much cherished low-key approach to the poor. Nor do they relish getting as close to developing-country governments or to the international or bilateral donors that might provide much of the financing as would probably be needed. In other words, it seems to be just too big a bite.

Helping the Farmer: the Role of Advocacy NGOs

Now let's turn to the rural-oriented, advocacy NGOs and their relations with farmers. Earlier I defined rural advocacy NGOs as organisations that try to influence rural policy, try to make rural life more equitable, or work to empower the farmers and the landless. In many places in the developing world, these groups are regarded as radical by governments which believe they are aiming to change the status quo and therefore to be resisted. In fact, in many developing countries, NGOs are either not allowed to organise and work freely or are co-opted by the government. The situation differs greatly from country to country, but the lesson is that where governments are determined to block the work of advocacy NGOs—and are strong enough to prevail—not much positive happens.

Will government opposition to NGOs change? I think it will, for the NGO movement is quickly becoming a major political force in country after country. But the speed of this change is likely to be a function of how well and how quickly democracy, and civil society more generally, evolve. Civil society, where it thrives in developed countries, still tends to be a predominantly urban and middle-class phenomenon, and so the urban-oriented part of civil society needs to be awakened to the values of partnership with a broader spectrum of NGOs.

Civil society must support the rightful demands of neglected rural peoples, and recognise the importance of promoting rural equity and well-being. In any case, I

believe the evolution of civil society is likely to gain momentum in the rural areas as the 'communications age' moves ahead. NGOs of all sorts—but particularly advocacy NGOs—must gear up to help speed this process. For rural empowerment is likely in the longer run to be a keystone of equitable rural development.

That raises another question: how well do advocacy NGOs work with farming communities? My own experience has shown that relations can vary from very close to very distant and cold. Some NGOs are seen by farmers as self-serving, uninformed about and detached from rural life, and sometimes autocratic. Others work closely and successfully with rural communities. The most successful tend to be ones that are represented by people who have lived and worked in rural areas.

I will now briefly consider the role of international advocacy NGOs, advocacy NGOs from particular industrial countries, and international NGO coalitions. First I will examine their dealings with the development agencies and international agricultural research centres; I chose to discuss this relatively small part of the work of these organisations because I have a chance to observe it in my own day-to-day activities.

Critical oversight of these international organisations by international NGOs and NGO coalitions of development agencies is, in my view, a very appropriate function, especially when national NGOs are too far away to defend their own farmers' interests. But this is only appropriate if these international NGOs keep well informed and stay reasonably in touch with the farmers' groups in the country concerned.

Every day I see signs that NGO influence is growing in international organisations including the development banks. Every international organisation I work with is now at least paying lip service to the principle of consultation with NGOs. Indeed, a good case can be made that outside pressure, exercised in no small part through NGOs, has been a principal force in bringing about important changes in these organisations' rural development practices and policies.

This is especially true for both the World Bank and the international agricultural research centres. In the case of the World Bank, NGO impact has been greater on the Bank's overall policies—openness of documentation, processes for consultation with NGOs, for example—than on Bank policies towards lending for particular sectors or countries. The exception is on Bank lending for big dams, where NGOs have been the major force in persuading the Bank not to fund such projects.

In contrast, there has been comparatively little specific international NGO attention to the Bank's policies and programs for rural development, and even less on rural development projects other than dams and irrigation systems. In the CGIAR's case, very few NGOs have paid much attention to the policies of the CGIAR itself or to the work of particular international agricultural research centres. Again the exception is genetic resources, where CGIAR policies have attracted a lot of NGO attention and more than a little opposition.

To my knowledge only we of the US Committee on Agricultural Sustainability, along with very few other groups such as Australia's Crawford Fund, have kept in regular touch with the work of the CGIAR, the international centres and the World Bank. I would like to see more NGOs or NGO coalitions from other countries develop the capacity to follow in some detail the Bank's work in their own country. But barring greater decentralisation, this requires being in Washington a lot, and

that seldom seems to be practical. For our part, we wish we could—unasked—follow more of the Bank's 100 or so major rural projects for NGO colleagues in other countries, but we only have time to follow particularly sensitive projects at the request of NGO friends.

A final word on international advocacy NGOs: groups like Greenpeace or GRAIN or Friends of the World are examples of NGOs working on one aspect or another of agriculture or hunger. There are many more and their number is growing daily. During the recent Food Summit in Rome, over 100 NGOs with interest in rural problems met and put together an agenda on hunger, food security, and rural development. They also agreed to form a loose coalition to carry forward joint enterprises. Many of these NGOs have work that takes them well beyond rural problems, and each rightly tries to ally itself with local organisations, often its own affiliates. International coalitions tend to come and go—and to vary greatly in their strength and ability to work with national NGOs. But the trend towards more and stronger international NGO action is indisputable and very welcome.

