Take it to the farmer

The Sasakawa experience in Africa

Sasakawa Africa Association

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FOREWORD: by Professor Ruth Oniang'o

A FARMER-CENTERED APPROACH

In contributing this foreword to "Take it to the farmer: The Sasakawa experience in Africa", I am conscious of how much is owed to our founders, Dr Norman E Borlaug, former US President Jimmy Carter, and the Japanese philanthropist Ryoichi Sasakawa.

"Take it to the farmer" were Dr Borlaug's last words before he died in 2009. These words epitomize the way we operate today.

In recent years, we have evolved from a highly centralized smallholder development organization with a single donor, to a broader-based organization with several partners. In essence, however, we still work alongside farmers in their fields and operate by example and demonstration. Today we talk about the value chain and we strive to strengthen the links in that chain. We recognize the crucial role played by women farmers and the need to incentivize them. We are fully aware of the potential of smallholder farming and the opportunities available to the youth of our continent through employment in agriculture.

Dr Borlaug, President Carter and Ryoichi Sasakawa came together at a moment in history when the world could no longer ignore the images of famine from a stricken Ethiopia. They believed that instead of tackling Africa's problems of hunger and malnutrition through endless humanitarian aid, practical steps should be taken to increase crop production on millions of small-scale farms in Africa. Thus was born the Sasakawa Africa Association (SAA) in 1986.

None of this would have been possible without The Nippon Foundation (originally the Japan Shipbuilding Industry Foundation) and the vision of Ryoichi Sasakawa. His son Yohei, another man of vision, was also there at the start, and carries his father's mantle through his continued strong support for SAA's work.

Perhaps never in the history of African development has financial assistance been more reliably and constantly given by a non-governmental organization. Over $300 million has been committed in nearly three decades. Few donors can match this record of consistent support.

This backing enabled the indefatigable Norman Borlaug to traverse the African continent and introduce Sasakawa-Global 2000 programs into 14 African countries. In this task, he would rely on his hand-picked team of country directors. They all had their individual personalities and preferred methods of work, but crucially, they produced results.

From The Carter Center, and President Carter himself, would come the policy advice to Africa's political leaders and international decision makers to give greater priority to African agriculture.

This advice was not always heeded. Africa was put through various economic contortions, including structural adjustment and misconceived industrialization programs. Africa's rural areas were largely ignored and its road networks – which could have provided a stimulus to agricultural development – left largely in disrepair. Rural populations, particularly young people, headed for the cities and their sprawling slums.

Throughout this period, Sasakawa persevered and Norman Borlaug's voice became more prominent. But it was not until 2003 that Africa came together to embrace agricultural development through the Comprehensive Africa Agriculture Development Program (CAADP), which helped to harmonize donor support for the sector. Two years later, the Alliance for a Green Revolution for Africa (AGRA) was launched, backed by funds from the Bill and Melinda Gates Foundation, with Kofi Annan, the former UN Secretary General, as its first Chairman.

In 2014, AGRA finally felt able to declare that the "tipping point" for creating Africa's green revolution had been reached. African Union member states have adopted an agricultural transformation agenda, which the private sector, including the major agribusiness companies, have started to buy into. The World Bank stated that growth in agriculture was 2.5 times more effective in reducing poverty than that in any other economic sector.

Norman Borlaug had often despaired that a green revolution in Africa to match that in Asia during the middle of the 20th century was beyond reach. But, if the tipping point has now been reached, then it can be said that he and SAA helped lay the foundation.

Even in the early years of this century, just before his death, Norman Borlaug was involved in a major reconstruction of Sasakawa Africa Association through the development of a fresh Strategic Plan outlining the organization's vision, mission and goals until 2016.

The Strategic Plan was driven by the changed environment in which we found ourselves working. These changes are outlined in the first chapter of this book, entitled "Sasakawa

Today" and amplified in discussions of the theme areas and countries in which the organization works in later chapters.

The Plan was approved at our Board Meeting in Bamako, Mali, which followed SAA's 25th anniversary celebrations in November 2011.

Shortly after that, SAA's Executive Director for Programs, Christopher Dowswell, died suddenly at his home in Mexico. Chris was an inspirational figure for SAA and for all of us as individuals. His contribution to the Strategic Plan – and indeed to the entire organization over many years – was immeasurable. He spearheaded the reforms that SAA has now embraced.

Chris drafted the historical sections of this book shortly before his death. By completing and releasing this book, we honor his passion to improve African agriculture and his desire for it to make a positive difference to the lives of poor African farmers.

This history tells the story of how a relatively small NGO made a continent-wide impact and how it is tackling the challenges in the four countries where it now focuses its activities – still achieving successes and learning lessons that can be applied across Africa.

With a career in agricultural sciences striving to empower women farmers and to put nutrition at the heart of the agricultural agenda, I am proud to chair both SAA and the Sasakawa Africa Fund for Extension Education (SAFE), whose story is also told in these pages.

Norman Borlaug said, "Take it to the Farmer". Today we react with the words – let us listen to the farmer too. Ours is a farmer-centered approach, and it works.

Professor Ruth Oniang'o
Chairperson
Sasakawa Africa Association and
Sasakawa Africa Fund for Extension Education

TODAY'S SASAKAWA AFRICA ASSOCIATION

Ending hunger across Africa by 2025 – that is the ambitious goal that leaders from across the continent have set themselves.

But they are under no illusions about the scale of the challenge.

Gathered at the June 2014 African Union summit in Malabo, Equatorial Guinea, the leaders recognized that this will mean at least doubling agricultural productivity, halving the wastage of crops after harvest and sustaining 6% annual growth in agricultural GDP.

But the prize for success would be enormous. Progress on the scale targeted could radically reduce levels of poverty and child malnutrition.

And there is a strong belief that these goals are achievable, if the continent can push resources in a more productive direction.

"Africa spends more than $40 billion a year on food imports. Just imagine if this amount was invested in agricultural production," says Rhoda Peace Tumusiime, the African Union's commissioner for rural economy and agriculture.

Expanding scope

Serious progress towards such a turnaround depends on transforming the performance of small family farms – for these account for more than 90% of Africa's agricultural output.

This is where Sasakawa Africa Association (SAA) comes in. Over almost three decades, it has worked with smallholder farmers across the continent, helping them to boost output, to store and process their crops more effectively and to market surplus output in order to generate income.

Founded by the Nobel Prize-winning agriculturalist Norman Borlaug, former US president Jimmy Carter and the Japanese philanthropist Ryoichi Sasakawa, the organization initially focused on boosting farm output.

From the foundations laid by these singular personalities SAA has gradually expanded the scope of its activity *(see page 6 and the history section in Part 2)*.

Today the association also promotes crop storage and processing technology, helps create farmers' groups to share equipment and market output and supports the emergence of local input shops and agricultural service providers. A sister program, SAFE, promotes and arranges mid-career higher education for extension professionals, enhancing the scientific and technical knowledge of each country's own specialist advisers and managers.

Right across this broad agenda, the focus is on practical grassroots engagement.

Smallholder farmers are the priority

"A huge proportion of the population of sub-Saharan Africa lives on small family farms. You cannot solve the challenge of poverty and raise living standards unless you work with them," says Yohei Sasakawa, son of Ryoichi and current Chairman of The Nippon Foundation, SAA's principal donor.

That, SAA believes, means building an effective partnership with government, helping to develop African states' capacity to deliver agricultural extension services and train the skilled personnel who advise farmers on how to produce more food, strengthening both their security of food supply and their incomes.

"Every African country is interested in food security and the wellbeing of rural households; every government tries to reach out to the farmers who produce the food," says SAA's Managing Director Juliana Rwelamira.

"Our distinctive contribution is to facilitate and strengthen the delivery of extension services by working with national governments and the services they provide in support of farmers.

"We do not seek to replace national structures but to help build them up. For it is the national governments, and in particular, the agriculture ministries, that will have to continue this work over the long term."

In practical terms, this means working with farmers and the local extension personnel who are engaging with them on a day-to-day basis. SAA staff spend much of their time on the

More than 90% of Africa's agricultural output comes from small family farms. To improve food supply, their performance must be transformed.

The President, the philanthropist and the "impossible" pioneer

Today's Sasakawa Africa Association is the fruit of a partnership launched in the mid-1980s by the American agriculturalist Norman Borlaug, the Japanese business philanthropist Ryoichi Sasakawa and former US president Jimmy Carter.

Their distinctive strengths were combined with can-do pragmatism. Less than two years after Sasakawa had first met Borlaug, the new initiative's first agricultural specialists were establishing farm demonstration plots in Ghana and Sudan, in mid-1986.

All three were united by a common vision of an Africa self-sufficient in food.

"They were on the same page from the first day and were like brothers," recalls John Hardman, Chief Executive of The Carter Center in Atlanta.

They believed that Africa's small farmers could substantially increase their production of food crops – even on small plots and without heavy machinery – because Borlaug had seen what could be achieved in the Indian sub-continent, where he had played a key role in the "Green Revolution" of the 1960s and 1970s.

Borlaug had shown how new hybrid seed varieties, the application of fertilizer and better cultivation techniques could dramatically boost yields. He also understood the crucial role of effective extension services – an understanding that went right back to his roots in Iowa, in the American Midwest.

Understanding borne of experience

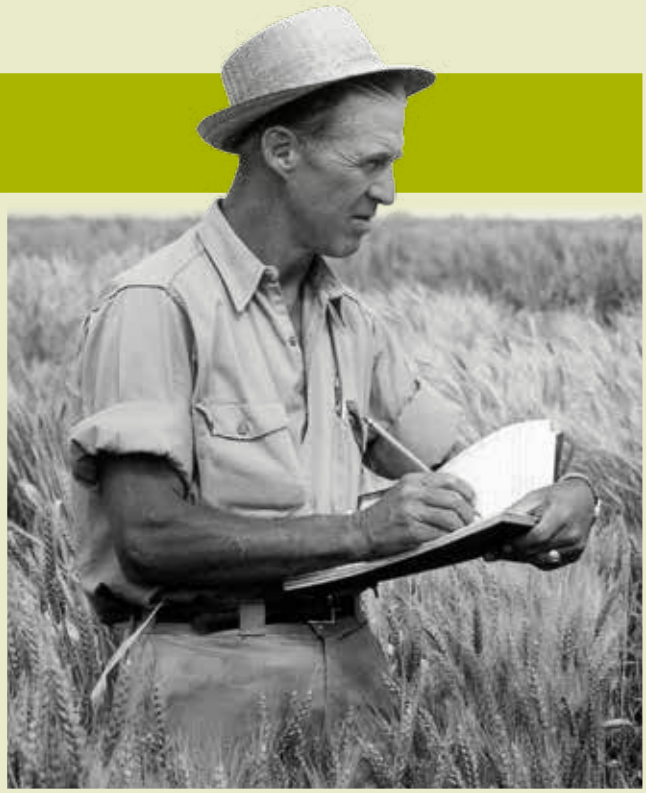
Under the Morrill Acts of 1862 and 1890, federal land was granted to American states for resale, in order to finance the establishment of higher educational colleges to teach the subjects required for a modern economy, notably agriculture and mechanics (A&M). Networks of extension advisers were later developed so that the benefits of academic research could be put into practice in farmers' fields.

"Growing up on a family farm, my grandfather had seen how extension brought the benefits of science to the rural communities. And he himself then studied at one of the Land Grant Universities, in Minnesota," explains his granddaughter Julie Borlaug.

"He also saw what the Depression did to Iowa farmers. Having seen the impact of deprivation, he was persuaded by the eminent plant pathologist Elvin Charles Stakman to study cereals – food crops."

Borlaug was subsequently recruited to work at a research station in Mexico, breeding strains of wheat for differing climate and soil conditions. From there, in the 1960s, he began travelling regularly to Pakistan and India, telling local scientists: "I'm going to teach you to be rebels, not with guns and daggers, but with science and technology."

Two decades later, well past official retirement age, Borlaug was persuaded by Sasakawa to take up the African challenge. Deeply moved after cradling a dying child in his arms during a trip to a crisis zone, he was determined to help the continent become self-sufficient.



Norman Borlaug at work in Mexico, where he pioneered the techniques he later brought to Africa through the Sasakawa Africa Association.

Borlaug was still travelling to the continent well into his nineties before illness finally obliged him to stay at home with the family in Dallas. Visited during his final days by a scientist friend Bill Raun, who had just devised a new tool for measuring soil fertility, his very last words were: "Take it to the farmer."

In 1970, Borlaug had been awarded the Nobel Peace Prize in recognition of his efforts to boost world food supply. Not that he was ever much bothered about the plaudits.

He was never happier than when talking with farmers in their fields, bringing his expertise to the grassroots.

"He was very informal, plain-spoken and down to earth," recalls his daughter Jeanie Laube. "He appreciated all his awards, but he felt even more proud of the time he spent in the fields with farmers and students."

Yet he knew that such public recognition could focus attention and mobilize vital resources and he tried to persuade the Nobel Foundation to establish a prize for agriculture. Informed that the rules would not permit this, he set out to create the annual World Food Prize, based in Des Moines, Iowa, in the heart of the US farm belt.

He was, says Ambassador Ken Quinn, who now runs the prize, "driven by the ferocities he had lived as a young man… He was driven by Africa; he was going around trying to plant the ideas – literally and figuratively, the seeds."

Through persistence and determination, Borlaug spoke out, inspired and got things done. He had won the Nobel Prize, says his daughter Jeanie, "not for his scientific achievements, not for his engagement, but he because he was an impossible man."

road in rural areas, introducing new agricultural techniques and facilitating the creation of community farmers groups and the emergence of local service providers.

"Our resources are needed to assist changes at the grassroots level, working with farmers," says Yohei Sasakawa.

"A lot of money has been poured into African agriculture in the past. Results have been patchy. But we know that a sustained effort to ensure that small farmers have access to practical technology and expert knowledge can achieve a lasting transformation in agricultural productivity and rural livelihoods."

Sasakawa believes that in the four countries where SAA now focuses its operations – Ethiopia, Mali, Nigeria and Uganda – it is possible to achieve and sustain a major expansion of both farm output and the subsequent processing and marketing of food crops.

"I want to change the minds of those who believe that nothing really succeeds in Africa and show them that the agricultural sector in this continent really can perform well. We want to create models of success, so that the international organizations and donors, and NGOs with financial resources can see the approaches that work and are then prepared to invest in them more widely," he says.

The founding documents of the African Union – launched in 2002 in succession to the Organization of African Unity – recognize the importance of agriculture.

"Yet for many years, agricultural policy for African governments had concentrated on the production of tropical cash crops for export," says Sasakawa.

"However, over time government leaders have come to acknowledge the importance of small family farmers, primarily producing food crops for domestic consumption."

And this is where Sasakawa has been able to make a critical contribution, in helping states to broaden the reach of the national extension services that work with these small rural producers.

"Governments can go a certain distance, but we try to go deeper, to reach the marginalized farmers – many of whom, in some countries, never see an extension agent," Rwelamira explains.

"We also try to engage youth. We believe they have the potential to play a big role, even if they choose not to become farmers themselves. For example, many can work in crop processing, or in local IT services for agriculture – if we train them properly and link them up to providers of credit," she says.

Many of the smallholder farmers are women, particularly among the younger generation. But they are often marginalized and in a relatively weak economic and social position.

"Most are still tilling their husbands' land. Relatively few own or rent their own holdings, although some women are now clubbing together to rent blocks of land in their own names," Rwelamira says.

Yohei Sasakawa tries out a maize shelling machine at the National Agricultural and Trade Show in Jinja, Uganda in July 2014.

Developing livelihoods through the value chain

SAA's first priority is to help communities to build food security, but that is not the limit of its ambitions.

"Each household should be able to have enough food to eat. But we feel much more encouraged if some members of the community have moved beyond this, producing a substantial surplus that they can sell to generate income to meet their cash needs," says Rwelamira.

"Africa still has quite some way to go to reach this stage. For us, the continent would have made real progress if 90% of households grow enough to be routinely food secure, while 40% generate a substantial surplus for sale.

"In SAA we are working with 400,000 farming households spread across four countries. We hope that by the end of our current five-year plan in 2016 some 35% are regularly producing surplus food that they can sell into the commercial market."

The shape of today's Sasakawa Africa Association, and its sister SAFE program, are the product of a gradual evolution. The organization has been prepared to learn from experience, reviewing individual projects and country programs; it has not been afraid to alter or even close down activities that were failing to achieve the desired results – or to extend them where there have been solid reasons to do so.

In nearly 30 years, SAA has moved from focusing purely on farm output to develop a much more comprehensive approach that embraces the full agricultural sector value chain, from cultivation through to crop processing and marketing.

This represents a deep engagement that goes well beyond the farmer's field and is sustained over the long term. So while the scope of activity has broadened, SAA has tightened its geographical spread to ensure that all its resources are focused on delivering effective and lasting impact in Ethiopia, Uganda, Nigeria and Mali.

A tighter focus on fewer countries means SAA can more readily develop a strong indigenous and expert staff team and build closer partnerships with both central government and regional authorities.

Private providers offer teff-threshing services in Shashemene, Ethiopia, capable of meeting the needs of over 100 farmers at harvest time. In addition to teff, these machines also thresh wheat, barley and finger millet. SAA facilitates such service provision across its focus countries, so that farmers no longer need to carry out inefficient, labor- and time-intensive manual threshing. In Ethiopia, consumers have developed a preference for machine-threshed teff because it is not contaminated by soil and animal excretions.

"We are trying to bring about change at the grassroots level. Our resources are needed but we also need the support of the national extension services and agricultural ministries. For us, the extension workers are key in delivering success and infusing the 'Norman Borlaug spirit' of working directly with farmers, standing in the fields with them," explains Sasakawa.

"Of course, many NGOs are active in development. But what distinguishes SAA is that we work with, and through, each country's agricultural ministry and administration. For each, we agree a formal Memorandum of Understanding to establish a firm foundation for this partnership," says Sasakawa.

SAA is seeking to build up each state's own capacity to support the agricultural sector value chain in an effective and sustainable manner.

And at a grassroots community level, SAA works as a partner for farmers, not only bringing new technologies but also helping them to form local groups, developing their ability to work together to spread knowhow, store and process crops to a consistent standard and market their output in bulk. As the groups become stronger, they are able assess their problems, develop plans for tackling them and look for appropriate services and external support.

"We are trying to build up their capacities to a point where they can articulate what they need. Meanwhile, we assess the situation independently, so that we can help them to confirm whether their aspirations are realistic or not. As we assess the situation, we can see where our support would be of most help," says Rwelamira.

Five themes

SAA organizes its operations under five key themes: Crop Productivity Enhancement (CPE), Postharvest Handling and Agroprocessing (PHAP), Public-Private Partnerships for Extension Delivery and Market Access (PPPMA), Human Resource Development (HRD) and Monitoring, Evaluation, Learning and Sharing (MELS).

"On the basis of our needs assessment of a local area, we then design a blend of activities drawn from our five key themes to form a comprehensive program that will help the members of this particular community to improve their food security and build up their livelihoods," explains Rwelamira.

At this rural grassroots level, it is the first three themes that primarily come into play.

Agricultural knowhow to achieve CPE is spread through "Farmer Learning Platforms" (FLPs). An important element of these are demonstrations, whereby a small number of farmers in a community are invited to use their fields as demonstration plots to show how crops can be grown by employing new seed varieties and better cultivation methods such as, planting in rows, and applying fertilizer and pesticides or using natural compost. These demonstrations are complemented by farmer training sessions, and supervision and monitoring by extension agents and SAA staff – all three elements are crucial to ensure comprehensive knowledge transfer.

Institutional arrangements vary according to particular country circumstances. But everywhere SAA's full-time professional staff train local personnel who are based at community level, to advise farmers on a day-to-day basis.

Theme 2, Postharvest Handling & Agroprocessing (PHAP), tackles the next stage of the farming economy, introducing better storage techniques – so that crops do not rot or get eaten by pests – and equipment for processing crops, to save labor and boost productivity. Some are simple manual machines, but others are powered by petrol engines, and many are mobile, so they can be transported from farm to farm, or village to village. This facilitates the emergence of crop processing entrepreneurs, providing service to farmers, while local fabricators are taught how to build and repair the machines.

The third theme, PPPMA, focuses on developing the structures through which farmers can spread knowledge, share the costs of processing equipment and collaborate in marketing – putting them in a stronger bargaining position to negotiate with input providers and crop buyers. A central strand of this work is support to develop the capacity of local farmer-based organizations (FBOs).

SAA aims to work in a community for several years before winding down its own direct involvement, building up the skills, networks and self-confidence of villagers.

"Individually, farmers are weak, but as a group they are in a position to ask for things and exert pressure, and are willing to learn and do and help themselves. By the time we leave, they should have the courage to make their own approaches to other institutions or even government when they do need additional help on a particular issue," Rwelamira says.

"This is not something we can build up in a period of three months. So we stay a minimum of two years, and most of the time we stay even longer. But 'dependency syndrome' can stay with farmers for a long time, so we tell them point blank: 'We think you can help yourselves.'"

Outreach to young people is an important dimension of the program, because many show great interest in taking up the agroprocessing activities that are so important in saving tedious manual labor time, ensuring consistent quality in output and adding value, so that rural communities get the full economic benefit from what they grow.

A challenging road

The development of SAA's strategy over almost three decades has not been without difficulties or the need to make tough choices.

Yohei Sasakawa cites the example of the 1990s when the World Bank and some other donors were strongly committed to a free market philosophy in support of the "structural adjustment" programs that were supposed to restore financial stability to Africa. At one stage this meant that SAA's assistance for small farmers was sometimes viewed as an economically unviable subsidy.

"This was in part what led us to develop the concept of demonstration plots, where we would show farmers how they could improve their performance, rather than directly helping them to do so," he says.

Today's international thinking is rather more pragmatic, leaving scope for experimentation with a range of approaches.

Meanwhile, SAA's decision to begin promoting storage and processing technologies and communal marketing arrangements was born of the harsh lessons learned through the dramatic success of programs supporting farm production.

"With the new techniques, harvests surged but this sometimes produced gluts in output – and a resulting plunge in the price that farmers got for their crops," recalls Sasakawa. "But by investing in storage facilities, farmers are able to phase the release of their output into the market, limiting the risk of slumps."

Another major challenge has been ensuring access to improved varieties of seed.

"Sometimes the farmers could not afford the new seed. We experimented with providing them with interest-free loans but discovered that this was difficult to manage."

These days SAA does not get involved in rural lending. But farmers' access to credit remains a significant issue that is not yet fully resolved in all countries.

And an issue that has come to the fore in recent years is the debate over environmental issues and the use of fertilizer. SAA helps farmers test out the use of both chemical fertilizer and local organic compost; however, the latter is not always available in significant quantities, particularly in areas with a more arid Sahelian climate or thin levels of topsoil. Sasakawa points out that the use of fertilizer used by small farmers in Africa – even those applying SAA technologies – is still minimal, compared with the dosages typical of Europe.

In debates on all these challenges farmers tend to have a weak voice.

"They are not a powerful interest group who can make their concerns easily heard. That is one reason why we seek to help them build their own organizations and cooperative arrangements, so that they have market clout in the rural economy and a voice in wider debates," says Sasakawa.

The four-country strategy

The four focus countries for SAA programs have been chosen for their commitment to rural development, the potential to boost food production, the availability of markets to sustain an expanded small farming sector and their track record.

SAA used to pursue a policy of closing national programs and moving on to new countries of operation after a number of years – an approach that enabled it to introduce new technologies to many different parts of sub-Saharan Africa.

However, Sasakawa explains that the organization has now shifted towards long-term engagement in a small number of countries that, in different ways, are models for different agricultural and economic environments, and differing government structures and strategies for extension.

Nigeria is Africa's most populous country, with a wide variety of climatic zones and huge productive potential – but also vast potential demand, which represents both a challenge and a market opportunity for farmers producing food crops.

"Governments can go a certain distance, but we try to go deeper, to reach the marginalized farmers," says Juliana Rwelamira, SAA's Managing Director.

Farmers in Jigawa state, northern Nigeria, receive advice from SAA.

The country is also distinguished by its highly developed federal system and SAA works directly with a number of state governments, as well as the federal administration in Abuja. Moreover, Nigeria has become a pioneer in contributing public funds directly to pay for SAA activities.

"Nigeria is setting an example of how an African government can take responsibility," says Ruth Oniang'o, Chair of the SAA Board.

"We are providing the expertise and new technology; the government is providing funding, vehicles and the extension staff – whom we then train. We hope that other countries such as Mali will follow suit."

Mali lies largely in the Sahel, where farmers must cope with the regular risk of drought, but the country has made efforts to develop a nationwide state extension system and networks of reserve food stocks.

Moreover, as a francophone country and a member of the eight-country Western CFA franc single currency bloc, it is part of one of the closely integrated regional economic markets in Africa.

Conditions are dramatically different in much of Uganda, much of whose territory enjoys a well-watered equatorial climate, with the potential to grow a wide range of food and cash crops. The country is already a substantial exporter of maize to regional neighbors.

Extension structures in Uganda have been less state-based than in some other countries. SAA has played an important role through the recruitment of local facilitators from within village communities, an approach the association is now testing out in West Africa.

With a large population and a two-decade history of government focus on food security, Ethiopia has entrusted SAA with the development of its extensive official agricultural extension network – whose personnel engage closely with villagers nationwide. This is a country where government plays a strong leadership role in not only setting policy for the farm sector, but in organizing support at local level.

Because of its huge geographical extent, and the great variations in altitude between and within regions, Ethiopia offers an extraordinary diversity of climates and crops and models of rural production.

In 2013, SAA directly employed 149 staff across its four focus countries and in the head office in Addis Ababa, a rise of almost 10% from the previous year. They worked with an approved annual budget of $11.3 million, funded by the Nippon Foundation in Japan and a range of international and African partners.

From transition to transformation

How SAA adapted to meet the changing needs of African farmers

Knowledge is forever expanding. Drawing on the lessons of both scientific research and his own practical field experience, Norman Borlaug was always ready to explore fresh approaches that could help small farmers increase crop yields, enhance their incomes and improve the security of food supply.

He was at the forefront of the Green Revolution that enabled India and Pakistan to increase their production of cereals massively. And then he brought his agricultural expertise and his passion for development to Africa, where – in partnership with Ryoichi Sasakawa, his son Yohei and former US President Jimmy Carter – he had established SAA as a leader in the campaign to bolster the output of smallholders across the continent.

It was this long experience of working at the grassroots that fuelled his belief in the power of science and his desire to give rural communities access to its benefits.

Borlaug's final years coincided with the growth in international concern about issues such as biodiversity, better nutrition and the role of women as economic actors. He was an active participant in these debates, keen to encourage a wider public understanding of how technology and education could help Sub-Saharan countries to produce the food they need on a sustainable basis.

He was constantly open to new ideas and remained a key voice in discussions within SAA in his later life, as the organization began to reflect how best to develop its strategy to tackle the issues becoming central to rural development thinking in the 21st century.

The Sasakawa leadership team was now exploring new approaches that could meet this challenge. Borlaug, with a lifetime of scientific research and practical field experience, was a source of wise counsel and passionate inspiration.

His passing, on September 12th 2009, was inevitably a moment for reflection. But his legacy was more than a compendium of past achievements.

Facing up to new challenges

Borlaug's final writings had displayed a sharp awareness of the challenges to be overcome beyond crop cultivation itself, if Africa was to develop a more resilient rural economy that could not only ensure security of food supply but also increase incomes and foster new livelihoods – challenges such as access to credit, more affordable inputs, better functioning supply and distribution chains, consistent product quality and better awareness of market demands.

And it was across this ambitious agenda that SAA was beginning to shape a new strategy for the years ahead.

Borlaug, noted Yohei Sasakawa in a final tribute to him, "was a man of conviction and courage… determined… to incentivize and encourage Africa's small-scale farmers. And thereby confront a deep and fundamental cause of poverty in Africa. He worked for this right up to the time of his death."

So it was apt that a symposium held to commemorate Borlaug, held in Addis Ababa in July 2010, was forward-looking and practical. Organized and chaired by Patrick Orr of Raitt Orr & Associates, SAA's public affairs consultants since 1988, the gathering reviewed the state of the rural economy in Africa today and the challenges that would have to be overcome to achieve a sustained rise in yields, reinforce added value activities after harvest and strengthen the education of sub-Saharan agriculture professionals.

Today, these are core priorities for SAA. The Addis symposium provided a crucial chance to debate and refine the new strategic avenues that the association should pursue over the following years. There were tributes to Borlaug, notably from Jimmy Carter – but the new way forward for African agriculture was eloquently enunciated by Akinwumi Adesina, Vice President of the Alliance for a Green Revolution in Africa (AGRA) who later became Nigeria's Minister of Agriculture and Rural Development.

The gathering was a key moment in making the transition from SAA's original focus on boosting crop yields and the productive use of farmland to a broader approach that seeks to sustain the value chain across the community-level rural economy. The new strategy acknowledged the changing nature of today's sub-Saharan society, notably gender balance and the key role that women play in farming and many other activities. The 'new' SAA itself reflected these changes – more African, younger, more gender balanced – with a formidable African chairperson at the helm in Ruth Oniang'o.

At the grassroots level, Africans had been experiencing major social and economic evolution. Many growers were organizing themselves into cooperatives and other types of collaborative networks, in order to control standards, process and store crops and market their production to commercial dealers. They were making more use of machinery, often hired or jointly owned,

"Norman Borlaug's moral fortitude, his strength… and his scientific brilliance were just a few of the reasons why he has been a hero of mine:" former US President Jimmy Carter at the Borlaug Symposium, Addis Ababa in 2010.

and they were developing partnerships with an increasingly wide range of private sector, public or non-governmental service providers.

Moreover, at the level of primary agricultural production, newer varieties of seeds, new fertilizers and agro-chemicals were becoming available, while scientific understanding of environmental and health issues had deepened.

SAA needed to support rural communities to make the most of their opportunities in this increasingly diverse and complex environment – an environment that included very poor farmers, often women, who generally had been excluded from mainstream extension programs.

An evolving strategy

Since 2008, SAA had been developing a new approach to meet these challenges – for example, through the establishment of "farmer learning platform" demonstration plots at village level, and enhancing the role of specialist technical advice to farmers cooperatives and local machinery fabricators.

The Addis symposium – attended by ministers of agriculture, specialist academics from across Africa, farmers, businesses and donors – provided a forum to discuss these new tools with expert partners, tapping into their advice and ideas, as the association was drawing up a new five-year strategy to be implemented from 2012.

In one of his final comments on the new agenda, Norman Borlaug had acknowledged the need for a further broadening of approach: "We remain committed to working with public and private extension providers to ensure the delivery of much needed technologies, knowledge and information to Africa's resource poor smallholder farmers. But there are new priorities and new goals for us to attain… as we strive for that elusive Green Revolution in Africa."

A critical role in developing the new strategy was played by the late Chris Dowswell, Executive Director, Programs, at SAA, who had also been an aide to Norman Borlaug. He understood the need to refresh and extend the range of instruments through which the association supported farming communities, if it was to keep pace with Africa's changing needs.

Dowswell died suddenly in November 2011, shortly before the new strategy could be fully rolled out, but the energy with which he had coordinated its preparation had made a decisive impact.

"Chris presided over the transformation of SAA with re-defined strategies and objectives, a stronger management matrix – and staff levels that truly reflect an African organization facing up to African progress and problems," Yohei Sasakawa said

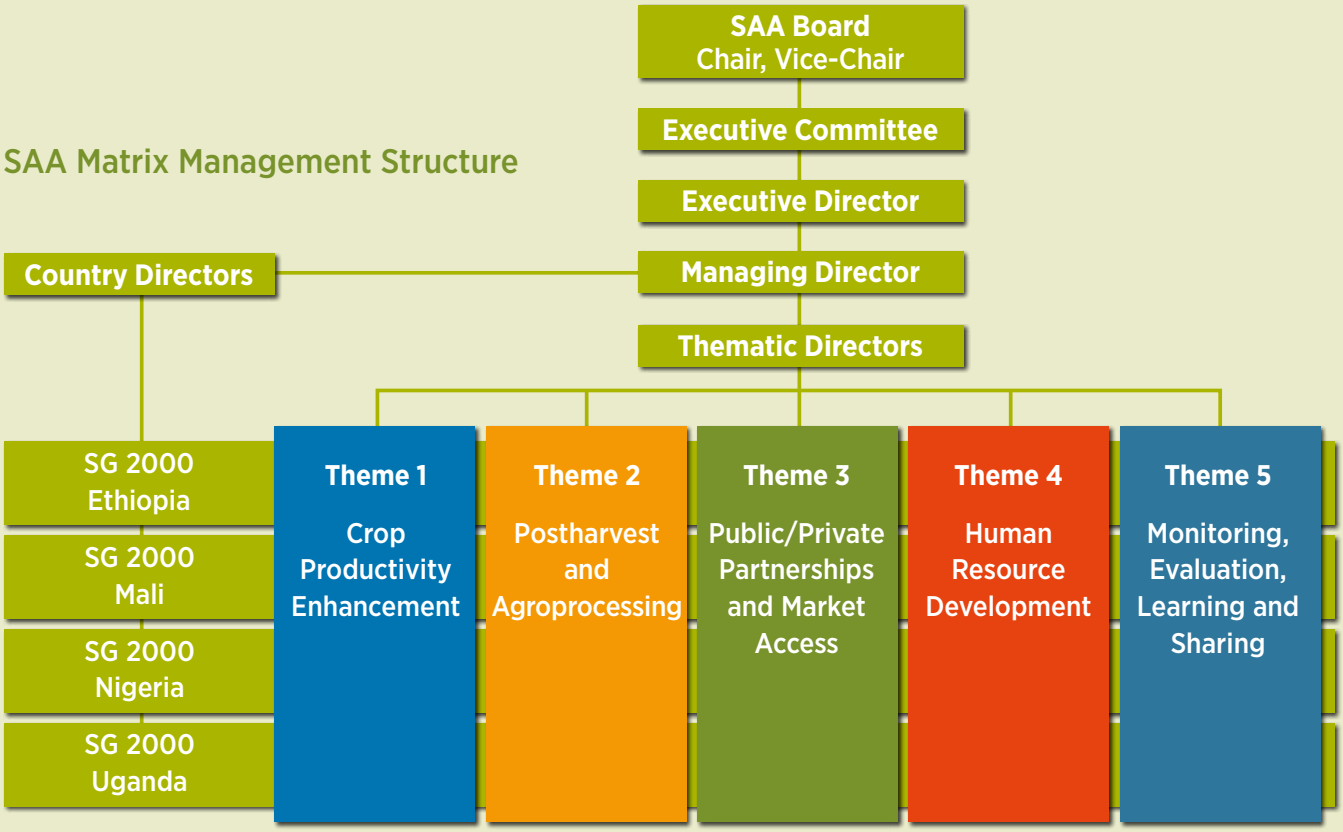
Improved structures

As this new "matrix" structure was rolled out, thematic directors were appointed, based at SAA's Africa head office in Addis. Their role was to ensure that the association could implement all the main five themes of its strategy in all four of its principal focus countries – Ethiopia, Mali, Nigeria and Uganda.

Hitherto, decisions over the range and relative importance of different activities had been left to SAA's country directors, responding to local needs and the views of national governments. National programs were largely autonomous.

But through the matrix structure the association was gradually able to develop greater consistency of approach in putting thematic programs into effect.

SAA Matrix Management Structure



Making all the difference: the impact of post-harvest technologies in Ethiopia

Crop	Human and animal labor required to thresh/shell crop	Machine type used	Resulting improvements
Teff	2-3 days/hectare (ha) 3-4 people 8-10 animals	Multi-crop thresher 9HP petrol/diesel engine	Up to 4 hours/ha 3-4 people 5 liters of fuel
Maize	One quintal per person per day	Maize sheller 5Hp petrol engine	20-25 quintals/hr 2- 3 people 1.2 liters of gasoline
Wheat	10 quintals 3-4 people 5-6 animals 3 days	Multi-crop thresher 9HP petrol/Diesel	10 quintals Up to 6 hrs/ha 3-4 people 7.5 liters fuel

As part of its transformational strategy, SAA has expanded its support to include all aspects of the agricultural value chain. The table shows how the introduction of simple but effective machinery transforms the lives of farmers by saving time and effort, as well as adding value to crops. SAA facilitates access to machinery, provides training in its use, and then supports farmers in the sale of the resulting products.

SAA opted to retain strong country offices, headed by directors with a deep understanding of local circumstances and how to operate in partnership with national policies and institutions. But through the subject expertise and leadership of the theme directors it was now possible to achieve greater depth and consistency in the technical and business knowledge and support that was being delivered.

With this new management structure in place, SAA set itself five strategic goals:

1) to establish cost-effective farmer learning platforms that improve smallholders' productivity in growing food crops, particularly for women farmers and for growers starting out from an inefficient and weak technical base.
2) to enable farmers to capture a larger proportion of the added value that accumulates through the value chain.
3) to foster the creation of public-private partnerships that could financially support the delivery of extension services for smallholders and for efforts to market crops on profitable terms.
4) to enhance the capacity of both extension professionals and farmers, to bolster the competitiveness of the local agricultural economy;
5) to set up information systems to support the evolution of technology and new methods and help communicate know-how to rural communities.

SAA had begun to roll out the new strategy from 2010 onwards and to start implementing it across all four focus countries from 2012 onwards.

However, the organization is always seeking to learn lessons and remain adaptable, through regular progress reviews and a program of monitoring and evaluation in each focus country.

SAA's Theme 2 Director, Leony Hallos Kim, demonstrates grain storage techniques to farmers in Bugiri, Uganda. The association advises rural communities on how to make the most of their opportunities.

PART TWO: Call to Action

Chapter 1
THE BEGINNING

In 1983-84, the famine that ravaged the Horn of Africa countries – Sudan, Ethiopia, and Somalia – shocked the world. Although global attention was focused on Ethiopia and Sudan, the protracted drought and ensuing famine engulfed at least a dozen countries in sub-Saharan Africa. While a long drought was the catalyst for this human catastrophe, the root causes were far more complex – an overlapping mix of social, political and economic malaises.

One of the first organizations to fly food aid and medicines into Ethiopia and Sudan was the Japan Shipbuilding Industry Foundation (JSIF), now known as The Nippon Foundation. Under the chairmanship of Ryoichi Sasakawa, JSIF had become a strong private supporter of international disaster relief and world health programs.

However, Sasakawa feared that when the rains returned and the images of starving Africans disappeared from television screens around the world, the root causes of the 1983-84 famine would persist. This is the story of how his concern gave birth to what became a major non-governmental organisation, seeking to build up Africa's capacit to feed itself and raise rural living standards.

So what was the state of development policy in sub-Saharan Africa at that time – and what was the economic context in which the new NGO would appear ? Who was Sasakawa and with whom did he work, to transform a sense of human concern into a concrete initiative that would have a real impact on the lives of people in rural communities across the continent.

Africa's struggle to create its own Green Revolution

During the 1970s and 1980s, the supply of food in much of sub-Saharan Africa did not keep pace with rising demand. Explosive population growth overwhelmed such traditional agricultural systems as shifting cultivation, which was widely used in the region to restore soil fertility by letting the land "rest" after a period of cultivation. Rapid population growth and the accompanying increase in demand for food led to ever-longer periods of cultivation, which in turn reduced soil fertility and crop yields.

Population in the region was increasing by 3-3.5% a year, while food production was rising by only 2% a year. The Malthusian prediction of catastrophe, which had been avoided on the Asian sub-continent in the 1960s due to a "Green Revolution" in rice and wheat production, was being realized in Africa. By the early 1980s, 40% of African children under the age of five were malnourished. Two out of every five Africans depended on food aid. Agriculture in sub-Saharan Africa was in crisis.

Sasakawa wanted to break the psychology of dependence on food aid in favor of self-reliance and more productive local agriculture.

Even though in the late 1950s and early 1960s the vast majority of Africans lived in rural areas, many newly independent governments chose to focus their scarce resources on state-led industrial development strategies. They established factory after factory in the belief that industrialization was the best way to achieve overall economic growth, and that this would eventually lead to rural development too.

But by the early 1980s, thousands of state-owned companies were bankrupt, and government coffers were no longer able to bail them out. African governments had become heavily indebted, both to OECD nations and to the Soviet Union and its satellite states. Meanwhile, investments in rural infrastructure, education, agricultural research and extension, and input delivery systems remained woefully inadequate.

The cold war struggle between capitalism and communism strongly influenced the nature of international aid. Considerable military aid was provided to countries struggling to establish themselves as nation states. In addition to military aid, Western governments, especially the US, supplied considerable quantities of grain at subsidized prices and under concessionary terms of sale. African governments used this food aid to help keep food prices low in the cities in an effort to appease more politically volatile urban dwellers.

However, food aid had the perverse effect of reducing incentives for African farmers to grow crops for the marketplace. This soon resulted in relatively meager buffer stocks of staple foods in many countries. Moreover, with the exception of tea, sub-Saharan African farmers lost global market share in traditional export crops, such as cocoa, coffee and palm oil – important sources of scarce foreign exchange.

Government price controls and heavy export taxes exacted a significant economic cost. Farmers often received less than half the world market price for their commodities. They had little reason and even less ability to invest in their crops. Yields

The history of SAA – part 2 of this book – was written by the late Chris Dowswell, who worked closely with Norman Borlaug and from 1991 to 2011 played a key role in the SAA management team.

stagnated, while there was little access to improved production technologies. As traditional exports from Africa declined, rival output increased in other parts of the world, especially Asian countries, which were to become major exporters of coffee, palm oil, cotton, and even cocoa.

By the early 1980s, not only were most sub-Saharan governments in debt, they were also faced with a decline in the tax base needed to support their large and often inefficient and corrupt bureaucracies and parastatal companies. While some of Africa's external debt was for armaments – the product of Cold War politics – a larger part could be attributed to the effects of state socialism, which resulted in economic stagnation.

The rise of the "Washington Consensus"

In 1982, the World Bank published "Accelerated Development in Sub-Saharan Africa: An Agenda for Action" – known as the Berg Report after lead author Elliot Berg, the Harvard economist – which outlined what should be done to get developing economies moving. A central finding of the study was that private enterprise and liberalized markets are much better at creating wealth than the state. According to Berg, the allocation of scarce economic resources should be left to largely unfettered market mechanisms, since interference with markets usually reduces overall economic efficiency. This view became known as "market fundamentalism" and formed the basis of structural adjustment programs in Africa that called for significant reductions in the economic activities of the state. In their place, the report energetically endorsed the development of global capital markets and freer international trade – in short, economic globalization.

This economic development paradigm has come to be known as the "Washington Consensus", partly because the World Bank and International Monetary Fund (IMF) are based in Washington, and partly because the US government has been a strong advocate of free global markets (though sometimes less compliant in its own trade practices). By the late 1980s, the Washington Consensus had become the dominant paradigm for the policies promoted by the major multilateral and Western donors of development aid to Africa.

The structural adjustment programs in Africa promoted by the IMF and World Bank called for macroeconomic reforms in exchange rate policy, by allowing exchange rates to float in response to market supply and demand for foreign currency; fiscal policy, by reducing government deficits; and in the management of the economy, by ending governments' direct participation in most economic activities. In agriculture, structural adjustment programs led to an end of government subsidies for key production inputs (improved seed, fertilizers and other agrochemical inputs). Credit became less readily available to farmers, and crop price subsidies were reduced or eliminated. Government agricultural service companies that provided certified seed, fertilizers, crop protection chemicals and mechanization services were either sold off, or more commonly, simply closed.

Norman Borlaug (second from left) supervises a shipment of Lerma Rojo wheat, sent from Mexico to India. The wheat was a high-yielding cross between the dwarf variety Norin 10 and Mexican traditional wheat, which helped to underpin Asia's Green Revolution in the 1960s.

The expectation for this new market-oriented development paradigm – based largely on the experience of market liberalization in Asia – was that once government companies and intervention programs were removed, a much more vibrant and efficient agricultural sector would spring up to serve farmers and consumers. This in turn would result in much higher rates of economic growth, and transform agriculture into an engine for economic growth and modernization.

Market liberalization in Asia certainly did accelerate the adoption of productivity enhancing technology, and this did result in broad-based economic growth and development, increased food security and widespread poverty reduction. However, in sub-Saharan Africa, this strategy did not produce comparably positive results.

By the end of the 1970s, few Green Revolution benefits in food crop production had been realized in sub-Saharan Africa. Most farmers still practiced traditional hand-hoe agriculture and there was little irrigation, except in a handful of countries. Relatively small amounts of fertilizer were used in food crop production, and most farmers continued to rely on planting their own saved seed. Not surprisingly, food crop yields remained low.

Sasakawa meets Borlaug

In August 1984, Ryoichi Sasakawa, through JSIF, helped to finance an international conference honoring the 50th anniversary of the development of the dwarf winter wheat varieties by the renowned Japanese wheat breeder Gonjiro Inazuka in Iwate province. Nobel Peace Laureate Dr Norman Borlaug – widely regarded as the father of the Green Revolution in Asia – had

used one of these Japanese dwarf wheat varieties, Norin 10, to reduce the height of improved, but tall wheat varieties. Borlaug was asked to attend the conference as a keynote speaker.

While there were many problems with the first crosses, it was evident that the use of Norin 10 was leading to a new type of wheat – one shorter in stature but with much higher yield potential than seen before. This new variety would go on to have a tremendous impact on global wheat production, and serve as the foundation of the Green Revolution in Asia, for which Borlaug received his 1970 Nobel Peace Prize.

Borlaug's early work was done under the auspices of what was known as the Rockefeller-Mexican Cooperative Agricultural Program, an initiative aimed at helping Mexico to become self-sufficient in food production. This program eventually led to the creation in the mid-1960s of the International Maize and Wheat Improvement Center – better known by its Spanish acronym, CIMMYT. Borlaug was appointed as director of CIMMYT's wheat program and, until his retirement in 1979, he worked tirelessly in the cause of improving agricultural productivity in developing countries in Asia. From 1966-1970, he shuttled between Mexico, India and Pakistan, overseeing the transfer of the new "Mexican" dwarf wheat varieties to farmers in the Indus and Ganges river basins.

This production campaign became one of the most successful rapid diffusions of new agricultural technology in the history of world agriculture. By 1970, more than 50% of the Asian sub-continent's wheat area was planted with high-yielding dwarf varieties. Improved agronomic practices – especially the increased use of fertilizer and irrigation – combined with the new varieties to produce a more than doubling of Pakistani and Indian wheat production.

Although he officially retired from CIMMYT in 1979, Borlaug remained extremely active, working as a consultant for CIMMYT and traveling widely in the developing world, promoting the development and use of improved agricultural technologies. In 1984, Borlaug accepted a Distinguished Professorship in International Agriculture at Texas A&M University, agreeing to teach one semester per year. For the remainder of the year he planned to live in Mexico, working on his professional memoirs, speaking publicly on agriculture, and assisting CIMMYT in any way he could.

During his 1984 visit to Japan to attend the conference being supported by JSIF, he was invited to meet Ryoichi Sasakawa. The JSIF chairman told Borlaug that he had been greatly impressed by the impact of the Green Revolution wheat and rice technologies in Asia. He asked him whether a such a revolution could also be achieved in sub-Saharan Africa – one focused on increasing maize and sorghum production so as to mitigate hunger and suffering in the region and promote economic growth and development.

Borlaug told Sasakawa that he did not have much first-hand experience in Africa, but he believed that a lot of good research on maize and sorghum had been done in a number of countries. The problem was that the improved technologies remained on the shelf and had yet to reach farmers in any substantial way.

He said he believed small-scale farmers the world over were similar in at least one very important respect. When they test a new technology with their own hands and on their own fields and see that the recommended technology is much more productive and profitable, they are quite willing to adopt it, provided that the essential components (eg, seed and fertilizers) are reliably available at affordable prices.

Borlaug further speculated that, if improved technologies were available for one or more of the major food crops, and if dynamic agricultural extension campaigns could be organized in a few key sub-Saharan countries – as had been done in India and Pakistan in the 1960s – this could "set the grass roots on fire" and lead to a rapid modernization of African agriculture. On that optimistic note the discussion ended – but not for long.

Ryoichi Sasakawa's journey from war to peace

Ryoichi Sasakawa was an uncommon and controversial man. He was born in 1899 in Toyokawa village in Osaka prefecture – a land of rolling hills and rice paddies – into a devout Buddhist family. A teenage fascination with airplanes led him into military service in 1918 in the Japanese Air Corps. Two years later, he returned home after injuring his shoulder while trying to start the engine of an aircraft. He soon became involved in local politics and was elected to the village council in 1921 at the age of 22.

The following year his father died, leaving Ryoichi, the eldest son, as head of the household. His father, Tsurukichi Sasakawa, a brewer and wholesale distributor of sake, had been a careful investor and had lived frugally. Ryoichi inherited a modest family fortune, but he also discovered a talent for commodity trading – rice, sugar, silk thread, and other goods. Over the next few years he increased his inheritance many fold, and by the time he was 30, he was a wealthy and successful businessman.

Japan was in turmoil during the 1920s and 1930s. It was reeling from the great Tokyo Earthquake of 1923 and subsequent tidal waves and fires that all but leveled Tokyo and Yokohama. The global economic depression had severely curtailed the country's international trade. As in many other countries at that point in history, pressure was mounting to increase the role of the state in many social and economic areas. However, as a successful entrepreneur, Sasakawa had strong feelings about the spread of socialism. In 1930, he entered the national political arena as one of founders of the Peoples' Party of the Nation, a strongly nationalistic group dedicated to combating state socialism in Japan.

Sasakawa soon developed some powerful political enemies, strong enough to get him arrested in 1935 on suspicion of "attempted intimidation, violence, and interference", but with no substantiated grounds for doing so. He spent the next two years in prison, before being released in 1937 and then being cleared of any wrongdoing in 1938. But by then, the winds of war were gaining strength in Japan. Sasakawa had serious doubts about the

wisdom of going to war with the US, but the war continued on its relentless course, with eventual defeat for Japan.

As was the case for many Japanese industrialists, a few months after the country was defeated, Sasakawa was arrested and charged with Class A war crimes, again without clear grounds. His second stint in prison provided him with time to reflect and to plan for a post-war future. Sasakawa decided that, if he were acquitted, he would dedicate the remainder of his life to the goal of world peace and to rebuilding Japan into a democratic and pacifist nation.

On Christmas Eve 1948, after three years of imprisonment, Sasakawa was unexpectedly released from Sugamo prison without having faced trial. No official reason was given for his release, but, in retrospect, it appears that the US and its allies were reacting to the fear that communism might gain a foothold in post-war Japan. They decided that political and industrial leaders from the past, if set free and integrated back into society, could help keep Japan committed to capitalism and free markets.

While he was once again a free man, much had changed for Sasakawa. Before the war he had been very wealthy, but he left Sugamo prison having lost virtually all of his personal fortune and carrying the stigma of being a suspected war criminal.

Motorboat racing – an unusual vehicle for development

During his prison stay, Sasakawa had much time to ponder the future of Japan. One conclusion he reached was that the rapid rebuilding of the Japanese maritime and shipbuilding industries would be critical to restoring the economy. Maritime development, however, requires very large investments, and Sasakawa was unsure about how to generate such large amounts of capital. Inspiration struck when he saw a photograph in Life Magazine depicting motorboat (or hydroplane) racing in Florida. Sasakawa decided he should try to introduce it to Japan, but as a legalized gambling sport, known as Kyōtei in Japanese, with the profits used to support the rebuilding of the Japanese maritime and shipbuilding industries.

There were many political, technical and financial obstacles to overcome. But eventually, with Sasakawa operating in the background, a controversial bill to legalize betting on motorboat racing made its way through the Diet, Japan's legislature. Passed in 1951, the Motorboat Racing Law set a legal framework for the organization of racing associations, coordinated by a national federation. Funds were mobilized to build racing arenas, design and manufacture racing boats, and organize the betting facilities and administrative structure needed to ensure that the sport operated in a legal manner.

A motorboat suitable for racing in Japan was designed – small and light, with a powerful outboard motor and room for only a single racer, who had to kneel in the cockpit. Six boats ran in each race, which began from a flying start. Each race was over in three minutes, at which point the winning gamblers rushed to collect their rewards.

Payouts to winning betters amounted to about 75% of the gross amount wagered. The remainder was retained by the organizers and split between various public and philanthropic activities. Local governments received about 9% of the gross amount wagered to help finance their operations and capital investments – amounting to trillions of yen in local tax revenue. Slightly less than 12% was allocated to cover the operational costs of the races, while 1% was passed on to the prefecture motorboat racing associations.

Motorboat racing then . . .

Income from betting on motorboat racing firstly helped finance reconstruction of Japan's shipbuilding industry after World War Two, before being used to fund other activities, including African development programs overseen by Ryoichi Sasakawa. This race took place in 1959.

. . . and now

Income from motorboat racing still supports the Sasakawa Africa Association and many other organizations under the auspices of The Nippon Foundation.

This left about 3% of the gross betting revenue earmarked for "promotional work". Initially, these funds were directed primarily towards loans and research and development subsidies to help rebuild the Japanese maritime industry. Over time, as that goal was achieved, more of the racing profits were directed towards philanthropic activities.

The first motorboat race took place on April 6th 1954 in Minoo City, Osaka Prefecture. The sport proved to be very popular, and Sasakawa became President of the Motorboat Racing Federation in 1955. Under his leadership, the network of motorboat racing arenas grew rapidly. By 1960, annual wagering on motorboat racing exceeded $3 billion, which provided more than $100 million annually for promotional activities.

In 1962, the promotional section of the Motorboat Racing Federation was transformed into the Japan Shipbuilding Industry Foundation, which was authorized by the Ministry of Transport to make two types of investments – loans and subsidies in support of the shipbuilding industry and maritime safety, and grants to support charitable and philanthropic activities.

However, there was no requirement for the latter to be related to shipping and the money was spent on initiatives related to health and nutritional care, youth leadership development programs, disaster relief and refugee assistance, cultural and sports promotion, and programs focused on promoting international understanding and peace.

As president of the national Motorboat Racing Federation and of JSIF, Ryoichi Sasakawa wielded considerable control over the way racing profits were used. This gave him much power and influence in Japan. Indeed, he was considered a Koromaku, one of the last of a vanishing breed of political power brokers that could make or break prime ministers, without themselves being in politics.

Then, in 1979 JSIF moved into international philanthropic work, granting $37,000 to the United Nations and disaster relief in Turkey and Brazil. JSIF made its first grant to the World Health Organization (WHO) in 1975. Over the next 30 years, The Nippon Foundation (as it became known from the mid-1990s) made grants to the WHO in excess of $150 million in support of smallpox eradication and leprosy control programs. Grants also began flowing to other United Nations agencies, especially the UN High Commissioner for Refugees (UNHCR), the United Nations Environment Program (UNEP), and the United Nations Disaster Relief Organization (UNDRO).

The African Agricultural Initiative is born

But, having been so shaken by the sight of famine in Africa, Sasakawa soon identified African agriculture as a potential target for JSIF philanthropic activity. To follow up on his August 1984 discussions with Borlaug in Tokyo, Sasakawa sent Itaru Tanaka, his international program advisor, to Texas A&M University in January 1985. Tanaka's mission was to map out the steps that might be taken to accelerate maize and sorghum production in African countries, and to signal JSIF's potential

President Jimmy Carter and Ryoichi Sasakawa (pictured here in 1989) built on their shared Interest in Africa to collaborate on agricultural development policy.

interest in financing such an endeavor. Borlaug and Tanaka agreed to arrange a major international workshop focused on assessing sub-Saharan Africa's agricultural production, food and nutritional security, poverty, health and demographic challenges.

Jean Freymond, head of the Center for Applied Studies in International Negotiations (CASIN) in Geneva, was asked to organize the meeting, which took place in the Swiss city in July 1985. Its official agenda was *"Alleviation of Poverty and Hunger in sub-Saharan Africa: Prerequisites for Peace"*. Alongside international specialists and leaders from a wide range of fields, the workshop was also attended by former US President Jimmy Carter – who was soon to join Sasakawa and Borlaug as a prime mover in the African Agricultural Initiative (AAI), which was founded in 1986. *(For more on the role of the CASIN workshops in the early development of early Sasakawa activities in Africa, see page 30.)*

Carter shared Sasakawa's concern about Africa. He was the first US president to pay a state visit to sub-Saharan Africa and had supported the people of southern Africa who were struggling to overcome apartheid and other forms of racism. While in office, Carter had developed an extensive set of relationships with African political and civil rights leaders. He also knew both Ryoichi Sasakawa and Norman Borlaug. In 1981, JSIF had made a donation to help build The Carter Presidential Center in Atlanta. At that time, Sasakawa had expressed interest in forming a partnership with The Carter Center to benefit the developing world.

Borlaug had served on a Presidential Commission to End Hunger during The Carter administration. When contacted by Sasakawa about the AAI, Carter enthusiastically offered his collaboration and assistance, especially in the policy-making arena so critical to overcoming the many problems plaguing Africa's agricultural development.

Drawing on their experience from other parts of the world, workshop participants discussed ways to achieve greater

food security in Africa, particularly through increased cereals production. They identified priority areas for investment if progress was to be made – from agricultural research to rural roads to education and health services. Those familiar with agricultural research in Africa argued that the biological potential existed with the available improved technologies, which were still largely unused, to double or even triple yields of most food crops.

Borlaug shared his hypothesis that if one could stimulate widespread adoption of high-yielding technologies for a major food crop, such as maize, in a few selected countries, this technological breakthrough would prompt governments to increase their investments in agriculture. He also believed that success in a few countries would lead to a "domino effect" in neighboring countries.

His first-hand experience from other parts of the world was that smallholder farmers, when given adequate economic incentives and access to appropriate technology, were quick to adopt new technologies once they saw the benefits for themselves. He had also been successful in convincing government leaders to establish stimulatory agricultural policies and programs that would encourage and facilitate farmer adoption of high-yielding agricultural technology. He was confident he could do so again.

Borlaug viewed food insecurity in sub-Saharan Africa as fundamentally a problem of inadequate food production, and thus recommended the rapid introduction and diffusion of high-yielding production packages. He proposed that the new AAI be organized largely along the lines of his past Green Revolution experiences in the Asian sub-continent.

While there were some similarities between smallholder agriculture in Asia and sub-Saharan Africa, there were also fundamental differences. The Green Revolution had been largely confined to irrigated or well-watered production areas, and to countries where agricultural scientists and farmers were challenged to eliminate large and growing national deficits of wheat, rice and other food staples. Agriculture in sub-Saharan Africa was largely rain-fed and often subject to drought.

Relevant infrastructure was also much less developed than in Asia. Railways, for example, had been built into the Punjab, the vast irrigated area of India and Pakistan in the Indus Valley basin. Why? Because colonial Britain had needed cotton fiber to feed its textile mills back home. In Africa, the few railways that existed had been built to reach mines. African agriculture was of little interest to colonial European nations.

Finally, the Green Revolution in Asia unfolded within a socioeconomic context in which governments and donor agencies were prepared to subsidize and assume responsibility for input delivery and output marketing. By the time the AAI began its work, the dominant trends in international development thinking had evolved in a more market-oriented direction. Donors were pressing structural adjustment programs on African governments, many of whom were in desperate financial straits after 20 years of implementing state-led economic development models. These differences, while not fully evident in the beginning, were later to weigh heavily on the activities begun under the AAI.

Global 2000 becomes involved

Participants in the July 1985 CASIN workshop had endorsed the need for action programs to increase African food production in the near-term, as was done in Asia 20 years earlier.

Representatives of CIMMYT and the Hyderabad-based International Center for Research in the Semi-arid Tropics (ICRISAT) had come to the meeting with brief concept proposals for technology transfer activities related to maize, sorghum and millet, which were to be evaluated by JSIF and Carter Center staff.

On November 12th 1985, a follow-up meeting, chaired by President Carter, was held in Atlanta. Those in attendance included Ryoichi and his son Yohei Sasakawa, Itaru Tanaka, Alexander King (an eminent scientist who co-founded the Club of Rome), Jean Freymond, Donald Winklemann (the new Director General of CIMMYT), Miles Wedeman (representing Leslie Swindale, Director General of ICRISAT), Robert Havener (head of the newly created Winrock International Institute for Agricultural Development), Norman Borlaug, Andrew Young (then the mayor of Atlanta), and Rosalynn Carter.

Ryoichi Sasakawa informed the group that JSIF was prepared to finance an "African Agricultural Initiative" for an initial five-year period, which, if successful, could be extended for another five years. The program was to be an action-type extension program – not a research program – confined initially to to two countries, and with the aim of giving farmers rapid access to the research findings in maize and sorghum that had been developed by CIMMYT, ICRISAT and their African national agricultural research partners.

The discussion then turned to how best to organize the overall management of such an initiative. Borlaug thought that Winrock International, with Bob Havener at the helm, was best suited to be the implementing agency. Winrock was formed in 1985 through the merging of three smaller agricultural NGOs that were originally established by the Rockefeller Foundation and individual Rockefeller family members – the International Agricultural Development Service (IADS), the Agricultural Development Council, and the Winrock International Institute for Livestock and Small Ruminant Development. The new Winrock International already had projects on the ground in Africa, and its staff knew how to manage and support international technical assistance work.

Borlaug had first met Havener in the mid-1960s when Havener was serving as an agricultural program officer for the Ford Foundation in Pakistan. Havener was intimately involved in introducing the Green Revolution to Pakistan, where the Ford Foundation provided crucial financing for the introduction of the new high-yielding wheat and rice varieties developed at CIMMYT and the International

Global 2000 was based at The Carter Presidential Center, in Atlanta, Georgia.

Rice Research Institute (IRRI). In 1978, Havener became Director General of CIMMYT, and Borlaug's boss. His considerable skills with people, his talent for managing large, complex organizations, and his broad understanding of agricultural development made Havener a gifted leader in the development field. Borlaug was confident that the Sasakawa Africa Initiative would be in good hands at Winrock.

However, President Carter was keen for the African Agricultural Initiative to be managed by The Carter Center as one of the core programs of Global 2000, Inc, which was to be an action arm of The Carter Presidential Center.

The Carter Presidential Center, the construction of which would be completed in late 1986, is a magnificent facility located on 10 hectares of rolling land just east of downtown Atlanta. On opening, the facility comprised four separate but interlocking entities. One was the library and museum, which was to be deeded to the federal government and managed by the US National Archives, as are all presidential libraries. The second was The Carter Center of Emory University, addressing issues of international public policy – such as conflict resolution, global health, and democratization – first, through research, analysis, and consultations, and second, through the promotion and implementation of policy recommendations. The Executive Director of The Carter Center of Emory University was Dr William Foege, a former director of the US Centers for Disease Control and an eminent figure in global health. Foege had accompanied President Carter to the CASIN workshop. The third entity was The Carter-Menil Human Rights Foundation, which was designed to address human rights abuses and would award an annual prize to champions of human rights.

The fourth entity at the Center was Global 2000, Inc, which had its genesis in a comprehensive, forward looking assessment of humankind's prospects in the coming century. *"The Global 2000 Report to the President – Entering the 21st Century"* was published in 1981, after Carter had left office – and was disregarded by President Ronald Reagan's administration. The study painted a bleak picture of what life would be like in the next century, assuming that existing trends continued. It envisioned a more crowded and polluted world, one less stable ecologically and increasingly vulnerable to social and political upheavals. Global 2000 sought to arrest this downward spiral through action-oriented programs that encouraged sustainable development and the equitable and responsible use of resources for promoting food self-reliance, improving health and the environment, and encouraging sound population policies.

Ryoichi Sasakawa was attracted to the idea of placing the AAI at The Carter Center. He saw considerable advantage in a former US president with a very good reputation in Africa being the head of the initiative.

Indeed, he saw a triumvirate – with Carter taking the lead in policy intervention, Borlaug providing technical leadership, and JSIF providing financial support – as a very powerful combination.

Sasakawa was also attracted the ambitious pledge of George Schira, President Carter's fundraising consultant, to have field staff on the ground within three months of signing a formal agreement, and to have crop demonstrations planted during the first cropping season of the initiative's life. This would be an implementation speed rarely witnessed in international technical assistance programs.

While Carter had a general vision of mounting action-oriented, grassroots health and nutrition projects in the Third World, it was Schira who was asked to give substance to the idea.

Marts and Lundy, a New Jersey firm that managed the national and international fundraising campaign to build The Carter Presidential Center, had sent George Schira to Atlanta at the end of 1983. As the lead fundraising consultant, Schira travelled extensively with President Carter and impressed him with his ability. The Carter Center, founded in September 1982, had been based at Emory University while the planning, the fundraising, and the construction of the permanent facilities took place. President Carter expected, once these facilities were opened, to expand the activities of the Center.

Following the July 1985 CASIN workshop in Geneva, Schira had developed a rough vision for the action-oriented core of The Carter Center, with programs in agriculture, health and nutrition. He had two prospective international donors in sight – JSIF, which in the past had donated more than $40 million to the United Nations alone, and the Bank of Credit and Commerce International (BCCI), an international bank with a developing world focus that was then growing rapidly, though it closed later in controversial circumstances.

Over a 15-year period, Pakistani banker Agha Hassan Abedi had built BCCI up from a small bank in Karachi to become a major international bank, with branches and subsidiaries in 73 countries, and an active program of philanthropic support in

the developing world. It was unique in that it was a developing world international bank that aspired to be an equal of the major transnational banks in industrialized countries. Its asset growth, built in part on the wealth of Arab oil-producing countries, had been phenomenal. Abedi had systematically courted Carter after he left the US Presidency. BCCI made a $500,000 contribution to building The Carter Center and made Abedi's corporate jet available to Carter for trips overseas. Knowing of Carter's interest in undertaking humanitarian work in the developing world, Abedi enthusiastically pledged his financial support.

For George Schira, the various key elements that were to comprise The Carter Presidential Center – and especially Global 2000 – were coming together. President Carter decided that when the new facility opened, Schira would serve as its executive director.

The proposed Global 2000 program was to be built around an integrated assault on hunger and illness, with action programs planned in agriculture and public health. Borlaug would lead the agricultural programs. William Foege, would lead the Global 2000 health programs to eradicate one or more debilitating diseases. Carter would use his access to heads of state and the leaders of international donor agencies to address major policy issues related to nutrition and health of the poor, and he would work in concert with development leaders to mobilize needed resources.

On January 10th 1986, Borlaug received a letter from Schira informing him that President Carter and Ryoichi Sasakawa hoped Borlaug himself would become Director of the "Sasakawa Africa Initiative." Although this looked like a wonderful opportunity for a coordinated attack on Africa's food, nutrition and health problems, Borlaug already had teaching and consulting commitments at Texas A&M University and CIMMYT and

The initial project countries

Ghana

Under the leadership of the flamboyant Head of State Jerry Rawlings, Ghana had embarked on a major economic recovery program in 1982, with strong support from the World Bank. Unfortunately, drought and devastating brush fires in 1983 had dramatically reduced food production the following year, and the country now had a serious food deficit. To make matters more difficult, Nigeria had expelled 1.5 million Ghanaian workers in 1984, many of whom had to be resettled and re-engaged in farming.

Rawlings, though not democratically elected, appeared to be a new breed of African leader, committed to stamping out corruption and to moving away from a centrally planned economy to a market-oriented one. Moreover, CIMMYT had a very successful collaborative maize research program underway with the Ghana's National Crops Research Institute. A number of high-yielding, open-pollinated maize varieties and improved production methods were ready for widespread demonstration and diffusion.

Sudan

Following the ouster of Sudan's long-time ruler General Nimeiry in a 1985 bloodless coup, the country was moving towards elections for civilian rule. President Carter had been very active in promoting this process – both behind the scenes and in a more public way. In the wake of the 1983 drought, Sudan had suffered more than 500,000 deaths from starvation. Although production of sorghum and millet – the nation's food staples – had rebounded when the rains returned in 1984 and 1985, there was still considerable food insecurity in rural areas. Carter was interested in agricultural development as one cornerstone for bringing peace and greater prosperity to the nation. Ryoichi Sasakawa, having participated in disaster relief in Sudan, wholeheartedly concurred.

Tanzania

Although it maintained good relations with the West, Tanzania was philosophically more closely aligned with Communist-bloc countries. It was home to Julius Nyerere, one of the first great leaders at the forefront of African liberation movements – and a committed socialist. Despite his political leanings, Nyerere was a person that Carter had dealt with and admired during his presidency. By the early 1980s, however, Tanzania's agriculture was in a shambles due to a disastrous attempt to collectivize smallholder farming. By 1985 the country had agreed to drastic structural changes in its economy. However, even though Nyerere had retired, he still wielded enormous influence in the country, and he still clung to his socialist dream for Africa.

Zambia

Even though its wealth was based largely on copper mining, some 75% of Zambia's population was engaged in agriculture. The country's president, Kenneth Kaunda, had played a central role during the war of liberation for Zambia. The government was moderate and pro-Western, despite the nationalization of private land in 1975, as part of an unsuccessful agricultural improvement program. In recent years, copper prices had been declining and food imports increasing. Borlaug and Sasakawa were less enthusiastic about Zambia as a prospective project country, and Carter was neutral. However, BCCI had extensive operations in the country and had created a foundation there, called the New and Emerging Science and Technology Foundation (NESTF). Abedi felt that NESTF could be mobilized effectively to support a Global 2000 project.

Norman Borlaug (center) and Yohei Sasakawa (left) make a media appearance with Jerry Rawlings, Ghana's Head of State through the 1980s and 1990s. The country was central to Sasakawa activities in the organization's early years.

so did not want this full-time position. However, he did agree to serve as a senior part-time consultant and to help recruit a suitable director and senior field staff. His precondition for doing so, though, was that donor funds be secured for at least five years, which Borlaug considered to be the minimum timeframe needed to achieve something significant and offer sufficient job security. Schira and Tanaka agreed.

The next step was to select the first countries in which agricultural projects would be established. Four candidate countries were identified – Ghana, Sudan, Tanzania and Zambia *(See panel previous page)*.

BCCI offers its services

BCCI had branches or affiliated banks in all four of the prospective countries. Abedi envisioned the bank providing various types of backstopping and support – from smallholder credit programs for participating farmers to direct financial support to the Global 2000 programs. He was extremely well connected with the political leadership in all four prospective countries, and eager to offer the services of BCCI in support of the Global 2000 agricultural initiative.

On January 21st 1986, President Carter, Ryoichi and Yohei Sasakawa, Norman Borlaug, US politician and diplomat Andrew Young, George Schira, and Itaru Tanaka boarded the BCCI executive jet and took off from Atlanta's Hartsfield International Airport bound for London, where Agha Hasan Abedi and Leslie Swindale joined them. Late that night, they left for Khartoum, arriving early in the morning on Wednesday, January 22nd.

In Sudan, The Carter delegation met with transitional government officials, including General Suwar El-Dahab, who had been head of state since the 1985 overthrow of General Nimeiry, Prime Minister El Gizouli Dafalla, and representatives from the ministries of agriculture and foreign affairs. The group then travelled on to Dar-es-Salaam, Tanzania, for meetings with President Ali Hassan Mwinyi and his predecessor, Julius Nyerere, who had remained head of the ruling party after retiring as head of state in 1984. The next stop was Lusaka, Zambia, where The Carter delegation met with President Kaunda and his prime minister and cabinet.

Finally, the group visited Accra for talks with Jerry Rawlings, head of Ghana's Provisional National Development Council, and his cabinet. *(See photo left)*.

Before leaving the delegation in Lusaka, to fulfill a teaching commitment at Texas A&M, Borlaug had reminded the group that he favored selecting Ghana for one of the first Global 2000 agricultural projects. CIMMYT staff had been posted there since 1979, engaged in a technical assistance project funded by the Canadian International Development Agency (CIDA) and involving CIMMYT, the Nigeria-based International Institute of Tropical Agriculture (IITA) and Ghana's Crops Research Institute (CRI). More than a dozen CRI researchers had been sent for graduate training, and a growing number of improved maize and cowpea varieties and crop-management practices had been developed and tested on farmers' fields, and were in the process of being adopted.

From Ghana The Carter delegation flew to London, to hold a press conference, on January 27th, at the US embassy. They were able to report that they had been received everywhere at a high level and with considerable interest and enthusiasm. At each stop, national leaders had been keen to discuss the prospects for establishing Global 2000 agricultural projects to accelerate the transfer of improved technology to small-scale subsistence farmers. Draft memoranda of understanding – based on the model used by CIMMYT in establishing national and regional program offices – had been prepared and presented for consideration by government officials in each country.

After careful consideration, Carter, Sasakawa and Borlaug initially selected Ghana and Sudan as the first countries where JSIF-funded projects would be launched. This move would give Global 2000 a presence in both East and West Africa, and both countries had strong research ties to CIMMYT and ICRISAT. But Abedi soon convinced the group to add Zambia to the list of initial project countries, with the work there to be funded by BCCI.

Developing the structure

With the selection of the initial project countries completed, Borlaug returned his attention to staff recruitment – specifically to finding a director for the new African Agricultural Initiative. But because of persistent ambiguities about the future structure of the program, he failed to win over his prime candidate for the job, Dr Charles Krull, a Vice President with Dekalb-Pfizer Genetics.

Borlaug knew that without a competent director to back up the field staff, the field program would not succeed. He was especially uneasy with the idea of creating an entirely new organization that would have to rapidly develop the managerial skills needed to effectively execute technical assistance programs

in foreign countries. Largely for that reason, he still preferred the idea of establishing the program under the umbrella of Winrock International.

Borlaug called Itaru Tanaka to express his concerns about the lingering lack of clarity on organizational structure and identity. He did not want to be associated with a program funded by JSIF that was destined to fail because of organizational and structural weaknesses. Tanaka insisted they discuss the matter in person and in mid-February 1986, he and Yohei Sasakawa travelled to Texas to see Borlaug. After a day and a half of intense discussions, Borlaug thought it had been agreed that Winrock International would manage the "Sasakawa Africa Agricultural Project" – with himself, President Carter and Ryoichi Sasakawa serving as senior advisors – and wrote to President Carter on February 24th 1986, reporting this outcome. However, this apparent decision did not stand for long. Ryoichi Sasakawa gave the nod to The Carter Center as the implementing organization. Borlaug was to be the senior agricultural advisor, focusing on the technical dimensions of the program, while Carter was to take charge of the policy intervention work.

In March 1986, Global 2000, Inc was established as a private, autonomous, non-profit institution, chartered in Georgia under US law, to engage in humanitarian projects in public health, agriculture, and the environment. President Carter chaired the new organization, with Ryoichi Sasakawa and Agha Hasan Abedi serving as Co-Chairmen. Itaru Tanaka was named Vice Chairman, George Schira Executive Director, and James Jackson Africa Projects Director. Norman Borlaug and William Foege were designated as Senior Consultants.

To facilitate the flow of funds from JSIF to Global 2000, an intermediary organization called Sasakawa Africa Association (SAA) was formed and registered in Geneva on March 5th 1986 as a non-profit association under the Swiss Civil Code.

JSIF (and then The Nippon Foundation) would make grants to SAA, which in turn would fund Global 2000 to manage the agricultural projects.

Schira focused on developing The Carter Center program, and it soon became apparent that he saw the Global 2000 agricultural projects as Carter Center activities, with JSIF and BCCI playing

Borlaug brings in leading Mexican scientists

In early 1986, Norman Borlaug identified three scientists from Mexico, with whom he had worked previously, to fill key staff positions on the new African project. Ignacio Narvaez, Eugenio Martinez and Marco Quiñones were invited to Atlanta and to Plains, Georgia – where President Carter lived – for the weekend of January 18th-19th 1986 to meet Carter and Ryoichi Sasakawa. Both were impressed by the caliber of the candidates.

Narvaez had joined Borlaug's wheat team in Mexico in 1946, fresh out of university. He rose to be Borlaug's top Mexican scientist, eventually obtaining an MSc and PhD in plant breeding from Purdue University. In the early 1960s, Narvaez was appointed director of the national wheat research and production program of Mexico's National Institute for Agricultural Sciences (INIA). His first task was to bring the new semi-dwarf wheat varieties into commercial production in northwest Mexico. The first varieties were released in 1962. Seed was multiplied and disseminated primarily by farmers, and was rapidly adopted. Borlaug called this the "quiet" green revolution, as it did not receive much publicity beyond Mexico.

When the Mexican wheats started to move to India and Pakistan, Borlaug assigned Narvaez as his representative in the transfer of this technology to Pakistan. Working in Pakistan from 1966 to 1969, Narvaez was instrumental in the rapid introduction and diffusion of the new high-yielding varieties and improved production methods.

Eugenio Martinez had joined the Rockefeller Cooperative Agricultural Program in 1954, working primarily in field bean pathology. He received Rockefeller Foundation fellowships to study for an MSc in plant pathology at the University of California-Davis and a PhD in pathology at the University of Wisconsin. Returning to Mexico in 1961, He was appointed director of INIA's Northwest Center for Agricultural Research (CIANO), based in Ciudad Obregon, the main location where Borlaug conducted wheat research during the irrigated winter season. At CIANO, Martinez was instrumental in the establishment of a very successful farmers' association, known as the Patronato, which helped to fund and guide agricultural research in the region. In 1966, Martinez joined the Rockefeller Foundation as an agricultural scientist, based in Guatemala and then Brazil, working on various grain legume crops, including field beans and soybeans.

Marco Quiñones had joined Borlaug's wheat research team in 1963 to do his thesis work for a Licensure in Biology at the National Autonomous University of Mexico. Quiñones was from northwest Mexico. When he was a teenager his family settled in Ciudad Obregon, where he learnt of Borlaug, who was well known in the Yaqui valley. After studying biology at the National University of Mexico, Quiñones was accepted for an on-the-job training program that Borlaug had established for young agriculturalists. After completing a thesis on triticale – a small-grain crop that was created by crossing wheat with rye – he joined the CIMMYT wheat program in 1966 and eventually rose to lead the center's durum wheat breeding program.

In 1976, Quiñones left CIMMYT to head INIA's national wheat program, which was based at CIANO in Ciudad Obregon. Subsequently, he served as director of technical services at one of the large farmers' cooperatives (Union de Cajema) before entering into private farming and seed production.

Michael Foster, SAA Country Director for Uganda 1996-2007 (center with cap), shows then-agriculture minister Dr Kisamba Mugerwa a demonstration plot in Iganga district in the late-1990s.

Foster was born Abu Sakara and raised in Ghana until he was 14 years old. When he and his brother moved to the UK, they took the surname of an English missionary who had been based in Damongo, Ghana, and who was a good friend of their father. To facilitate their entry into England, the two Sakara brothers were legally adopted by the Fosters, who had no natural children of their own. But Michael's heart remained in Africa and his interest in agriculture grew. After obtaining a BSc in agriculture at the University of Reading, he entered the MSc program and spent a year at

IITA headquarters working in on-farm research. Foster also spent three years in Mexico at CIMMYT as a University of Reading pre-doctoral fellow working on a PhD thesis related to variable oil content in quality protein maize. Borlaug got to know Foster during his time at CIMMYT and persuaded him to join the Global 2000 team after he completed his PhD.

the role of "valued donors" but not directly involved in program implementation. No real role was identified for SAA, other than being part of the funding pipeline.

However, Ryoichi Sasakawa saw things differently. He fully intended to be involved in programme-related matters, and not just as a provider of funds for the work. After all, he had been the first to propose such an activity in sub-Saharan Africa and he felt considerable ownership. This difference in perspective was destined to be the source of considerable organizational angst, but, in retrospect, was neither surprising nor debilitating to the work of those involved in the initiative.

Selecting the initial staff

With assurances of funding for at least five years, Borlaug had begun to screen potential candidates to fill staff positions earlier in 1986. His search turned up three outstanding Mexican scientists – Dr Ignacio Narvaez, Dr Eugenio Martinez and Dr Marco Quiñones – all of whom were interested in going to Africa *(see panel, previous page)*.

Despite the continuing search for organizational identity and structural clarity, and even though a project director was still needed, Schira moved to hire Martinez, Narvaez, and Quiñones. They were employed as consultants on April 1st 1986, and sent to ICRISAT headquarters in Hyderabad, India, for a three-week orientation.

At ICRISAT, the Mexican scientists met a South Korean soil scientist and agronomist, Dr CW Hong, who had worked for 20 years as a researcher in the Office of Rural Development in South Korea before joining the International Fertilizer Development Center (IFDC) in 1981. Hong was working on a collaborative IFDC/ICRISAT soil science project based at ICRISAT headquarters. He was an excellent field agronomist, with a natural flair for teaching. Since the IFDC/ICRISAT project was coming to an end, ICRISAT's Swindale indicated to Borlaug and Schira that he thought Hong would be an excellent candidate for the applied research-technology transfer position in Africa. Hong was keen to join Borlaug in this initiative.

On April 20th 1986, the four scientists traveled from Hyderabad to London to meet Schira and Tanaka. Here it was decided that Martinez would direct the Global 2000 agricultural program in Ghana, with assistance from Hong, while Narvaez and Quiñones would go to Sudan.

During May, the Global 2000 teams in Ghana and Sudan worked with steering committees appointed by the countries' agriculture ministers to develop the terms of reference and a program of work in each country. By June, general work plans covering the next several years were ready. Even though they had not yet purchased vehicles and still had not settled their families, Martinez and Hong in Ghana and Narvaez and Quiñones in Sudan set out to establish a handful of demonstration plots in the 1986 summer season, using borrowed vehicles and whatever other human resources and inputs they could muster.

During 1986 and 1987, the staff team was strengthened. Martinez and Hong were joined in September 1986 by Marcel Galiba, a former student in Borlaug's graduate course in international agriculture who had just completed his PhD in sorghum breeding at Texas A&M University

Born of a Senegalese mother and Congolese father, Galiba had been raised in Dakar before going to study agriculture at the University of Abidjan. Following graduation in 1974 he went to work for the Senegalese National Agricultural Research Institute (INSRA). In 1976, Galiba was awarded a scholarship from Canada's International Development Research Center for his MSc studies at the University of Laval in Quebec. He returned to INSRA in 1979 where he worked on sorghum improvement. In 1982, Galiba was given a scholarship by USAID to attend Texas A&M University, studying under the renowned sorghum breeder, Fred Miller. Here Borlaug came to know Galiba and was impressed by him. In 1986, Borlaug invited Galiba to join the Global 2000 agricultural program, after completing his

dissertation. Galiba accepted, eager to become a member of the Borlaug team.

For the Zambian project, Schira recruited Dr RP Jain, a distinguished Indian scientist who had been based in Sudan with ICRISAT who was looking for a new role, as USAID funding for the ICRISAT/Sudan sorghum and millet project was coming to an end. Jain had been very helpful to the Global 2000 staff when they first arrived in Sudan and Narvaez and Quiñones recommended him to Schira; he took up his new role in October 1986 and was soon joined in Zambia by Dr Michael Foster, who was completing a PhD at the University of Reading in the UK *(see panel on previous page)*.

Borlaug also directly recommended the eighth member of the original Global 2000 international field staff team, Dr José Antonio Valencia, drawing again on the strong talent pool in Mexico *(see panel)*.

By early 1987, Global 2000 had eight expatriate crop scientists living and working in Ghana, Sudan, and Zambia. Project offices had been established, basic transportation acquired, and – in partnership with national ministries of agriculture and farmers – demonstration plot programs in maize, wheat, sorghum, and millet had been established.

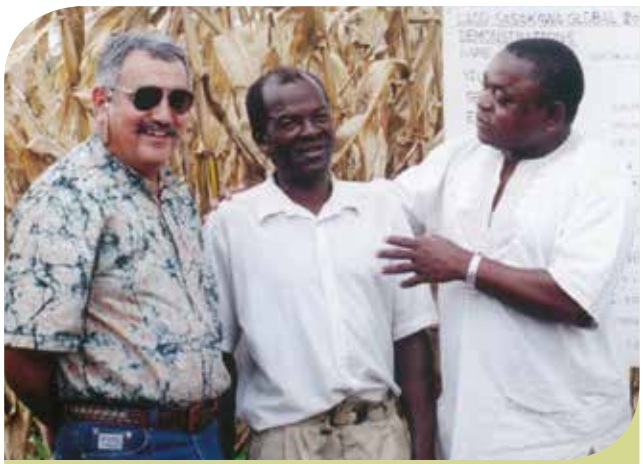
Global 2000 scientists were intended to work in agricultural extension and production rather than pure research, so they were housed within each country's national extension service. Borlaug felt that would help to build the confidence of national extension officers in their dealings with researchers. He also expected that the Global 2000 staff would strengthen the communication bridges between research and extension, which were often weak.

Management Challenges at The Carter Center

By early 1987, George Schira's management style was increasingly at odds with the focus on grassroots relationships favored by Borlaug, President Carter and his wife Rosalynn and the Global 2000 field staff. There were also significant differences between Schira's view of the roles of SAA/JSIF and BCCI as donors and those of the organizations themselves. As donors, they expected to have considerably more input into how their funds were to be used than Schira believed was necessary or appropriate. His strong feeling was that, beyond a broad approval of general programmatic directions, program implementation of Carter Center/Global 2000 activities should be left to him as Executive Director.

These differences regarding Global 2000 were in addition to other problems with Schira's management of The Carter Presidential Center. In March 1987, President Carter asked for and received his George Schira's resignation.