Some countries, such as the USA, are investing more and more political capital in trying to promote 'democracy' and to encourage more active civil societies in developing countries. In the process they are working to strengthen national and local NGOs. So far, I have not found any United States democracy programs that directly focus on rural affairs or on rural empowerment. Again, that may come.

The Scientists, the Farmers and the NGOs

I have left to last NGO relations with scientists and farmers in order to place special emphasis on the subject. Even though help from NGOs for farming communities is very important, the case can be made that the singular gap NGOs can hope to fill may be to act as a channel between organised farming communities and the scientists. Farmers all over the developing world absolutely require a new generation of food plants that are at the same time more productive, more water-conserving, more disease- and drought-resistant, and more nutritious. They also need to know about new combinations of plants that will promote sustainability. They need more cost-effective, more labor-effective, and more sustainable ways to use soil and water. The international agricultural research centres, the national centres and some scientific centres in the industrial countries are pursuing just such research.

While in theory all the CGIAR's international agricultural research centres accept the need to work more closely with farmers and NGOs, I find that even the most sensitive centres still have trouble doing this on a day-to-day basis. For one thing, some agricultural scientists still think of themselves as the farmers' teacher, and not as their partner. Some consider NGOs as bothersome and ill-informed. Some claim that farmers' 'indigenous' knowledge, if not irrelevant, is too diffuse to be of much use scientifically. Also many researchers find it hard to spend the time needed to establish and to sustain a collaborative relationship with farmers and their organisations.

Even so, progress is being made. I'm particularly impressed by the work of the International Potato Center with rural NGOs in Peru in testing and disseminating improved integrated pest management techniques for smallholders. Other centres have programs, but they readily admit they have far to go in bringing their research

into the real world of the dirt farmer. Admittedly, organising closer farm-centre research collaboration presents formidable problems.

But this is one place where I know the right kind of NGO can help a lot more. This will require changes of attitude and mutual confidence-building and information exchange by both the international centres and the NGOs. In the NGOs' case, it will also require a substantial upgrading of their technical capacity. They will also have to improve their knowledge of what technologies farmers want and need—and where in the scientific community those technologies can be found. So far, I've seen few NGOs that fulfil these qualifications.

Under the best circumstances, there remains another huge scientific and technical problem for the farming communities: who is going to help them adapt potentially useful advanced research results to the thousands of ecological and economic situations farmers face? In theory, this is the job of the research systems of the developing countries. And in the longer run I see no answer other than building stronger national—or at least regional—research systems. But, for the present, I accept the views of many agricultural scientists from developing countries, who state that only a handful of national research systems are currently able to apply the adaptation process on the large scale demanded by the urgency of the problems facing farmers.

Can the private sector be expected to handle the problems of local adaptation? Experience suggests that companies, even the growing number of companies that are producing research relevant to tropical agriculture, are not ready to spend money on the adaptation of even their own research unless they see substantial profits from doing so—profits at least in the near- and mid term. Right now this means that while the private sector will pay some attention to the needs of the small but increasing number of more prosperous and 'modern' farmers, they can be expected to pay little or no attention to poor smallholders. This reluctance may change when and if the upgrading of smallholder farming on rain-fed lands gains momentum and smallholders get to the point where they can afford to pay—or pay more—for new agricultural technology.

In late January, I had a fascinating talk with a large American company scouting out just such possibilities. This company is determined to be 'ahead of the curve' on this one. In the meantime they are spending more time and money learning about smallholder farming and in establishing ties with farmers and farm groups.

I have gone into the adaptation problem in such detail not because I believe that most NGOs as presently organised can take on the adaptation problems themselves. Rather it is because I believe that if properly trained they can certainly help many farm communities do at least part of the job. And why not experiment with organising a new type of NGO just for this purpose?

Closely associated with the problem of adapting farmer-tested plants and technologies is the issue of making available already adapted plants, seed systems and methodologies to the millions of farmers who could use them profitably. Again, the theory is different from the reality. The extension services of the developing countries and the private sector should do most of this work, but can't or usually don't.

The World Bank has loaned billions of dollars trying to change this. But basically I do not think top-down government extension has much chance of success. We need effective bottom-up approaches of the kind that are still too rare.

Here again NGOs can help. From late 1995 until late 1996, I was chair of an international NGO committee appointed by the CGIAR. Among other things, we tried to create new links between agriculturally-oriented NGOs and the international centres, in no small part to help with research dissemination. This task of stimulating linkages proved difficult because we didn't know enough about the detailed needs of either specific groups of farmers or the centers. Nor did we know enough about strengths and weaknesses of particular NGOs. The work of the CGIAR-NGO committee is continuing and in time should greatly assist in stimulating better cooperation. The NGO committee is, moreover, taking on another important job: encouraging the CGIAR centres to change their research to reflect a stronger agro-ecological approach.

Do We Need a New Kind of NGO?