In early May, Borlaug traveled to Atlanta where he met Akira Iriyama, then Executive Director of the Sasakawa Peace Foundation, which had been established in 1986 by JSIF. Speaking on behalf of Ryoichi Sasakawa, Iriyama said that JSIF/SAA was willing to continue support for the Global 2000 African Initiative,



José Antonio Valencia (left) with a farmer (center) and SG 2000 National Coordinator John Kumenda in Malawi, in the late 1990s, when Valencia was Country Director there.

Valencia first met Norman Borlaug in 1969, shortly after he graduated from agricultural college in Sonora, northern Mexico. Enthused by Borlaug's knowledge of wheat, he worked at the CIANO agricultural research station in Ciudad Obregon in collaboration with CIMMYT, where Borlaug was director of the wheat program. After obtaining his MSc in Mexico, he studied for a PhD in wheat breeding at Oregon State University. Warren Kronstad, a leading wheat breeder whom Borlaug knew well, supervised him there.

but they wanted to be more involved in program planning and they required greater accountability in the use of their funds.

With this meeting, Iriyama established himself as the principal liaison between JSIF and The Carter Center, and showed himself to be a strong emissary. He had worked for Japanese railways before moving to Japan Airlines, where he became marketing manager for North America, based in New York. In 1982, he left the world of business and joined the staff of the Japan-USA Foundation, which was largely funded by JSIF. When JSIF established the Sasakawa Peace Foundation, Yohei Sasakawa turned to the experienced Iriyama to be its intellectual architect.

Following Schira's departure, President Carter asked Bill Foege, who was already Executive Director of The Carter Center of Emory University, to also lead The Carter Presidential Center, The Carter-Menil Human Rights Foundation, and Global 2000, Inc. Foege accepted, while his long-time colleague and friend, Bill Watson, Associate Executive Director of The Carter Center of Emory University, also expanded his responsibilities for the other entities. The two had worked together at the US Centers for Disease Control (CDC), and when Foege became Director, he had asked Watson to serve as Deputy Director. Both men were leaders of the global public health community—Watson as a superb manager, and Foege as an inspiring medical scientist and strategist *(see photo)*.

William Foege taking his temperature with an oral thermometer during a swine flu vaccine test at the US Centers for Disease Control in 1976. He played a major role in the push to eradicate smallpox and other diseases worldwide.

Under the new management team, The Carter Center negotiated an acceptable way forward with the principal Global 2000 donors. Joe Giordano – a close CDC colleague of Foege and Watson, and a very experienced manager – would handle day-to-day management of operations.

A clear distinction was drawn between activities funded through SAA and those funded by other donors. JSIF would fund the Global 2000 agricultural projects in Ghana and Sudan and BCCI would fund the emerging health-related projects, as well as the Zambia agricultural project. It was also agreed that SAA and BCCI would each hire someone to work with Global 2000 in the management of their financed projects. Late in 1987, SAA hired Dairuku Tsurumaki, a rural development specialist, to work with Giordano to oversee the SAA-funded agricultural programs. Similarly, BCCI appointed Mahmood Hassan to oversee the BCCI-supported projects.

Despite these changes, Global 2000 management continued to be bumpy for the remainder of 1987. Giordano was not familiar with agricultural research and extension and often questioned requests for necessary equipment and supplies.

The field staff were also concerned about their terms of employment. In mid-1987 – more than a year after most had joined – there was still no clear set of personnel policies. Giordano felt it was time to put the administrative house in order and by the end of 1987, he had linked Global 2000 with the Institute of International Education (IIE), which was assigned to handle payroll and personnel benefits for the international agricultural research centers. Field staff were placed on proper employment contracts and accorded the range of benefits received by other senior staff working under the IIE umbrella.

There were also operational problems in scaling up the Ghana, Sudan and Zambia programs. Administrative approval by Giordano for the purchase of program vehicles and of fertilizer and seed, which had to be available at the beginning of the planting season, was often slow in coming. And despite signed memoranda of understanding with the host country governments it was difficult to get customs clearance for imports of vehicles, equipment and supplies.

Progress in the field

Notwithstanding the organizational growing pains of Global 2000 in Atlanta, the country field programs made remarkable progress in 1987. Several thousand demonstration plots were established in the three project countries during the year. Frontline extension workers and participating farmers were very pleased with the Global 2000 technology transfer approach, which emphasized the use of modern inputs and made them available to farmers on credit and at discounted prices. Moreover, the country plans for expanding the field programs in 1988 and beyond quickly made Global 2000 the darling of government officials and small-scale farmers in project countries. Administrative and financial management had been strengthened.

However, little attention was being given to the critical issues of program planning, monitoring and evaluation. To remedy this shortfall, proposals were developed for a Global 2000 Advisory Committee, which would include President Carter, Ryoichi Sasakawa (or his representative), Agha Hasan Abedi (or his representative), Norman Borlaug, William Foege, Adeto Lucas (a health consultant) and an outside agriculture consultant, who was to be identified. But this concept was quickly overtaken by events.

In early 1988, Iriyama informed The Carter Center that JSIF wanted SAA to play an even more prominent role in management of the agricultural projects being funded by JSIF, and that the SAA Board of Directors would perform the functions envisioned for the Global 2000 Advisory Committee. Borlaug agreed to serve both as President of SAA and as Chairman of the SAA board, which also included representatives from The Carter Center and JSIF. Jean Freymond served as Board Secretary and the official representative in Switzerland, where SAA was registered as a non-profit organization. Yohei Sasakawa agreed to serve as Treasurer, and Akira Iriyama, Saburu Kawai, William Foege and William Watson joined as board members.

By the end of 1988, the SAA board had become the de facto governing board, and it was agreed that, henceforth, the "brand name" used for collaborative Sasakawa and Global 2000 agricultural field programs would become Sasakawa-Global 2000, or SG 2000 for short.

As SAA become more prominent in Global 2000's African activities, BCCI's role declined dramatically when it became embroiled in a financial scandal relating to money laundering and other illegal activities by one of its affiliated banks. Subsequent investigations led to the permanent closure of BCCI in 1991 and an end to its association with The Carter Center and SAA's efforts in Ghana, Sudan and Zambia.

But by this time the Sasakawa-Global 2000 African Agricultural Initiative was up and running and producing exceptional results at the field level – results that belied the conventional wisdom of the day regarding African agriculture.

CASIN: the forum that helped shape SG 2000

As Ryoichi Sasakawa and Norman Borlaug began to sketch out early concepts for a new African agricultural initiative in 1985, the Center for Applied Studies in International Negotiations (CASIN) in Geneva, Switzerland, was commissioned to organize a preparatory international workshop. This would review the challenges of farming productivity, food and nutritional security, poverty, health and demography that faced sub-Saharan countries.

The workshop on *Alleviation of Poverty and Hunger in sub-Saharan Africa: Prerequisites for Peace* took place in Geneva on July 8th-10th 1985 and was attended by some 35 international leaders in agriculture, nutrition, medicine, demographics, economics, anthropology, sociology, religion and public policy. Among those present was former US President Jimmy Carter, who subsequently joined Sasakawa and Borlaug in launching the initiative that is SAA today.

Few participants had specialist knowledge of sub-Saharan countries or smallholder food production. However, they brought wide international expertise and a fresh outside perspective.

Dr Leslie Swindale, head of the International Center for Research in the Semi-arid Tropics (ICRISAT) – based in Hyderabad, India – discussed sorghum and millet, while the debate on maize was led by Robert Havener, the former CIMMYT Director General who had become head of the newly formed Winrock International Institute for Agricultural Development.

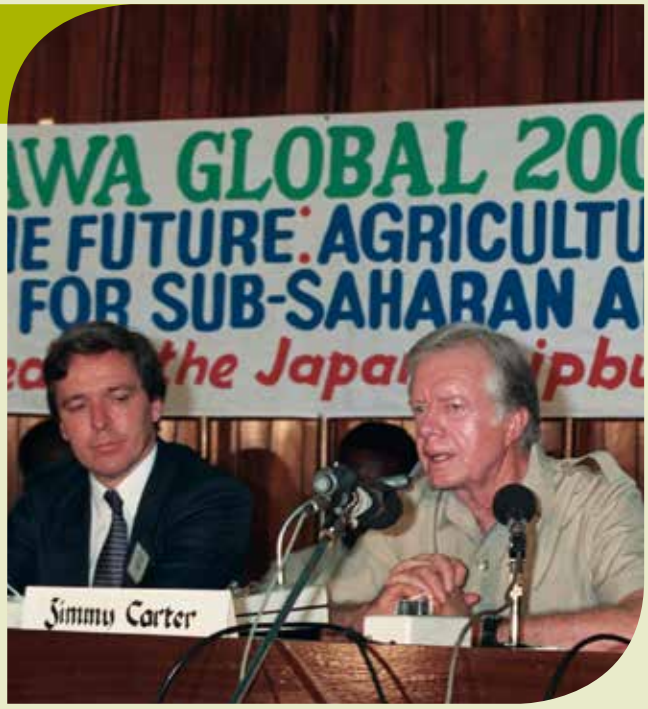
Domino effect

Shri C Subramaniam, who had served as Minister of Agriculture and Food in India during the famine of the mid-1960s, explained how his country had subsequently revolutionized its production of wheat and rice. He emphasized the need to ensure farmers had access to key inputs, such as improved seed and fertilizers and outlined the importance of stabilizing prices for both inputs and outputs, to give growers the confidence to invest in more intensive, but costly production methods.

Workshop participants familiar with agricultural research in Africa argued that the biological potential existed for the continent to double or even triple yields of most food crops with improved technologies that were already available but still largely unused. And Borlaug expressed the hope that progress in a few countries would have a positive "domino effect" on others.

There was broad agreement on the need for investment in agricultural research, rural roads, education and health services – all of which, directly or indirectly, have an impact on food security.

Proposals for maize- and sorghum-related technology transfer discussed in July 1985 were subsequently taken forward as a major plank of the new African Agricultural Initiative led by Borlaug, Sasakawa and Carter.



President Jimmy Carter (right) and Jean Freymond, Director of CASIN (left), at a CASIN/Sasakawa Global 2000 workshop held in Accra, Ghana in August 1989.

And over the following years a series of other workshops were organized by CASIN's director Jean Freymond – who is also Secretary to the Board of SAA – covering a wide range of subjects, often far beyond agriculture and the food sector as narrowly defined.

These gatherings played a valuable role in raising the profile of issues that have a major impact of African food security and rural development but which fall outside the areas in which SAA itself operates directly.

They stimulated new thinking and practical suggestions for action on these issues. And they thus indirectly supported the wider drive to develop African agriculture and reduce food and income poverty.

For example, the second CASIN workshop – held in Geneva in July 1986, just as the new agricultural initiative was getting underway – addressed health. This is, of course, crucial for human welfare, but it also affects the productivity of smallholder agriculture, which is labor intensive.

Health was also an issue of longstanding interest to Jimmy Carter. The fight against diseases such as Guineaworm, trachoma and onchocerciasis has become a major strand of activity for The Carter Center.

But CASIN workshops have focused more directly on farming. A 1988 gathering in Nairobi reviewed the initial performance of the new SG 2000 projects in Sudan, Zambia and Ghana.

PART TWO: Call to Action

Chapter 2
SG 2000 Spreads its Wings

By 1988, the Sasakawa-Global 2000 (SG 2000) field programs in Ghana, Sudan and Zambia were well under way, showing that appropriate technology could allow farmers to escape from reliance on traditional, low-yielding modes of production. SG 2000 country staff were training and providing support to several hundred national and local extension officers who, in turn, were working with several thousand small-scale farmers to plant demonstration plots of maize, wheat and sorghum. Yields on these plots – each usually one acre in size – were at least two, and, occasionally, up to four times higher than the yields on the companion plots being cultivated using traditional methods. This experience belied the prevailing pessimism about the potential for African agriculture.

Norman Borlaug had made several visits to each SG 2000 project country, reviewing field demonstration sites, talking with farmers, extension workers, and researchers, and then synthesizing this information in his discussions with political leaders. The talk was of a potential green revolution in Africa. Borlaug also emphasized the need to overcome constraints that threatened to hold back progress, by ensuring the supply of inputs and enable producers to get credit.

President Carter, Ryoichi and Yohei Sasakawa, and Agha Hassan Abedi had also visited the field projects. The excellent demonstration plot yields, the enthusiasm of farmers and frontline extension staff and the strong support of national leaders for the Global 2000 methodology, gave JSIF officials much satisfaction and reason for hope.

Ghana leads the way

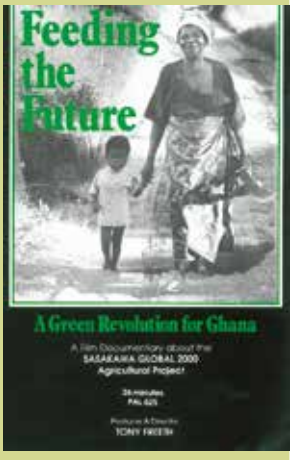
There was particular excitement about Ghana, where demonstration plots were showing spectacular increases in yield and a satisfactory rate of recovery for input loans. This inspired confidence that the new technologies were proving to be appropriate and economically viable. The number of demonstration plots in the country grew from 40 in 1986 to 1,600 in 1987 and then 16,000 in 1988. Rainfall had been good during 1987 and 1988, and most farmers obtained maize yields in the range of 3.5-4 tons per hectare – about three times the national average. With the cost of seed and fertilizer still subsidized by the government, but the maize harvest sold at free market prices, the use of technology recommended by the SG 2000 field staff was proving highly profitable. As a result, most farmers were able to repay the SG 2000 input loans made to them.

Ghana's Head of State, Jerry Rawlings, and his agriculture minister Commodore Steve Obimpeh, were monitoring the activities of SG 2000 closely. Delighted with this initial progress, the government announced that it would use national resources to expand the field demonstration program to 80,000 farms in 1989. This represented a five-fold increase over the previous year and constituted a shift from a field-testing and demonstration program to an incipient national maize production campaign.

Ghana appeared to be on its way to a crop production success story. Suitable improved technology was available from the national agricultural research system, the extension service – with training, transport, and per diems supplied by SG 2000 – was performing effectively in supporting the field demonstration program, and SG 2000 was providing production credit to farmers and ensuring that inputs were delivered on time. As a result, Ghana's maize farmers were at least doubling their production and greatly increasing their incomes.

In 1988, an international workshop featuring the activities and success of the SG 2000 projects was organized by CASIN in Nairobi, Kenya. Impressive crop yields were being obtained in Sudan and Zambia as well, but it was Ghana that enjoyed the spotlight at that meeting. SG 2000 had commissioned a British filmmaker, Tony Freeth, to prepare a documentary about the project: his film, ***Feeding the Future – A Green Revolution for Ghana***, suggested that the country was quickly modernizing its traditional smallholder agriculture.

Borlaug shared everybody's enthusiasm for what was happening in Ghana, but he was becoming increasingly concerned that an oversupply of maize to the local market could depress the prices being received by farmers. After the bumper 1988 season, he wrote to Obimpeh, urging him to cut back on the number of demonstration plots in maize, and to broaden the work to include other important food crops for which improved technology existed. He also advised the government to mount an extension campaign



Tony Freeth's film, released in early 1989, was the first in a series of documentaries on the work of Sasakawa Global 2000 in helping to modernize African agricultural practices.

to encourage farmers to expand their on-farm grain storage capacity, using improved technologies.

At its October 1989 meeting, the SAA Board of Directors decided to cut back financial support for Ghanaian demonstration plots in 1990. Funds were provided to buy inputs for only 2,000 plots, and these were to be for crops other than maize. This was a drastic drop from the previous year, and the SG 2000 staff were pressured by regional and district extension staff to find ways to support more plots. Participating farmers were also loudly voicing their discontent with the drastic scale-back in the demonstration program.

The Agricultural Development Bank (ADB) of Ghana agreed to help out. The bank had supported some demonstration plots in 1988 and 1989 and enjoyed repayment rates by farmers of more than 90%. It was, therefore, eager to team up with SG 2000 and MOFA and provide credit to farmers participating in the field demonstration program. ADB agreed to provide credit to 20,000 farmers involved in the 1990 SG 2000/MOFA production test plot program.

However, serious problems arose. What was not clearly understood by SG 2000 field staff was that SG 2000 remained responsible for any defaults on the loans. Staff felt that they had been misled by ADB officials on that point, while ADB officials countered that they had been misled by public SG 2000 reports of very high past rates of loan recovery.

Initially, the 1990 loan recovery rate appeared as though it would be even worse than in 1989, but a Herculean effort by SG 2000 and MOFA extension officers managed to push the loan recovery rate up to the 1989 level. Even so, that was still only 40%, and eventually SG 2000 had to pay ADB about $400,000 to cancel the farmers' debts.

An added complication for the Ghana project was the departure of two senior staff in barely a year. At the end of 1988, CW Hong had moved from SG 2000-Ghana to become extension advisor in a World Bank-funded project, while in mid-1989, Eugenio Martinez decided to resign as Country Director at the end of that year and return to Mexico. Borlaug was concerned.

To replace Hong, Martinez had hired Astolfo Fumagalli, a Guatemalan who had originally trained as a wheat scientist with Borlaug in Mexico. After almost 20 years as head of the Labor Ovalle highland research station near Quetzaltenango, he had moved to Guatemala's Agricultural Science and Technology Institute (ICTA), where he eventually became director. There he helped to develop a technology generation, validation and transfer model that had influenced participatory on-farm research methods.

And when Martinez himself decided to quit, Borlaug strengthened the Ghana team with the recruitment of Wayne Haag, an experienced CIMMYT maize breeder, to work on seed supply systems and quality protein maize (QPM) development *(see panel opposite)*.

In recent years, Haag had become a strong supporter of QPM, the nutritionally superior high-lysine maize developed by CIMMYT and Mexico. QPM held great promise for improving the diets of maize consumers in developing countries and as a nutritious animal feed. However, it was not being widely adopted because of a supposedly inferior yield potential compared to maize with normal protein content. Haag was eager to get CIMMYT's most recent QPM varieties into the hands of Ghana's farmers. He believed that their performance would dispel notions of the crop's yield inferiority.

Martinez's successor as Ghana Country Director was Marcel Galiba. Having joined the program in 1986, he had successfully managed the field demonstration program in southern Ghana and launched crop demonstrations in neighboring Benin and Togo. He was now tasked with managing operations in all three countries.

In light of these staff changes and programmatic challenges, the SAA board decided to commission an external review of the Ghana program, led by Dr Montague Yudelman, a South African agricultural economist who had been Director of Agriculture and Rural Development at the World Bank under Robert McNamara. His team included two former colleagues from the World Bank, Paul Goffin, a rural finance expert, and John Coulter, an agronomist, together with Don McCune, former Director of the International Fertilizer Development Center (IFDC), and Ester Afao Ocloo, a Ghanaian agribusiness entrepreneur and founder of Women's World Banking. The team visited Ghana in October 1990 and January 1991.

Yudelman concluded that SG 2000 had shown that appropriate technology was available to allow farmers to break out of their traditional modes of production – and that it had effective techniques for diffusing this knowledge and convincing farmers that the new methods were effective and profitable.

However, the external reviewers questioned whether SG 2000 had met two other key conditions needed for the widespread adoption of the new ideas. Firstly, farmers needed to be able to purchase off-farm inputs and, secondly, they needed adequate incentives to adopt high-yield technologies. Moreover, they also needed markets in which the increased output could be sold at prices providing a reasonable return.

The Yudelman report was generally favorable about the SG 2000 Ghana project, recommending a continuation of the crop demonstration program – but with a manageable numbers of plots and with due consideration to a "wider range of activities, especially the support and promotion of artisan seed production and of improved on-farm grain storage". These and other recommendations were adopted by SAA.

However, the strongest recommendation – that SG 2000 give more attention to all aspects of the economics of its field program, including the hiring of staff with training in agricultural economics – was ignored.

During its November 1990 meeting, the SAA board came to the conclusion that it was asking too much of Marcel Galiba to manage three country programs. They decided that Galiba

Wayne Haag is seen here *(second from right)* **working with SAA in Mozambique in the 1990s.**

He brought a wealth of practical experience in maize breeding and production to Sasakawa. Before he joined, he was working primarily in outreach positions – first in Egypt, then in Turkey and finally in Colombia. He was especially knowledgeable about seed production. Having grown up on a small farm in Michigan, Haag had a broad understanding of farm enterprises, from crops to livestock and poultry. He had also worked in Guatemala as an extension agent, first with the US Peace Corps and then with the NGO World Neighbors.

should move to Cotonou and mount fully-fledged Global 2000 projects for Benin and Togo. Galiba was excited by the prospect of building these programs. He was convinced that suitable improved technologies were available, at least for maize, and wanted to focus on making smallholder agricultural intensification more sustainable in these countries.

Wayne Haag took over as Country Director of the Ghana project in January 1991. With this change, all of the original Global 2000 Ghana project staff had left. The new team was Haag, Fumagalli and Dr Tareke Berhe, who was transferred from the SG 2000-Zambia program in mid-1991. Each member of the new team wanted to address new challenges. Haag wanted to introduce QPM and develop a smallholder seed system involving private growers and public research and seed certification organizations. Fumagalli was interested in focusing his efforts on improving on-farm grain storage. Meanwhile, Berhe worked with national extension leaders to develop a sustainable crop demonstration program. All of these new initiatives would take one or two years to bear fruit.

The Sudan project

SG 2000's efforts in Sudan had achieved mixed results. The original plan had been to concentrate on improving rain-fed production of sorghum and millet in the dry, semi-arid areas. However, the lack of new technologies that were significantly better than traditional methods of production – not to mention the resumption of civil war following the imposition of Islamic law throughout the country – frustrated efforts to work in these drier areas.

The team of Mexican scientists that Borlaug had sent to the country had all worked in the irrigated valleys of northwest Mexico, which were similar in ecology to Sudan's irrigated areas. The SG 2000 staff members were also world experts in irrigated wheat production, and Sudan was seriously deficient in the crop.

However, while the country plan envisaged some extension work in the irrigated wheat areas adjacent to the White and Blue Nile rivers, this was not meant to be the primary focus of SG 2000 efforts. Now, the technological constraints and severe security problems in Sudan, combined with the staff's areas of expertise, meant a change in plans was warranted.

The first irrigated wheat plots established during the 1986/87 season had shown that the proposed package of recommended practices could lead to a quantum jump in Sudan's wheat yields. The largest of the Sudanese irrigation schemes was the Gezira project, near Khartoum *(see photo, right)*. Developed originally by the British in the early 1900s to produce cotton, it had grown to an area of around 1 million hectares under irrigation. The land was owned by the government, and the Gezira board exercised considerable control over which crops were produced and how.

The typical Gezira farmer cultivated 20 hectares of land and relied on mechanized production methods (tractors and combine harvesters). Cotton was the primary crop in the rotation, but wheat and other crops were also permitted. While certainly not rich by industrial country standards, the Gezira farmers were quite wealthy in African terms. Although they differed from SG 2000 's prototype farmer clients, a strong case was made that increasing wheat production would provide significant socio-economic benefits for Sudan as a whole.

By the 1987/88 season, Gezira farmers and extension workers had seen the yields of the SG 2000 plots and they were extremely impressed. One early discovery made by the SG 2000 team was that the addition of phosphorus fertilizer – Gezira farmers were using only nitrogen at the time – could result in an additional 35 kg of wheat grain for each kilogram of phosphorus fertilizer applied. Farmers began to pressure government officials to import the required fertilizers and machinery, and to multiply and provide more seed of the newer high-yielding wheat varieties.

The Sudanese government awarded a Gold Medal and Diploma to The Carter Center in 1988 for the work done by a team led by Marco Quiñones to increase wheat production and productivity in the Gezira Scheme.

However, the prevailing political situation in Sudan was chaotic. Prime Minister Sadiq al-Mahdi led the civilian

government, but he was dealing with a fractured parliament and a high degree of paralysis in government.

By early 1988, Ignacio Narvaez, the SG 2000 director in Sudan, had lost faith in the prospects for achieving significant impact in the country. He informed Borlaug that SG 2000 should consider ending its work in the country and shift field staff to other locations where there was greater potential for improving agricultural production. Narvaez suggested establishing a project in Tanzania, which had been one of the original four countries visited by Carter, Sasakawa, Abedi and Borlaug in January 1986.

After considerable discussion, the SAA board agreed with the idea of closing down the Sudan project and shifting resources to Tanzania. Giordano, Narvaez and Quiñones visited the country during the year and final negotiations were completed in October. Quiñones was named Country Director and was asked to move to Dar-es-Salaam and take up his new assignment in January 1989.

However, the SAA board decision to close the SG 2000 Sudan project was soon re-examined. While the program had faced various political and administrative frustrations with government offices in Khartoum, the wheat field demonstration program in the Gezira and adjacent irrigation schemes was expanding rapidly and achieving spectacular results. By 1988/89, there were several hundred large demonstration areas producing yields two-to-three times greater than those normally achieved by farmers. Large crowds were being attracted to the farmer field days, and the Gezira agricultural officials and farmers were very excited about the SG 2000 program. Impact was being achieved in farmers' field, though this message seemed to get lost in the halls of government in Khartoum.

JSIF had accepted the earlier arguments from the SAA board that the Sudan project should be closed after the 1988/89 wheat season. Quiñones had already moved to Tanzania, and it was expected that Valencia, at least, would be joining him. A final report on the SG 2000 project in Sudan had been prepared, and it was then that the widespread impact being achieved in farmers' fields became so obvious. Despite the political problems at the national level, wheat production was increasing rapidly.

Furthermore, President Carter was actively involved in trying to mediate a peace agreement between the government of Sudan and the resistance movement in the south of the country. He wanted to persist with the refocused agricultural effort, but funding was now a problem. So despite the previous decision by the SAA board, JSIF agreed to provide funding to the Sudan project for six months in 1990, while Global 2000, Inc worked to secure new funding. Fortunately, the governments of Norway and Sweden provided The Carter Center with sufficient support to operate the Sudan project for another 18 months. At that point, Narvaez decided to retire and return to Mexico, while Valencia was asked to stay on in Sudan.

The Gezira irrigation scheme in Sudan, photographed by a NASA satellite in 2006. Sasakawa held successful wheat field demonstrations in the area, close to the confluence of the White and Blue Niles.

The Zambia project

The Global 2000 program in Zambia began in early 1987, one year later than the Ghana and Sudan projects. Outstanding maize yields had been obtained in the first season, and plans called for a substantial expansion in maize plots in the 1988/89 season. But when the new project was begun in Tanzania, Michael Foster asked to transfer there from Zambia. This was approved in early 1989, and Quiñones posted him to Arusha, the regional center for the northern highlands.

Foster was replaced in Zambia by former Borlaug wheat trainee Tareke Berhe, Ethiopian by origin but by then a naturalized US citizen *(see panel opposite)*.

Although the project continued in 1989, funding was increasingly precarious and its future uncertain. By this time BCCI, which was funding the Zambia work, was fighting for its life. Abedi had experienced serious health problems in 1988 and never really returned to the business. Abu Dhabi's ruling family, BCCI's largest shareholder, had taken control at the bank. In 1990, BCCI was still honoring its commitments to Global 2000, but it advised The Carter Center that it would not be able to fully meet previous pledges. Some of the Global 2000 project activities would have to be curtailed.

The Gulf War in 1991 may have pushed Abu Dhabi's Sheikh Zayed to end BCCI support for the project in Zambia, whose president, Kenneth Kaunda, had been publicly in favor of Saddam Hussein's decision to invade Kuwait. This stance was not appreciated by the Gulf states. The Carter Center decided to close the project down at the end of 1990.

Changes in SG 2000 management

By 1992, SAA was managing the SG 2000 country projects, though they continued to be joint initiatives of SAA and the Global 2000 program of The Carter Center. Akira Iriyama had indicated at the SAA board meeting in November 1989 that SAA was interested in starting some new rural development projects that might not be directly concerned with crop production. He also proposed that Dai Tsurumaki – who had been serving as SAA's administrative representative for the Global 2000 African Agricultural Initiative – be located in Accra, where he could supervise the new SAA projects, as well as attend to SG 2000 administrative matters. In 1990, Tsurumaki moved to Accra and established a new SAA regional office for Africa.

To help Tsurumaki with the SG 2000 administrative work in Africa, Iriyama hired Deola Naibakelao, a young Chadian, who had been living and working in Japan for the previous seven years *(see panel, top)*.

During 1990, Tsurumaki developed his ideas for several small SAA projects – to improve animal health, produce poultry feed and promote development of agroprocessing enterprises. Several former Japan Overseas Cooperation Volunteers were hired by SAA and Sasakawa Peace Foundation staff in Tokyo and dispatched to Ghana to work as advisors on the new projects.

In addition to help provided by the SAA field staff in Ghana, Tsurumaki received backstopping from two SAA/SPF staff in Tokyo – Maasaki Miyamoto in administration and Katsumi Hirano in program development. Miyamoto had joined JSIF after university and had spent his career in the Sasakawa group. Hirano had joined SPF more recently, as a junior program officer. His career interest, however, was academic research in African economic development.

Meanwhile, the SAA regional office in Ghana was under strain. Tsurumaki – who was primarily interested in developing agricultural and rural development pilot projects that could complement SG 2000 field demonstrations – felt there was a need for stronger management support, as problems of administrative coordination between the regional office and the SG 2000 country project offices in Ghana, Sudan, and Tanzania were becoming apparent. Administrative pressures had also increased when the full management responsibility for the SG 2000 projects was shifted from Global 2000 to SAA.

So, in 1991, Iriyama hired a new General Manager, Masataka Minagawa, who had strong credentials in finance and administration, to consolidate SAA administration in SPF's Tokyo offices. In the new configuration, all SAA and SG 2000 administration and finance was to be handled from Tokyo, while SG 2000 field staff became SAA, rather than Global 2000, employees. Borlaug was to continue managing programmatic matters from Mexico, and SG 2000 policy intervention work would be managed from Atlanta.

Minagawa had recently taken early retirement from Tokai Bank, a large Japanese banking firm where he had been posted to London, Houston and Seoul during 32 years of service, and risen to the rank of Vice President. He enjoyed working in multinational settings and, in his "second career", he wanted to pursue humanitarian work. He had joined SPF after spotting an advertisement in a Tokyo newspaper, talking about the work of SPF and inviting people to apply for employment.

A few months before Minagawa was brought on board, SAA/SPF had recruited Michio Ito, who had been working for a Japanese NGO focused on water resource development in Africa. Ostensibly, he was to replace Katsumi Hirano, who had recently left SPF to join the Institute of Developing Economies to focus on African development issues.

Tareke Berhe *(on the right)*, **is pictured with Inoussa Akintayo of the Africa Rice Initiative in Mali in 2009. Early in his career, Berhe had worked for the Ethiopian Institute of Agricultural Research (IAR), and was its first teff breeder.**

Meeting Berhe in Mexico in 1968 at a CIMMYT wheat-training course, Borlaug had been impressed by his talent and hard work. Berhe secured a Rockefeller Foundation fellowship, pursuing an MSc at the University of Nebraska and a PhD at Kansas State University. Berhe worked for ICRISAT and IITA, first in Sudan and later in Zaire (now the Democratic Republic of Congo). He joined the Global 2000 Zambia project in 1989 and remained there until the project was brought to a close.

Deola Naibakelao is now both Managing Director of the Sasakawa Africa Fund for Extension Education (SAFE) and SAA's Theme Director for Human Resource Development.

As a child he had grown up barefoot in a small village in southern Chad. After his academic performance caught the eye of his Jesuit school teachers, he was awarded a scholarship that took him to Lyon, France, where he eventually obtained his PhD in rural sociology. While in France, he met and married a Japanese graduate student, and after completing their studies, Deola and his wife moved to Japan – he could not return to Chad for security reasons. Following a stint working in a car wash, he became a French teacher and was eventually able to find a professional position at an international development institute. The thought of returning to Africa and be closer to his family was never far from Deola's mind, so, he was happy to take the SAA opportunity in Ghana, even though the job was an administrative one. He moved to Accra in mid-1990.

Tsurumaki, with backstopping in Tokyo from Miyamoto and Hirano, had initiated the development of SAA's financial and administrative systems. Now Minagawa and Ito completed the job. Minagawa's first task was to put budgetary and financial reporting systems in order. He standardized the budget reporting format and retained Price Waterhouse Coopers to serve as external auditors for the SAA operations. He also revised and refined the organization's personnel policies.

Christopher Dowswell, who had been working as a consultant for Global 2000 and SAA since 1986, was named Director for Program Coordination at the end of 1991 *(see panel right)*.

To strengthen the overall SAA management structure, both Minagawa and Dowswell were asked to join the SAA board in 1991. And from the outset, they had a good working relationship: both wanted a simple administrative system, delegating substantial authority and responsibility to the Country Directors. Both also wanted to reduce the size of the country budgets by half, to around $500,000 per year. In Ghana and Sudan, and to a lesser extent in Tanzania, SG 2000 had made considerable investments in pick-up trucks, motorcycles and bicycles. Vehicle purchases comprised a third or more of total country budgets, an amount that Minagawa and Dowswell felt was too large for a small NGO to sustain. They thought it was better to leave larger donors to fund transport support for national extension staff.

Also, the Ghana experience had shown that a field-testing and demonstration program should not be confused with a national production campaign. A few thousand well-placed and well-tended field demonstration plots were sufficient to introduce new technologies to farmers. Thus, SG 2000 financial support was to be limited to demonstration programs that would normally consist of not more than 5,000 demonstration plots. If a project country wanted to establish more plots than that, it would be expected to finance them with its own resources.

In October 1991, Yohei Sasakawa addressed the SAA board as JSIF President. He expressed the satisfaction of JSIF with the results achieved so far by the SG 2000 agricultural projects. He attributed much of this success to the leadership of Norman Borlaug and President Carter, and to the dedication of the Country Directors, whom he considered a "driving force" in the initiative. He reminded the board, however, that despite the SG 2000 successes, many Africans still did not have enough to eat. Therefore, he reported, the JSIF board had decided to extend SAA's activities for another five years. He also suggested that SAA should "think further than this second period of five years".

Chris Dowswell *(right)***, shown with Joaquim Chissano, former President of Mozambique, at the agricultural symposium held in Addis Ababa in July 2010 in honor of the life of Norman Borlaug.**

Dowswell met Borlaug in 1978, when he was hired by Bob Havener to be CIMMYT's Head of Information. He left in 1986 to embark on new career as a freelance agricultural communications consultant, working mainly for CIMMYT on special assignments in Pakistan, and with Borlaug on science-writing assignments. He had also participated in the CASIN workshop in 1986 that launched the Global 2000 health projects. In 1988, he took on communications assignments for Global 2000 as a consultant and by 1990 he was supporting Borlaug, particularly on program coordination. In late 1991 he finally joined SAA as a regular staff member, filling the newly created position of Director for Program Coordination.

At the same meeting, Borlaug reported to the board on his visit to Nigeria, made two months earlier in the company of an SG 2000 delegation. The International Institute of Tropical Agriculture (IITA) and General Olusegun Obasanjo, the Nigerian head of state at the time, organized the visit to assess whether SAA might implement some activities in Nigeria. The team had reached the conclusion that it might be feasible to start projects in one or two states. The objective would be to initiate a demonstration of the SG 2000 technology transfer approach, which could then be studied and hopefully adopted by other Nigerian states.

The board also discussed a proposal prepared by Dowswell and Winrock International for an African scholarship scheme. The proposal called for 32 scholarships to allow students to study at the BSc level at local universities, coupled with 16 MSc. and 4 PhD scholarships for study abroad. The Country Directors would manage the BSc scholarships and Winrock International, which had a scholarship management program in place, would manage the MSc and PhD scholarships.

Yohei Sasakawa expressed concern about sending promising students abroad to obtain their advanced degrees. There was strong evidence that doing so could lead to a "brain drain" in the home country with students deciding not to return home once they completed their studies. Still, he strongly supported the scholarship concept, as did other board members.

The genesis of SAFE

The proposed scholarship program led to a remarkable success story for SAA's efforts in Africa. In 1992, Deola Naibakelao was given responsibility for managing the program and, by 1996 it became officially known as the Sasakawa Africa Fund for Extension Education (SAFE). The program increasingly focused on providing more BSc scholarships to attend African universities, in the belief that doing so would reduce the potential for producing graduates that were "over qualified" for the national extension positions needed in project countries. It soon became apparent, however, that institutional innovation and capacity building would be needed to develop a curriculum suitable for mid-career professionals interested in obtaining a BSc degree in Agricultural Extension. The SAFE program was destined to become one of SAA's flagship activities in Africa.

The Carter Center moves away from agriculture

Global 2000's health projects grew rapidly between 1987 and 1995 – by which time it had health-related programs underway in 35 developing countries. The eradication of Guinea worm and reducing the incidence of river blindness in Africa were the priority programs, though initiatives to control other diseases, such as lymphatic filariasis, schistosomiasis (bilharzias), and trachoma were also undertaken.

The shift toward public health programs was natural for Global 2000. Many key Carter Center staff had spent careers

Yohei Sasakawa with President Jimmy Carter. In 1991, the JSIF board, led by Sasakawa, decided to extend SAA's activities for another five years and said SAA should also think beyond that period.

working at the US Center for Disease Control in international health programs. Bill Foege, Don Hopkins, Bill Watson, and Andy Agle were well-known CDC professionals in the field of public health. Significant donor funds began to flow to Global 2000 public health programs.

In addition to the health-related programs, President Carter and The Carter Center staff became increasingly involved in conflict resolution and democratization in many developing countries. Carter was involved in mediating civil conflicts in Ethiopia, Eritrea, Sudan, Rwanda and Liberia, in addition to similar work in Haiti and North Korea. Since the first Carter-led election monitoring team went to Panama in 1989, The Carter Center participated as international monitors in numerous national elections, including in Zambia, Ethiopia, Nigeria, Liberia, Mali, Mozambique and the Democratic Republic of the Congo .

All this resulted in a move away from agriculture, with The Carter Center's direct involvement in the management of agricultural development projects ending in 1992. The Global 2000 Zambia project was closed in 1991 and the Sudan project came to an end in 1992. Despite various efforts to maintain a close working relationship between Global 2000 and SAA, over time the two NGOs drifted apart.

After Ryoichi Sasakawa indicated his desire that SAA manage the program, President Carter decided not to further develop agricultural expertise within the Center. Nevertheless, he personally remained an active leader of SG 2000 and always was keen to link his peace initiatives in Africa with the subsequent establishment of Global 2000 health projects and SG 2000 agricultural development programs.

Andy Agle was responsible for coordinating Global 2000's policy intervention work, with assistance from Chris Dowswell on the SAA side. The JSIF/Nippon Foundation made annual

grants to Global 2000 to support its policy intervention work, which began at $400,000 in 1992, declining to about $250,000 per year after 2000. The reduction in funding was due mainly to Global 2000's inability to spend its allotted budgets for agricultural policy work.

Agle, with the assistance of Ed Schuh, a distinguished agricultural economist, made a determined effort to develop a policy-intervention program that would engage President Carter in support of the SG 2000 agricultural projects. At the time, Schuh, was Dean of the Hubert Humphrey School of Public Policy at the University of Minnesota, and was especially knowledgeable in matters of international trade. He had lived and worked in Brazil during the 1960s and 1970s. He served on the Council of Economic Advisors to two Presidents, was a former Director of Rural Development at the World Bank, and had served as Chairman of the Board for International Food and Agricultural Development (BIFAD), which provided counsel on international agriculture to the Administrator of USAID.

When he joined Global 2000 in 1990, Agle's first inclination was to hire a senior economist with policy experience, preferably in Africa, to be based at Global 2000 headquarters in Atlanta. However, he soon realized that Global 2000 could neither afford a recognized policy expert nor provide adequate job security to attract the caliber of person they wanted. As an alternative, Agle suggested that, rather than hire one person, a pool of experts should be created that would be available to advise President Carter, Norman Borlaug and SG 2000 Country Directors on a broad range of subjects. Agle's idea was favorably received.

In January 1992, a council of distinguished economic policy advisors was formed. Called the Agricultural Council of Experts (ACE), it was composed of several dozen internationally recognized specialists, including economists, agronomists and experts on women's issues. Members included Ed Schuh, Carl Eicher, Per-Pinstrup Anderson, Monty Yudelman, Sally Yudelman, Uma Lele, Harris Mule, Francis Idachaba, Don Plucknett, and Joyce Endeley. ACE held its inaugural meeting in Geneva in July 1992. Schuh chaired the meeting and was subsequently appointed ACE Chairman.

Expansion of the SAA board

While The Carter Center reduced its involvement in day-to-day management of SG-2000 projects, it continued to be involved through the SAA board. Andy Agle served, as did William Foege. When Foege stepped down as Executive Director of The Carter Center in 1992, he remained on the board, but the new Center Executive Director, Dr John B Hardman, was added as a member.

In 1993, the SAA board decided to add two external members – Bob Havener, who had recently stepped down as President of Winrock International, and former Nigerian president Olusegun Obasanjo, now chairman of the African Leadership Forum. In 1995, Ed Schuh also joined the board, which added greatly to its depth on economic policy. The addition of these members changed the complexion of the board, as until then Borlaug had been the only board member with agricultural development experience in the developing world.

Havener, whom Borlaug had known since the 1960s, had worked in developing world agriculture for nearly three decades. He had experience at leading international agricultural research and development organizations, and was a skilled administrator and institution-builder.

After retiring from politics, Obasanjo had busied himself with farming and agribusiness and engaged in conflict resolution work across Africa. This brought him into frequent contact with President Carter, who was also active in this field.

Obasanjo first became involved with SG 2000 In May 1991, when he attended a CASIN workshop in Arusha. Addressing workshop participants, he focused on the problems of over-centralization of political power and its impact on the formulation

Born and raised on a small farm in Ohio, Bob Havener majored in animal science (with a minor in agricultural economics) at Ohio State University. After graduation, he became a county extension specialist and then manager of a local agricultural cooperative before taking up a Michigan State University position as a rural development advisor in East Pakistan (today's Bangladesh), based in the rural town of Comilla.

In 1965 he joined the Ford Foundation, initially based in Dacca and later in Lahore and Islamabad before moving to Beirut, Lebanon in 1972, as director of the foundation's Arid Lands Agricultural Development (ALAD) project. This was the precursor of ICARDA, the International Center for Agricultural Research in Dry Areas, which Havener helped to establish in 1976, with its headquarters in Aleppo, Syria, because civil war had broken out in Lebanon.

Havener and his family were evacuated from Beirut and reassigned to Ford Foundation headquarters in New York City, as a senior agricultural program officer. In 1978 he became the third Director General of CIMMYT and then, in 1985, President of the newly formed Winrock International Institute for Agricultural Development.

and implementation of policy. He made a plea for greater decentralization of decision-making and stronger participation by the people in governance, both to improve effectiveness of government programs and to increase accountability. Obasanjo subsequently helped IITA arrange a visit to Nigeria by Borlaug, which led to the establishment of SG 2000 activities in the country. His election to the SAA board brought invaluable African political experience and added considerable legitimacy to the overall SG 2000 Africa program.

In 1997, the SAA board added a new member, Victoria Sekitoleko from Uganda, who was the FAO's sub-regional representative for southern and eastern Africa. As Uganda's Minister of Agriculture, Livestock and Fisheries from 1988 to 1995, she had helped bring the SG 2000 project to the country. In addition to providing her insights to the board as an agriculturalist, politician and senior policy maker, Sekitoleko added a strong gender focus to programmatic considerations.

Former Nigerian president Olusegun Obasanjo became involved with SG 2000 activities in 1991. Here, he is pictured (right), meeting Sasakawa's Masaaki Miyamoto (centre) and Michio Ito (left) at the Tokyo International Conference on African Development (TICAD III) in 2003

A new round of SG 2000 expansion

During the October 1991 SAA board meeting, Andy Agle conveyed President Carter's wish that SAA consider establishing an SG 2000 agricultural project in Ethiopia.

Carter had become involved in peace negotiations in 1989 between the Ethiopian government of Mengistu Haile Mariam and the Eritrean People's Liberation Front (EPLF). In May 1991, the Mengistu government fell and an interim government was established, dominated by the Ethiopia People's Revolutionary Democratic Front (EPRDF). The Carter Center was assisting the interim government to establish a democratic structure that would accord self-government rights to major ethnic groups or regions. In the process, President Carter also talked about the Global 2000 health and agriculture programs to Meles Zenawi, the former Tigray liberation fighter, who headed the EPRDF and the country's transitional government, before later becoming Prime Minister.

The end of the Mengistu government in Ethiopia opened the door for establishing an SG 2000 project. Initially the SAA board expressed reluctance. The political situation was still unstable, a new SG 2000 project had just begun in Nigeria and SAA funds were limited. But the food needs of the nation were compelling.

Ethiopian agricultural production in 1992 had faltered and some 7.8 million people (out of a total population of 54 million) were at risk of starvation. That problem was largely averted, however, thanks to efforts of the World Food Program and other food distribution organizations, which were able to bring in about 1.4 million tons of food for distribution to affected areas. Still, the danger of food shortages was not lost on Zenawi, who vowed to make agriculture the focus of the new government's economic strategy.

The interim government, together with the international donor community, quickly charted an agriculture-led economic development plan. Marco Quiñones, SG 2000 director in Tanzania, made contact with officials from the Ethiopian Ministry of Agriculture and this led to a 1992 field visit to Tanzania by a small team of Ethiopian specialists, led by Takele Gebre, National Head of Extension.

For several weeks, the visitors toured the SG 2000 field sites, talking with farmers and Tanzanian extension workers. By the end of their trip, the Ethiopian team was eager to implement a similar program in its own country. In early 1993, an SG 2000 project proposal was submitted to the Addis Ababa government and quickly approved. By May of that year, Quiñones had transferred to Ethiopia as the new Country Director.

Meanwhile, Obasanjo recommended to the board that it explore the scope for establishing an SG 2000 project in Mozambique, which had just ended 17 years of civil war. He had played a role in the negotiations between the Frelimo-dominated government and the Renamo-led insurgents.

Despite vast areas being suitable for food production, the nation's agriculture was in a shambles and years of conflict had resulted in the abandonment of hundreds of thousands of hectares of arable land. As a result, Mozambique was dependent on food aid to avoid widespread famine.

With the 1992 peace accord holding, and the disarmament and decommissioning process of the combatants underway, Obasanjo was eager to see SG 2000 contribute to the rehabilitation of Mozambique's agriculture. Ed Schuh, Chairman of the Global 2000 policy advisory group (ACE), was also keen for SAA to consider Mozambique as a future project country. In particular, he foresaw the potential for technical and financial support from Brazil, which shares a common language and has similar agro-ecological conditions.

For a host of reasons the prospect of establishing an SG 2000 project looked attractive: Mozambique had vast areas of unused or underutilized arable land, maize was an important part of the diet and there were possibilities for collaboration with an established government extension agency and a large and successful private-sector agricultural development organization (Lonhro de Mozambique). Moreover, Wayne Haag was fluent in Portuguese. Minagawa, Agle, Dowswell and Haag made several visits to the country during 1994 and in late 1995, SG 2000 and the Mozambique government finally signed a project document.

During 1996-97, SG 2000 also established new field programs in four additional countries – Uganda, Guinea, Mali and Burkina Faso. Several agricultural leaders in Uganda had attended CASIN workshops and had become familiar with the SG 2000 Africa program and President Carter was working with Uganda's President, Yoweri Museveni, in conflict resolution initiatives in the Great Lakes countries of Burundi, Rwanda, Uganda, Sudan and the then-Zaire.

Based largely on his experience with Museveni, Carter recommended to the SAA board that an SG 2000 project be established in Uganda. World Bank staff familiar with the situation there also encouraged such a move. The board concurred and in 1996 a new SG 2000 project was established in Uganda under the leadership of Michael Foster.

The interest in Guinea was strongly motivated by SG 2000's desire to gain more experience in rice production. After wheat, rice is the second-largest food import into sub-Saharan Africa. And unlike wheat, which grows well in only a few regions, rice is well suited for domestic production almost everywhere. Guinea is one of the West African countries where the crop is the major staple. It has a range of irrigated mangrove, and upland rice production environments, which are similar to those of its neighbors, Sierra Leone and Liberia.

The board considered both of these countries as alternative possible locations for the rice production project, but because of the ongoing civil war in Sierra Leone and insecurity in Liberia it eventually decided to stick with the plan to establish the program in Guinea. The new SG 2000 project, focusing on rice, began in 1996 under the leadership of Tareke Berhe.

The projects in Mali and Burkina Faso were motivated by several considerations. One was that the projects in Togo and Benin were coming to a close and SG 2000 wanted to maintain a presence in francophone Africa. Another was the opportunity to work in the cotton production zones of Mali and Burkina Faso, both of which had reasonably large and well-developed irrigated commercial agricultural systems (500,000 hectares in Mali and 200,000 hectares in Burkina Faso). The cultivation of an internationally traded cash crop like cotton in the farming system made it easier to intensify food crop production in the same areas, since input delivery systems were already in place to serve smallholder cotton farmers. SG 2000 also wanted to see what might be done to increase food security in the semi-arid farming areas of the Sahel.

Jose Antonio Valencia became country head of SAA's new Malawi project, which started operations in 1999.

With the closure of the Togo and Benin projects, Marcel Galiba was available for relocation, and he was well suited to lead the planned projects in Mali and Burkina Faso. He was especially interested in bringing improved soil and water conservation technologies to the erosion-prone areas of these countries. He also wanted to apply integrated nutrient-management strategies that involved using small amounts of conventional fertilizer, together with rock phosphate for direct application and green manure crops to supply part of the nitrogen needed by the crops.

Norman Borlaug was not a strong advocate of working in the very dry areas of the Sahel, unless irrigation was available. He reasoned that, as such areas were marginal for food production and too risky to merit significant investments in production inputs, SG 2000's limited human and financial resources would be better directed towards more favorable environments, where farmers still used low-yielding traditional technologies. It was there that the greatest impact on food production could be made. Still, some of the most food-insecure people in Africa live in the Sahel, and thus the board felt that promising new science-based technologies needed to be made available to farmers in the region.

The composition of SG 2000 country projects continued to evolve with the addition of Malawi to the mix in 1999 – motivated in part by a 1998 decision to close the Nigeria project the following year. Obasanjo, who had been so central to establishing the Nigeria project, had become a political prisoner in 1996 and was still languishing in prison at the time of the board's 1998 annual meeting, with no real expectations that he would be released as long as General Sani Abacha remained in power in Nigeria. The board thus decided that SG 2000 should no longer operate its project in the country. This meant that Country Director Jose Antonio Valencia would be available to lead a new project elsewhere, and the board instructed SAA management to identify an appropriate country where a new project could be established.

Malawi looked like a good candidate and exploratory activities began in 1998. The country was very poor and very food-insecure. Maize was the main staple, contributing an average of nearly 60% of total calories, while in populated areas arable land was in short supply, so the case for agricultural intensification was imperative, if food supply problems were not to worsen. Technologies were available that could at least double maize yields and a number of partner organizations, such as the World Bank and CIMMYT, were keen for SG 2000 to establish a project in Malawi.

Borlaug, on the other hand, was less enthusiastic. He didn't dispute the need, but he was concerned about the very large number of NGOs, private foundations, and bilateral and multilateral aid agencies already operating in Malawi. With so many other international organizations involved in agriculture and rural development, he wondered whether SG 2000's already limited resources were really needed there. However, most of the board was in favor of moving ahead and recommended that the project be established. Borlaug acceded to the consensus, and the SG 2000 Malawi project began in 1999, with Jose Antonio Valencia in the lead.

Changes at JSIF

In 1995, Ryoichi Sasakawa, the founding JSIF Chairman, died at the age of 96. While his son, Yohei Sasakawa, had been JSIF President since 1989, there was no automatic presumption that he would become the foundation's chairman. Indeed, some thought that such a succession was unwise. Ryoichi Sasakawa had been a very influential national personality and a high-profile leader of JSIF. For many Japanese, JSIF and the name Sasakawa were virtually synonymous and this perception was a source of growing criticism within government in Tokyo. Following Ryoichi's death, the board of directors of JSIF decided the time had come to give the foundation a new institutional image.

In 1996, JSIF changed its name to The Nippon Foundation and invited the noted Japanese novelist and NGO activist Akayo Sono to become its Chairwoman. She was already serving on the Sasakawa Peace Foundation Board of Directors and now accepted The Nippon Foundation Chair for an initial five-year term, while Yohei Sasakawa continued to serve as President. In 2005, Sono retired, and Yohei Sasakawa was elected Chair, while Takeju Ogata – a 1967 graduate of the Tokyo University of Agriculture and Manager of the foundation's Department of International Affairs – was appointed President.

During the 10 years that Akayo Sono was in the chair, the foundation underwent important institutional changes. In particular, the Department of International Affairs grew considerably under her leadership, assuming the role played earlier by SPF in representing the foundation internationally; it was increasingly interested in formally assessing the impact of the foundation's projects.

Nippon Foundation income had peaked in 1990 at about $550 million, when wagering on motorboat racing reached a level of about $21 billion. But as the Japanese economy experienced prolonged slowdown, racing revenues declined. This inevitably reduced the foundation's budget, to about $360 million in 2001.

Yet in spite of this decline in revenue, The Nippon Foundation actually increased its funding to SAA by 50% between 1992 and 2002, with nearly half the additional money devoted to the SAFE scholarship program and to work on postharvest agroprocessing. But the number of project countries doubled over this period, which meant that the flow of funds to individual country projects increased by only about 25%.

While The Nippon Foundation remained steadfast in its support for the SG 2000 projects, it was not happy that the SAA board seemed unable, or unwilling, to carry through the plans to bring some of the older country projects to conclusion.

During its October 1992 meeting, the board had discussed the need to phase out certain country projects, agreed that a clear strategy should be developed for winding these up, and produced a schedule for phasing out different activities: Ghana was to close in 1994, Tanzania in 1995, Benin in 1996, Togo in 1997 and Nigeria in 1998. Borlaug agreed to convey this schedule to the Country Directors.

Everyone recognized that national governments would need to be given at least a one-year notice of the closure of a project. But even with a strategy and timetable in place, none of the projects were closed as scheduled.

Akayo Sono greets Uganda President Yoweri Museveni at a 2001 workshop in Kampala. The novelist and activist was Chairwoman of The Nippon Foundation for a decade from 1996.

PART TWO: Call to Action

Chapter 3
Program Consolidation

Plans for the phased closure of five SG 2000 country programs by 1998 were not implemented on schedule. Indeed, overall program activity actually increased with the addition in 1997 of four new country projects, in Burkina Faso, Guinea, Mali and Uganda. Confronted with this burst of new initiatives, The Nippon Foundation decided that it had no choice but to intervene directly in SAA's operations for the first time, instructing the board to close four of the oldest SG 2000 country projects – in Nigeria, Tanzania, Benin and Togo -- by the end of 1998.

But the rationale behind the closure decisions varied from country to country. In Nigeria, Obasanjo remained in jail after his incarceration by the dictatorship of General Sani Abacha, without any indication of when he might be released. The Nippon Foundation wanted to express its unhappiness with this situation by closing down the Nigeria project. The SG 2000-Tanzania project had been operating for 10 years and was now in a Phase II mode, with a locally hired national coordinator and a much-reduced budget. In the cases of Benin and Togo, the foundation felt that the projects had run long enough and that Marcel Galiba, who had been given responsibility for managing the new programs in Mali and Burkina Faso, would be too stretched if asked to also continue with his work in Benin and Togo.

The Nippon Foundation's directive came as a surprise to Norman Borlaug and his field staff. Until that time, the foundation had given the SAA board essentially unfettered control over its field programs and, in turn, the Country Directors had considerable autonomy as well. But the foundation became increasingly frustrated with the board's inability (or unwillingness) to design and implement exit strategies for older projects, even as it continued to expand activities into new countries. It was this frustration – coupled with the reality that funds for SG 2000 activities were not unlimited – that led to the direct intervention.

Borlaug and Yohei Sasakawa agreed that 1998 would serve as a transition year for bringing program activities in the four targeted countries to a conclusion. At the same time it was decided that project activities in Ghana, where SG 2000 had been operating longest, should continue for three-to-five more years. This was due largely to the SAFE, agroprocessing, and quality protein maize (QPM) research and development programs that were operating there, which were providing valuable direct benefits to Ghana, and considerable indirect "spillover benefits" to other SG 2000 project countries.

Nigeria

The SAA board began taking steps to close the SG 2000-Nigeria project in 1998, but, once again, unexpected events led to a change in plans. The Nigeria Country Director, Jose Antonio Valencia, was transitioning between his posting there to his new assignment as Country Director of the recently established Malawi project. He was very busy getting the Malawi project underway, especially during the latter part of 1998 when he was involved in planting the first demonstration plots for the 1998/99 cropping season. To take some pressure off Valencia, the board decided to postpone the final shutdown of the Nigeria program until well into 1999. So when Nigerian dictator Sani Abacha died suddenly in early 1999 the program was still in operation. With Abacha gone, the new Nigerian acting head of state General Abdusalam Abubakar ordered the immediate release of Olusegun Obasanjo – who then asked Yohei Sasakawa to maintain the SG 2000 project for at least another five years. Amidst signs of a fresh start for Nigerian reform and development after the dismal Abacha years, Sasakawa agreed to Obasanjo's proposal, although Valencia himself still moved to Malawi. The program continued and today Nigeria is one of SAA's four focus countries. *(For more on SAA's activities in Nigeria see page 92.)*

Tanzania

In 1998, after 10 years working with the Ministry of Agriculture extension services, SG 2000 ceased its direct field activities in Tanzania. During that time, the Tanzania project had two directors: Marco Quiñones, from 1988 to 1993, and Michael Foster, from 1993 to 1998. Quiñones reacquired management responsibility for SG 2000 activities in Tanzania in 1998, after the field program had ended. He was well connected with the Prime Minister and Minister of Agriculture, and shifted SG 2000's focus towards providing policy advice. SG 2000 activities in Tanzania yielded important lessons that could be applied elsewhere as well. This was especially true with respect to crop demonstration programs, input supply systems, grain storage, animal traction and soil fertility management.

Crop Demonstrations: The crop demonstration program was SG 2000's main activity in Tanzania, especially during the first five years of the project. Over the life of the project, smallholder Tanzanian farmers produced crops on nearly 41,000 Management Training Plots (MTPs). In addition, between 1989 and 1995, about 1,000 of the country's 5,000 government extension workers received crop management training from SG 2000 staff. Maize was grown on about two-thirds of the

MTPs, followed by sorghum (25%) and various grain legumes and wheat (9% combined). Average maize yields on the MTPs ranged from 4.5 to 5.1 tons per hectare (t/ha), compared to a national average yield of about 1.3 t/ha – a clear indicator of the superior productivity of the recommended technologies. Several thousand MTPs were devoted to growing sorghum, pigeon pea and other legumes, and they too produced yields that were significantly higher than those obtained with traditional farming methods. Through farmer field days, an estimated 400,000 farmers learned about the new packages of improved crop varieties and practices.

The first three years of the MTP program were an unqualified success. The total number of MTPs expanded rapidly, exceeding 10,000 plots during the 1990/91 cropping season. Farmers who participated in the MTPs received loans covering the entire cost of the recommended inputs. During the first three years, the loan recovery rate was high, in part because the total numbers of plots and farmers were manageable, but also because generally good rainfall patterns in the highlands resulted in high yields.

As the program expanded, SG 2000 realized that village extension workers were handling perilously large sums of money and were struggling to keep track of which borrowers had repaid their loans and which had not. Moreover, the distasteful task of collecting overdue loans was hindering efforts to build a rapport between extension workers and farmers. During the 1991/92 season, the MTP program continued to grow, to about 15,000 plots located in six different regions. Unfortunately, this expansion coincided with the first of three consecutive seasons of poor rainfall.

The loan recovery rate began to decline during the 1990/91 season, and dropped to a worrisome level during the 1991/92 and 1992/93 seasons. In response, SG 2000 staff cut back on the number of MTPs and introduced a scheme by which farmers had to pay 50% of the input costs in advance. In addition, participating farmers were allowed to stay in the MTP program for a maximum of two years (for a given technology) before being "graduated." A significant minority of farmers, learning they would not be eligible for a third input loan, decided to default on the second one. To tackle this problem, further changes were made.

Input supply: By the 1993/94 cropping season, SG 2000 had ended the practice of providing input credit to farmers participating in the MTPs and was considering alternative ways to help ensure that sufficient inputs were available to farmers when needed.

A new initiative, the Joint Inventory Guarantee Scheme (JIGS), was launched, intended to build up an embryonic input supply market by fostering routine business transactions among fertilizer and seed companies, input dealers (village stockists), and farmers.

Under this program, SG 2000 enabled 100 registered village stockists to obtain fertilizer on partial credit from two large fertilizer wholesalers, the Tanzanian Farmers Association (TFA) – an agro-service cooperative – and the Tanzanian Fertilizer Company. SG 2000 offered guarantees to these organizations, covering half the value of each fertilizer shipment – usually 10 tons – to registered stockists. When the stockist paid off the first purchase, SG 2000 would guarantee half the cost of the next shipment. The guarantee could be applied to a maximum of 30 tons of fertilizer per registered stockist per year.

Through this program, the fertilizer importer and SG 2000 shared the risk involved in working with small-scale entrepreneurs in rural areas, with the hope that after several years of successful interaction between wholesalers and registered stockists it would become possible to establish normal credit relations. The guarantees were to be used for a minimum of two years to help kick-start and extend the delivery of inputs to smallholder farmers. Though short-lived, JIGS showed considerable promise: only two defaults had to be covered by SG 2000 during the program's two years of operation. But unfortunately, the end of the SG 2000 field program in 1998 also brought an end to the JIGS program.

It is interesting to speculate whether the JIGS program would have continued, perhaps with government support, had it been given time to mature. The risk of default was certainly an issue with the fertilizer suppliers. Indeed, the large fertilizer importers and wholesalers were themselves so strapped for capital that they found it difficult to finance sales of fertilizer on credit. They simply lacked the capital to increase the reach of their businesses into more remote rural areas.

Postharvest handling: The SG 2000-Tanzania project invested considerable effort in promoting improved grain storage, both on the farm and also in the form of communal storehouses. Traditional grain storage structures, which took the form of large woven baskets, were improved by surfacing the baskets with cement and raising them off the ground on a platform that protected against damage by rats, insects and mold. Companion drying patios, usually about 50 m^2 in size, were also shown to be an important addition to the storage system.

In the Arusha region, a grain inventory credit pilot project was introduced in 1992, in collaboration with TechnoServe, an international NGO that now helps build competitive, growth-oriented and sustainable businesses that benefit the rural poor.

At several locations, organized farmer groups were linked to credit institutions that would provide short-term loans against grain held by the associations in bonded warehouses. These inventory loans were repaid as the grain was sold, usually over a 3-6 month period as market prices rose. However, this pilot scheme was discontinued after only a few years: because of past default problems in other project countries, the SAA board did not want to see SG 2000 country projects involved in credit programs. It also proved difficult to sustain farmers' participation in collective grain storage in bonded warehouses, because they shied away from any scheme reminiscent of the Ujamaa (forced collectivization) policies of former President Julius Nyerere. They were reluctant to deposit their grain in communal storage, especially when government officials were involved.

Animal traction: In areas free of tsetse fly, a considerable number of Tanzanian farmers were tilling their fields using oxen. Typically, plowing requires two people – one to guide the animals and another to handle the plow. In 1993, SG 2000 set out to boost the productivity of this traditional practice by introducing improved implements and training farmers in their use. The improved equipment enabled single-operator plowing, theoretically doubling the productivity of labor used in land cultivation.

Over the next four years, SG 2000 established 50 animal traction centers to teach farmers better tillage methods. Each center comprised a simple shed in which improved plows and other equipment were stored for use in training sessions. Each training session involved 10 farmers (and their oxen), and allowed SG 2000 to introduce farmers to better, labor-saving plows and weeders.

The actual distribution of the new equipment was not done by SG 2000, but by other NGOs (mainly church groups), private stockists and the FAO-supported Special Project for Food Security. However, SG 2000 staff trained more than 1,000 farmers in single-operator plowing techniques between 1993 and 1997, and government extension staff that had been involved in the initiative continued the training program after SG 2000's field program came to a close.

Hune Nega from Ethiopia's agriculture ministry conducts a water harvesting training course in the Same district of Tanzania in 2004. SG 2000 organized and sponsored the course, which demonstrated rainwater harvesting and construction of underground water storage tanks. It was carried out in collaboration with the Tanzanian agriculture ministry, via a World Bank-financed project.

Soil fertility management: In 2000, Marco Quiñones became actively engaged with Tanzania's Ministry of Agriculture and World Bank officials in developing a project to assist smallholder farmers to restore degraded soils and accelerate agricultural productivity growth. The condition of Tanzanian soil resources was not good. Continuous cropping without replenishing soil nutrients had degraded them and accelerated wind and water erosion. This was a serious constraint to increasing agricultural productivity.

To help remedy this situation, the government proposed a Soil Fertility Recapitalization and Agricultural Intensification Project (SOFRAIP) and asked SG 2000 to develop the core technical elements, a move supported by the World Bank.

SOFRAIP envisioned an integrated approach to soil fertility restoration and management, combining conservation tillage with the use of chemical fertilizers and organic fertilizer sources such as compost, green manure and phosphate rock. A major portion of the project budget was set aside to fund input credit, by giving organized groups of smallholder farmers vouchers for 50% of the cost; meanwhile, farmers had to pay the remaining 50% up front and agree to capitalize the full value of the voucher as savings in local savings and credit societies.

The idea was to greatly extend the use by smallholder farmers of modern inputs, build a suitable supply system and start developing a new base of farmer associations and microfinance institutions in Tanzania. SG 2000 would be responsible for training front-line extension staff in crop management and helping to accelerate the formation of savings and credit cooperative societies (SACCOs).

The SOFRAIP proposal was submitted to the World Bank and the formal project appraisal process began in April 2001. Anticipating that it would be quickly approved, the SAA board agreed to reopen an in-country SG 2000 office. Quiñones planned to spend several months a year in the country, working with Tanzanian and World Bank colleagues to implement SOFRAIP. SAA also posted a young Japanese agronomist, Dr Jiro Aikawa, to Tanzania to work with ministry officials during the technology generation phase, while the SAFE program – operated in collaboration with Winrock International – continued to support the BSc course for mid-career extension workers at Sokoine University.

However, the SOFRAIP proposal ran into considerable resistance at World Bank headquarters in Washington DC, and was sent back to the drawing board. Reviewers felt that there were too many project sub-components, from extension production campaigns, to production credit schemes, to soil conservation and natural resource reclamation. They also felt that SOFRAIP was too "top down" and prescriptive in recommending the

promotion of specific technologies. The World Bank lobbied for a more streamlined project, with stronger participatory and community development components.

The result was a new project, the Participatory Agricultural Development Project (PADEP), which supported a range of community-based initiatives to enhance agricultural productivity and conserve the natural resource base. This was eventually approved, but not until 2003. While SG 2000 continued to advise Ministry of Agriculture and Food Security officials assessing new technologies, it did not have the level of influence or responsibility for project implementation that had originally been envisioned.

By 2004 it became clear that SG 2000 support was more urgently needed elsewhere, and the Tanzanian Program was brought to a close.

Togo

The SG 2000-Togo project began in 1990 as a satellite of operations in Ghana and the following year it became an independent country program, under the supervision of Marcel Galiba, who was also responsible for SG 2000 activities in Benin. The project structure and activities were similar in both countries. A field demonstration program was initiated to promote improved maize production technologies; *Mucuna utilis*, the green manure crop, was promoted to improve soil fertility and to control spear grass (Imperata cinlindrica), a noxious weed, while village savings and loan associations were developed.

However, the SG 2000-Togo project did not receive the same level of financial support as its counterpart in Benin and it did not achieve the same level of success. Because of governance issues Togo's relationship with the international donor community had run into difficulty, with key European donors and the World Bank suspending most assistance. This left the Ministry of Rural Development and its national agricultural extension service under serious financial pressure.

By the time of its October 1997 meeting, the SAA board was leaning towards closing the Togo project. But it learnt that the World Bank was in fact finalizing a credit to support essential agricultural services, such as extension and research, which was likely to become effective in early 1998, breathing new life into the Ministry of Rural Development. SG 2000 financial support was therefore critical – if only as a bridging facility to keep at least a scaled-back field demonstration program going – so the SAA board agreed to a one-year extension of the project. Unfortunately, security conditions in Togo deteriorated further, so the board finally decided to terminate the program in 1998.

Even so, SAA felt that the Togo project had been worthwhile. Over the seven years of SG 2000 activity, farmers planted more than 5,000 half-hectare plots, which clearly demonstrated the potential benefits that improved technology packages could deliver for maize, cassava and rice. Soil fertility restoration methods built around the use of Mucuna had been introduced and took root in the country. The yields produced using recommended technology packages were invariably two-to-three times greater than those being obtained by farmers using traditional methods.

SG 2000 was also able to convincingly demonstrate the advantages of improved on-farm grain storage methods and structures for maize and other basic food crops. Finally, the effort to promote the development of village-level savings and loan associations *(Caisses Rurales d'Epargne et de Prêt)* showed considerable promise, with 30 CREPs being established countrywide before the project was closed.

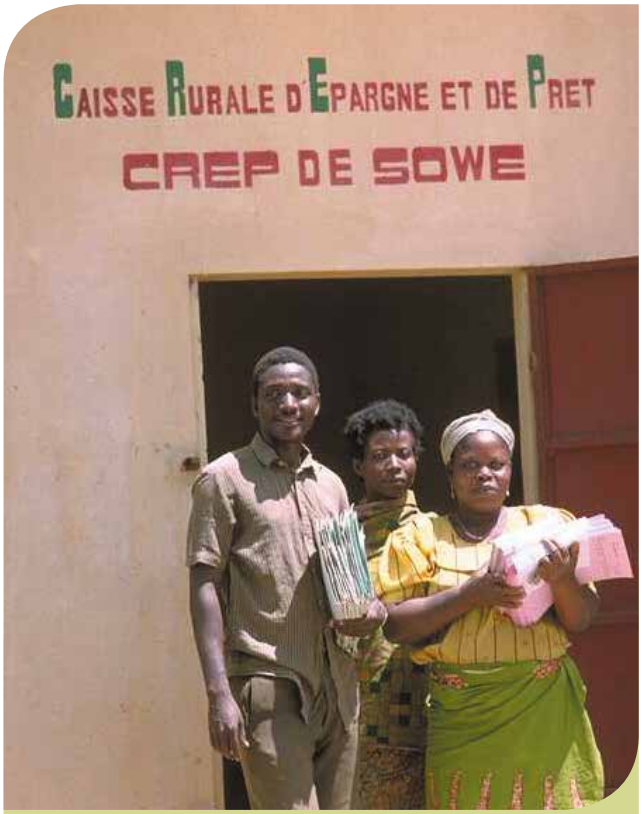
Benin

After seven years of operation, SG 2000 program activities in Benin were scaled back in 1996. Field demonstrations shifted away from their earlier focus on maize to include improved rice cultivation and promoting the use of Mucuna. About 250 production test plots (PTPs) and some 30,000 small-scale seed increase plots of Mucuna were established. The postharvest program focused on demonstrating improved on-farm grain storage. Over 140 cribs and 60 grain silos were constructed using SG 2000 resources and were subsequently used as farmer training sites.

In 1997, the Benin field program focused on QPM and rice production demonstrations, some additional work on the diffusion of Mucuna and on postharvest activities, especially improved grain storage. In 1998, efforts to promote Mucuna were discontinued because the crop had by then already taken off (it was estimated to be being used by more than 100,000 farm families at the end of 1997). Efforts to introduce QPM continued (using a local version of the successful Ghanaian variety, Obatanpa), as did efforts to promote improved rice technologies. Despite the successes of the Benin field program, however, the SAA board acceded to The Nippon Foundation's request that the program be closed by the end of 1998, though some SAA-sponsored agroprocessing, SAFE and, especially, microfinance work would continue after that.

Promoting microfinance in Benin: The SG 2000 story about microfinancing in Benin is an interesting one. The initiative came about in the search for a mechanism to ensure that farmers could purchase the inputs demonstrated in the Production Test Plot (PTP) program. Initially, the PTP program offered loans to participating farmers so they could purchase the inputs required for 0.5-hectare plots – but the loans were available for a maximum of two years only. After that farmers graduated from the PTP program. It was hoped that they would continue using the improved technology package on their own, but many smallholders struggled to afford the inputs – they usually abandoned or drastically reduced the use of fertilizer, the most costly component.

Larger plots had been established in the PTP program, in the hope that participating farmers would produce enough marketable surplus grain to pay for the inputs needed during



Providing local CREP savings and loans offices, with safes, in Benin (pictured) and Togo helped encourage saving among farmers.

the next cropping season. But unfortunately, the additional cash revenue they received was often spent on other necessities.

PTP farmers increasingly joined forces through local farmer associations. Given this tendency and the continuing need for input loans, SG 2000 staff suggested establishing local savings and loan associations, or CREPS, like those in Togo. Farmers found the idea of local banks, controlled by them and dedicated to local service, extremely attractive. SG 2000 provided training in the cooperative action of microfinance institutions, and provided small grants for building local CREP offices (each equipped with a safe). Eventually, more than 120 CREPs were established, with a combined membership of 22,000 and $3 million in capitalization. All CREPs provided agricultural services to their members, and some of them also extended various social welfare services, such as medical care and primary education for members and their children.

A National Federation of Savings and Loan Associations (FENACREP) was established in 1998 to backstop the microfinance efforts of the village-level CREPs. FENACREP took over the offices built by SG 2000 and had the use of their furnishings, equipment and vehicles. SAA loaned $125,000 to FENACREP in 1999 and again in 2000 and FENACREP also attracted financial support from the UNDP MicroStart Program and CARE International, as well as a credit line from Financial Bank, a private Benin institution.

By the end of 2000 FENACREP had succeeded in affiliating 67 individual CREPs, with a total membership of about 22,000 men and women farmers. So towards the end of that year SAA had sent an assessment mission to Benin to examine its operations, including the agricultural extension program, member services and financial governance.

A number of recommendations were made to strengthen future operations. However, one very serious problem came to light that eventually led to the demise of the national association. FENACREP had been offering input services to member CREPs, with fertilizer being the main commodity supplied; it was able to negotiate credit lines with SONAPRA, the parastatal cotton company, and HydroChem-Benin, a private concern, and pass these on to its member CREPs. But financial problems within SONAPRA led to delays in paying farmers for their cotton, and this in turn left FENACREP with debt obligations in excess of $700,000. The SONAPRA debt was under negotiation with the government – and eventually was forgiven. But a $300,000 debt to HydroChem-Benin (for fertilizer) was still outstanding and due. FENACREP made a concerted effort to recover the funds owed by CREP members, or take back the fertilizer. But fertilizer distribution records were far from clear and it proved hard to pin down who owed what to whom. SAA therefore said it would discontinue its support in 2001 unless FENACREP could not make good the HydroChem debt.

FENACREP's debt recovery efforts eventually reduced the HydroChem obligation to about $100,000, but it could not retire the entire debt by the stipulated deadline, and the prospects of making further progress were not promising. FENACREP lacked strong management and was either unable or unwilling to deal with the outstanding debt. It was also unable to mobilize fresh money from other donors or even to get its individual members to pay annual membership fees. So SAA decided to discontinue its support of the national association, and the organization soon disintegrated, although individual CREPs continued to operate throughout the country.

Ghana

The SG 2000 program in Ghana began in 1986 under the leadership of Eugenio Martinez. The program started small, with only 40 demonstration plots, but grew and diversified rapidly and soon became the main success story of SG 2000's early ventures in West Africa.

By 1984 – before SG 2000 made its first exploratory visits to Ghana – the country's President, Jerry Rawlings, and his Provisional National Defense Council (PNDC) knew that Ghana's agriculture had to be transformed, to move away from the system of shifting cultivation which had been practiced for centuries – and that this transformation had to happen as quickly as possible.

The PNDC developed and implemented a five-year agricultural development plan for 1984-89, which called for the introduction of intensified agricultural systems that would permit

smallholder farmers to plant the same land almost continuously. Such systems would involve the use of improved seeds, modest amounts of chemical fertilizer, and pesticides as needed, to protect the crops being grown. Significant donor support was mobilized to support national agricultural research, extension and production programs for staple food crops. A special initial emphasis was given to improving maize and grain legume yields and production.

When the SG 2000-Ghana project began, it fitted perfectly with the government's agricultural development plan and was enthusiastically supported by President Rawlings and by the Ministry of Food and Agriculture (MOFA), headed by Steve Obimpeh. The project was structured to complement the activities of Ghana's Crops Research Institute (CRI), the Ghana Grains and Legumes Development Board (GLDB) and MOFA. These organizations had been active in crop research for some time and had developed a number of improved varieties and crop management practices, both through on-station and on-farm research.

Looking back, the Ghana project can be divided into three distinct yet interrelated phases.

In Phase I (1986-90) the primary program activities and budget expenditures were directly related to supporting the MOFA/SG 2000 crop demonstration program. During this phase, more than 115,000 demonstration plots – each usually one acre (0.4 ha) in size – were planted by the 50,000 or so smallholder farmers that participated in the program in 1986-90. MOFA and Ghanaian banks financed two-thirds of the inputs used by farmers in the demonstration plots, and SG 2000 funded the remainder. Total salary and operational project costs for SG 2000 averaged around $2 million per year.

During Phase II (1991-97) average project costs steadily declined year by year, and by 1997 total SAA expenditures in Ghana were only a third of what they had been in 1991. Over this period SG 2000's program and budgetary priorities had shifted to supporting collaborative programs in seed production, QPM research and development, postharvest grain storage, agroprocessing enterprise development and formal training opportunities in extension education. Direct SG 2000 financial support for crop demonstrations had been almost eliminated – except for new technology testing and "verification/ demonstration" plots. Ghanaian banking institutions financed more than 90% of the inputs used by farmers to grow about 15,000 demonstration plots annually over this seven-year period.

During Phase III (1998-2002), national professional staff managed the project, and annual operating budgets stabilized at about $500,000, including the SAFE and agroprocessing activities, and a QPM nutrition study. Program priorities included the promotion of QPM, the introduction of conservation tillage technologies, support for seed production, agroprocessing enterprise development, and SAFE program activities that included individual scholarships, as well as support to the

The First SAFE diploma group enrolled at Ghana's Kwadaso Agricultural College: the course was launched in autumn 1999 with 31 students including 10 women. The two-year diploma program in agricultural extension supported the University of Cape Coast's post-diploma program.

University of Cape Coast (UCC) and Kwadaso Agricultural College for mid-career courses in agricultural extension.

In 2003, the SG 2000-Ghana project was "officially" concluded, although regional activities continued in QPM and agroprocessing, as did SAFE's work in the country. SAA's history in Ghana saw the development of many program components that were later spread to other SG 2000 project countries, such as QPM, conservation tillage, the agroprocessing program, and the SAFE initiative.

During the time that SG 2000 operated in the country, Ghanaian maize production more than doubled – from 559,000 million tons to 1.3 million tons—and cassava and rice production tripled. It was estimated that Maize Streak Virus-resistant maize varieties were planted on more than 500,000 ha, and that QPM varieties covered another 250,000 ha. A 2003 CIMMYT-CRI research report estimated that more than 100,000 ha were at that time planted using conservation tillage.

By the time SG 2000 officially ended its efforts in Ghana, the SAFE program had helped more than 500 extension workers to obtain BSc degrees and "Higher Diplomas" through Cape Coast University and Kwadaso Agricultural College, while another 130 were enrolled in courses and well on their way to completing their studies. The SAA agroprocessing program had similarly positive impacts. Its postharvest training efforts, for example, resulted in farmers' groups and individuals purchasing more than 1,700 sets of equipment used for producing fermented cassava flour.

SAA still maintains close ties with several Ghanaian institutions. Until 2009, collaboration continued with CRI in QPM research and development and with MOFA in agroprocessing. SAFE continues to maintain a relationship with UCC in Cape Coast that began back in 1993.

Mozambique

SAA representatives first visited Mozambique in 1993, after the country's 14-year civil war had finally been brought to an end.

The purpose of that first visit – which was organized by Lonrho of Mozambique, a private sector agribusiness company engaged in cotton production and the sale of agricultural equipment – was to explore the possibility of establishing an SG 2000 project. After protracted negotiations, the government of Mozambique and SG 2000 signed a memorandum of understanding in 1995 that was to govern project activities, and Wayne Haag was appointed Country Director.

The SG 2000-Mozambique project staff worked with colleagues from the Rural Extension Directorate (DNER) – which was located within the Ministry of Agriculture and Fisheries (MAP) – in Manica and Nampula provinces during the start-up season for fieldwork (1995/96). Participating farmers grew 40 maize demonstration plots during that first season, and maize yields averaged about 3.5 t/ha. The 1996/97 field program expanded into Cabo Delgado and Gaza provinces. Some 720 demonstration plots were planted, most of which were grew maize, although rice was added to the demonstration program as well.

A farmer in Gondo, Sofala Province, applies glyphosate to prepare a rice field for planting. The use of new technologies empowers women farmers.

DNER/SG 2000 staff moved quickly to establish a village input stockist development program aimed at supplying seed, fertilizer and crop protection chemicals to smallholder farmers. During 1996, 15 input dealers were supported in four provinces. Testing of QPM varieties from Ghana and CIMMYT began in 1996/97, with promising results.

The field program expanded again during the 1997/98 season, with new demonstration plots in rice production established in the Beira area, and with the testing of new conservation tillage crop management packages on all plots. Eight hundred demonstration plots (130 in rice and 670 in maize) were planted in Manica, Nampula, and Cabo Delgado provinces during 1997/98. This expanded to 1,146 plots during the 1998/99 season (1,171 in maize and 255 in rice). At the same time, conservation tillage methods, including the use of herbicides, were introduced to about 500 maize farmers in these same areas, in partnership with Monsanto, Agri-Focus, DNER and the National Agricultural Research Institute (INIA). Conservation tillage was also being introduced to rice and field bean farmers in Gaza and Sofala provinces.

In the 1999/2000 season, farmers planted more than 3,000 demonstration plots. By this time the program had expanded to include maize, rice, sunflower (for oil), cotton, pigeon pea, dry beans, sesame, potato, and tobacco. Maize and rice demonstration plot yields were quite good, averaging around 2.8 t/ha in maize and 3.2 t/ha in rice. However, the sunflower demonstrations were planted too late and did not reach maturity before the rains stopped, so yields were low.

An improved version of the Ghanaian QPM variety Obatanpa was released for commercial use in 2000 by Mozambique's national maize program, under the local name of Sussuma. This variety out-yielded the three most popular maize varieties being grown in the country at the time (Matuba, SEMOC-1, and Manica SR) and was quickly adopted by farmers.

As the demonstration program grew, SG 2000 shifted its strategy away from working with individual farmers and towards partnering with farmer associations. By 2000, about two-thirds of the demonstration plots supported by credit were being implemented by farmers who were members of organized associations.

In 2000, Mozambique suffered serious flooding in low-lying areas near the Limpopo and Zambezi rivers and tributaries. Hundreds of thousands of people were displaced from their homes, and the international community provided substantial assistance, including large quantities of food aid. Unfortunately, this food aid was brought in from outside the country, despite continuing good harvests in many parts of the country. This seriously depressed domestic food commodity prices, especially for maize.

In 2004, Mozambique successfully completed the first stage of its National Agricultural Development Plan (PROAGRI). The major objectives of this included getting displaced people and decommissioned soldiers back on to the land after the country's long civil war, strengthening the capacity of the Ministry of Agriculture to serve the farming community, increasing farm production, stimulating private sector activities in input supply and output marketing, and promoting the organization of farmers into collective action groups.

In 2005, after 11 years in operation, the SG 2000 field program in Mozambique came to a close, although SAA regional program activities in QPM, rice and agroprocessing continued. Over the lifespan of the SG 2000 project, the production of maize, rice and pulses (beans and pigeon pea) had doubled, while cassava production increased by 50%. Fertilizer consumption increased from 7,800 nutrient tons per year to over 30,000 nutrient tons.

Seed production was also strengthened and the QPM variety Sussuma was being grown on about 75,000 ha.

The government began Phase II of its agricultural development program (PROAGRI II) in 2005. The focus of that five-year program was on applied research, improved marketing of agricultural commodities, improved financial services for farmers and agricultural service providers and the creation of a more investment-friendly and enabling environment for agribusiness.

Special attention was given to achieving self-sufficiency in rice, an important staple crop in Mozambique. The strategy was to improve the value chain in rice production and processing, including input supply and credit, improved farm production practices, marketing and milling. A Consultative Group on Rice (CGR) was established as part of this initiative, made up of producers, millers, traders, input suppliers, government agencies and institutes, international centers and NGOs. The CGR focused on improving the efficiency of production and creating a more competitive rice industry.

The former SG 2000 national coordinator, Carlos Zandamela, with 20 years of research and production experience in rice, was appointed to the executive secretariat of the CGR. Although the SG 2000 program ended in 2005, SAA continued to backstop the work of CGR through its regional rice program. Memorandums of understanding were signed with the West African Rice Development Association (WARDA) and the International Rice Research Institute (IRRI) to guide SAA future collaboration.

The SAA regional QPM program also continued to work with INIA maize breeders to develop new varieties and hybrids, and to strengthen seed production systems. Special emphasis was given to sustaining an effective QPM seed quality laboratory to ensure that the protein quality was maintained during breeding, and indeed throughout the seed production process. Efforts by SAA to link QPM to agribusinesses interested in processed foods and feeds also continued for some time after the program's official closing in 2005.