So far I've listed a number of unfilled or poorly fulfilled functions, most of which are ones that developing country governments are now—at least theoretically—supposed to carry out. National governments all over the world—even the strongest—are losing strength and NGOs and other parts of civil society are moving in to fill vacuums. We must, I believe, ask ourselves whether the NGO community is strong enough to take over vital rural development functions—and if not, how NGOs can be strengthened to do so.

In this regard, I was intrigued by a list of NGO strengths and weaknesses cited in a recent Asian Development Bank working paper. It is worth reviewing this list because on the 'downside' it suggests places where NGOs need to be strengthened. But on the 'upside' the Bank lists as NGO strengths their rural roots; their linkages to farm communities; their connections with local-level administrators; their 'field-based presence'; their development experience; their administrative flexibility; their freedom from many of the constraints that governments face; their ability to respond quickly to new circumstances and experiment with innovative solutions; their strength in identifying problems overlooked by other people working on poverty and development; and—a sort of summary—their ability to project voices that might otherwise not be heard.

Now the other side of the coin: the Bank suggests that perhaps the principal NGO weakness, where it exists, is the failure to effectively communicate with rural people on their own level of understanding. Other potentially negative characteristics they cite are their typically small size and a limited financial base that limits their capacity for large-scale endeavors; their limited managerial and organisational abilities, plus a tendency to focus only on their own priorities and outlooks rather than those of the people they seek to serve.

Some NGO limitations will probably persist until a larger, more experienced, and better financed NGO leadership cadre is developed. Certainly the movement's sophistication and breadth of vision is increasing as it grows and gains political power. USAID and some other economic assistance agencies are working to help NGOs overcome their weaknesses through training programs. But, in the final analysis, NGOs need to take responsibility for remedying their own weaknesses.

One more important thing that NGOs—national and international—might do to help to relieve rural poverty and promote rural development is help to recruit more

'local' NGOs that can help farm communities better organise themselves. This is a formidable task. The larger international and national networks—CARE, Save the Children, OXFAM, Aga Khan Foundation, among the international NGOs—might be willing to participate to some degree in the process of identifying new national NGO partners, even though they may not be willing to take on the whole job themselves. But they will want the help of others.

Could or would the World Bank or the bilateral donors effectively take on the major responsibilities for recruiting new NGOs to work at the local level? I've discussed this possibility with the Bank's top people who are charged by Jim Wolfensohn with implementing the Bank's new rural development strategy. They share my view about the need to find new ways to recruit more NGOs for this scaling up function but they point out that the Bank works only with governments and then on the basis of big loans, not grants. Asking the Bank to work at that level of detail is, they believe, just not realistic. And I fear that financially strapped bilateral donors are in the same boat.

I believe the developing world needs a new type of organisation operating at a level between the NGOs working in particular villages and, on the other hand, the national or regional governments. It should be an organisation capable of identifying farm community interests but sufficiently different to have a broad strategic outlook that the communities tend to lack. It would be separate from government and, as far as practicable, from government patronage, but close enough to give local politicians and bureaucrats a way to take at least partial credit for successful efforts. It would be close enough to the World Bank and other donors to allow them to provide strategic guidance, but sufficiently removed to avoid the complicated procurement and accounting procedures that until now discouraged NGO-development agency team work.

These new mid-level rural development groups could also advise on, encourage and protect community farming groups' interests. They could also be the channel for the small amounts of funds needed from donors or from foundations to help organise farm communities. Perhaps they could also help farmers participate in the regional and national economic and environmental planning that is becoming something of a prerequisite for securing developmental funding. Such an organisation should obviously have good connections with the international agricultural research centres.

I have no pat formula for what a mid-level organisation for various countries and cultures would look like. From country to country it would obviously have to differ enough to meet the needs of specific groups of farmers. But it should be similar enough to provide a basis for working across countries and regions. A period of experimentation is clearly called for to get rural development moving on a sustainable and more equitable basis in the years just ahead.

Concluding Thoughts

I leave you with one more idea to ponder. A lot of my 20-year diplomatic career and my 20 years of working with NGOs has involved operating within the framework of organisations conceived during the post-World War II years of western-led organisational creativity and expansion—for instance the International Monetary

Fund, the World Bank, the United Nations and its specialised agencies, the OECD, and bi-lateral aid-giving organisations. But a lot has changed in these 40 or 50 years, and some of our earlier organisations now badly need reform.

Where will the impetus for a new period of organisational invention come from? Hopefully, in no small part from the NGO movement, particularly NGOs in the developing countries. After all, the most rapid economic growth is now coming from developing countries, particularly those in East Asia. I hope and believe that a new wave of organisational creativity will spring from the same circumstances that brought about this new economic dynamism—creativity that will not only embrace such problems as trade and industrialisation but also the problems of rural people and poverty. For more equitable and more productive rural societies *must* emerge—for the good of the farmers and for the good of the countries concerned. We have no time to lose.