The SAA regional agroprocessing program collaborated with Mozambican agricultural research and production organizations to promote the development of fermented cassava flours. Some work was also done to make acceptable breads from a flour mixture made up of 10-15% cassava flour (or a like amount of QPM flour).

However, SAA regional activity in Mozambique wound down markedly after the retirement of Wayne Haag – who had remained based in the country – at the end 2009. Since 2010 there has been only sporadic SAA involvement with Mozambican institutions.

Guinea

The SG 2000 Guinea project began in 1996, under the leadership of Country Director Tareke Berhe. The memorandum of understanding was signed in July and Berhe took up residence in October. During 1996, the first 50 production test plots were established with farmers. Most of these were in rice, although some maize and sorghum PTPs were also planted. Given Guinea's serious soil fertility problems and its scant use of chemical fertilizers, many of the PTPs were grown using Mucuna as a nitrogen-fixing relay crop.

Young woman farmer in Guinea with an extension field officer holding heads of new WARDA rice types selected for seed.

From this modest beginning, the field program steadily expanded over the years, reaching 10,000 plots in 2003 and involving more than 13,000 farmers. In total, more than 30,000 farmers participated in the program, growing 23,000 demonstration plots over the eight-year period that the SG 2000-Guinea field program was active.

Rice is the staple food in Guinea and was the principal crop used in the field demonstration program. Alarmed by rising rice imports, which had reached 232,000 tons in 1996, costing large amounts of foreign exchange, the government had launched an accelerated rice production campaign and asked SG 2000 to assist in field demonstrations and in seed production.

At about the same time, WARDA – in concert with a number of national rice research programs in Africa – brought forth a higher-yielding type of rice that was well suited to production conditions in Africa. The new rice varieties were the result of crossing African and Asian rice types, and were referred to as NERICA, or New Rice for Africa. The early-maturing characteristics of NERICA varieties enable farmers to grow a second crop of rice, or if they prefer, improve the fertility of their soils by growing a nitrogen-fixing legume such as Mucuna. SG 2000 worked with Guinea's national extension service, SNPRV, and its national research institute, IRAG, to rapidly multiply the new WARDA rice varieties and to help accelerate their distribution to farmers through the PTP program.

Yellow-seeded quality protein maize ready for the granary in Guinea.

Efforts to build a more efficient input-delivery system received considerable attention during this same period, as did the development of appropriate postharvest rice technology. Especially useful was the rice threshing and polishing machinery developed by the Nigeria-based International Institute of Tropical Agriculture (IITA). This equipment reduced grain loss during harvest and improved its marketability.

By 2003, smallholder Guinean farmers were planting an estimated 60,000 ha of NERICA, and national rice production had increased from 670,000 tons to over 900,000 tons. As a result, the country's rice imports dropped to only 98,000 tons in 2004.

While rice received the lion's share of attention, maize was also an important crop in the SG 2000 field demonstration program. Obatanpa, the QPM variety from Ghana, was well adapted to Guinean production conditions and yielded an average of 3.5 t/ha. QPM production test plots using Obatanpa were established in the country's maize-growing regions and the variety was further popularized through a village women's program that focused on improving nutrition through the production and use of QPM and soybeans, complemented by PTP demonstrations in vegetable production and training in new methods of cassava processing.

The SG 2000 Guinea field program was brought to a close in 2004, though the SAA regional rice, QPM and agroprocessing programs continued to provide support.

Burkina Faso

The SG 2000-Burkina Faso project began in 1997, under the leadership of Marcel Galiba. Much of the field program was carried out in the country's extensive semi-arid zones, where millet and sorghum are grown. Given the limited availability of water, the recommended production packages involved few purchased inputs. Instead, SG 2000 worked to improve and maintain soil fertility through combinations of improved soil conservation practices and improved fallows.

Field demonstrations of improved maize technology packages were also established in the country's cotton zone, where rainfall is more plentiful and farmers were accustomed to using chemical fertilizers. The maize PTP program had considerable impact. Yields of up to 6.9 t/ha were obtained with one of the new QPM hybrids from Ghana, compared to a national average maize yield of 1.4 t/ha.

A Ministry of Agriculture/SG 2000 steering committee was established in 1999 to monitor progress in the project. The committee tried to address a number of challenges, such as low PTP loan recovery rates in some areas, farmers' need for training in crop management, and the difficulties associated with developing village-level savings and loan associations. Loan recovery problems persisted in the PTP program, and a decision was made at the end of 2000 to discontinue about one-third of them.

In 1999, SG 2000-Burkina Faso began encouraging the formation of village savings and loan associations (CREPs) to mobilize savings and to provide a locally controlled source of credit. Four CREPs were established with a total of 332 members, of which about 15% were women. However, the program failed to grow significantly.

Starting in the 2003 rainy season, a new strategy for SG 2000-Burkina Faso was launched. This involved stepping up efforts to encourage farmers to purchase inputs on a cash basis, while strengthening fertilizer dealer networks and the CREP movement. Seed production concentrated on QPM and NERICA varieties.

In 2004, Burkina Faso was the first francophone country to work with the SAFE program – at the Université Polytechnique de Bobo Dioulasso – to upgrade the skills of mid-career extension staff. This was a hopeful sign that the government understood the need to invest in strengthening the capacities of its extension personnel, especially those with considerable field experience. About 60 students had enrolled in SAFE courses at the Université Polytechnique by 2010.

But after The Nippon Foundation had asked SAA to consolidate its activity, SAA decided in 2005 to bring the SG 2000-Burkina Faso program to a conclusion.

Malawi

The SG 2000 Malawi program was started at the end of 1998 under the leadership of Jose Antonio Valencia. The program operated in close collaboration with the country's Ministry of Agriculture and Food Security.

SG 2000 began its field operations during the 1998/99 season just as a huge three-year food safety net program was being launched, funded largely by the European Union, the UK's Department for International Development (DFID), the World Bank, and the government of Malawi. Under this scheme, participating farmers received a free "starter pack" of maize and legumes seed and the fertilizer required to plant 0.1 ha. A massive effort was mounted to distribute 1.8 million starter packs to farmers.

SG 2000's field program was to start quickly, with an initial 2,250 maize management training plots (MTPs). The timing was such that SG 2000 was able to harmonize its operations with the national starter pack program, and it accordingly set the size of its MTPs at 0.1 ha, the same as the starter pack scheme.

But that is where the similarity ended.

Farmers growing SG 2000 maize MTPs obtained average yields of 5.1 t/ha – twice as much as the average starter pack plot yield of 2.6 t/ha, and four times the national average maize yield. SG 2000 also adhered to its policy that participating farmers had to repay the cost of inputs supplied to them. The 1998/99 rate of MTP loan recovery was excellent – 100% in Blantyre, 82% in Machinga, 80% in Lilongwe and 77% in Mzuzu. Farmers identified the excellent training they received as a major motivation for repaying the SG 2000 input loans.

Malawi enjoyed bumper maize harvests of around 2.5 million tons in both 1999 and 2000. However, these were followed by two disastrous years, with national annual output slumping to around 1.5 million tons in 2001 and 2002, leading to widespread hunger and tremendous hardship. In 2003, the maize harvest did recover, to nearly 2 million tons but then dropped off once more in 2004 and 2005 to about 1.75 million tons, again leaving the country seriously food insecure. In 2006, maize harvests rebounded once more, due to favorable weather throughout most of the country and because a large subsidy had been applied to fertilizer in 2005.

While the SG 2000 Malawi program focused on improving maize production, the MTP package was modified to include QPM varieties and hybrids, as well as appropriate conservation tillage practices. Efforts were also made to diversify cropping systems, with excellent results obtained using soybeans in rotation with maize. Pigeon pea, rice and wheat were also incorporated into the MTP program, and a rainwater harvesting and micro-irrigation initiative was begun in 2003.

The Malawi government adopted the SG 2000 recommendations for maize production in all its crop demonstration work. Beginning in the 2004/05 cropping season, SG 2000 worked with the Millennium Villages project, which at that time involved 15,000 farmers in three districts. In this project, highly subsidized input packages were provided on credit to participating farmers. SG 2000 technology recommendations were applied, including the use of improved on-farm storage technologies, and the 2005/06 maize yields on the 0.4 ha plots used in the Millennium Villages initiative were outstanding.

Norman Borlaug with a farmer in Blantyre, Malawi in March 2000.

A bumper maize harvest in 2006 was the cause for much celebration in Malawi. National yields had rebounded, approaching 2 t/ha. Widespread adoption of improved crop management practices was evident. Thus, the decision to close the SG 2000 project was met with some consternation, both within the SG 2000-Malawi program and among its partners.

Three key questions were asked: why leave when the country was finally turning the corner in smallholder development? Would SG 2000's early exit undermine the momentum that had been building in the Ministry of Agriculture and participating groups to introduce significant technological improvements? And could the huge food safety net program, built on heavy subsidies for fertilizer and seed, be sustained and actually benefit those most in need of such assistance?

These were not easy questions to answer but the SAA board – faced with the prospect of declining budgets and pressing needs elsewhere – stood by its decision to close the program. It felt that it had laid a firm foundation for the government and organizations such as the Millennium Villages, which continued to support agricultural development. The government adopted the SG 2000 maize MTP recommendations for all its crop demonstration work, while SG 2000 had convincingly demonstrated the value of science-based agricultural technologies in the hands of smallholder producers and the need to strengthen the skills of frontline extension staff and subject matter specialists. Another notable program legacy is a recognition of the importance of effective postharvest handling – especially storage – and agroprocessing, farm enterprise diversification, and smallholder access to stable and efficient input and output markets.

Strategic questions facing SAA: – program scope and longevity

By 2005, the SAA Board had been grappling for more than a decade with the question of how long SG 2000 should stay in any given country. Initially, the idea was that an SG 2000 project would run for five years (Phase I) and then possibly for an additional 2-3 years (Phase II) to address specific problems of institutionalization and capacity building. But over time, the period had been getting longer.

Phase I was eventually expected to be six-to-seven years and Phase II around three-four years. But, even after stretching the expected project life spans, the SAA board had great difficulty in terminating country projects. The most notable case was that of Ghana. Despite several announcements that the project was to be closed, the field program ran for 17 years (and support from SAFE was still being provided in 2014).

The board also struggled with establishing the appropriate scope of SAA activities. It had long advocated that the core activity in SG 2000 projects should be the implementation within national extension services of dynamic field demonstrations in important food crops. SG 2000 staff and resources should be largely devoted in Phase I to demonstration programs, focusing on in-service training of extension workers and farmers and on the development of operational systems at the state and local government levels to plan and implement such programs.

But, from the outset, SG 2000 country staff brought a systems point of view to their jobs. They soon saw that a dynamic field-testing program, while necessary, was not sufficient to bring about the green revolution they were steadfastly pursuing.

They saw that improving the market systems – the value chains by which agricultural inputs and outputs are exchanged – were an essential component of any strategy aimed at encouraging smallholder farmer adoption of improved technologies and practices that enhance their productivity. So they were reluctant to stop at just demonstrating the value of improved technologies and sought to improve participating farmers' access to input markets. This led to efforts in seed production and smallholder input delivery systems, while the high cost of fertilizers quickly inspired staff efforts to develop smallholder production credit systems.

Meanwhile, increased production, and particularly the surplus production that was often achieved, led staff to think increasingly about improving access to output markets. Initial efforts along these lines focused on improved postharvest on-farm storage, both to protect the physical quality of the grain and also to allow farmers the option to sell when market prices for their grain were more favorable.

The same thinking led to the establishment of the SAA agroprocessing program: this originally had Ghana and Benin as its geographic focus, but soon began to expand into other project countries. This in turn led to more extension work aimed at strengthening the ability of farmer groups to formally participate in local markets, increasing their bargaining power, adding value to their primary production and improving the quality of their products.

These staff-driven expansions in the scope of program activities created a dilemma for The Nippon Foundation and the SAA board.

Containing the scope of program activities made the design and implementation of exit strategies more feasible. But as new program objectives were added by staff, the time needed to achieve impact lengthened, requiring operational horizons beyond five or even ten years and closer to 15 years.

An expanding project scope also implied access to a broader range of technical skills than the SG 2000 agronomists possessed. This required either the hiring of new staff with the required skill sets, or the development of formal partnerships with other organizations, primarily NGOs, that had more expertise in addressing these broader value chain challenges.

Donald Plucknett (left) and Tetsuo Matsumoto (right) interview farmers in Kano, Nigeria in 2001, as part of a team carrying out an external review of all SG 2000 country projects.

Still, most SAA board members – as well as Yohei Sasakawa and President Carter – were committed to an organizational culture and structure that gave SG 2000 Country Directors considerable freedom to decide what else needed to be done to achieve impact. Country directors, within the limits of their budgets, had been notably free to initiate new efforts, although they had to do so without the assurance that they would be granted sufficient resources and time extensions to achieve impact.

A series of internal and external reviews added to the board's dilemma. In 2000, SAA board member Ed Schuh led assessment missions to Ghana and Ethiopia. In both cases, the review teams produced favorable reports, recommending that the projects be extended for another three-to-five years and that new activities, especially in the area of policy intervention, be undertaken.

In 2001, the SAA board – implicitly understanding that The Nippon Foundation needed such an evaluation – commissioned an external review of all ongoing SG 2000 country projects.

The International Cooperation Center for Agricultural Education (ICCAE) at Nagayo University in Japan was asked to undertake this exercise. The review process began in Ghana in September 2001, and continued in Malawi, Mozambique, Uganda, Nigeria, Ethiopia, Burkina Faso, Mali and Guinea. Field visits were completed in November 2002.

Professor Tetsuo Matsumoto of ICCAE led the evaluation team, which also included as members: Donald Plucknett (Agricultural Research and Development International), Pierre Antoine (Winrock International), Hiroyuki Takeya (ICCAE), Kunio Takase (International Development Center of Japan) and Dr Shuichi Asanuma, Japan International Research Center for Agricultural Sciences (JIRCAS). From the SG 2000 side, Marco Quiñones (SAA Regional Director 2001-08), Ernest Sprague

(Senior Advisor for Food Security at The Carter Center) and Michio Ito (SAA Administrative Officer) traveled with the external evaluation team as facilitators.

The ICCAE external evaluation team was impressed with the SG 2000 field programs and generally provided a strong endorsement of resources that had been expended. In particular, Matsumoto commented that:

> ***"You have three stages of the project cycle – Phase I, Phase II, and Phase-out. You might have a rough measure of how many years each phase should last, but you shouldn't apply that measure regardless of how the actual project has been progressing in each country. I'm not only talking about phasing out, but also about other phases. After all, it is the host government that must continue the work that SG 2000 has been doing and must show a willingness to do so from the beginning. Willingness is important, but alone is not enough. A host government has to improve its level of technology and human capacity. It is a tremendous task to transform sub-Saharan smallholder agriculture to a commercial-scale one, and it certainly takes time. What SG 2000 alone can do is limited, but close collaboration with local people will expand the capacity of local institutions. In time, it will indeed lead to a Green Revolution for Africa.***
>
> ***"SG 2000 is a professional organization that transfers available technology to farmers. Rather than talking, SG 2000 implements effective and practical technology demonstrations on farmers' own fields. Working at the grassroots level, as well as with top policy makers, makes SG 2000 more effective than other NGOs."***

Matsumoto went on to note that:

> ***"Country directors enjoy great autonomy and I believe that it is one of the strengths of SG 2000. Because each director has decision-making authority, each project is able to identify the best way to disseminate modern technology within that country."***

Nick Sichinga, an agricultural specialist for SG 2000 Malawi, gives a demonstration to farmers at a Management Training Plot in Blantyre in 2001, observed by an evaluation team, including Ernie Sprague of Global 2000 *(right)*.

Thus the SAA board found itself sandwiched between two outlooks. On one side were the enthusiastic, expansion-minded staff and local governments, as well as very favorable external program reviews. On the other was The Nippon Foundation, which was keen to reduce the number of countries in which SG 2000 projects were operating, primarily for financial reasons, but also because it wanted to focus its limited resources, in the hope of achieving even greater impacts.

Indeed, ever since the foundation's edict in 1998 to close down four projects, it had been clear to the board that it had to cut back the number of SG 2000 countries. It had to find ways to limit the scope of its country programs and negotiate acceptable exit strategies with host country governments.

On the heels of the ICCAE 2001-2002 external review, the board was optimistic that it could achieve these objectives.

However, The Nippon Foundation was growing impatient. In early 2003 it formally instructed the SAA board to design a strategy for focusing SG 2000 efforts – which at that time were spread over nine countries – on just three or four countries.

PART THREE: A five-pronged strategy

Introduction:
Working across the agricultural value chain

Subsistence farming is fundamental to many Africans, but, increasingly, food security rests upon the development of a functioning rural economy where crop production is oriented to commercial sale, as well as local consumption.

At the heart of Sasakawa Africa Association's operations is its support for increased productivity from smallholder plots, primarily by bolstering extension systems. But, at the association now also offers support across the agricultural value chain, promoting technologies and techniques for the processing and storage of harvested cereals and other crops, as well as helping to make the marketing of produce by smallholders' groups more effective.

In today's Africa all farming households need a significant flow of cash income to pay for essential purchases, such as clothing and domestic goods, schooling costs, agricultural inputs and mobile phone credit.

To maximize that income, farmers need to produce a healthy agricultural surplus, process it efficiently and store it until market prices are attractive. Many of these tasks are more effectively carried out by villagers working together, with support from appropriate service businesses, such as input shops selling seed, fertilizer and pesticide, machinery fabricators and local farmers' groups.

These elements of the value chain feed off each other, creating a virtuous circle in which the improved processing, storage and marketing of crops add value and, in turn, incentivize smallholders to step up their own efforts to improve yields and quality.

A coordinated approach

To broaden its support to cover all these activities, SAA developed a set of five themed programs deliverable in a coordinated manner across all four of the focus countries where it operates – Nigeria, Ethiopia, Uganda and Mali.

The association has a matrix structure of management. So while activities in each country are overseen by a Country Director, who heads the national staff, each theme program is also led on a pan-African basis by a specialist head office team. This team is able to draw on experience from different countries, and apply new ideas across all four focus country operations.

This section of the book covers the evolution of these themes, since they first became operational during the last decade.

Theme 1, Crop Productivity Enhancement, involves working with the smallholder to develop crop yields, improve soil fertility and enhance agricultural performance.

SAA supports indigenous extension networks and community farming advice, to promote better cultivation techniques, introduce improved seed varieties and explain how to make efficient and affordable use of fertilizer and safely apply agro-chemicals to tackle pests and disease.

Theme 2, Postharvest Handling and Agroprocessing, builds on this, covering teaching and support for farmers and local entrepreneurs using machines and techniques designed to cut the amount of work and time required to handle, process and store harvested crops. Theme 2 activities also involve working with local machinery fabricators to produce affordable – and readily available – processing machines.

Theme 3, Public-Private Partnerships and Market Access, covers SAA's work with local farmers' groups to develop their commercial skills and focus on the quality and reliability of produce delivery to meet the requirements of wholesale buyers. By working together, smallholders – who have little negotiating power as individuals -- are able to strengthen their bargaining position and benefit from economies of scale when purchasing supplies or selling crops.

Theme 4, Human Resource Development, complements these first three themes, generating activities to enhance the teaching skills and technical expertise of the extension workers and community advisers who actually deliver the practical support for farmers and rural communities nationwide. Theme 4 activities are coordinated with those of the Sasakawa Africa Fund for Extension Education (SAFE), which is constitutionally a separate organization from SAA, but which is am integrated part of the overall Sasakawa operation in Africa.

The role of SAFE *(see Part 5)* is to work with universities and colleges in nine countries across the continent, to arrange the provision of degree courses for mid-career extension professionals, or those who plan to take up this work.

Theme 5, Monitoring, Evaluation, Learning and Sharing (MELS), provides activities that reflect the expectation that a development organization operating in the 21st century must ask hard questions of itself, thoroughly assessing the results of its activities, identifying needs and problems and new routes to success.

In each country, dedicated teams carry out regular monitoring and in-depth surveys, in a scientifically rigorous and independent manner, to find out what is working well and where adjustments and improvements in SAA's activities are required.

PART THREE: A five-pronged strategy

Theme 1: Crop Productivity Enhancement
Higher yields, better lives

Small farmers are the foundation upon which Africa builds its food security. Across the continent, from the Atlantic to the Indian Ocean, hand-tilled family plots grow the vast bulk of the crops that sustain rural communities and urban consumers alike.

In a few countries, large-scale commercial agriculture produces cash crops for export. But such big businesses are exceptions to the general pattern.

Almost everywhere, the Sub-Saharan rural economy is built around small farms and village communities. Enhancing their productivity is essential if Africa is to ensure a reliable supply of food for every family – and sufficient cash income to cover basic spending needs.

And that is where Sasakawa Africa Association comes in. From its inception in the mid-1980s, the organisation has focused consistently on helping small farmers to increase yields, to extract more output and more value from their land, but while maintaining its fertility.

This issue was at the heart of the vision of Norman Borlaug, the celebrated agriculturalist who co-founded SAA with Ryoichi Sasakawa and former US president Jimmy Carter. He had played a crucial role in helping India and Pakistan raise cereals output in the 1960s and 1970s – the Asian "Green Revolution".

Borlaug believed that Sub-Saharan African countries could emulate their achievement in producing sufficient staple food to meet national needs.

Inevitably, technologies evolve with time. Borlaug was a pioneer in promoting the use of new hybrid seed varieties, fertilizer and pesticides in the developing world. Today, these are complemented by a strong focus on improving cultivation techniques, which enable farmers to enhance crop yields even when they cannot afford expensive inputs.

Meanwhile SAA has developed wide practical experience of how to convey ideas to farmers at the grassroots level, through demonstration plots and the training of the professional advisers who work in national agricultural extension networks to bring knowhow to rural communities. This was also an early priority for Borlaug, who had grown up in the US Midwest – where extension played a crucial role in bringing the lessons of science from the research station to farmers in a practical form.

Today, SAA works as a partner to African governments in mobilizing their extension services in support of small farmers growing food – mainly cereals – for national consumption.

"Our overall objective is to increase productivity and strengthen the capacities of farmers and national extension systems in our four focus countries – Uganda, Ethiopia, Mali and Nigeria," explains Andreas Oswald, SAA's Theme 1 Director.

For most Sub-Saharan rural families, the first priority is to ensure their own subsistence. But once their own essential nourishment is secure, a second goal is to produce surplus output that can be sold – for urban consumption, or even export to regional markets – to bring in the cash that pays for household purchases and costs related to education and key needs.

A challenging environment

Small farmers in Africa work in a tough world. They have to live within tight margins and seek, above all, to contain the risks that might threaten their ability to produce an essential minimum of food for their families.

Typically, they will have only one or two hectares of arable land at most, and often less than that. Indeed, population growth means that family holdings are subdivided from generation to generation, so that today's families must survive on smaller farms than their immediate forbears.

With the supply of land under pressure, it becomes harder to leave fields fallow for a season, to allow soil fertility to recover. Tree cover is at risk of being cleared, for planting and to provide firewood – which accelerates soil erosion.

Many farmers lack secure tenure and are therefore reluctant to invest in longer-term production such as bush or tree crops. This makes it all the more important to improve yields for annual crops.

In Mali, parts of Ethiopia and in northern Nigeria, there is always a risk that the annual rains will fail, or arrive at the wrong moment, which can hinder planting and prejudice the prospects for a good harvest. And in some more arid regions there is insufficient waste vegetation to produce much natural compost.

Across Africa, small farmers cultivate their fields with basic hand tools. Hardly any can call on the use of tractors or

The southern highlands of Ethiopia: The rural economy of Africa revolves around a patchwork of small farms and communities. Raising their productivity is crucial to ensure reliable food supply and enough income to cover basic spending needs.

other machinery, and many do not even have access to oxen for plowing.

The production of food crops is largely undertaken by women, who of course also have heavy responsibilities for childcare, cooking and other household chores. Farming may provide them with an independent source of income – but only if they can produce surplus output for cash sale.

Access to inputs and credit is often difficult or too expensive. Many smallholders simply keep back some of their crop as seed for the next planting, because they cannot afford to buy better varieties or indeed inputs such as fertilizers.

As individuals, farmers are usually in a weak position to bargain with commercial crop buyers or suppliers of inputs. They often have to travel considerable distances on tracks or dirt roads to reach the towns where they have direct access to the market; and in their home villages their access to information, advice or mass media may be highly limited.

These factors are not necessarily reasons for pessimism. Much of rural Sub-Saharan Africa has in fact made huge progress in development over recent decades, and particularly since the 1990s.

However, it remains the case that African smallholders operate in a difficult environment.

In such a context, the avoidance of risk is an absolute priority. Farmers will therefore often opt to rely on proven traditional methods that ensure at least the essentials of survival.

If they are to be persuaded to take up new ideas, they have to see that these will deliver results – the better quality and higher yields that will enhance their food security and their chances of producing surplus output for sale, and the "downstream" storage, processing and marketing techniques that will enable them to turn that surplus into commercial sales and cash income.

The technologies that can boost production are available, and in the long term, population pressure means that a conservative reliance on old methods will only lead to worsening food insecurity and income decline.

But that is the future danger that farmers may not appreciate today.

They already have to live with risk in the present – and that can incline them towards caution, and an inclination to "play safe". If they are to take up new methods they have to know that these will be worthwhile, in both agricultural and economic terms.

Fatuma Nanfuka, a Community-Based Facilitator (left) and Hillary Rugema Semaana, SAA's Thematic Coordinator for Crop Productivity Enhancement in Uganda (center), explain to smallholder Harriet Nabuufu (right) how she can use improved cultivation techniques to increase yields on her plot near Sekanyonyi, Uganda.

"There can be big fluctuations in prices and dependency on the market. Farmers have to cope with the risk of what they will get at the end of the season for the crop, and this impacts on what they are willing to invest," says Andreas Oswald. "There has been progress in developing varieties which have yield potential, but these are not always widely distributed. Actual levels of yield across Africa have not seen much improvement; small farmers have not much changed their approach or techniques. Access to seed and inputs is still difficult, and advisory services are often weak, so they end up buying the wrong stuff."

Education and evidence

That is why SAA's long experience of explaining new ideas in ways that can win over African farmers to the new methods is able to make such a singular contribution.

"Through practical experience we have learnt the most effective ways of conveying ideas to farmers and persuading them to take up new technologies. This is one of our most distinctive strengths," says Oswald.

"Our strength is to bring these technologies to the farmer – and in that area we are innovative."

For example, new seed varieties and agricultural technologies are demonstrated on full size plots at community level.

If farmers are shown small planting beds or individual rows, such as one might find in a research station, it is hard for them to visualize how the approaches on display might translate to their own land, in terms of plant growth, yields or levels or disease and pest infestation.

But SAA persuades farmers to loan their normal fields for use, to demonstrate new varieties, and the use of fertilizer or cultivation techniques. So these are planted at the same time as other fields in the village, by the farmers themselves and on a real-life scale.

Other villagers going about their own day to day activities see the demonstration fields growing over the course of a season and thus notice how the plants are developing and what the final harvest is like. They see how one of their own, a fellow member of the community, has piloted a new approach, and the results from this.

In 2009 it introduced a clearly structured pattern of demonstration agriculture across all the four country programs, in Uganda, Ethiopia, Mali and Nigeria.

The principal tool for training and knowledge transfer is now the "Farmer Learning Platform" (FLP), which is a broadly-based structure that embraces demonstrations using two or three types of plots, training sessions, and supervision and monitoring by extension agents and SAA staff.

Oswald believes all these activities must be combined to achieve impact and change.

"We are transferring knowledge and skill to the farmer. The demonstration is there so that the farmer can see that what we say is true.

Theme 1 Director Andreas Oswald visits a project in Nigeria.

But the knowledge is actually brought to the farmer through training," he says.

"For example, we can teach someone how to apply fertilizer efficiently. Because the quantity of fertilizer that a farmer buys depends on what he can spend."

SAA is trying to build up smallholders' productivity on a basis that is sustainable over the longer term.

The farmer who hosts a demonstration plot may receive free or subsidized inputs for that initial demonstrating season. But after this first year they will have to buy the improved seeds and the fertilizer, so that they operate on an economically sustainable independent basis.

So it is important that farmers are taught how to make the best use of improved cultivation techniques, which can give a significant boost to yields at no additional expense. This can mean spacing plants, so that they have the soil nutrients and light to grow well, pulling out weeds that could compete for these resources and applying fertilizer with care so that none is wasted and even small quantities can make an impact.

These days, of course, there is widespread awareness of the environmental impact that excessive dosage of fertilizer can have. But Oswald points out that in Africa, the amounts that small farmers are being taught to apply are a tiny fraction of the dosage that is typical in developed countries.

Farmers are also taught about the safe use of pesticides. These are sold by the input shops that SAA encourages at local level; shopkeepers supply safety masks with the spray kits and Sasakawa sometimes works with wholesalers to ensure these are sold at affordable prices.

The Farmer Learning Platform

Farmer Learning Platforms (FLPs) involve field demonstrations of adaptable, low-cost technologies and capacity building, supported by training sessions with extension agents.

The training sessions help to develop farmers' skills and knowledge, provide solutions to constraints in agricultural production and inform them about options and opportunities to improve farm enterprises.

FLPs help change the role of farmers from being merely recipients of improved technologies to being drivers of agricultural innovation, voicing their needs and demands. Involving farmers in the entire extension delivery process, while giving them more control, makes it more likely they will take ownership of the process. This increases adoption of techniques and technologies and makes the whole process more sustainable and better able to be scaled up.

The demonstration component of FLPs generally consists of at least two types of field, and sometimes three – Technology Option Plots (TOPs), Women Assisted Demonstrations (WADs) and farmer-initiated Production Test Plots (PTPs).

A TOP usually covers 1,500 m^2, divided into three contiguous 500 m^2 sub-plots. On the first of these the smallholder applies in full the recommendations of the national extension service advisers and SAA, while the second also applies their prescription but to a lesser degree and thus at lower-cost. The final segment is farmed without additional inputs but still using cultivation methods that should improve yields.

Typically this approach would mean that all the three plots are cultivated with improved techniques such as planting in rows, with adequate spacing of the plants and regular weeding, perhaps with the plots edged with a bund – a heaped up field margin that helps retain water and soil and can itself be planted with a secondary crop such as beans.

The first 500 m^2 sub-plot could be given a full application of fertilizer, while the middle plot would only get a half dose. No fertilizer is applied to the third plot. So the sequence of three plots enables villagers to compare the impact that levels of fertilizer application can make, but also see the benefits that improved cultivation techniques deliver, even if a farmer cannot afford to apply much or any fertilizer.

WADs are simplified versions of the TOPs, intended specifically for marginalized women farmers who have not been able to take a direct role in previous demonstrations and therefore have less technical knowledge and experience than other villagers.

These women are short of resources and may struggle to afford full doses of fertilizer or other technologies; so the WADs demonstrate technologies that are lower-cost yet will still make a worthwhile impact. Normally they extend over 500-1,000m^2 and are cultivated by a group of 10-15 women working together.

Theme 1 Program Officer Daniel Olol (left) discusses the performance of a Technology Option Plot in Agoga, in Kwera sub-country, Uganda, with farmer Joel Ecir and Mercy Asamo, the Community-Based Facilitator (CBF), who advised him. Mercy, who is educated to secondary level, was selected by fellow villagers to become Agoga's CBF.

TOPs and WADs serve as the main vehicles for community or group-based training and technology evaluation. Through TOPs innovations are presented to the community as a whole.

Before deciding whether to adopt new technologies permanently and on full-scale, many individuals who have participated in FLP training and field days then opt to try out what they have learnt, at their own expense and on their own land – fields that SAA terms "Production Test Plots" (PTPs).

Where a farmer carries out such a test on their own initiative, she or he buys the inputs, decides how much land to plant and which technological options to try out.

Extension workers and SAA staff do not subject PTPs to the sort of intense supervision that is applied to WADs and TOPs. However, they are on hand to provide advice.

SAA normally works closely with a village to enhance farm productivity for about three years, with visits by its own expert staff three to five times a year at least. But even after the period of intense engagement is over, and the focus has shifted to another partner community, SAA maintains contact, is always ready to offer advice and may in any case remain engage closely through other strands of its activity, such as crop processing, storage or marketing.

Moreover, farmers are also encouraged to produce natural compost from plant waste and manure from livestock. And through improved cultivation techniques they can achieve a worthwhile increase in yield even if they cannot afford to apply any fertilizer or chemicals at all.

Reinforcing national extension structures

SAA's long-term mission is to strengthen Sub-Saharan countries' ability to help themselves. So the Association always works with and through the indigenous national systems for agricultural extension – the network of outreach workers who advise small farmers and help them secure access to technology, inputs and credit.

For SAA a crucial goal is to build up African countries' own extension arrangements, strengthening national capacity rather than running an alternative parallel scheme.

"One of the unique features that SAA has is that we are entirely working through the national extension program s. We always support and train the personnel in the national system – so that this becomes sustainable and can continue its work in the future," says Oswald.

"In any case, given the scale of the challenge we are tackling, we could not do all the extension work ourselves. We have a relatively small staff."

The nature of extension structures varies from one country to another. Some focus largely on export cash crops and some are weak and underfunded, while a number of African governments have experimented with the liberalization or privatization of these arrangements.

Differing national arrangements

But in the four countries where SAA operates – Uganda, Mali, Nigeria and Ethiopia – the public sector leads the extension service, although the nature of arrangements varies.

Ethiopia has a dense national network, with one extension agent for every 500 households. The agriculture ministry sets a strong policy direction from the center yet the system reaches right out to the grassroots.

By contrast, in Uganda there is one extension agent for every 5000-8000 households, so they play a more supervisory role. In villages where it is working, SAA has developed a network of Community-based Facilitators (CBFs) – farmers chosen by fellow villagers because they are literate and have the potential to be trained to run demonstrations and provide advice, in return for a small mobility allowance.

In Mali too the national extension system is thinly staffed, but village development committees – typically four men and three women – provide some local leadership and SAA is now seeking to reinforce the transfer of knowledge by training CBFs to work in their own communities. Moreover, local farmers' organizations are relatively well developed.

Nigeria's extension network is more dense and the governments of several northern states have provided funds for SAA to develop the system's effectiveness. This program is now to be extended nationwide, in phases, with federal government support.

Micro-dosing fertilizer – a vital productivity tool for vulnerable farmers

Crop yields in Mali's fragile semi-arid regions have been in decline as pressure on land erodes the fallow periods that soil needs to rebuild its fertility. Yet few Sahelian farmers can afford the applications of mineral fertilizer that would break the vicious cycle – low yields holding back hopes of marketing surplus output, thus depressing incomes and further limiting smallholders' capacity to buy inputs.

But in collaboration with USAID and Mali's national agricultural research service, SAA has taught farmers how to make effective use of "microdoses" of fertilizer. This means applying a small, affordable amount of fertilizer with the seed at planting time or as a top dressing three to four weeks after seedlings germinate.

Paradoxically, this technique is particularly well suited to the manual planting techniques that still predominate in Mali. Rather than spreading chemical fertilizer over the entire field – as would happen with mechanized agriculture – microdosing applies it only adjacent to the plant, which makes much more efficient use of what is a costly input.

SAA trained farmers – through demonstrations and field days at Farmer Learning Platforms (FLPs) – and made sure that the fertilizer was available in the input shops established at village level by agro-dealers.

Fully 94% of those who attended the training sessions used the technique the following year, applying it to 98% of their millet and sorghum fields. The experience also helped to dispel skepticism about whether fertilizer is worth the cost or whether it burns crops. And millet and sorghum crop yields soared, from an average of 600 kg per hectare (ha) to 1400 kg/ha.

SAA hopes that researchers can develop a mechanized micro-dosing system that is affordable for small farmers

But already the technique is being combined with the "Warrantage" – where farmers place part of their harvest in collective storage in return for inventory credit. They use this to cover urgent postharvest expenses and invest in revenue generating activities for the dry season, such as sheep fattening, small scale irrigated vegetable production and the extraction of groundnut oil.

Meanwhile, the stored grain is sold later in the year, when prices have rebounded from the postharvest glut and thus produce a much better return for farmers.

Butamira – a changed farming reality

Green and fertile, the fields of Butamira, a few miles north of Lake Victoria, offer rich agricultural promise. But even here, the challenges that confront small farmers are tough.

With population rising, there is pressure on land and families struggle to meet their basic needs. Many are outgrowers for a local sugar factory, but they must also grow their own food and try to bring in extra cash for essential household needs.

Reconciling these demands can exert constant pressure. But when yields are boosted through the adoption of technology and better cultivation techniques, fragile family economics can be transformed.

After attending a training session run by the local SAA-trained community-based facilitator, Juliet Kawuzi offered to host a demonstration on her land in Musisi village in 2014. She planted three adjacent 500 m^2 plots of maize: one got a full application of fertilizer, one received a half dosage, while the third got none but was still farmed with improved techniques such as well spaced planting in rows, regular weeding and the heaping up of a bund (embankment) surround to conserve water.

Juliet Kawuzi on her maize plot (above), edged with a bund planted with beans (below).

"Last year I planted 4000 square meters, which produced 400 kg of shelled maize. I sold half of this to meet cash needs and the family ate the other 200 kg – but this did not provide enough food for my children.

"When I was growing up I was better fed, because my parents had more land. But this had to be subdivided to provide land for me and my siblings; so my farm is smaller and the soil is over-used and less productive.

"However, this year, with fertilizer to enrich the soil, combined with better farming techniques, I think the crop will be about 1500 kg. I will keep 500 kg to feed the family and still have a much bigger surplus to sell, to meet family cash needs – particularly school related expenses."

Justine Namuyaya works in her soya bean field. Thanks to advice from her local Community-Based Facilitator, she is now farming single crop plots rather than a traditional mixed plot.

Justine Nanuwaya, who farms nearby at Mbale, used to grow maize, coffee, beans, groundnuts and soya in the traditional way, interplanted in a mixed field. But now she has separate plots for each main annual crop such as soya.

"I thought it worth advising Justine because she seemed open to new ideas," says Emmanuel Musane, the local CBF, who taught her how to follow Sasakawa farming methods – planting in rows, weeding and applying fertilizer where possible.

For her part, Justine explains that she trusts him because she has seen the results. The difference between land that has been fertilized and land that has not is clearly visible.

"My groundnut crop increased from 200 kg to 1500 kg and this has given me the confidence to try other crops such as onions," she says.

"The extra income is a big help because it pays for the costs related to school – I have already sent two children to university and another is at secondary school, with the last three at primary school."

Justine uses some of the extra money she now earns to buy seeds and fertilizer, although she makes natural compost for her family vegetable plot.

"The only drawback with the new methods is that I get more insect infestation than on the old mixed plot. Now I am growing one crop in each field I have to spray to control insects."

One option could be to try planting alternate rows of crops that complement each other, such as beans and maize; this reduces insect pests and can also boost fertility.

Sarah Naluganda, who has become a demonstration farmer for other women, used to dig a patchwork of planting holes for seeds.

"Early in 2014 the village CBF trained me to plant the groundnut field in rows, which makes it easier to weed and apply fertilizer insecticide efficiently. This was the first time I had ever received any agricultural training," she explains.

"And now I have applied these lessons to my maize field as well, and I am getting bigger harvests and more income. We have more food and money and it will be easier to send the children to school regularly."

PART THREE: A five-pronged strategy

Theme 2: Postharvest Handling and Agroprocessing
Capitalizing on increased yields

Increasing yields is only the first stage for farmers seeking to move beyond subsistence level. The gains of better land productivity will not be fully realized unless smallholders are equipped to harvest, process, store and sell their produce as efficiently as possible. A bumper harvest risks going to waste if any of these links is weak.

Leonides Halos-Kim, who became Director of SAA's Theme 2 Postharvest and Agroprocessing (PHAP) program in January 2010, worked in Asia for the International Rice Research Institute (IRRI) in the 1980s. There, she witnessed how farmers' groups benefited from yield-boosting techniques, but then ran out of storage space for their rice, because they couldn't afford to process and move it quickly enough.

"They were processing in a traditional way and just didn't have the facilities to handle the increased output, so a bigger harvest did not lead to the production of more food," she says. Such shortcomings were largely rectified by the implementation of improved postharvest programs that became "institutionalized" and widely adopted across many Asian countries.

Lessons learned in Asia formed the foundation for the development of SAA's postharvest activities in Africa (see panel, p66, for more on how they helped shape the Theme 2 program).

Leony Halos-Kim, SAA's Theme 2 Director, checks one of the association's demonstration postharvest machines at Uganda's National Agricultural and Trade Show held in Jinja in July 2014.

"We are trying to make sure that when we introduce a new crop and want to increase production, farmers are able to handle that increase," she says.

"In Asia, postharvest was developed after production was in place. In Africa, we are trying to make sure that when we introduce a new crop and want to increase production, people are able to handle that increase," Halos-Kim says.

While SAA's agroprocessing program dates back to 1994, the recent development of a section of the organization to cover the PHAP theme across all four focus countries has brought a more tightly targeted and coordinated approach to this important link in the value chain. Now, lessons learnt in one country can be applied more easily in the others, with benefits for income generation, food security and job creation.

SAA has put in place a specialized team of around 20 people including a Theme Coordinator and Program Officers in each country, with the addition of a Regional Program Officer to tackle postharvest storage issues and assist in program implementation.

The objectives set for the team were:

- Promoting postharvest handling and storage technologies that reduce losses, improve quality and food safety, and enhance smallholder farmers' food security and income.
- Strengthening extension capacity to provide training in value-adding agroprocessing technologies and promote off-farm rural enterprise development for resource-poor farmers, especially women.
- Promoting the development of networks of private service providers to supply value-adding mechanized services to farmers, as required, from planting to harvesting and agroprocessing and farm-to-market transport.
- Building and strengthening the capacity of private enterprises to supply and maintain recommended postharvest and agroprocessing machinery and equipment, including drying and storage facilities.

Underpinning these aims was a shift in emphasis towards helping farmers and processors to make their produce more saleable by providing high quality and value-added products in a more market-oriented environment, while still providing for their own families and communities.

"If you want to enter into competitive markets you need to find out what the customers want. The value chain in Sasakawa is now driven by the market," Halos-Kim says.

Those customers, meanwhile, have become increasingly urbanized, meaning farmers need to produce food that is longer lasting and more convenient for consumers.

To achieve this, SAA has to first focus on improvements in primary processing to improve quality and hygiene to standards acceptable to both traders and the end-consumer, before demonstrating more advanced crop-processing technologies.

Postharvest handling and storage losses

A central plank of SAA's Theme 2 strategy has been to reduce losses caused by the poor handling and storage techniques still employed by many farmers. A significant proportion of harvested crops can be lost this way, reducing potential food supply and income for farmers before further processing has even started.

Resources pushed into training and demonstrations are now paying dividends. For example, in Mali, a project run since 2002 in conjunction with the USAID-backed INTSORMIL grains program found that farmers were losing 15-25% of the millet they stored. But following the introduction of grain threshers, sieves for cleaning and tarpaulins for drying, postharvest losses were reduced to 5%.

Also in Mali, a survey of storage facilities in 40 villages by a local construction materials and services company – as part of an SAA project – led to the rehabilitation of 38 storage facilities and the construction of 227 concrete drying floors adjacent to the stores.

Across the four SAA focus countries, farmers also receive training and demonstrations on the benefits of hermetic storage and raised storage platforms to protect against infestation and unfavorable conditions. Encouraging results among initial adoptees are helping to speed uptake among farming communities.

Good uptake has been achieved with the many types of simple and easy-to-obtain storage solutions now available, such as metal silos, supergrain bags, and plastic water tanks and barrels. SAA successfully demonstrated insect-free storage over 6-12 months in Uganda using plastic tanks, which come in varying sizes from half ton to 2 tons and are sealed with rubber straps.

Enthusiasm for improved storage has been buoyed by the increased flexibility this gives farmers to capitalize on changes in the market. Poor storage means farmers must sell their produce almost immediately, regardless of the price fetched. Those with longer-lasting storage can choose the best moment to sell *(See panel below)*.

Introducing technologies

The next step in the chain after storage is the adoption of grain processing technologies, such as harvesters, threshers/shellers and cleaners. SAA introduces farmers to the latest, affordable technology, encourages the development of local agroprocessing centers and helps local farmers and entrepreneurs to provide agroprocessing services to the community.

Typical of the type of technology SAA seeks to promote is a maize sheller tested in Nigeria in 2013 and 2014. Imported from China by the Kaigama Agricultural Machineries and Company in Kano, the machine is powered by a 5 horsepower petrol engine and can process 450 kg of maize per hour with a rate of grain breakage below 1%. It is easily portable, by just two people, and is priced at a relatively affordable $240, so it is an attractive proposition for farmers.

Technology successfully used in one SAA focus country can then be tested out in the others. For example, a Boshima-type

Stella Ojok and her husband George – farmers in Kwera in the Dokolo district of northern Uganda – now have a storage tank in which they can keep maize for up to five months, without the grain rotting or being attacked by pests. This is a big improvement on the plastic storage bags they used before, in which the crop could only be stored for one or two months.

Longer-term storage allows farming families to have greater food security for themselves and, if they have a surplus, to sell it, when market prices are high.

In Uganda, A storage tank costs 65,000 Ugandan shillings (around $25), but the expense is worth it. Just after harvest, maize sells for around 300-400 shillings/kg, but six months after harvest the price can rise to more than double that.

Stella is an SAA-trained community-based facilitator (CBF), so she helps to introduce fellow villagers to new technologies. At the last harvest she and George harvested 5 tonnes of maize; they sold some to buy a power saw for George's 1-acre pine tree plantation, which provides feedstock for his wood workshop in Dokolo town.

There is a real need for storage techniques that help families in the area. Stella estimates that almost half of the 2,500 households in Kwera do not have food security yet.

A lightweight harvester was first demonstrated with wheat in Ethiopia, before being shown to rice farmers in Nigeria and Uganda.

harvester – a lightweight, powered grass cutting machine – demonstrated for wheat harvesting by the SAA's Ethiopian team in 2012, was then demonstrated successfully for rice harvesting in Nigeria and Uganda in 2013 *(see photo above)*. When the Ethiopian Agricultural Transformation Agency (ATA) decided to scale up promotion of the harvester, SAA then faced the challenge of finding potential suppliers to meet high projected demand – a process that was continuing in 2014. Meanwhile, in Nigeria and Uganda, SAA has been helping to link local importers of the harvester to potential customers.

Alterations to existing technology can also reap benefits. In Mali, adjustments to the sieve opening and the clearance between the upper and lower concave plates of a wooden groundnut sheller made it effective for cowpea shelling. The modified unit was being produced for testing in 2014.

Taking technology to the farmers

SAA's drive to improve storage techniques and processing technology is underpinned by the organization of field days and demonstrations, and its participation in agricultural fairs.

A key ingredient of these events is the involvement of private machine suppliers and manufacturers, providing forums for potential vendors and purchasers to meet. In Ethiopia, for example, more than 25,000 farmers were estimated to have seen machine and process demonstrations in 2013. Field demonstrations led four Ethiopian farmers to buy multi-crop threshers, while two others acquired maize shellers. In Uganda, a storage demonstration resulted in 25 farmers buying super-grain bags, while farmers also bought 15 PVC tanks of various capacities for maize and bean storage.

Demonstrations, field days and training sessions also provide SAA with platforms to tackle other important issues. They provide a good opportunity to identify motivated people who would benefit from further support. The Theme 2 team also conducts food safety training alongside other demonstrations – notably on how to spot and control aflatoxins, the toxic and potentially carcinogenic microbes that colonize crops before harvesting or during storage.

Enhancing agroprocessing and rural enterprise

A pivotal new element of SAA's strategy to facilitate the adoption and scaling up of PHAP technologies are its Postharvest and Extension Learning Platforms (PHELPs), which are being rolled out over time across the four focus countries. These build on existing structures to improve facilities for farmers to learn about technologies to reduce postharvest losses and show how local agri-business enterprises can develop produce.

Getting a PHELP off the ground in a given area requires a high degree of active involvement from extension agents (EAs), farmers and agroprocessors. SAA encourages local ownership of such initiatives by asking users to share the cost of setting them up. Local financing helps ensure the projects are sustainable and reduces SAA's financial commitments. For its part, SAA provides demonstration machines and training on operation and management for as long as it is needed.

More than 50 PHELPs have already been established in Ethiopia, with a lesser number in the other three countries, where the concept is due to be introduced over coming years. In Mali, 10 postharvest and trading centers (PHTCs) also functioned as PHELPs in 2013. In Uganda, existing One-Stop Center Associations (OSCAs) already host basic platforms, which are being strengthened to provide post-production training to about 800 farmers.

Women's processing groups to the fore

Another aspect of the push to improve training in processing technologies and promote off-farm rural enterprise is support for the establishment of agroprocessing enterprises. In this field, there has been an emphasis on supporting women farmers, who often struggle to realize their aspirations, due to limited education, social pressure and demands placed on their time by running a home.

"Women's groups can immediately get used to the technology, but the challenge is the management of the group itself, because of the long period of time they have to spend in a training center, when their available time is limited" Halos Kim says.

SAA has assisted women processing rice in Ethiopia, Nigeria and Uganda, cassava in Uganda and Nigeria, and vegetables and spices in Ethiopia. Benefits can readily be seen. For example, in Nigeria, one SAA-backed enterprise in Achilafiya, Kano, owned and managed by 10 rice processors, now parboils and mills rice, serving six communities in the surrounding area. It is located in a community that is more than 100 km away from the next nearest mill center, so the new project substantially cuts transport costs and saves travel time for the users. The group processes an average of 150 kg of paddy rice every week.

Geoffrey Munyegera's fabrication yard in Mayuge, eastern Uganda is a growing concern thanks to the popularity of his product lines, notably his motorized maize sheller, with a petrol engine providing power both for shelling and driving the machine from one farm to another.

SAA chose to work with Munyegera because of his creative designs and original thinking, but technical aspects of work at the yard needed improvement. SAA took him and his employees to Busitema University, Tororo for a two-week training course on welding, benchwork, material selection and assembly, engine repair and other aspects of machine development.

Since then, output has increased, quality has improved, feedback from farmers has been positive and sales are on the increase.

Promoting private service providers

Private service providers are taking on an increasingly important role in the development of postharvest and agroprocessing technologies. SAA now devotes considerable resources to encouraging budding entrepreneurs to provide value-adding mechanized services to farmers, whether for planting, harvesting, agroprocessing or farm-to-market transport.

In Ethiopia, for example, the SAA team identified and assisted 23 private investors who invested in machines to provide services to farmers in their locality. These included multi-crop and teff threshers, maize shellers and rice mills. The service providers bought the machines using their own finances, while SAA provided training on the operation and management of both the machines and the enterprise *(also see panel, page 10)*.

In Mali, a PHTC in Sikasso Region provided maize shelling services to 585 farmers and processed 13.8 tonnes of maize, while a platform in Kondogola reported income of 600,000 CFA francs ($1,200) from rice milling in 2013.

Facilitating the private provision of equipment is only part of the story. People also need to be trained to operate and maintain it, and – if demand looks poised to take off – learn how to scale up their operations. They need to be ready to run a growing business successfully.

In Ethiopia, 150 operators recruited by machine owners and by Farmers' Training Centers and PHELPs were trained on operation and management of machines and engines in 2013, while 42 technicians were trained to repair and maintain machines and engines.

The Mali team trained 49 technicians in Sikasso Region on safety operation, repair and maintenance of threshers, cleaners and rice mills. And in Uganda, 15 technicians from the Munyegera workshop, which fabricates and sells a successful mobile maize sheller, were trained in quality welding *(see panel above)*.

Training the trainers

Ensuring expertise is available in the community requires training of the trainers themselves. SAA trains extension agents,

farmers' leaders and community-based facilitators on how to train farmers and agroprocessors. Where training is complex, SAA teams continue to provide support after initial instruction has ended, until the new trainers are confident enough to conduct training on their own.

Promoting continual re-training is also becoming an important part of SAA's work, so that operators use machines as efficiently and safely as possible, and agricultural communities have access to the latest techniques and technology.

There is considerable collaboration with training staff from other SAA Themes, as well as training service providers outside SAA in areas such as basic business skills and gender-related issues.

The next phase

The challenge now is to build on these foundations and overcome the obstacles still holding back improved postharvest storage and agroprocessing.

Technologies, while improving, remain limited in many places and spare parts can be hard to get, especially where imports are restricted. SAA is stepping up support for domestic research and development, as well as strengthening its partnerships with development institutions to improve technology adaptation, given the generally low quality of many machines.

Improved training for both machine development and operation is also being targeted. SAA also plans to work with more service providers, in an effort to push up the quality of machines and increase their availability.

Greater government assistance in incentivizing successful enterprises is also being sought. Successful collaboration with both governments and partner organizations is likely to play an important role in SAA's future strategy, *(For more on SAA's partnerships, see Part 6, page 107).*

Improved access to credit is another major priority, given the high cost of machinery and of starting a business. At one end of the scale, a manually operated maize sheller might cost around $20, whereas a powered thresher with a 2 tonnes/hour capacity can cost more than $2,500. And where new businesses get a toehold in the market, SAA hopes to facilitate links with financial institutions and markets to support private service providers, producers and processors – activity that requires close collaboration with SAA's Theme 3 staff.

But perhaps the biggest challenge is to convince trained farmers and technicians, with minds set in the ways of subsistence agriculture, that they can and should take up service provision or agroprocessing as a viable business that can improve their lives.

From Asia to Africa: the roots of postharvest activities

SAA's Postharvest and Agroprocessing activities, organized under Theme 2, have their origins in the pioneering work led by Dr Yong Woon Jeon, an agricultural engineer and rural sociologist at the International Institute of Tropical Agriculture (IITA) in Nigeria. Jeon began to develop small-scale agricultural machinery in South East Asia during the 1970s and 1980s, largely related to rice harvesting and processing. While at the International Rice Research Institute (IRRI) in the Philippines, he developed a range of equipment suitable for use in the rural areas of developing countries.

When he moved to IITA in the late 1980s, he was joined by Leony Halos-Kim, then an agricultural engineer at IRRI and now SAA's Theme 2 Director. Their first challenge was to develop improved technology for the production of fermented flour from cassava, called gari, a staple food in Nigeria and much of West Africa. They studied every step of the gari production process, and began to develop, successfully, small-scale machinery – hand and motor powered – to improve the laborious traditional processes.

This attracted the interest of a former Japanese overseas volunteer, Toshiro Mado, who was working in Ghana for SAA to improve the profitability of various agroprocessing enterprises. His research led him to IITA in 1993, where he was introduced to the Postharvest Engineering Unit. In 1994, SAA and IITA established a collaborative agroprocessing project. IITA focused on technology generation and technical backstopping for equipment fabricator training, while SAA concentrated on farmer groups - largely made up of women – which could use the IITA technology and equipment to develop agroprocessing micro-enterprises.

A major step forward was taken in 2003 when SAA launched the Agroprocessing Project (SAA-AP) to develop techniques and management skills to establish "small-scale appropriate and sustainable processing enterprises that were easily manageable and required little capital investment".

SAA-AP was initially implemented in Ghana and Benin – while opportunities for assisting agroprocessing in other SAA countries, including Ethiopia, Guinea, Uganda, Mali, Mozambique and Nigeria, were also investigated. The project was headed by Toshiro Mado, with Leony Halos-Kim as a consultant.

When the SAA collaboration began, relatively few organizations were engaged in the development of appropriate technology and local manufacturing capacity. Now there is widespread agreement that value-adding enterprises are critical to poverty reduction in Africa and to agriculture-led industrial development.

PART THREE: A five-pronged strategy

Theme 3: Public-private partnerships and market access
Connecting farmers to the market

Partnerships with other organizations have been central to SAA's work since the beginning, but they are becoming increasingly important as the association seeks to help farmers adopt sustainable business models, become more market-oriented and collaborate with private sector suppliers and service providers.

SAA continues to build on its long-standing relationship with governments – almost three-quarters of people working in extension with SAA's field activities across its four countries are civil servants, so close collaboration with agriculture ministries remains vital to the success of projects.

However, in recent years partnerships have deepened with private sector participants – who are well placed to serve the needs of rural communities by providing equipment, financial services and training – and with non-governmental organizations that provide services complementary to SAA's own activities.

"We know there are many things farmers need that SAA cannot help with, so we want to make sure that farmers' groups are properly linked to institutions that provide a range of services," Juliana Rwelamira, SAA's Managing Director and Acting Director for Theme 3 activities, says.

Private sector service entrepreneurs, such as agricultural inputs suppliers and grain traders, working directly with local communities, can also act as a ready made new network of skilled personnel, who can provide training and extension services for farmers. Machinery manufacturers and suppliers or fertilizer sales companies, for example, should be able to provide training programs and advice to farmers about their products in much the same way as already happens in the world's developed economies.

SAA is working to develop a model where private input suppliers would help finance smallholder agricultural extension services, such as field demonstrations and training programs, while farmer-based organizations (FBOs) would help to finance some local extension costs, such as training and possibly some financial support for community-based facilitators.

In any partnership model, governments would need to continue to play a major role in research on basic food crops and providing extension services. NGOs and other non-locally based actors are also important collaborators in extension service provision. *(See Part 5, page 101 for more on Sasakawa's extension activities.)*

Theme 3 objectives: expanding market opportunities

As part of its Strategic Plan 2012-16, SAA set a series of objectives to maximize market opportunities for farmers from its Theme 3 activities:

- Develop revenue-generating models to make smallholder agricultural advisory services more scalable and sustainable. This includes enlisting farm input suppliers, agro-service providers, and farmer-based organizations (FBOs) to help finance smallholder agricultural extension advisory services.
- Support the emergence of FBOs, capable of securing the needed information, inputs, credit, and scale to discover and access markets. This includes coaching FBOs to conduct market demand and value chain analysis and develop viable business development plans.
- Organize and market specialized training courses in input supply, seed production, crop management and extension methods, on a cost recovery basis, for private organizations in the seed, crop and agro-input sectors.
- Help broker new business opportunities for partner FBOs and entrepreneurs, especially women and youth.
- Facilitate commercial credit services for partner FBOs and entrepreneurs.
- Support new business development activities for SAA projects.

Successful partnerships have been forged with local financial institutions, government agencies, research facilities, foreign embassies, USAID, the World Bank Group, the World Food Programmed and large NGOs such as Oxfam and the Bill & Melinda Gates Foundation.

In Nigeria, for example, SAA has worked with Agricultural Development Projects (ADPs) from five states, Sterling Bank, the USAID MARKETS program, the National Stored Products Research Institute and the Fertilizer Suppliers Association of Nigeria, among others. *(For more on partnerships, see Part 6, page 107.)*

Market opportunities: SAA brings together delegates of farmers' cooperatives and consumer associations in Bishoftu, near Addis Ababa.

Collective action

Maximizing farmers' benefits from these links with governments, NGOs and private sector service providers is often best achieved via farmers' groups. With the right training, these can pool their products, finances and know-how to target the most useful services and negotiate better value deals collectively.

"Even individual farmers that are well equipped to deal with service providers are stronger in a group. Working together makes it easier for farmers to articulate what they need, approach service providers and negotiate for services. Farmers' groups that learn to do these things can help themselves and will no longer feel dependent on handouts," Rwelamira says.

None of this happens overnight. Encouraging closer collaboration and a market-oriented approach among farmers, who are more accustomed to working as individuals and making ad hoc sales of occasional crop surpluses, can be difficult. So SAA spends a minimum of two years – and often much longer – working in the community with farmers' groups.

The supply side

On the other side of the equation, agro-input supply firms and business service providers must also be persuaded to work with smallholder groups in remote areas – whom they may not immediately view as a very good business proposition. Working with farmers' groups, rather than individuals, gives suppliers a sufficiently large customer base to merit their time and investment, and reassures them that they are dealing with organized, more business-savvy partners in the community.

Financial incentives from government, such as tax breaks for services and equipment sales into such poor communities, will also encourage investment.

Meanwhile, those setting up crop processing and sales operations need access to long-term financing with low borrowing costs, which will be easier to obtain if it is clear that farmers are committed to work with them. Organizing famers into groups also helps here, as peer pressure encourages everyone to pull their weight.

Given the power, transportation and communications requirements involved in scaling up agroprocessing and marketing, improved rural infrastructure and a steady energy supply are also important factors for everyone.

CAT power

The development of Commodity Association Trainers (CATs) has been key to SAA's efforts to improve farmers' access to supplies and markets. These are usually business-minded input dealers, trained by SAA to assist farmers to gain access to services that will raise product quality, pool those products for bulk sales and then market them successfully.

The CATs themselves provide some of the business services otherwise lacking in agricultural communities, for example, by acting as agents for seed suppliers, commission-driven agents for buyers, or financial agents to link extension agents and farmers with banks.

SAA contributes seed money to help CATs become established, but to provide incentives and ensure the system is sustainable in the longer term, the CATs charge produce buyers around 5-10% commission, depending on what is involved.

SAA has also focused on improving the business skills of input dealers and business service providers, such as store managers, traders, seed companies and processors.

In 2011 and 2012, around 32,400 farmers in SAA's four focus countries received business service provision from 27 CATs and 205 service providers who supplied extension services, threshing and shelling machines, storage services and milling. SAA also helped over 15,000 farmers to access credit worth some US$440,000 from 18 financial providers in 2012.

Expanding local networks of input dealers and traders also provide a valuable addition to existing extension services. Theme 3 staff, working with their counterparts in Theme 1, provide training to newly established input dealers and traders enabling them to act as advisors and extension workers themselves, helping to establish demonstration plots for new technologies and selling inputs to farmers in Mali, Uganda and Nigeria.

Getting results

The benefits of this training and extension work are already being experienced in agricultural communities.

In 2011 and 2012 SAA supported the development of over 1,000 commodity associations from 27 Farmer-based Organizations (FBOs) – whose capacities the Theme 3 staff then built up through training and mentoring. The backbone for this was the development of 24 business plans and eight agribusiness models that connected the FBOs to more than 30 fresh market opportunities.

Those new links to the market resulted in business

opportunities worth over $4 million, while farmers were able to supply produce worth an estimated $3.4 million to markets. Training support provided by SAA's Theme 1 and Theme 2 teams enabled more than 50,000 farmers with crop surpluses in the four focus countries to improve their productivity and grain quality to the point where the produce sold for an estimated 15-20% premium over previous prices on average. Some 71 women's groups received special capacity building support for business skills development and improving access to finance and markets.

Developing access to financial services

Capitalizing on and scaling up these activities requires access to banking services to which many farmers and village agents have had little exposure, given their poor financial resources and the lack of local banking infrastructure – the nearest bank may be tens of kilometers away.

Even when SAA helps to bring farmers and local business people together with banks, there is no guarantee of a positive outcome. Farming is a risky activity, from which returns cannot be guaranteed, so securing even small loans can be difficult.

Village shop owners may need perhaps a few thousand dollars in loans to provide the capital needed to properly stock a new outlet, but they will also struggle to get it, unless they have sufficient collateral – and few do. While business-minded shop owners can raise their own capital by offering extra services, such as mobile shellling units, the process of properly stocking a much-needed village inputs shop is inevitably slowed down.

To improve this situation, SAA aims to encourage capacity building in financial institutions, while also opening up the channels between farmers and local service providers, and the banks, by providing training on how best to access financial services and obtain credit.

SAA intends to support at least 60 farmer-based organizations across its focus countries by 2016 through formal training and mentoring in market demand, value chain analysis and business planning, to enable them to engage in negotiations, secure services and carry out commercial trading.

In Ethiopia, for example, SAA has already helped several FBOs to draw up business plans, conducted credit needs assessments, developed simple borrower's guides and conducted financial management training sessions across the communities in which it works. As a result, more than 2,300 farmers' groups have opened accounts, while five Village Savings and Loan Associations (VSLAs) have been established.

SAA is involved in inventory credit schemes as part of its Mali and Uganda programs and through several projects with partners such as World Food Program, Purchase for Progress (P4P) and AGRA. Under these, farmers' organizations deliver grain to a bonded warehouse and then use it as collateral to obtain partial credit from financial institutions.

As the farmers with which SAA works become more market-oriented, helping them to get better access to capital and credit is set become an increasingly high priority activity for the association.

The grain trader's view: meeting market expectations

If farmers can sell their produce on regional, national and international markets, they are likely to achieve much higher returns than by selling locally on an ad hoc basis. To upscale in this way usually requires the involvement of agricultural commodities trading firms, which have wider reach than local farmers' networks can hope to achieve.

In Uganda, SAA has been working with a number of grain traders who buy produce collected at centralized stores by farmer-based organizations (FBOs) and Commodities Association Trainers/Traders (CATs).

One trader, Advent Commodities, started working with SAA in 2012, focusing on maize. David Ejalu, Managing Director of the Kampala-based company, said working with small-scale producers made sense for both his company and the farmers, because the strong market in maize across East Africa provided high potential demand for farmers, while still adding up economically for Advent.

Maize production has expanded rapidly in Uganda over recent years, surpassing 2 million tonnes/year. While most of it is consumed domestically, the country is well placed to increase exports – and if that happens, help smallholder plots to achieve higher yields and increase surpluses, to provide the grain for sale.

Kenya, which has only limited arable land and a large population, provides an obvious potential market. The requirements of emergency relief agencies such as the World Food Program provide another outlet. The WFP, which used to import much of its grain for its relief operations from outside Africa, now buys more within the East African region to go to areas such as South Sudan and the Democratic Republic of Congo. However, concerns over the quality of maize being offered to the WFP by Uganda's big traders led to the organization temporarily suspending maize purchases from the country in 2013.

"Uganda should be a bread basket for the region, but big issues need to be resolved, such as better processing, attaining a high quality standard and putting an improved system in place to get the produce to the market," Ejalu said.

If local community organizations are to win long-term sales contracts, buyers need to be convinced that grain will be top quality every time a truck visits to pick up the latest cargo.

The centralized storage of maize from small farmers and the CATs-based network developed under the SAA program gives grain traders a good point of contact in local communities, while SAA training means locally-based CAT traders already understand the basics of quality improvement.

Farmers need to improve postharvest handling and processing to meet the high standards required by big grain traders. This grain cleaner, demonstrated in Kudanda in Nigeria's Kaduna state, is helping producers deliver good quality grains to the market.

"These traders are very close to the farmers, as they are working at community level, rather than sitting in Kampala, so they know exactly what is happening at the grassroots. But for their system to be viable, they have to have a larger volume turnover – so they need access to bigger markets by linking up with larger traders." Ejalu contends.

Working long term with larger grain traders to sell high quality maize also provides greater financial security for farmers' groups than ad hoc and one-off sales of low quality maize to opportunist traders, he suggests.

A one-off sale may solve a cashflow crisis in the short term, but doesn't guarantee future sales or enable farmers to maximize their profits. Long-term contracts with better funded buyers are more likely to result in punctual payments to farmers for their maize and make it easier for them to obtain pre-financing and other loans for equipment, everyday household necessities and so on.

Becoming involved directly with the CATs, has given traders the opportunity to help farmers and local traders to become better equipped for the market by providing advice on adopting postharvest techniques to improve grain quality to a tradeable standard and on how to work more effectively as part of the business community.

Ejalu hopes that quality improvements at the local level in Uganda being promoted by SAA and others, together with government backing and improvements in national distribution networks, will eventually turn the country into the regional bread basket it has the potential to be.

Bringing the market to the farmers

Ronald Npungu works as an input dealer and as an extension agent for both SAA and the Ugandan government's NAADS scheme in central Uganda, some 80 km northwest of Kampala.

He started training farmers around the village of Sekanyonyi in Mityana District in 2012, instructing them on using improved seeds, fertilizers, pesticides and related equipment such as spray pumps, masks and gloves. Armed with this knowledge, the farmers then faced a problem – the nearest shop they could buy the necessary inputs was in the town of Mityana – a time-consuming 20km journey along a dirt road.

Npungu, who already owned an inputs shop in Mityana, saw a market opportunity and established a shop in Sekanyonyi. This new outlet outperformed his existing shop, which was located on a main road, but not conveniently located for many farmers receiving SAA-backed extension training.

The Sekanyonyi shop did much better, because it was closer to the Farmer Learning Platforms and demonstration plots. The farmers there could see the point of the technology and then obtain it easily from the shop," he says.

At first, Npungu had to travel to Kampala to get supplies for the new shop. But, he now gets them delivered by a supplier that SAA put him in touch with.

The rapid pace of improvement of Uganda's telecommunications infrastructure means he can use a mobile phone to check product price information and place orders through the AgriNet Uganda internet market brokers' service, which is backed by various partners including NAADS and the UN's Food and Agriculture Organization (FAO). Npungu is also able to pay for his orders via his mobile phone using one of the country's increasingly popular "mobile money" services. Business has been good enough to enable him to take on a trained employee to provide cover in the shop when he is carrying out extension work or visiting his other shops.

The success of the Sekanyonyi store has enabled Npungu to open a third store in another village 20km away. This has been beneficial for his business, and his farming customers, because the increased turnover it generates enables him to buy in bulk at lower prices.

The next major challenge, says Npungu, is to find capital to scale up his business still further.

PART THREE: A five-pronged strategy

Theme 4: Human Resource Development
Working with SAFE to develop skills

The nature of agricultural extension in Africa is evolving constantly. The provision of advice and technical support to farmers, a crucial tool in helping smallholders to improve the volume and quality of what they grow, now takes myriad forms.

Once seen as the prerogative of government or the parastatal entities tasked with overseeing the production of export cash crops, extension has now become a much more complex and sophisticated operation. For Sasakawa Africa Association, these changes have led to a need for increased flexibility and fresh thinking.

The training of extension workers is at the heart of SAA's mission, because, despite its scope, it cannot provide advice directly to farmers everywhere. Training the trainers means improved technologies and techniques can reach a far wider pool of farmers than laying on demonstrations alone.

Much of Sasakawa's extension training is carried out by the association's sister organization, the Sasakawa Africa Fund for Extension Education (SAFE), which works with universities to design practical programs of mid-career study for extension professionals.

However, the work of SAFE is only one dimension of Sasakawa activities in this area. SAA itself is involved in various forms of training to support small farmers. These frequently overlap with the activities of SAFE, so, to ensure their proper coordination, Deola Naibakelao, the Managing Director of SAFE, is also Theme Director at SAA for activities in human resource development.

The form that SAA's work takes varies within and between countries, reflecting the differences between national strategies in support of the farm sector. In Ethiopia, extension remains a service delivered almost entirely by government. So SAA's work in that country is primarily focused on supporting the development of that system.

By contrast, Uganda has opted for a more liberalized model. There is a national extension service – indeed the Ugandan government recently signaled a reinforcement of its role in this area – but at the grassroots, a crucial role is now played by smallholders chosen by fellow villagers to work as Community-Based Facilitators (CBFs). This system has proved so successful it is also being extended to Mali.

CBFs in Uganda undergo regular training, so that they can impart new technologies to their neighbors, providing advice and helping to set up demonstration plots. Although the CBF does not have the depth of scientific knowledge of a professional extension worker, he or she does have distinctive strengths.

As CBFs live and work in the farming communities that they advise, they also understand farmers' needs readily. They are often applying the technologies on which providing training, and depend on them to feed their families and generate income – topped up by a modest stipend for their advisory work.

The effectiveness of the CBF system depends on comprehensive training by SAA. CBFs need to become effective communicators, providing advice that is properly informed and relevant to local circumstances.

Nigeria provides yet another model for extension and training, as they operate there under a federal system where individual states assume much of the responsibility for agricultural development. So it is the state governments that assign extension workers to be trained by SAA.

Vocational training

Meanwhile, the association's human resource development activities are also being developed in more vocational and thematic terms. As SAA has sought to develop its support for the rural economic value chain – crop processing, storage and marketing – so it has begun to train extension workers with particular skills in these areas. Many of these extension workers are women, reflecting SAA's recognition of the important role that women play in the processing of farm output and commercial life in the African countryside.

Over time, it seems likely that this area of training will expand considerably, as SAA seeks to reinforce its support for the wider rural economy and a more varied range of livelihoods (for more on this see sections covering Themes 1-3).

Training is also provided to farmers' organizations, so that they can improve communal storage and processing systems, better manage their financial affairs and become more commercially nimble, reliable and competitive.

And where SAA lacks the appropriate expertise itself, in professional skills such as bookkeeping, it sometimes arranges for specialists to provide the training to farmers groups. *(For more on SAFE and SAA's human resources development activities in general, see Part 5 of this book.)*

PART THREE: A five-pronged strategy

Theme 5: Monitoring, Evaluation, Learning and Sharing (MELS)

Learning lessons, supporting change

Effective development initiatives depend on a clear understanding of how interventions impact on the communities they are designed to assist. Inevitably, some techniques or project types work better than others, while some will work better in one place than in others. SAA's Monitoring, Evaluations, Learning and Sharing (MELS) activities help the association to assess the benefits of its operations accurately, learn from them and make improvements where necessary.

A clear-eyed and objective assessment of activities is not only key to successful SAA operations, it is also essential to give donors, host countries and other development partners the confidence to forge closer alliances with the association.

SAA's Theme 5 MELS activities strengthen SAA's evidence-based programs across the spectrum of its operations in Ethiopia, Mali, Nigeria and Uganda, helping SAA to transform itself into an evidence-based organization better equipped to document and understand the impacts of its own investments and those made in conjunction with partners.

There is no "silo" approach in place. Theme 5 works with and through the other four SAA themes and the country programs, to implement the system.

MELS addresses what had been a lacuna in operations. Over the first 25 years of its history SAA did not undertake formal monitoring and evaluation of its program activities, leaving a hole in the organization's data bank.

No baseline data was collected when program activities began in any of the 15 program countries with which SAA has been involved. No professional studies were conducted on adoption rates and patterns resulting from the technologies demonstrated in more than 3 million plots.

While it was clear that SAA's operations were making a significant impact on crop production, the lack of an organized monitoring and evaluation system proved to be a source of institutional weakness, reducing the overall impact of SAA investments and eroding the influence the program had in international development circles.

"When we started looking beyond The Nippon Foundation for funding, it became very clear that monitoring and evaluation needed to be given a high priority," says Justine Wangila, SAA Theme Director for MELS.

"Some organizations, such as the Bill & Melinda Gates Foundation, require their partners to have a dedicated department. But even if the first pressure was external, internally within our organization it was clear that we had reached a stage where we needed to do this."

Justine Wangila, Theme Director for MELS at SAA, says the creation of his program was a response to both the organization's need to improve its monitoring and evaluation, and the requirements of its partner organizations.

The creation of MELS

This deficit was rectified in 2006 when the first steps towards a fully-fledged MELS Program were taken. Nippon Foundation funded the Mexico-based International Maize and Wheat Improvement Center (CIMMYT) to undertake an independent project – "Knowledge System to Monitor and Assess Impacts of SAA and Partners' Activities" – in Uganda and Ethiopia.

The CIMMYT project employed a team of social scientists, economists and geographic information systems (GIS) specialists to assess SAA/SG 2000 interventions' impacts on the livelihoods of smallholder farmers. It covered the direct and indirect, the positive and negative, and the intended and unintended impacts. Significant spillover effects were also assessed, including those on local non-participants, NGOs and the private sector, as were those on local development efforts and policies.

The project's findings and their potential policy implications were communicated through workshops and publications, and through a project website. More than 20 technical economic reports were produced, including published versions of international peer-reviewed journal papers, before the project was concluded in 2010.

Implementing change

The major challenge facing SAA country teams was to how to institutionalize MELS – to make it part of the fabric of the organization. To achieve this, capacity development was critical.

Relevant software, training staff and partners were acquired to establish a web-based implementation monitoring system (WIMS) in Ethiopia, which could then be applied to Mali, Nigeria and Uganda. Partnerships were put in place with the relevant arms of ministries of agriculture, NGOs and

Practical training at SAA's office in Mali for the use of GPS for location and mapping for surveys in the field.

international organizations. Today a data center in Ethiopia is home to information resources and WIMS, and is linked to the country's Woreda Extension Resource Centers (WERCs), as is an indicators' performance and tracking table for Mali.

In Uganda, which started MELS implementation in 2010, the country team has been developing logframes (analytical documents), strategies, methodologies, concepts and procedures, as well as building the capacity of staff to deal with the requirements of MELS. In conjunction with the other themes, MELS co-facilitates annual planning meetings where annual budgets and plans are shared with stakeholders.

Nigeria's moves to institutionalize MELS in its SAA activities have included training in the use of GPS hardware, data collection techniques and methodologies, conducted in Jigawa and Adamawa States. Rapid appraisal monitoring on thematic activities was undertaken and the findings shared among staff across SAA's themes.

An evaluation study of the functioning and impact of SAA technologies in Nigeria was conducted in 30 villages from 15 local government areas in Jigawa and Adamawa States. Three households in every selected community were approached, giving a total of 80 respondents in the two states.

Assessing farmers' needs

Needs assessments form a core component of MELS procedures.

In Ethiopia, the MELS team has undertaken needs assessment surveys at Farmers Training Centers (FTCs) on 202 project sites and produced 40 reports. Staff across SAA Themes have been able to prioritize their activities on the project sites accordingly. Assessments have also been conducted for Strengthening Agricultural Extension Delivery in Ethiopia (SAEDE) – a project funded by the Bill & Melinda Gates Foundation – and the Tigray-based Promoting Crop Diversification and Advanced Technologies (PCDAT) project.

Studies showed that most farmers used traditional farming practices. Line planting was on the rise, but was constrained by labor and time requirements. Demand was high for new and different improved crop and livestock technologies and practices. Slow harvesting, poor storage and losses were significant challenges.

In Nigeria, MELS assessments found that over 85% of farmers sampled needed training on fertilizers, line planting, storage and value addition. Access to markets and credit were near zero.

In Uganda, assessments of beneficiaries' needs to facilitate guided thematic interventions were made. So far, six needs assessment reports have been completed and shared with the Themes. Preferred crops were maize, beans, soybeans and groundnuts with different preferences across districts.

Baseline surveys have also been conducted in some areas to assess the outcomes and impacts of SAA interventions. In Uganda, indicators include socio-economic status of farmers, access to use of extension and agricultural information, input access, food security, crop productivity levels, postharvest handling practices and losses, markets and credit access. Benchmarks are already in use for tracking of outcomes and impacts.

In Ethiopia, SAA recently compiled baseline reports for five projects. A synthesis of the baseline reports was also produced and published as a book.

Establishing efficient monitoring

Regular monitoring is a significant element of the MELS process.

In Mali, where MELS has been operating since 2010, regular field monitoring and the evaluation of the extension approach relating to Theme 1 crop productivity was introduced in 2012. The following year saw regular field monitoring and evaluation of the adoption and impact of technologies introduced by SAA. In 2014, there was regular field monitoring, valuation of the performance of SAA-established input shops and an evaluation of the INTSORMIL revolving fund.

"Our monitoring is basically focused on the outcome of other themes' implemented activities. For each Theme, we

Training enumerators and development agents on data collection in Aleta Wendo Woreda at Homecho Waieno Farmer Training Center (FTC) in Ethiopia.

Attendees at a MELS stakeholders' workshop in Kano, Nigeria. Such workshops and meetings are crucial to gather feedback and share lessons learned from evaluation in the field.

look at whether introduced technologies and received training are meeting beneficiaries' needs, doing better than previous practices, or improving beneficiaries livelihood, before being adopted by producers in their own fields," says Abou Berthé, SAA's Country Director for Mali.

In Uganda, monitoring is done on a quarterly basis and helps guide decisions on improving implementation processes and collective action, providing lessons for the future. In Ethiopia, SAA has conducted outcome monitoring surveys in the kebeles (sub-districts) where the association works and has produced around 14 periodic outcome monitoring reports. These have then been shared with the other Theme teams.

In Nigeria, unstructured field monitoring has been conducted in Jigawa and Adamawa States with a focus on Theme 3 activities. Monitoring of performance is also undertaken by observing outputs.

The key role of evaluation

The impact of data gathering data and the establishment of effective monitoring will not be maximized unless effective evaluation systems and in-depth issue studies are put in place

In Ethiopia, recent evaluation projects have covered the following:

- SAA's crop extension approach, which was conducted in four Regions and 22 project Kebeles.
- A final evaluation of a Women's Empowerment Project.
- A mid-term external evaluation of the SAEDE extension project.
- Internal evaluation.
- Evaluation of training provided in the SAA – World Food Program collaborative project, Purchase for Progress (P4P).

In Uganda, evaluations and in-depth studies to document the impact of SAA interventions have included:

- Evaluation of SAA crop productivity enhancement extension approaches.
- Perceptions, utilization and adoption of improved postharvest and agroprocessing technologies for maize. Lessons from SG 2000 Interventions in Uganda.
- Assessment of One Stop Center Associations (OSCA) in Uganda.
- Adoption of SAA-promoted crop technologies in selected sites of Kamwenge, Buikwe and Tororo Districts.
- A Postharvest Handling and Agroprocessing Tracer study.

Spreading the word

Sharing results and opening up channels for feedback are key to the success of the MELS system.

In Uganda, the MELS team uses a number of events during the year to share results from different surveys and studies with stakeholders. Quarterly meetings are co-facilitated with other Themes to share reports developed during the quarter.

Annual learning and sharing meetings are organized to share results from surveys and studies done during the year. The stakeholders include staff from implementing Themes, the National Agriculture and Advisory Development Services (NAADS, which oversee extension work in the country), the National Agricultural Research Organization (NARO), the agriculture ministry, input suppliers and distributors and financial institutions *(see panel, next page)*.

Ethiopia undertakes a periodic quarterly review and planning meetings are used to enable personnel from each Theme to present and discuss quarterly implementations and major challenges, and specifically for the MELS Theme, to share its major findings.

Nigeria shares findings with SAA's Theme 5 Director, country management, implementing Theme coordinators and program officers, and also with local areas and clients on the ground and also agricultural development programs. During monthly and quarterly review meetings, the various findings are shared in the field. Stakeholder meetings are held regularly.

Implementing MELS in Uganda

Ramzy Magambo, Program Officer for Monitoring, Evaluation and Learning for SAA in Uganda, talking in mid-2014, explains some of the main aspects of association's implementation of its data gathering strategy in the country.

Before setting out on any field survey or study, we go through the following phases,

1) Conceptualization of the activity: here methodologies and the sampling strategy are developed to include the area of study, identifying respondents (classified by sex and age), and tools and checklists for data collection. These are then shared with the relevant themes for their input.

2) Training enumerators on the methodologies and administering tools: we have developed a network of freelance enumerators and data entry technicians who are hired on a temporary basis to carry out data collection work, and supervised by the MELS team. These are university students and experienced freelancers.

3) Data collection: extension agents such as Community-based Facilitators (CBFs) are used to guide the field team on location and to gather information the farmer does not immediately have to hand. These extension agents facilitate proper recording on MELS behalf.

4) Data analysis and reporting: the MELS theme undertakes data analysis, report writing and sharing.

Our surveying process measures what SAA provides in terms of types of training sessions, the techniques promoted, type of field visits, what services were provided and so on. We then look at how this has changed behavior and the knowledge acquired, yields and production levels, and we do household income surveys.

For each mission we do an implementation trial and develop a sampling sheet. We then stratify the analysis by gender, youth, social breakdown – well-off, average, low income. This might mean talking to five people in a village initially to get them to produce a list of interviewees meeting the various criteria.

A typical sample size would be 450 farmers – a cross section of women and men, young people and differing income levels. We would include some farmers and places that have not experienced SAA intervention, as well as those that have.

To carry out the survey work, we have developed a network of freelance enumerators and research assistants. It is a serious exercise, as a major evaluation costs $20,000-$28,000. So usually we only do one on this scale each year, plus a number of smaller studies.

In Uganda, we are about to undertake a mid-term review and impact assessment of our five-year MELS strategy. We share our findings with management, but also with local areas and clients on the ground.

Mechanisms for feedback have been put in place, such as quarterly review meetings with Uganda country staff and the Theme teams, as well as village visits to give feedback directly to farmers.

Towards the end of the year, Uganda's MELS team runs "reflection" workshops – where stakeholders are invited to discuss findings. These include local government, NGOs, CBFs, extension agents, financial institutions, input suppliers, NAADS and senior officials from the agriculture ministry.

Ensuring data is maintained accurately by the extension agents and farmers with whom SAA works is crucial for the success of MELS.

PART FOUR: CURRENT FOCUS COUNTRIES

Introduction:
Four national programs – a broad palette of experience

Africa is a strikingly diverse continent. Climate and soil, local farming traditions, the economic environment and government policy differ from one country to another. Sasakawa Africa Association (SAA) must therefore demonstrate a corresponding ability to adapt its response to local conditions.

SAA's underlying goals of sub-Saharan food security and stronger rural livelihoods remain consistent. The technologies and organizational ideas that it has developed through decades of experience are relevant everywhere. But the manner in which this knowhow and support is delivered to small farmers and entrepreneurs must of course be adapted to suit circumstances in each country.

Over the course of its development, SAA has worked in many different places and it has learned lessons of these varied experiences. To ensure that expertise and management capacity are not too thinly spread, the association has, from time to time, closed down operations in one country, thus releasing resources to be used elsewhere.

Now SAA has settled on a long-term structure of four national programs, in Ethiopia, Mali, Nigeria and Uganda. Each of these countries exhibits distinctive characteristics, in terms of geography, agriculture, the market for food crops and the role of the public administration in working with small farmers and the wider rural community.

Through its engagement across this varied range of national contexts, SAA is able to maintain a broad understanding of the challenges that face Africa as the continent seeks to become more self-sufficient in food, reduce the risk of malnutrition and improve incomes and economic opportunity for rural populations.

Uganda, for example, is largely fertile and well watered, with rain spread through much of the year. The range of local geographical conditions is such that the country can produce many different crops, both for local food consumption and for export to neighboring markets such as Kenya, South Sudan and Democratic Republic of Congo.

Distances are relatively small and most regions are well served by all weather roads, which facilitates farming communities' access to inputs of seed, fertilizer and pesticides and their contact with commercial suppliers and grain buyers. Against the background of a relatively liberal approach to agricultural extension, SAA has developed a strong network of grassroots advisers, trained by the association to support farmers with technical advice at village level.

Nigeria, by contrast, is Africa's most populous country, with a federal structure, where state governments play a crucial role in agricultural development, complementing the national strategy set at ministerial level in Abuja. As a major oil exporter, the country has the resources to substantially finance its own development. Yet major challenges still face rural communities, as they seek to reduce poverty, and to strengthen fragile livelihoods and boost their capacity to feed Nigeria's growing towns and cities.

In this context, SAA has pioneered partnerships with several northern states, which have provided funding for the association's activities. Building on this model, an agreement was recently signed with the federal government, which will provide the finance for SAA to gradually roll out its programs across the whole of Nigeria, to reach rural communities in a range of different climates and landscapes.

Ethiopia is characterized by an even more varied agricultural geography, due largely to great variations in altitude. A notable strength is the two-decade history of government commitment to enhancing food security, particularly in vulnerable regions.

National administrative structures are strong, delivering rural strategy through a dense public network of development personnel, working alongside farmers at community level. The Ethiopian government chose SAA to assist in the construction of an effective nationwide agricultural extension system. Government extension workers use the teaching methods developed by the association and they use SAA approaches to teach farmers about agricultural and postharvest storage and processing technologies.

Mali provides yet another model. A member of the CFA franc single currency bloc, it is the one francophone country where SAA has a full national program. The country presents major challenges because of the Sahelian climate, with a single rainy season for cereal planting and a permanent risk of drought. Levels of deprivation are high and malnutrition is a serious concern is some regions.

However, Malian governments have a long history of concern for food security, and farmers' organizations and rural microcredit are well entrenched in rural society and in national structures.

Through its engagement in Ethiopia, Mali, Uganda and Nigeria, SAA has experience of a broad range of African contexts for agricultural and the postharvest economic value chain – a breadth of knowledge further reinforced by the role of the SAFE training program for mid-career professionals, which operates in 19 universities across nine countries.

PART FOUR: CURRENT FOCUS COUNTRIES

Ethiopia
Building on diversity

Large-scale commercial agriculture accounts for just 5% of farming activity in Ethiopia. Africa's second most populous country remains overwhelmingly rural – and small-scale subsistence farming is the backbone of economic life.

This explains why the country is so important for Sasakawa Africa Association. The technologies that SAA brings – the use of new seed varieties, affordable micro-doses of fertilizer and improved cultivation techniques to boost yields, small-scale processing machinery and marketing advice – are highly relevant to local conditions.

Moreover, the building of national food security has consistently been a major focus for government action and the state has chosen SAA as a key partner in building the nationwide extension network that trains farmers at the grassroots level.

Environmental challenges

With landscapes that vary in altitude from 120 meters below sea level to highlands over 4,600 meters, Ethiopia presents a striking range of agricultural ecologies and potential. It is one of the world's leading centers of crop diversity and also supports a large livestock population.

But the challenges are huge. Agriculture accounts for about 50% of GDP and 90% of exports; and it provides a livelihood for 80% of the country's population.

Yet almost all farming is rainfed. Although Ethiopia has 12 major river basins, irrigation is relatively little developed. So this sector, the foundation of the national economy and household welfare, is highly exposed to the risks of climate shock.

Moreover, with the population now close to 95 million there is serious pressure on land resources in many areas and this can lead to severe erosion of soil when trees are felled for fuel or construction, or land is over-used without fallow periods.

Historically, road network coverage has been much less dense than in many other sub-Saharan countries, hindering farmers' ready access to urban markets.

But while Ethiopia's geography poses challenges, the governmental context is helpful. The administration is highly organized and gives priority to small-scale farming, with state extension workers operating at community level. Meanwhile, a major program of highway construction and resurfacing is aiding access to and from rural areas.

Farmers receive training in Tigray. SAA has worked closely with the Ethiopian government to build a nationwide extension network working with farmers at the grassroots level.

An early priority for Sasakawa

It was the dramatic images of drought and famine in Ethiopia and the Sahel in the 1980s that first inspired Ryoichi Sasakawa to approach the American agriculturalist Norman Borlaug and suggest the launch of an initiative to bolster agricultural productivity in sub-Saharan Africa. But the Ethiopian political context at the time was not conducive to selection of the country for the first wave of projects.

This environment was transformed by the advent, in 1991, of a new government that recognized the critical importance of achieving national food security and was ready to work with outside partners to try to achieve this.

The then-SG 2000 took a group of Ethiopian extension and research specialists and senior officials to tour the projects where it was engaged in Tanzania. And after they had reported back favorably on the impact that these were making, the government in Addis Ababa invited SG 2000 to negotiate an agreement for a program in early 1993. Within months, under the leadership of then-SAA Regional Director Marco Quiñones, activities had been launched, with 161 field demonstrations in Oromia and the Southern Region.

Although some extension workers were initially skeptical that farmers could be persuaded to plant in rows or use hybrid seed, this early intervention had a big impact, boosting maize yields from an average 1.5 tonnes/hectare to 4 tonnes/hectare. In the following year, demonstration plots were also set up in Tigray and Amhara regions.

"Production alone cannot solve farmers problems," says Aberra Debelo, SAA's Country Director for Ethiopia. The organization now works across a range of activities from crop processing through education on nutrition to warehouse receipt finance systems and marketing.

The approach was suited to local conditions: the average size of farm plot was just 0.25-0.5 hectares, with seed and fertilizer advanced on credit to farmers, who then repaid after the harvest. The government established a technical center and a revolving fund to support the program.

Encouraged by the early results, Meles Zenawi, Ethiopia's prime minister, asked Sasakawa to massively expand the program, to cover the whole country more densely. Famously, Meles toured farmers' fields incognito with President Carter and was personally convinced that a green revolution was possible in Ethiopia.

The organization agreed to set up 32,000 demonstration plots, rising to 320,000 the following year. But such a massive operation could not be managed directly by its own staff alone. So the organization worked with the government to develop an official national program for implementing extension, but using Sasakawa techniques – such as persuading selected farmers to plant normal fields as demonstration plots and the advance provision of seed and fertilizer as "in-kind credit". Subsequently, postharvest activities such as crop processing and marketing, were added to the program.

By 2001 this huge national program was reaching 3.6 million households – a substantial proportion of all rural Ethiopians.

The program's achievements were much appreciated by Prime Minister Meles, who, in 2008, awarded Marco Quiñones a Millennium Gold Medal, in recognition of his work in the country. Quiñones has an honored place in Ethiopian agriculture.

Building the nation's capacities

Because Ethiopia has a strong state structure, it has been possible to build a genuinely nationwide service for farmers that is delivered through the National Agricultural Extension Intervention program (NAEIP).

The scheme uses the teaching strategies developed by SAA and spreads ideas and technical approaches that have largely come from the association, but it is delivered by Ethiopian national and regional institutions.

"The front line is the development agent who works with the farmer," explains SAA's Country Director, Dr Aberra Debelo. "We are not the front line actors, we are in the back seat."

Since the late 1990s, some 70,000 development agents have been trained. They have usually been educated at secondary school level and this is followed by three years vocational training, which is 70% practical and 30% theory. This massive investment in personnel has enabled Ethiopia to establish a strong network of support for farming in the country's 18,000 kebeles (sub-districts).

Each rural kebele has at least 500 families and their agricultural activity is supported by three development agents, for crops, livestock and natural resource development. There is an animal health agent for every three kebeles and a farmers' cooperative organizer for every five kebeles.

Sasakawa's role evolves

As the state assumed responsibility for the grassroots farming advisory work, resources were freed up within SAA for other important roles.

"Production alone cannot solve farmers problems. As yields increased, farmers began to produce more food than they could handle through traditional threshing techniques. So we have worked on processing, warehouse receipt finance systems and marketing," Debelo explains.

The initial drive to ensure basic security of food production had been so effective that in 1998 the market was flooded and Ethiopia suffered a collapse in farm prices. The government concluded that it was important to build up marketing structures so that growers could move on their crops over time, flattening out supply peaks and troughs and achieving more price stability.

A mid-career student (right), studying under the Sasakawa Africa Fund for Extension Education (SAFE) program at Haramaya University in Ethiopia, analyses a newly introduced taro variety with a trainer.

This diversification of requirements inspired SAA's decision to restructure its activities into the five thematic areas it uses today, while still working in tandem with the national authorities. "Whatever we do, we cooperate closely with the government," says Debelo.

SAA has been selected by the state as a partner to develop national agricultural sector strategy. In such a large country, the association could not deliver the program itself everywhere, so instead it works with the government to ensure implementation nationwide.

Demonstrations are a key activity. For example, SAA buys threshing machines, costing around $2,500 each, to show to farmers' cooperatives and private entrepreneurs, who then buy machines themselves.

SAA in Ethiopia has 33 technical staff and 30 support staff. Core funding comes from The Nippon Foundation, whose support has been particularly focused on strengthening agricultural extension and the drive to boost productivity. Other support has been provided by the Gates Foundation, the World Food Program, the Agricultural Transformation Agency and the Canadian government.

Ethiopian farmers attend SAA's demonstrations and then buy the crop processing equipment on show themselves.

Challenges ahead

Ethiopia still faces major challenges as it seeks to strengthen farm output and livelihoods and build a stronger value chain in the rural economy.

"There are climate risks and, with 32 different agro-environmental zones, the country is hugely diverse. You have to work out which technologies are appropriate for each. The growing cycles are short in lowland areas, but a long period is required in the high regions. SAA has therefore developed different demonstration models for these different agro-ecologies," says Debelo.

"The same model of extension is used everywhere, but the actual technologies promoted through extension are varied to suit local circumstances."

This variety also brings advantages.

"We can grow many different crops. For example, we are a globally important center for the diversity of crops, including in particular, wheat and barley strains. These strengths are not widely known internationally," Debelo says.

A major challenge is the shortage of credit accessible to farmers, which means many cannot afford to apply inputs and often fail to take up new technologies. The government has been trying to tackle these pressures by encouraging the emergence of rural banking cooperatives and microfinance.

Cereal fields are not usually fenced and traditionally animals have been left to graze the fields after harvest. But this can hamper the adoption of "conservation tillage" techniques.

"Soil degradation is a very serious problem, so we advise farmers to leave 30% of the crop residues in the ground, to build up fertility," says Debelo.

During the first two decades of the drive to build up national food security, the government gave special priority to regions that were most food insecure. Having secured considerable progress in those areas it has, since 2010, stepped up the support for regions with high agricultural potential too, both to boost output and to diversify and strengthen the "downstream" rural economy – processing and crop marketing.

A broad SAA approach

In 2013 SAA implemented projects in 60 woredas (districts), scattered across 10 regional states and covering over 310 kebeles. Each kebele has a farmer training center (FTC).

To support farming productivity, SAA set up 800 technology option plots (TOPs), almost 2,400 women assisted demonstrations (WADs), more than 220 community variety plots (CVP), 212 seed priming demonstration plots and 216 plots of quality protein maize (QPM). More than 143,000 people attended farmer field days.

Some 39,600 people were trained in cultivation and crop management practices, animal fattening and bee keeping; the vast majority of these were farmers but about 5% were district

Members of an agroprocessing cooperative in Fogera woreda, Amhara, prepare snacks to be sold at a promotional event. They learned the recipe through agroprocessing training provided by SAA.

extension agents, local subject specialists and woreda officials. Five groups of poor farmers, women and youth were given a total of 246 small ruminants and 230 beehives, with training in animal husbandry and beekeeping.

At 66 Postharvest Extension Learning Platforms, SAA trainers taught extension workers and lead farmers about multi-crop threshers, maize shellers, grain cleaners, and storage. Those that had been trained then went on to train more than 13,000 farmers and conduct 135 demonstrations, which were attended by some 33,360 farmers. As a result, 21 service providers bought maize shellers, and one of these businesses subsequently reported that it had earned $5,000 in just two months.

SAA's postharvest team also helped with the development of 25 women's agroprocessing enterprises, whose members were taught about agroprocessing, nutrition and business, enhancing local market opportunities for perishable raw materials such as potatoes and tomatoes. And SAA signed a memorandum of understanding (MoU) with the Ethiopian Agricultural Transformation Agency to scale up agroprocessing centers in four regional states.

Each farmer training center – the entry point for agricultural development activities in Ethiopia – represents around 1,000 farm families and is managed by a committee of the three agents and local farmers, women and youth representatives. Under a pilot scheme, centers access credit from microfinance institutions through a loan guarantee scheme agreed with SAA, to finance their own business activities, whose revenues support their operations.

Since the launch of this scheme – from which 63 centers benefitted in 2013 – some $600,000 has been dispersed for use as local revolving funds. Many FTCs that set up enterprises such as animal fattening or honey production have managed to pay back their loan within only two seasons.

The success of this pilot has persuaded the agriculture ministry and regional state bureaus of agriculture to allocate funding for the development of FTC businesses.

To link farmers to markets, some 7,274 farmers were organized into 48 Commodity Associations (CA) in 2013; they supplied 800 tonnes of various commodities to wholesalers and consumer cooperatives.

SAA's human resource development and IT team has trained agents, local entrepreneurs and farmers and equipped 20 woreda extension resource centers with computers and broadband internet connectivity. This has enabled participating woredas to upload reports about their achievements, challenges and best practices to websites, so that others can learn from their experience and an online data repository is being developed.

The delivery of extension services through digital video has also been supported by SAA, in collaboration with the agriculture ministry and Oxfam America.

Overall, SAA's Ethiopia program has met the targets set by management for the first two years of the organization's 2012-16 Strategic Plan.

A women's agroprocessing group receives training on rice parboiling in Ethiopia.

PART FOUR: CURRENT FOCUS COUNTRIES

Mali

Resilience and adaptability

One size does not fit all. Agriculture in Mali stands out from the other three countries where Sasakawa Africa Association operates – and the organization has adjusted its approach accordingly, while still pursuing its fundamental goal: to strengthen farm output and enhance the rural economic value chain.

In geographical and climate terms, Mali forms part of the Sahel. The country is a major cotton exporter. It has a francophone administrative culture and is a member of the West African Economic and Monetary Union (UEMOA), an eight-country single currency bloc.

Critically, rainfall failure during the annual planting season is always a risk, so water conservation has to be a much higher priority than in parts of Africa where drought is not a serious worry.

Despite this, the Malian rural economy offers many strengths. Most households have livestock, which helps to diversify incomes and produce manure to enhance soil fertility. There are strong traditions of community collaboration and farmer organizations have a recognized voice in the country's socio-political structure. The use of a stable regional currency, the CFA franc, facilitates domestic and regional trade in agricultural products.

All these factors shape the context against which SAA works with farmers and local entrepreneurs to build up food security and prosperity in the countryside.

The strengths of rural Malian society have been particularly important in enabling the country to survive the difficulties it has faced over the past three years. The 2012 conflict in northern regions contributed to a deterioration of food supply, which was already under pressure because of rainfall failure.

Conditions have improved somewhat since 2013: the number of people in a critical predicament has fallen from 1.5 million then to 800,000 in 166 municipalities now. But overall, 3.3 million people remain at risk of food insecurity.

A track record of adaptability

Activities in Mali – and Burkina Faso – were first launched by Sasakawa Global 2000 in 1996. By that time the organization had 10 years of experience operating in West Africa, in Ghana and Benin.

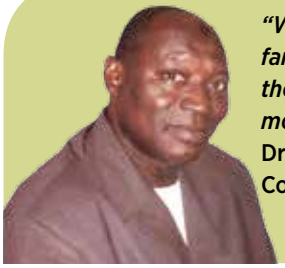
Having initially established programs in the regions of Koulikoro (around Bamako), Ségou and Mopti in the 1990s, the organization later moved into Sikasso region.

Mali's rural communities have a strongly collaborative culture. SAA is building on this to improve postharvest and marketing techniques by pooling their resources.

But in 2012, Mali suffered a military coup in Bamako and a nine-month jihadist takeover of northern regions, which forced SAA to suspend activity in Mopti region because of lack of security there.

"Unable to continue activities in Mopti, we decided to redeploy our expert staff and resources to a new region that would be secure and also within comfortable travelling distance, so that we could maintain a strong program of field visits and close engagement with the farmers. So we chose the parts of Kayes region nearest to Bamako," explains Dr Abou Berthé, SAA's Country Director for Mali.

Fortunately the jihadist occupation was ended by international military intervention in early 2013 and later that year the restoration of constitutional rule was completed with the election of a new president.



"We are trying to encourage farmer organizations to build up their service centers and become more professional," **says Dr Abou Berthé, SAA's Country Director for Mali.**

SAA has remained in touch with contacts in Mopti to prepare the ground for a resumption of its program in the region once local conditions permit.

The difficult 2012-13 period has tested the organization's resilience and capacity to adapt. But it has continued to implement the 2012-16 Strategic Plan, albeit with adjustments to the regional spread of activity.

By redeploying resources to Kayes region, SAA has been able to support new partner farmers in one of the most deprived parts of Mali.

"As the plan had always envisaged, we are working with 100,000-120,000 farmers, in some 80 villages across the country. Our new activities in the west have replaced the operations that we have had to suspend in Mopti," explains Berthé.

The post-crisis period has opened up further opportunities, due to an upsurge in external development assistance. Donors recognize the importance of strengthening the rural economy to help build a more stable Malian future.

Indeed, with financing from the Dutch government, SAA has helped establish revolving funds through which farmers can purchase the inputs they need at the start of the planting season.

Challenges facing Sahel farmers

Operations in Mali's Sahelian environment present major challenges, by comparison with the more watered coastal economies where Sasakawa started it West African operations in the 1980s.

SAA training helps Mali's farmers overcome problems such as low soil fertility, water variability and wind erosion.

When it began working in Mali the organization faced a yield potential for millet, a local staple that was less than half the potential yield achievable in Benin for its local staple maize. Furthermore, yields in the Sahel fluctuate widely from year to year, depending on the timing and volume of rainfall. The annual rainy season lasts only 90-100 days and, even within that period, it is common to experience up to 10 successive days without rainfall.

Soils in many areas are fragile or marginal, subject to water and wind erosion, draining poorly and carrying low levels of organic matter. The use of heavy farming equipment can further damage the soil.

Rates of high population growth add to the pressure on a natural environment suffering desertification. The scope for leaving land fallow is reducing, and with no opportunity to rebuild their fertility, soils risk exhaustion.

Moreover, the wider context is that Mali remains one of Africa's poorer countries, facing serious development hurdles.

Mali did make significant progress over the years prior to the 2012-13 crisis and it is on course to meet some important UN Millennium Development Goals (MDGs), for environmental sustainability, child mortality, maternal health and HIV/AIDS by 2015, the target year.

However, there is little prospect that it can reach some key MDGs relating to agriculture and nutrition -- such as halving the share of the population living on less than $1.25 a day or the proportion suffering from hunger. Although Mali's situation is no longer ranked as "alarming" under the Global Hunger Index, its position was still rated as "serious" in 2013.

Living in the high-risk Sahelian agricultural environment, Sahelian farmers tend to be highly conservative, sticking to proven technologies that will at least ensure them a minimal level of economic survival.

So over the past two decades, SAA has promoted not only the technologies that boost crop yields but also the environmental conservation methods required to rebuild soil fertility and make the best use of the limited water available.

The geography of agricultural performance and nutrition in Mali is complex. Despite its Sahelian location the country has considerable farming potential: irrigated cultivation is widespread in the Niger river valley and inland delta. Sikasso has the highest levels of rainfall, yet is characterized by serious malnutrition because of traditional dietary customs.

Improving value, raising commercial awareness

Typically, 30-40% of Malian food crop production is lost before reaching market, due to weaknesses in postharvest storage and processing. For SAA, progress in these areas has therefore been a key priority in the drive to reduce the food insecurity of smallholders and bolster their cash income.

Villagers and trainers at a Postharvest Handling and Agroprocessing Center (PHAP) in Sélingué, south-west Mali after a progress meeting, around the time of of SAA's 25th anniversary celebrations.

Under its 2012-16 Strategic Plan, SAA Mali aims to help 60,000 farmers access good post harvest processing and storage technologies. In 2011 and 2012, more than 13,300 farmers benefitted from these technologies.

The Nippon Foundation, the Alliance for a Green Revolution in Africa (AGRA), the International Fund for Agricultural Development and the Dutch embassy in Mali have funded a campaign to establish Postharvest Handling and Agroprocessing (PHAP) platforms – where processing machinery and storage facilities are available for local farmers. Typically, such centers have grain threshers, rice decorticators and peanut shellers, together with tarpaulins, sieves, pallets and weighing scales.

For example, in Sikasso many farmers already have access to a multi-service center, with threshing machines. By processing crops and cooperating to buy inputs and market their output, they have greater economic clout.

"Individual farmers typically have just two or three hectares of land. So we are trying to encourage farmer organizations to build up their service centers and become more professional," says Berthé.

The training of farmers, extension agents and agroprocessing entrepreneurs is of course a key support to the introduction of these technologies.

"Those who produce surplus crops can then take these to the service centers to be threshed for a fee. But we are also training private entrepreneurs in processing and encouraging them to set up input shops, so that there is a competitive environment where farmers have a choice of service providers. Now there are 23 input shops in the communities where we are working," says Berthé.

"At the same time we are trying to encourage farmers to develop more of a business mentality. As individuals, they are often unaware of market price trends or what buyers really want, so they need to develop more of a commercial outlook and awareness of what consumer needs, in order to establish a reputation and a loyal customer base."

Of course, smallholder farmers can be more effective when they work together to process and market their output. Under its strategic plan, SAA aims to support 300 Farmer-Based Organizations and their capacity to negotiate contracts by 2016.

Credit, to enable farmers to buy inputs, is another important part of the picture. Although SAA does not get directly involved in lending, it has helped set up the Dutch-financed revolving funds in Malian communities and it links farmers to local microcredit networks and warrantage schemes, another vehicle for providing pre-planting finance secured against future harvest income.

A new peanut sheller is put through its paces in Selingué, Mali — SAA aims to help 60,000 Malian farmers access good post harvest processing and storage technologies by 2016.

SAA works closely with Mali's government through the National Agricultural Research and Extension System (NARES) and it has been much involved in the development of a three year BSc program to train extension professionals, known as the Licence en Vulgarisation Agricole. The curriculum was reviewed and SAA was involved with the writing of teaching manuals and the supervision of mid-career trainees' projects.

Better practices, higher rewards

SAA established ten Postharvest and Trade Centers (PHTCs) in southeastern Mali in 2011. These provide a learning and service provision platform equipped with postharvest handling and agroprocessing equipment – threshers, a mill, shellers, parboiling materials and so on – as well as a warehouse for collective storage and marketing.

SAA helped smallholders to organize into a cooperative, and helped reduce postharvest losses of grains through training and use of simple equipment. SAA also linked farmers to credit and marketing services.

Madou Togola, a farmer in Niamala, explains the benefits:

"Before the center was created, each year after harvest perhaps 3% of my grain production was stolen from the field and 5% was either attacked by fungus and mold or rodents before the labor for threshing could be organized.

"During transport by road to the threshing site I lost another 1% at least. Then I had to pay women two bags a ton for winnowing. Then, during storage, I lost at least 10% due to moisture, because the bags were stored on the floor.

"Now, the use of threshers and tarpaulins allows me to reduce postharvest losses and get good quality products – and because I use pallets, I do not lose products in the warehouse."

Better quality processing and storage doesn't just mean farmers have more produce to sell. The better quality also means they can sell for a higher price – in Niamala, maize fetches around a third more per kilogram than before.

A new regional program in the west

Kayes region, west of Bamako, suffers particularly high levels of poverty. So the launch of SAA programs in parts of the region marks an important step in the organization's efforts to tackle rural deprivation.

"Over a two-year period we have established activities in 24 villages, with a combined population of about 30,000. In each village we have set up one Technology Option Plot (TOP) and three Women Assisted Demonstrations (WADs) – and we have also set up three Community Variety Plots (CVPs) in the region," explains Country Director Dr Abou Berthé.

"During these early stages we have concentrated on helping these villages to build up their basic agricultural capacity, so that they begin to produce good harvests on a regular basis and strengthen their own food security.

"In the past, farmers in this region have had difficulty getting access to the inputs they need – improved seed and fertilizer. So, with Dutch funding, we have established revolving funds at community level to help them meet these costs."

Once farmers are regularly producing enough to meet their local consumption needs and begin to generate surplus output that could be sold, SAA plans to introduce the postharvest processing technology and marketing advice that it provides in other regions.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PART FOUR: CURRENT FOCUS COUNTRIES

Nigeria

Supporting Nigeria's rural development drive

"If Africa is to get out of its morass, it has to be in agriculture": so declared former Nigerian leader Olusegun Obasanjo, when Sasakawa-Global 2000 started operations in the country in the early 1990s.

Today, the statement would still seem to hold true. In Africa's most populous country – of almost 170 million people – agriculture is the largest economic sector, providing employment for over 60% of the population and accounting for nearly 42% of gross domestic product. Most of the rural population still farms at a subsistence level on small plots.

Historically, agriculture has been hindered by sharply contrasting regional and seasonal weather patterns: a relatively hot climate with seasonal rainfall and a marked dry season (often drought) in the north, while soil erosion and flooding is a major problem in the south. Pressure from a rapidly expanding urban population is also impacting on already diminished resources, further threatening food production.

The resulting pressure on farmers has often led to reduced fallow intervals and, thus, reduced soil fertility. Meanwhile, poor seed supply systems and a lack of post-production capacity have led to increased food imports and food insecurity. Inadequate infrastructure – notably roads – further exacerbates poverty in rural areas by isolating rural farmers from much-needed inputs and profitable markets.

Moreover, of an estimated 71 million hectares of cultivable land, only half is currently used for farming. There is similar potential for an expansion of irrigation, which currently covers 7% of irrigable land, according to the International Food Policy Research Institute. Households spend up to 70% of their income on food, yet almost half of Nigeria's children below the age of five suffer from some form of malnutrition.

SAA/SG 2000 operations on agricultural extension and smallholder development in Nigeria run in parallel with those of the Sasakawa Africa Fund for Extension Education (SAFE), which builds capacity among national extension service staff and manages SAA's human resources development activity in the country.

In recent years, SAA has been active in seven Nigerian states - Adamawa, Bauchi, Jigawa, Kano, Kaduna and Zamfara. Historically, SG 2000 has worked mainly with, and through, the Agricultural Development Projects (ADPs) in participating states. Each of these assigned State and Zonal Coordinators and Extension Agents to implement jointly planned field programs. Facilitating technology transfer has been achieved by supplementing the on-the-job training of ADP staff, who, in turn, provide training for farmers.

In 2009, SAA's new strategic, value-chain based approach based around a thematic structure was adopted. The original focus on boosting crop yields was supplemented by a strengthening of the advisory services provided to farmers covering all of the areas embraced by SAA's new themed structure. SAA is currently implementing a market-based approach that helps farmers to produce more of what the market needs, while still promoting productivity improvements, better postharvest handling and improved storage.

To date, more than 200 extension agents and 1 million smallholder farmers in states across the northern provinces of Nigeria have participated in SAA's program. Thousands of demonstration plots have been established with participating farmers seeing improvements in yields of wheat, maize, rice, cowpea, soybean, groundnut, millet, sorghum and sesame-cassava technologies.

Only around half of Nigeria's estimated 71 million hectares of cultivable is currently used for farming, while only 7% of potentially irrigable land is irrigated. This is a country with massive agricultural potential.

Working closely with Nigeria's state governors

A distinctive aspect of SAA's work in Nigeria, compared to its other focus countries, is that it operates through the state governors – a reflection of Nigeria's federal political system.

Funding from Nigeria is provided from federal resources and channeled via selected states to SAA projects. In 2010, for example, eight northern state executive governors agreed to provide additional support for local SAA programs. The Jigawa and Bauchi State governments were the first to follow through on the pledges, each transferring 30 million naira (about $185,000) to a special drawing account for mutually agreed SG 2000 project activities in their state.

In 2014, the federal government in Abuja released 200 million naira to support farmers' developmental programs through SAA. These funds were directed through five states – Katsina, Ogun, Anambra, Benue, and Cross River state – to train 5,000 agricultural extension workers. It also distributed 800 motorcycles to agricultural extension agents across the country.

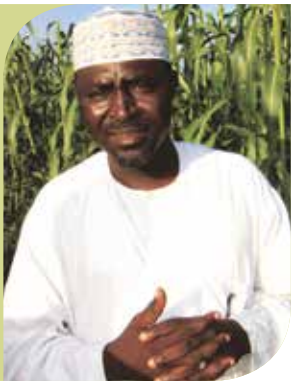
A focus on the northern states has brought a greater understanding of the country's agricultural challenges, according to Sani Miko, SAA's Country Director for Nigeria. "Working in northern states, over years, we've realized what the key issues are concerning production and productivity, and the necessity for crop enhancement to support farming communities and improve their income and livelihoods," he says.

The need for SAA to engage with state governors more closely became apparent in the late 2000s.

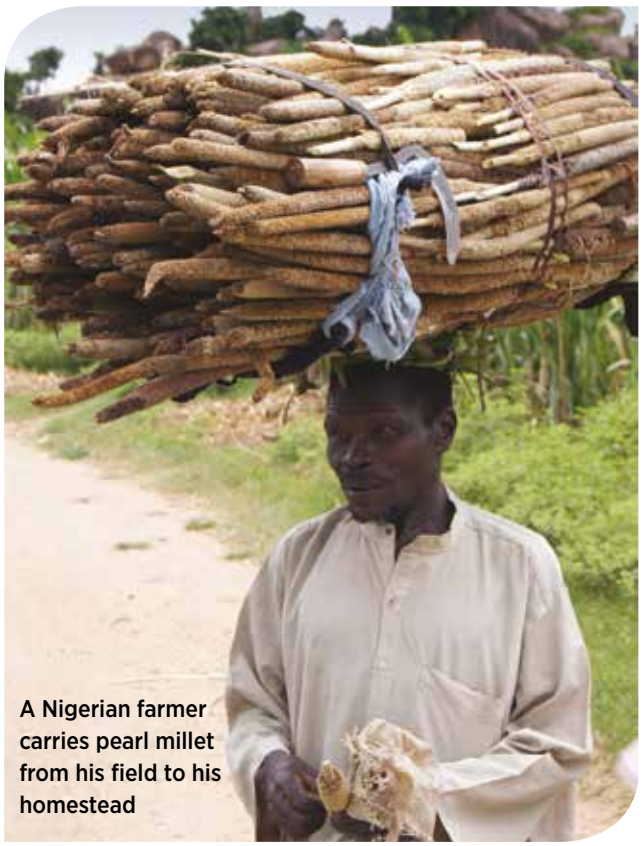
"We realized that our own resources were simply not large enough to make the impact needed, so we sent invitations to eight of the state governors to meet with them. With that we made progress in expanding and rolling out our program, with the financial support of states," says Miko.

Those efforts have now developed into a comprehensive agreement with the government, approved in 2012 and signed in 2013, under which the SAA program is due to expanded to all states *(see next page)*.

The federal government now views SAA as a cornerstone partner. In May 2014, the director of the Federal Department of Agricultural Extension, Damilola Eniaiyeju, described SAA as a strategic partner that would facilitate the attainment of goals set out in the federal government's Agricultural Transformation Agenda (ATA).



Sani Miko, SAA Country Director for Nigeria, says invitations to the governors of Nigerian states to work more closely with SAA have paid dividends in terms of financial support and rolling out the association's program.



A Nigerian farmer carries pearl millet from his field to his homestead

SAA's recent activities: working across the value chain

Crop productivity increases: Collaborations with institutes, such as the Institute for Agricultural Research, the National Cereals Research Institute and the National Stored Produce Research Institute, have has resulted in the development of 16 improved crop varieties, as well as better fertilizer application rates and improved agronomic practices. Further technological support has come from the International Maize and Wheat Improvement Center (CIMMYT) and the International Institute of Tropical Agriculture (IITA).

In 2012 and 2013, SAA worked in 777 communities and worked on almost 500 Technology Option Plots (TOPs), more than 1,400 Women-Assisted Demonstrations (WADs), 66 Community Variety Plots (CVPs), nearly 7,000 Production Test Plots and 36 farmer field days, as part of activities based on SAA funding. Meanwhile, some 9,300 demonstration plots were established as part of N2Africa nitrogen-fixation project.

Farmer training is a core activity. In 2012-13, over 64,000 were being trained variously in agronomic practice, postproduction skills, agribusiness management and group dynamics. This was backed with the training of 465 frontline extension agents and 1,200 farmer facilitators. The USAID/MARKETS II project that SAA manages has linked a substantial number of emerging

A groundbreaking agreement

In February 2013, Ruth Oniang'o, SAA's Chairperson, hailed the association's agreement with Nigerian agriculture ministry, as "SAA's most significant agricultural intervention in more than 25 years, since starting our operations in Africa".

The pact, signed in Abuja, paved the way for Sasakawa's activities to be extended across Nigeria. It sets out a plan for cooperation to improve agricultural productivity, production and food security through better support to resource-poor farmers, with a particular emphasis on women and youth.

Nigeria's Minister for Agriculture and Rural Development, Akinwumi Adesina, described SAA as "a strategic partner in our quest to transform the country".

SAA's involvement should strengthen the country's national extension system and ensure smallholder famers have access to training in new agricultural technologies and advice in areas such as input supply, credit marketing and farm management. The participation of the private sector, civil society, farm based organizations, universities and research institutes is to be encouraged.

"We have stopped viewing agriculture as a development program, but now as a business that can assume food security, create wealth and generate jobs," Adesina said.

SAA's work has helped spark a new Nigerian government policy, the Agricultural Transformation Agenda (ATA), which has been launched to tackle the challenges facing agricultural productivity and growth.

It calls for a focus on agriculture as a business, using change in the agricultural sector to create jobs, wealth and food security, as well as building value chains in areas where Nigeria has a competitive advantage.

As part of ATA, an e-wallet scheme – known as the Growth Enhancement Scheme (GES) – has be introduced which aims to eliminate the potential for corruption in the distribution of seed and fertilizer by enabling farmers to buy inputs through a private supply network using mobile phones.

Currently activities are concentrated in the northern part of Nigeria. So far, SAA has concluded Memorandums of Understanding with the state governments of Adamawa, Jigawa and Gombe, as well as with the agriculture ministry. But under its partnership with the federal government, SAA is set to operate in 12 other states across the country in the future.

Professor Ruth Oniang'o, SAA's Chairperson, signs an agreement with Dr Akinwumi Adesina, Nigeria's Minister of Agriculture and Rural Development, in February 2013. The agreement paves the way for SAA activities to be expanded across the country.

commercial farmers to quality input sources and farmers have produced good quality produce that can be sold at a premium.

Better postharvest techniques: Improved product quality is a pre-requisite for marked improvements in farmers' livelihoods. SAA Nigeria trains those it works with in the field to ensure simple, affordable and efficient technologies are made readily available to end-users. SAA also backstops fabricators and technicians with skills and new ideas on machine development and maintenance to optimize farmer's postharvest activities that raise incomes.

Produce quality is also being improved through skills development training for farmers and the promotion of off-farm agroprocessing enterprises, aided by the development of service providers in three states. Threshers, seed cleaners, cassava graters and oil extraction machines, and rice mill, were provided to promising entrepreneurs on a cost-recovery arrangement. These service providers are trained in business management, machine operation, and maintenance, and are linked to sources of spare parts. They then provide services for a fee.

SAA also sources and disseminates storage technologies to Nigerian farmers as alternatives to inefficient traditional methods. Hermetic storage technologies have been demonstrated, especially for cowpea. This was done in 17 locations across Adamawa, Gombe and Jigawa States in 2012. Some 385 farmers and 16 extension agents were involved in the demonstrations.

Forging partnerships and opening up markets: Vital to SAA's current strategy, partnerships have been forged in Nigeria to introduce proven productivity enhancing technologies more widely, or for extending extension advisory services to farmers. Put simply, working with partner organizations enables more Nigerian farmers to be reached faster – and that has helped SAA to move more rapidly towards the targets set in its 2012-16 strategic plan.

Partnerships with the private sector are targeted by SAA to provide financial support for farmer training and technology demonstrations and to open up markets for both inputs and outputs for smallholders. Partnerships with public institutions tend to support access to improved inputs and services. Meanwhile, SAA's partnerships with development agencies and donor projects usually involve collaboration to implement interventions of use to both partners, fully paid for by the sponsoring or collaborating agency. The USAID/ MARKETS II Project in Nigeria falls into this category.

Supporting extension training: Sasakawa Africa Fund for Extension (SAFE) programs currently operate in 4 Nigerian universities – Ahmadu Bello, Beyero, Adamawere State and Ilorin. To date, 177 BSc students have graduated from the accredited universities and a further 145 students are on course to do the same. *(See Part 5, page 101 for more on SAFE).*

Monitoring, Evaluation, Learning and Sharing (MELS): Data collection and sharing as part of MELS is now firmly entrenched in SAA Nigeria's culture. Three baseline surveys and six needs assessments were carried out in 2013 prior to the initiation of physical field activity. Two extensive evaluations were also carried out: one to assess the impact of a livestock fodder project run in partnership with the International Livestock Research Institute and the other for the extension approach being used for crop productivity enhancement interventions.

Among various training activities, MELS workers in the field have been trained in the use of GPS hardware and data collection techniques and methodologies. Various studies have been done for interventions across SAA's activities, which enabled the adoption of better strategies for intervention effectiveness. By 2014, three experience sharing and learning workshops had been organized to ensure development effectiveness and resource use efficiency. SAA has also boosted efforts to build up farmer feedback on its operations.

SAA in Nigeria: a brief history

At an SAA board meeting in October 1991, Norman Borlaug reported on a field trip, on which he had positively assessed the viability of implementing new projects in one or two Nigerian states.

Invited to the country by former Nigerian leader Olusegun Obasanjo, Borlaug hoped that this initiative would initiate a demonstration of the SG 2000 technology transfer approach that could be studied and adopted further across the country.

Obasanjo had initially become involved with SG 2000 in May of that year after attending a workshop in Arusha, Tanzania, concerned with sustaining Africa's agricultural development. In March 1991, the Nigerian Federal Ministry of Agriculture and Natural Resources signed an agreement to work with both federal and state agencies to raise agricultural productivity and improve food crop marketing.

Obasanjo was subsequently elected to the SG 2000 board, bringing invaluable political experience and adding weight to the SG 2000 African program.

After the Nigeria program's future had come under threat in the late 1990s, due to unfavorable political conditions in the country, Obasanjo – who became Nigerian leader again in 1999 – lobbied Yohei Sasakawa to continue the SG 2000 project for at least another five years. With political change seemingly in progress, Sasakawa agreed. The program went from strength to strength. Nigeria went on to become one of SAA's four focus countries and its government now sees a much larger role for SAA in agricultural development across the country.

PART FOUR: CURRENT FOCUS COUNTRIES

Uganda

Building up the value chain

Improved inputs, technology and training are improving Ugandan smallholders' yields. Higher yields mean greater surpluses and those in turn mean farmers now have increasing possibilities to gain income from those crops. To meet their needs, SAA has broadened the scope of its activities in the country to encompass the whole value chain.

Support now ranges from helping input dealers to become established at local level, through services to improve planting and postharvest techniques, to facilitating cooperative-based bulk storage and more fluid linkages with grain traders. Easier access to financing and saving schemes are being promoted. Women, in particular, are being encouraged to play a greater role in making smallholder farming more lucrative for families.

Progress is tangible. By 2014, more than 60,000 Ugandan farmers had been reached by SAA activities out of the 100,000 farmers targeted under SAA's Strategic Plan 2012-16 – it is envisaged that 35% of these farmers should be women.

The association's program operates in 18 districts across the country, in partnership with the Agribusiness Initiative Trust (aBi Trust), a multi-donor organization founded by the governments of Denmark and Uganda to support private sector development in the sector.

This mobile training center, seen here in Dokolo, northern Uganda, enables SAA staff to use the full panoply of training aids in the most remote farming communities. The venture is the fruit of a partnership with German fertilizer firm K+S Kali. As well as enabling multimedia presentations, the truck has specially tailored facilities to carry out soil analysis in the field, so SAA advisers can give instant recommendations to farmers on fertilizer requirements.

Roselline Nyamutale, SAA's Uganda Country Director addresses a symposium on the legacy of Norman Borlaug held in Jinja in July 2014. She says farmers must learn to save and reinvest if they are to experience long-term benefits from higher yields and improved postharvest processing.

An important new element of SAA's activities is a mobile training center, acquired in 2013, which enables SAA and extension staff to bring high quality training to farmers in remote areas. The initiative, which began in the districts of Apac and Dokolo in northern Uganda, is the result of a three-year partnership agreement between SAA and German fertilizer company K+S KALI *(see panel below)*.

SAA has also forged a number of partnerships with service providers as part of its drive to make farmers' operations more market-oriented. In 2013, Ugandan firms Dynapharm, Pearl Seeds, Victoria Seeds and NASECO provided inputs for farmer demonstrations in six districts.

The National Agricultural Research Organisation (NARO) and Integrated Seed Sector Development provided rice seed production training. Belgian-based NGO VECO trained farmers in groundnut value chain development, while the Uganda Development Trust (UDET) trained farmers on financial management, savings and loan schemes.

SAA also has strong ties with Ugandan academic institutions, such as Makerere University in Kampala, which provides degree courses on extension in conjunction with SAA *(See Part 5, page 101 for more on this)*.

Demonstrations get results

Demonstrations in the field remain at the heart of SAA's activities. More than 42,000 farmers were reached directly and indirectly through training, field demonstrations and field days in 2013. More than 9,700 farmers are estimated to have adopted new techniques and technology as a result and the benefits are being realized in terms of improved farm productivity and income growth.

Entrepreneur John Bright and the agricultural inputs shop in which he is a partner, located in Ntara, western Uganda. The village had no such shops when SAA started working there in the late 1990s.
By 2014, it had three good quality stores, where farmers could get what they need locally, saving time and transport costs. John and his partner also raise capital for the business by providing a mobile shelling service to local farmers.

Data from Production Test Plots (PTPs) run by farmers show yields have increased to 3000 kg/acre of maize, compared to the 500-800 kg /acre more usually achieved. Such eye-catching improvement inevitably led to increased demand for improved seed.

Some 400 technology option plots (TOPs) for maize, soya, rice and groundnuts were operated. Of these, 16 were at churches, 24 at schools, and eight were managed by prison inmates seeking to turn to agriculture as a source of income on their release.

1,200 Women Assisted Demonstrations (WADS) and more than 70 Community Variety Plots (CVPs) were operated for newly released varieties of beans, maize, soya bean, rice and groundnuts. The CVPs were established in partnership with seed companies, such as NASECO, Victoria Seeds, FICA, Pearl and Balton, which shared the costs.

The postharvest challenge

Gains on the farmer's plot can be lost if harvested crops are not handled properly and, here, the scope for improvement is great.

Most Ugandan smallholders are still wedded to traditional techniques that are often inefficient or likely to reduce quality, such as drying crops on bare earth, hand picking and winnowing. So SAA training makes a big difference.

More than 4,900 farmers were trained in improved postharvest and storage technologies in 2013 by extension agents, CBFs, Commodity Association Trainers/Traders (CATs), village agents (VAs), and lead farmers. At the same time, training fabricators, technicians and operators to provide better services to farmers and service providers.

Training on the use of hermetic storage technology has been well received by farmers, who can readily see the benefits of being able to store grain for over four months without weevil, mold or fungal infestation, while eliminating the need for fumigants. Better storage also boosts income, as grain can be held back to be sold at times of scarcity at higher prices.

For example, Bazanya Rozius of Keto Village, in Sekanyonyi sub-county, Uganda kept 200 kg of beans in a plastic tank for more than 3 months before selling it at 2,800 Ugandan shillings. Those in the area who did not use a tank were forced to sell their beans earlier at around 1,200 shillings *(see page 65 for more on the benefits of improved storage)*.

More than 100 processing machines were acquired by farmers and service providers in 2013, after observing technology

Uganda's huge agricultural potential

Despite rapid urbanization in recent years stoked by soaring population growth, Uganda remains a predominantly agrarian society. Well over 80% of Ugandans are still classified as rural, according to the World Bank, while agriculture accounts for around a quarter of the country's GDP. The sector is dominated by smallholders.

Physical conditions for agriculture are generally highly favorable. Much of the soil is fertile and rainfall is generally adequate. Staple crops include plantains, beans, maize, cassava and sorghum. While the export sector is less developed than in Kenya, cash crops are still vital to the economy. Crops, including coffee, cotton, tea, sugar, grains, horticultural products and tobacco, account for over 45% of Uganda's export earnings, according to consultancy PwC.

Yet investment in the agricultural sector has lagged behind other parts of the economy. While Uganda's overall GDP growth has been solid, this has been underpinned by government spending on transport and energy projects, rather than agriculture.

The agricultural sector's overall growth in output has fallen from a record high of around 8% in 2000 to 1.4% in 2012, held back, in part, by limited mechanization, restricted access to productivity-boosting inputs and their high cost, under-developed financing options, and difficulties in promoting effective extension services.

An insight into the potential for improvements comes from a recent survey complied by SAA's Monitoring, Evaluation, Learning And Sharing (MELS) theme staff, covering Dokolo and Apac, two districts close to Lira.

This suggests that virtually all farmers still use traditional postharvest handling techniques, such as hand picking, drying on bare ground and winnowing. The average distance from farm to inputs was 17km.

Only 17.2% of farmers surveyed had bank accounts, while 60.2% relied on ordinary local shopkeepers, rather than specialist stores, as their main sources of crop inputs. Nearly all farmers sold their produce individually, rather than collectively in a way that would boost their economic clout.

demonstrations, including maize shellers and mills, motorized groundnut shellers, multigrain cleaners, multi-crop threshers, and cassava chippers. Farmers from Rwanda bought three multigrain cleaners from suppliers collaborating with SAA, after a visit to SAA Uganda.

Moisture meters and collapsible driers were provided to One Stop Centre Associations (OSCAs) and traders to monitor and improve the quality of produce, while certified weight scales were provided to farmers to reduce the scope for cheating by traders.

The benefits of all these improved techniques and technologies are demonstrable. Those with good quality maize received a farm gate price of around $30/100kg in 2013, while poor quality maize sold for only $20/100kg.

Women's agroprocessing groups in five districts were trained in business management, marketing and business planning. For example, a women's group in Buikwe, western Uganda, made $900 by chipping and drying three tons of cassava in a six-month period, while the Oryem Chan Widows Association near Lira chipped 15 tonnes of dry cassava valued at $3,900.

Capitalizing on market opportunities

Uganda's increasingly vigorous private sector is providing opportunities for smallholders to maximize their returns, given the right linkages. So it is becoming important to create lasting partnerships between farmers, agents and companies, by developing workable business and financial models in support of extension delivery services and improved market access for smallholders.

The private sector is being encouraged to consider investing in smallholder farmers' activities to facilitate the establishment of market-led agro processing enterprises and strengthen the economic footing of farmers' groups.

SAA has assisted farmers' organizations to draw up lists of potential partners, including private seed companies, input dealers, banks and buyers, traders and processors. Memorandums of understanding have been signed with a number of companies. Adding further momentum to the process, training was provided for 90 stockists on input handling and business management in 2013, while more than 50 stockist shops were opened at grassroots level. Personnel at four OSCAs were fully trained to identify potential buyers, with more to follow.

Linkages are already building. A 2013 survey showed 25 large-scale buyers, including Savannah Commodities, Watcha and Sons, Uganda Breweries, and 60 small-scale local operations procured more than 3,730 tonnes of produce from SAA-linked OSCAs and around 500 small FBOs.

Building trust

To improve relations between farmers and grain buying middlemen, who smallholders sometimes do not trust, SAA has been promoting the role of the farmer/village agent/trader. This is a familiar individual from the local community, who can act as a trusted buyer and go-between, making links between the farmers and input companies, savings and credit institutions, and traders.

The model aims to incentivize everyone. The agents are motivated to build further linkages by the commission that their activities generate, while the farmers receive cash from the agents for their produce.

The move towards more market-oriented farming is taking hold. In 2013, grain and pulses worth almost $850,000 were sold by some 500 Farmer-Based Organizations (FBOs) to six major buyers and more than 180 local traders, while 55 tonnes of seed, worth $21,000, was produced under seed growers schemes.

To enhance women's participation, 45 women groups were trained in enterprise selection, business management and saving schemes. Youth participation in agricultural activities, has improved in areas of service provision, particularly spraying herbicides and insecticides, the sale of inputs and produce buying.

Another important link in the business chain is the development of mobile internet, which is enabling farmers and traders in even the remotest regions to do business on via phone and computer *(see page 73 for more on this)*.

Scaling up marketing operations means learning about financial management. SAA provides training to farmers' groups.

An increasingly market-oriented approach to smallholder agriculture, spurred by technological development, improved access to training and shifting attitudes, promises to bring yet more change to Uganda's rural societies.

SAA in Uganda: a productive history

The SG 2000 project in Uganda began in 1997 under the leadership of direction of Dr Michael Foster, Country Director from 1996 to 2007. He was succeeded by Emmanuel Kayaako, Interim Director in 2008, Dr Sarah Osiya in 2010 and then Dr Roselline Nyamutale, who became Country Director in 2011.

Initially, SAA operated in 24 districts and worked with over 300 government extension staff in 272 sub-counties to support development of over 50,000 smallholders. Until 2001, the major focuses were crop demonstrations, seed multiplication, implements for animal traction, postharvest handling, and input delivery through private stockists.

In the early days, the main crops promoted in demonstration programs were maize and field beans, and, to a lesser extent, improved cassava cultivars. Later, the project was successful in introducing and popularizing quality protein maize (QPM).

The program differed from those in other SG 2000 project countries at the time in some important respects:

- The plot size – at just 0.1 hectare – was much smaller.
- The recommended fertilizer dosage was much lower than the norm in other countries (around 40 kg/ha of total nutrients).
- Participating farmers were expected to pay for inputs, with SG 2000 providing credit to input dealers that stocked "input packages", known as "units". The farmers did not receive input credit, but the smaller plot size and smaller amount of fertilizer required meant that inputs were more affordable.
- SAA put an emphasis on building a network of input dealers

SAA provided support for Ugandan government initiatives, especially in the development of its extension systems. SAA provided input for the development of Uganda's Plan for Modernization of Agriculture (PMA) and the creation of NAADS (see extension panel).

In 2001, SG 2000 launched a program to develop farmer-based organizations (FBOs) to provide members with a range of services, from supplying inputs to diversifying crops and initiating livestock and agroprocessing enterprises to improving market linkages.

Twelve One-Stop Center Associations (OSCAs), each comprising 30-40 village-based groups within catchment areas of about 5,000 farmers, were set up. In 2001-08, SG 2000 focused on creating the infrastructure for the OSCAs and building leadership capacity and enterprise development. Enterprise development centered on seed multiplication and supply – mainly for QPM, improved NERICA rice varieties, groundnut and pigeon pea – as well as postharvest handling, bulk grain marketing and agroprocessing.

In the latter part of the last decade, SAA in Uganda started to adopt the association's thematic approach, which forms the basis for its work today.

Facilitators fill the extension gap

SAA has been able to provide support for Uganda's network of agricultural extension agents, which has become over-stretched in recent years.

The government's National Agricultural Advisory Services (NAADS) program, initiated in 2001, adopted a public private partnership approach to agricultural extension work, in line with a recommendation from the World Bank to reduce the extent of state intervention in the agricultural sector. Under the new regime, service provision was contracted out to self-employed individuals – often former state-employed extension agents – now required to operate in the private sector.

The move did not produce the hoped-for results, as agents struggled to make enough income through service provision to farmers who, themselves, had very limited financial resources. The number of extension agents in the country more than halved as a result of the organization to around 2,000.

A rethink of the Ugandan strategy was under way in 2014 with a view to increasing state support for extension provision.

SAA has helped fill the extension gap in the locations where it operates by developing the concept of community-based facilitators (CBFs), who are members of local communities trained to assist farmers with some of the basic issues on inputs and processing that would be otherwise be dealt with by extension agents.

These CBFs bolster services provided by a parallel network of Commodity Association Trainers/Traders (CATs), whose services encompass a wider range of business services and who are equipped to buy products from farmers and sell in bulk at improved prices (for more, see Theme 3 section).

Emmanuel Musana, a community-based facilitator (CBF), inspects crops in Mbale, Uganda, just to the north of Lake Victoria.

In 2013 alone, SAA trained 34 extension agents (EAs), while 400 community-based facilitators (CBFs) were trained as trainers of trainers (TOTs). They were then able to educate farmers in agronomic practices and technologies.

The success of the CBF concept in Uganda has led to it being rolled out in two other SAA focus countries, Mali and Nigeria.

Investing in the future

Improved growing, processing and storage techniques mean farmers are benefiting from growing surplus output of better quality, which can be sold at a premium through expanding sales networks. The extra income that farmers generate then opens up new opportunities for farmers to reinvest in their businesses or build up savings – reducing their dependence on assistance from the state and non-governmental organizations in the process.

Dr Roselline Nyamutale, SAA's Country Director for Uganda, says that to achieve this Uganda needs to see a shift in the thinking of many farmers, who are accustomed to prioritizing day-to-day spending, rather than thinking of the increased returns they could earn in future if they reinvest in productivity-enhancing measures.

"We are telling farmers' groups that when they start saving, it should be clearly spelled out in their articles of association that a given percentage of those savings goes back into agricultural inputs," she says.

"There needs to be a change in farmer's mindsets towards reinvesting. If you have benefitted from the system, you should be happy to reinvest a small part of what you have earned back into that system."

Progress is already being made. In 2013, SAA provided training on village savings and loan management to 150 farmers' groups, over half of whose members were women. As a result, 312 members opened bank accounts and 127 accessed loans especially to buy inputs.

PART FIVE: SAFE

The Sasakawa Africa Fund for Extension Education (SAFE)
Enhancing the skills of Africa's extension workers

People are at the heart of development. Money and materials matter, of course. But it is through human enterprise, ideas and commitment that lasting transformation can be achieved.

Certainly this is true of agricultural extension – a profession that demands not only scientific and economic skills but also the ability to communicate this knowhow in practical form and apply it to the practicalities of rural life.

From its early years, the Sasakawa agricultural initiative in Africa recognized the crucial importance of developing the capabilities of extension personnel. So, almost from the outset, specially designed training programs have been a key counterpart to its work with farming communities.

For administrative purposes the Sasakawa Africa Fund for Extension Education (SAFE) is legally distinct from the Sasakawa Africa Association (SAA). SAFE is run as a partnership between SAA and the Winrock International Institute for Agricultural Development, a US-based non-profit organization focused on rural development and natural resources.

But in practical terms, the two organizations work hand in glove as an integrated whole to deliver support for the development of Sub-Saharan food security and rural livelihoods.

Whereas the role of SAA is to support rural communities, working through the extension services of African governments in delivering advice and support, SAFE's role is to organize the training of the extension personnel who actually carry out this work.

This means educating professionals who are mostly already established in their careers, but who would benefit from the chance to pursue a period of university level study that will further enhance their ability to work in extension or in the management of government extension services.

Origins in Ghana

The scheme began in Ghana in the early 1990s at the express demand of the country's agriculture ministry, which had become concerned that many of its extension agents needed to upgrade their knowledge and skills. It felt they lacked adequate technical expertise and were not trained in how to communicate their ideas to farmers.

"We looked at the idea of giving individual scholarships to those who were really outstanding, to study for MSc degrees and doctorates outside Africa," says Deola Naibakelao, SAFE Managing Director, and SAA Theme Director for Human Resources Development.

Deola Naibakelao, SAFE's Managing Director, and Jeff Mutimba, Coordinator of SAFE activities in eastern and southern Africa, exchange notes at a symposium on the legacy of Norman Borlaug held in Jinja, Uganda, in July 2014.

"But we realized that it would be very expensive to send people outside and that it would be more effective to work with the universities in the countries where we were operating, to develop appropriate BSc and MSc courses."

So instead of spending money on costly overseas scholarships, Sasakawa decided to work with African universities and governments to develop a program of mid-career education that could be delivered in sub-Saharan countries for talented staff already working as extension advisers. The agriculture ministries would select candidates from among their staff to attend the courses.

The courses needed to be practical and focused on science that could actually be applied to smallholder farming. And they were able to draw on the experience that the students themselves brought to their studies: having spent a number of years already working in the field, they came to the university already equipped with a solid understanding of rural realities and a strong prior base of knowledge upon which to build.

The first program was launched in 1993 at the University of Cape Coast in Ghana, with a BSc and a diploma for agricultural extension professionals in mid-career.

Combining study with career

Over the subsequent two decades the SAFE initiative has expanded across the continent and now embraces 19 universities in nine countries – Benin, Burkina Faso, Ghana, Mali, and Nigeria, Ethiopia, Uganda, Tanzania and Malawi.

Throughout this period, the courses designed by SAFE have been structured around two core principles:

- Residential academic study is combined with practical project research in the field;
- Students retain their status as state employees and continue to receive their normal salary throughout the course.

Typically, participants are given leave of absence from their normal jobs for a period of up to 18 months, to pursue a course of intensive residential study at university. After this they then go home to their communities for eight or nine months to carry out supervised research into a specific enterprise project that they identify.

Finally, they return to the university to finalize a report on their research and present a formal academic defense of their findings.

This structure is broadly the same for both degree and diploma students and the whole process takes two-and-a-half to three years.

Throughout this period of study and research, participants continue to be paid their normal salaries as agricultural extension workers. This is essential because they have already worked for a number of years and are usually married, with children and other family responsibilities – most would not be able to take part in the program if that meant surviving on the sort of fragile income that sustains students attending university after leaving school.

"The scheme has now supported 5,000 extension professionals and demand for places in the program remains very high," says Naibakelao.

Candidates undergo a two-stage selection process. The employers – usually ministries of agriculture – put forward the names of potential participants, and these must then submit their academic and professional credentials to the universities and colleges, who decide whether to accept them and whether they should study for a diploma or a BSc.

"So the academic institutions have the final word, and thus maintain their standards and the credibility and rigor of the scheme, even where there are sociological, regional or political influences at play," he says,

National circumstances vary, of course. For example, in many anglophone countries it has long been possible to train at college for a certificate in agricultural extension, whereas in francophone countries tertiary studies are more academic and students learn more of the practical dimension once they are in employment.

"Even so, the underlying philosophy is the same in both anglophone and francophone countries is the same – learning by doing," explains Jeff Mutimba, Coordinator of SAFE activities in eastern and southern Africa.

Activities for an innovative mid-career bachelor's degree program in agricultural extension launched at Haramaya University, Ethiopia, with support from SAFE, in the late 1990s. Field-based research known as a Supervised Enterprise Project, which lasts for eight months, is part of the training.

"After their initial period of classroom study, each student goes back to their workplace and tries to identify a specific problem that faces farmers or rural entrepreneurs. Then they devise a 'supervised enterprise project' to tackle this problem, agree a plan of action with their university and then spend eight or nine months seeking to implement this in the field, before reporting back."

It is not just the students who engage with the practicalities of the rural economy.

"One of the specificities of SAFE is that academic staff go out into the communities to supervise their students carrying out these projects. So members of the university teaching faculty visit villages to provide advice and thus deepen their own experience," says Mutimba.

Indeed, sometimes graduates of SAFE courses go on to serve as supervisors for the field projects carried out by later generations of students.

Curriculum development is also participatory, bringing together academic institutions, governments and NGOs.

Because they remain engaged with the field work, the academics are made aware of the local cultural factors that can restrain certain courses of action at community level or that might prevent some farmers or extension personnel from saying what they really think.

"We think such issues should feed into the development of our curricula. We feel that we need to have some elements of

our courses that will help the extension workers to build up confidence," says Mutimba.

SAFE aims to equip extension workers not just in technical terms but also in social terms, so that they can communicate effectively with the rural communities where they work.

"Our courses help the extension advisors to be more confident and get their points across. One of the most significant changes lies in the behavior of graduates from SAFE. They become more confident and more articulate," he says.

Strong alumni networks have been developed, so that when graduates are back in normal working life they can keep in touch with former fellow students, exchanging experiences and ideas. These interchanges are continued through conferences and seminars.

Some of those who complete SAFE courses later move out of the government extension service to take up roles in the private sector, where salaries are often higher. But there they are still contributing to the development of the national agricultural economy.

Adaptation to change

Over its two-decade history, SAFE has evolved to meet shifts in circumstance and new challenges.

When the program began in 1992, agricultural extension for food crops was the almost exclusively the prerogative of the state; the role of the private sector was mainly limited to commodity companies' support for farmers growing export cash crops.

However, since that time, some countries, such as Uganda, have experimented with a much larger role for the private sector in extension support for smallholders growing cereals for domestic consumption. SAFE has adapted and continued to train appropriate personnel.

In recent years, the program has also extended its subject range in line with the decision of SAA to support downstream activities in the agricultural sector – the storage, processing and marketing of crops and assistance to farmers' organizations at community level.

"Over the last two years SAFE has revised the content of its courses to teach students about the technical and economic dimensions of this downstream agricultural value chain," explains Mutimba.

"Moreover, we have begun to teach extension personnel how to support the development of farmer-based organizations. This is a natural support to SAA's growing work with these groups in Mali, Nigeria, Uganda and Ethiopia, identifying communities that are not yet covered by farmer organizations, to provide help in setting these up, and to assist those already in operation with training in how to manage their affairs and get access to storage and processing technology."

In the SAFE program students are now taught how to identify where such support is needed.

However, program graduates do not necessarily provide the technical advice on these downstream activities themselves. Most are specialists in agriculture rather than business or commercial management disciplines.

Instead, during 2013, SAFE developed a new project under which local consultants are recruited to provide training and support for rural communities in areas like accounting and keeping financial records, leadership and management and how to secure access to credit, as well as crop processing and quality testing.

This new scheme in support of the agricultural sector value chain is budgeted at $1 million, compared with a core SAFE budget of $1.8 million. Implementation began in 2014.

Distance learning

The program is also adapting to the social realities of 21st century Africa.

"Traditionally SAFE has been based around a long residential course at university. But this limits the program's ability to attract personnel from private sector extension employers, who are often reluctant to release staff for lengthy periods. And it can cause serious complications for women candidates, many of whom have family responsibilities," says Mutimba.

"So we have been developing a partial distance learning version of the curriculum, which takes advantage of the fact that in Africa today, in the provincial towns where extension personnel live, there is usually good internet access. And of course, most students have laptops."

Under this new scheme, piloted by the University of Abomey-Calavi in Benin and Makerere University in Uganda, students study at home in their free time, connecting on line to the program's distance learning modules.

Mid-career extension students working on class assignments in the computer laboratory at Samanko College, Mali.

The agriculture faculty at Makerere University in Kampala plays a pivotal role in extension education in the country and has worked with SAFE to pioneer distance learning.

Home study is interspersed with a number of intensive residential study blocks on campus, each lasting three-to-four weeks – a period that is short enough for participants to secure leave from their jobs and get the help of family and friends to handle domestic responsibilities.

Securing the full support of employers is key for the operation of SAFE, both for the traditional full-time course and the new semi-distance program.

Employers carry the cost of paying staff in full while they are away and working on their field research projects. In return, SAFE maintains a close dialogue with agriculture ministries and other employers to ensure that the curriculum is designed to produce graduates who will bring relevant skills and knowledge when they return to their normal jobs.

Moreover, the curriculum is nuanced to suit the particular circumstances of each country. So, for example, although the main Sasakawa agenda is focused on cereals, SAFE has developed course units for Ethiopia that focus on livestock issues, because livestock play such a crucial role in the country's farming economy.

Ambitions for expansion

SAFE is faced with continuing strong demand for places as African countries seek to reinforce the effectiveness of their extension networks.

Deola Naibakelao and Jeff Mutimba feel there is a need to extend the program to more countries and institutions. They are therefore keen to identify new partners who could supplement the core funding that is already provided by The Nippon Foundation to help finance SAFE's expansion.

SAFE in a national context: Uganda

Adaptation to local needs is crucial for effective training. In Uganda recent years have seen a significant reshaping of the SAFE program in response to changing conditions.

Makerere University's traditional Bachelor of Agricultural Extension (BAE) course, an intense three-year program, has been phased out because its full-time structure no longer fitted comfortably with the way that extension had been reorganized in the country.

In coordination with SAFE, Makerere devised a new Bachelor of Agriculture and Rural Innovation, a three year course that can meet the needs both of mid-career personnel – who have already trained to diploma level – and school leavers.

"We are still attracting quite a few mid-career diploma holders, who want to look beyond pure extension. The attraction for them is the rural innovation aspect; this helps equip the mid-career people to offer broader advice on the value chain, livelihoods, prices, marketing and so on," says Paul Kibwika, Head of the Department of Extension and Innovation at Makerere's agriculture faculty.

School leavers and mid-career participants have some training needs in common and there are advantages to mixing the two groups, with benefits for both. But their requirements obviously differ in some respects. To cater for this, Makerere has developed a distance-learning program for the mid-career personnel.

This lasts four years, with students studying at home, and coming to the university for occasional two-week periods of study and exams. It has proved popular, attracting 40 students in the first year and 100 for the second.

Development of such courses is a process of adaptation, as Kibwika and his colleagues adapt their courses to needs and opportunities. The distance learning programs have to be tailored to particular local circumstances, presenting an extra challenge.

On the other hand, the curriculum of an agricultural college at Bugalasa already includes a large science component, so Makerere has decided to accredit this, which will allow students who have already trained at Bugalasa to take shorter version of the university course.

Paul Kibwika of Uganda's Makerere University says the extension department of which he is head now offers a degree to cater for the growing number of mid-career extension workers keen to receive further training in rural innovation.

It has been agreed that Winrock International, the program's technical partner, will play a central role in developing contacts with a broader pool of financial supporters.

For donors seeking to help tackle rural poverty in Africa, a key attraction of SAFE is it's institutional efficiency. The program is led by a small management team, but it is actually delivered by universities and colleges that already exist in Sub-Saharan countries: courses are taught by their staff, while the students are mostly extension personnel who are already on government payrolls.

SAFE is thus a highly cost-effective means of increasing the development benefit that the existing staff of national ministries of agriculture can deliver.

A graduate's congress at the University of Cape Coast, Ghana in 2002: The SAFE program had its origins in the country, when Ghana's agriculture ministry asked Sasakawa Global 2000 to provide support for extension agents.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Progress through collaboration

Partnership is an essential tool for development. Through collaboration with others, SAA is able to extend the reach of its work across Africa in support of food security and more prosperous rural livelihoods.

Successful partnerships enable organizations with differing roles, and distinct areas of agricultural expertise, to pool resources with more effective results than they could achieve working apart. Making them work requires adaptability, so, over the years, SAA has become highly versatile in its approach and program delivery, working with a range of different local and international partners to boost expertise and muster finance.

The sustained commitment of The Nippon Foundation has provided a solid foundation for decades of work with sub-Saharan farmers, extension personnel and universities – and the more recent launch of programs to diversify rural livelihoods and strengthen the agricultural value chain.

Building on this success, SAA has now developed relationships with a range of other financial and professional partners. These enable the association to expand the scope of its operations and thus help more African communities to become self-sufficient in staple food crops and diversify their sources of income and ability to compete in the wider economy.

In Ethiopia, for example, SAA has been working with the country's Agricultural Transformation Agency, the Bill & Melinda Gates Foundation *(see panel)*, the World Food Program (WFP), the Japan International Cooperation Agency (JICA) and Foreign Affairs, Trade and Development Canada.

Foreign Affairs, Trade and Development Canada (the new home, since 2013, for the activities of the former Canadian International Development Agency, CIDA) has been working with SAA to promote the cultivation of quality protein maize – new varieties of maize reinforced with protein to make them more nutritious than traditional maize varieties, which are low in the essential proteins lysine and tryptophan.

This project has been particularly effective in improving nutrition for women and children.

Meanwhile, JICA has supported two projects, with a combined budget of ¥150 million ($14. million).

Over a three-year period it has funded SAA's work to develop the capacity of women's agroprocessing cooperatives to become self-sustaining in three regions – Oromia, Amhara and Southern Nations, Nationalities and Peoples (SNNP).

Working with the Gates Foundation in Ethiopia

The Gates Foundation has provided $7.15 million for a four-year program of work by SAA and Oxfam America (OA) to help the Ethiopian agriculture ministry build a stronger national extension service and so foster the diversification of the rural economy. The scheme focuses particularly on groups that had not hitherto been well served by extension, such as women, young people, agro-pastoralists and the poorest farmers.

Implementation lies with the agriculture ministry, while OA has concentrated on building up Farmer Training Centers (FTCs) and helping development agents with local transport and training in how to teach.

SAA's role has been to promoted new technologies and the diversification of the value chain and livelihoods. A loan guarantee scheme has helped the FTCs develop revenue-generating activities so that, ultimately, they can cover their costs. Sasakawa has also persuaded input dealers and farmers' cooperatives to get involved in delivering extension and help smallholders to access markets on a more commercially viable basis.

This has been a major project, covering all of Ethiopia's regional states through 215 FTCs in 18 townships ('woredas'). It has helped to strengthen the skills of 645 development agents and 180 subject specialists, as well as some 215,000 farming households.

This has been a large-scale pilot, testing out an approach that the government will now apply to other agricultural development areas across Ethiopia. So it is a good illustration of how a strong partnership between SAA and other major partners with grassroots development expertise can become the kernel of a genuinely nationwide rural development initiative, even in a large country.

The Ethiopian authorities plan to establish FTCs in 18,000 villages ('kebeles'), each of which will be assigned three development officers. Extension resource centers are also being established in nine woredas, to serve as sources of information and management experience.

Members of a women's agroprocessing cooperative in Ethiopia. SAA has been working with the Gates Foundation, Oxfam America and the Ethiopian agriculture ministry to build a stronger national extension service. The focus is on reaching groups not well served by extension, such as women, young people, agro-pastoralists and the poorest farmers.

Not only have the women improved their processing techniques, to produce goods that can be sold to generate cash income, but they have also developed the skills to manage their activities, keep financial records, plan ahead and learn from their own experiences and those of other groups.

The project worked with five women's cooperatives, to develop a model that could then be replicated elsewhere that would diversify the livelihoods of Ethiopian women and their households more widely. The scheme has enabled participating groups to become more self-reliant and less dependent on management support from local government.

In Tigray – a northern region that is one of the country's poorest – JICA is working with SAA to improve agricultural productivity.

Marginal climate conditions mean many families struggle to grow sufficient food to ensure secure basic nourishment throughout the year. But upland rice is suitable for the well-watered local soil conditions. The crop was introduced to the region in 2005/06 and within just a few years, it had become popular. The SAA/JICA project build on these early gains with support for both the cultivation of rice and the processing and marketing of the crop.

Working closely with Ethiopia's national extension service, the project has also promoted the production of other crops, to broaden the base of nutrition and income generation.

Collaboration with national partners

SAA believes that it is vital to strengthen African countries' indigenous capacity to tackle the challenges of rural livelihood development. So wherever possible, the association seeks local partner organizations, within government structures and at community level too.

In Ethiopia – where farm sector growth of 8% a year indicates huge potential – SAA works closely with the Agricultural Transformation Agency to promote crop processing technologies and help with the development of women's' groups.

The agency has given high priority to cereal crops such as tef, maize and wheat, so there is a natural fit with SAA's own expertise in the cereals sector.

Another model of local partnership is the innovatory approach that SAA has taken in Nigeria, in response to the country's federal structure. State governments have important responsibilities in the agricultural sector and the association therefore has tailored

distinctive programs to suit conditions in four northern states – Adamawa, Bauchi, Jigawa and Zamfara. Detailed planning and program delivery has been worked out with the governors and local agricultural administrations of these states.

The Nigerian model has been particularly significant in pioneering indigenous African government funding of SAA's work. States have signed financial agreements with SAA and the federal government has provided 200 million naira ($1.2 million) for the four state programs.

The success of the approach has prompted the Nigerian government to sign an agreement with SAA to roll it out nationwide, adding more states to the program in phases *(see Part 4, Nigeria section for more on this)*.

Of course, relationships with Sub-Saharan partners, governmental or otherwise, is fundamental to the Sasakawa philosophy of supporting African societies in building up their own capacity to tackle challenges such as food insecurity and pilot their own development strategies. SAA does not seek to fill the roles that could be played by indigenous institutions and communities but to provide complementary specialist expertise and targeted resources.

So for example, under the Sasakawa's SAFE program, SAA and the Winrock International Institute for Agricultural Development work in partnership with higher education institutions in sub-Saharan countries to design and organize courses for extension personnel.

The different strengths of these various players are combined to provide a form of education that did not previously exist and which strengthens the long term operation of national extension services *(see Part 5, for more on SAFE)*.

Diversifying markets through partnerships

A similarly flexible structure is used to help farming communities boost their sales of grain, in both quality and quantity terms.

SAA introduces local smallholder groups to commercial grain dealers who are prepared work with the growers to help them establish themselves as reliable suppliers of cereals to the market.

For example, with its well-watered climate and good road connections, Uganda is well placed to export to Kenya, which has a large population but is more prone to drought and regularly needs to import food. This is a trade that makes sense for both countries: many Ugandan farming communities are well placed to produce regular surplus output for commercial sale, while Kenya has the consumer spending power and business infrastructure to bring in the food that it cannot always produce at home.

SAA has also collaborated with the World Food Program (WFP) – the United Nations agency that distributes food aid.

Where possible, WFP seeks to source the grain that it requires for its humanitarian programs from other countries in the same region, where farm output is in surplus. It does this through the Purchase for Progress (P4P) initiative – acquiring food from local producer organizations, which is subsequently sent to nearby regions in crisis.

Farmers working in the field, Jigawa state, Nigeria. Jigawa is among the states with which SAA already has strong partnerships. A landmark agreement signed in 2013 between SAA and Nigeria's federal government has paved the way for SAA to work with more states across the country.

Uganda, for example, is well sited to supply South Sudan. In Mali drought does not impact on all parts of the country equally; there are big variations in rainfall and some regions are in a position to supply grain to others.

Building on these opportunities, WFP has sought to extend the P4P program of local food purchases to encompass smallholder farmers in Ethiopia, Mali and Uganda – and in doing so it works in partnership with SAA.

Of course, WFP aims to ensure that the food aid it provides is of good quality, so the P4P initiative sets rigorous procurement

Japanese Overseas Cooperation Volunteers training a farmers' group in Ethiopia. The Japan International Cooperation Agency (JICA) has funded SAA's work to build capacity among women's agroprocessing cooperatives in three regions of the country.

standards. And to achieve economies of scale, purchases are made in lots of 50 tons or, preferably, 100 tons.

SAA therefore provides training and technical support to local farmers groups, to help them meet these requirements – and to persuade them of the value that a long-term relationship with a respected major customer such as WFP can bring.

Occasionally, a farmers' group may be attracted by the offer of a one-off, high priced single shipment from an individual commercial dealer. But it usually makes more sense in the longer term to resist this temptation and maintain the farmers' standing as regular suppliers to WFP. Indeed, success in selling to the WFP scheme often bolsters commercial sales as well, because grain dealers may see a farmers' group's participation in P4P as a badge of quality and reliability.

In Mali, SAA began working with P4P in 2009 and the following year 38 villages were selected as suppliers to the scheme. Members of six farmers' organizations were trained in farming, storage, packaging, management and marketing and they managed to supply 85% of their scheduled millet delivery to WFP and 97% of the sorghum that had been ordered. A premium price was paid, generating almost $170,000 in sales revenue.

In Uganda, since 2010, SAA has been helping farmers in six districts – Bugiri, Buikwe, Kamwenge, Kamuli, Lira, and Luwero – with postharvest handling arrangements so that they can supply P4P.

Two new local marketing centers were built, as well as 21 grain drying cribs; and 1,400 tarpaulins for cleaning and drying were distributed to farmers; some 1,500 farmers were trained, while local associations were trained in business management training. As a result, over the course of the 2010-11 farming year, 2,556 tons of maize and 66 tons of beans were sold as surplus to P4P and other buyers.

SAA's support for cooperation with P4P in Ethiopia was launched in June 2010, as an initial three-year project, training farmers in crop productivity enhancement and postharvest handling. Equipment and management training was provided to 16 participating cooperative unions, who learned how to prepare tenders and contracts and operate their warehouses efficiently.

The Sidama Elto Cooperative Union, in southern Ethiopia, exemplifies how improved quality and commercial competence can have a big impact. The group's sales of maize and beans rose from only 300 tons to some 2,500 tons of food – of which 1,600 tons were sold to the WFP.

Innovative approaches

Securing effective access to markets, to generate a flow of income from commercial sales of cereal crops, is a crucial tool for raising rural living standards – and this is a key dimension of SAA's collaboration with another important partner, the Alliance for a Green Revolution in Africa (AGRA).

In Mali, where annual variations in rainfall can have a dramatic impact on agricultural productivity, the two organizations have supported the promotion of micro-dosing fertilizer to increase cereal yields in semi-arid regions of the country.

With the population increasing rapidly, there is a strong demand for extra food, and this has put pressure on resources of cultivable land. It has become steadily more difficult for villagers to leave fields fallow to recover their fertility and there is increasing use of fragile marginal land that is less suited to cultivation. Yet cash incomes are low and most rural Malians cannot afford to spend heavily on fertilizer, to revive soil fertility.

The SAA-AGRA project has helped develop warrantage – a system of advance credit secured against future production – to help smallholders buy inputs, develop their local cooperative organizations and establish storage facilities. But it has also provided training on how micro-dosing – placing small doses of fertilizer carefully beside each plant – can achieve substantial productivity gains at relatively low cost.

A second joint project has helped farmers in Sikasso, in the relatively well-watered south, to improve postharvest handling and storage facilities. This is one of Mali's most fertile regions, yet malnutrition levels are high. By developing farmers' organizations access to market and through cultivation of newer varieties such as Nerica rice, it has been possible to help communities diversify their income and maintain a more balanced diet.

AGRA has also begun working with SAA in Nigeria.

Targeting key projects

One key element in developing effective partnerships is to identify allies in technical or financial areas who are able to support specific projects that pilot new approaches or meet a targeted requirement. If appropriately designed, even a relatively small intervention can open up a theme that might eventually find much wider application.

As part of a partnership between SAA and K + S Kali in Uganda, the German fertilizer company has provided a truck that acts as a mobile soil analysis laboratory and outdoor classroom, which SAA staffs.

For example, in Mali, SAA has collaborated with INTSORMIL (International Sorghum, Millet and other Grains) Collaborative Research Support Program (CRSP) – which is supported by USAID. This has promoted the use of new seeds, fungicides and fertilizer for the cultivation of millet and sorghums in the Ségou region.

This shows how it has been possible to achieve valuable results even with relatively small amounts of external finance – allocations of just $27,000 and $40,000 for this Ségou region millet project, for example.

This is not the only project where USAID funding or expertise has come to play a role. In Kaduna state in northern Nigeria – where environmental and development challenges are in many respects similar to those in Mali – SAA is working in partnership with USAID to implement a five-year project to boost farm revenue and local agriculture related enterprises.

Some 3,000 smallholders were trained as maize outgrowers for a foods and processing company, a process that entailed the promotion of both farming and processing technologies.

Meanwhile, in Uganda, the German fertilizer company K + S Kali is working with SAA on issues of soil fertility. An innovatory facet of this partnership is K + S Kali's provision of a truck that acts as a mobile soil analysis laboratory and outdoor classroom: the vehicle has been entrusted to the agriculture ministry and the Sasakawa team, who staff it.

SAA drives the truck from village to village, testing soil quality and using its audio-visual facilities to teach smallholders. They can use the results of the soil tests to provide immediate advice on fertility and the use of appropriate techniques and chemicals, while the truck itself is a highly practical means of bringing modern teaching aids – with a strong visual impact – to communities that often have no electricity or modern school facilities.

Major one-off funding injections from donor partners can be used to establish programs that will become self-sustaining over the longer term.

In the case of a major food crisis in Mali, the government of the Netherlands provided a large financial package to pay for the establishment of a network of local revolving funds to support ongoing rural sector programs. SAA was one of the organizations selected to run projects under this scheme, which has also dovetailed neatly with SAFE. There are plans for some graduates of SAFE's mid-career courses to go on to take management roles in the new revolving fund system.

Building up the value chain, forging partnerships

When the Sasakawa Africa agricultural initiative began work almost three decades ago, its central purpose was to help farmers grow more cereals.

But today the Sasakawa Africa Association (SAA) operates across a much wider canvass, supporting the emergence of a diverse rural economy that can process raw crops and deliver them to the wider market on competitive, commercial terms.

The initial focus on lifting the productivity of the smallholders who produce most of Sub-Saharan Africa's food was understandable and necessary.

In the aftermath of devastating famines in Ethiopia and the Sahel, the imperative was to boost massively the output of staple food crops – to help sub-Saharan countries escape the risk of further catastrophic starvation.

Norman Borlaug, Ryoichi Sasakawa and President Jimmy Carter led the new initiative with vision, as it pioneered innovative teaching methods at community level, showing farmers how to boost crop yields on their hand-tilled plots through the use of hybrid seeds, fertilizer and improved cultivation techniques.

The Nippon Foundation, with Yohei Sasakawa at the helm, provided the ongoing financial backup.

Later, the SAFE initiative began to enhance the expertise of the government extension advisers entrusted with spreading new ideas on a national scale.

However, it has always been clear that new technologies have a cost in money and in extra working time, a cost that small farmers with limited resources must count with care.

If increased agricultural productivity is to remain sustainable once the initial program of external support has been completed, it has to make sense in real economic terms.

Smallholders need to be sure that they can store crops in good condition – and then sell surplus output for a viable commercial price that justifies the financial input and the additional effort that they have invested.

So SAA has expanded from its early focus on farm productivity to establish initiatives that support the development of a dynamic agricultural value chain and rural economy.

The association has introduced local communities to the technology for crop storage and processing. It has helped entrepreneurs to open shops selling modern strains of seed, fertilizer and agro-chemicals directly to farmers in their villages.

SAA has also encouraged the emergence of local processing businesses, to efficiently transform raw crops into marketable products. And it has supported the development of local farmers groups and organizations that can control quality standards and sell output in bulk to commercial buyers, negotiating prices and conditions with a clout that smallholders trading as individuals inevitably lack.

A tighter focus for greater impact

After early campaigns to introduce new farming technologies to a broad range of Sub-Saharan countries, SAA has chosen to concentrate on working with a more focused group of host nations over the long-term.

By focusing its resources in this way the association is able to make a real impact in fostering the development of a full agricultural value chain across many regions of each country – and in supporting the growth of strong indigenous extension services to assist farmers and rural entrepreneurs.

In Mali, Ethiopia, Nigeria and Uganda the presence of SAA is well-embedded, staffed by expert nationals with a deep understanding of the societies in which they work and live and thus able to adapt operational structures to national circumstances.

So today's SAA represents a resilient and adaptable model for supporting the development of farming productivity and the rural economic value chain.

By demonstrating what can be achieved in its focus countries, SAA can help provide a blueprint for what can be achieved elsewhere.

The association is now working with a steadily growing range of partners to extend its activity within its focus countries to reach more regions. These are areas where there is a powerful need for locally focused direct engagement with farmers and the wider rural economic community.

The close relationships with The Nippon Foundation and – for SAFE – the Winrock International Institute for Agricultural Development remain the cornerstones of SAA strategy. Furthermore, it has always been SAA's policy to work closely with Ministries of Agriculture at all levels, building up a history of trust and collaboration that few NGOs can match.

However, the association has also built close working ties with many other partners, to support the gradual expansion and deepening of its activity. These encompass African national and state or regional government authorities, expert international private sector companies, leading multilateral development agencies and major independent foundations.

SAA believes that such partnerships are the most effective way to mobilize additional specialist expertise and funding in order to support the development of the agricultural value chain across an ever growing number of African communities, each with its own distinctive characteristics and each confronting specific local challenges.

One model does not suit all situations.

SAA has developed great expertise in bringing new technologies and entrepreneurial skills to rural Sub-Saharan communities – and practical experience in how to do this effectively. But the association claims no monopoly of knowledge or skill.

It values the contribution that can be brought by allies, with their own skills and resources. SAA demonstrates a willingness to adapt and a readiness to work with partners.

And for the future, it is keen to further deepen working ties with current allies and develop new relationships.

Collaboration with others, both from Africa and the wider international community, will be essential if the continent is to continue to increase the productivity of smallholder farming and strengthen livelihoods and incomes across the agricultural sector value chain.

Partnerships will be at the heart of the strategy of Sasakawa Africa Association as it looks to the road ahead.

PUBLIC INFORMATION

A number of publications are available from the Sasakawa Africa Association; including Annual Reports, and SAA's newsletter, Feeding the Future, with each edition focusing on a specific theme or country. For a complete list, see our e-library **www.saa-safe.org/e-libraries/**

In addition, recommended reading includes the authorised biography of Dr Norman Borlaug: The Man Who Fed the World. Leon Hesser. *Durban House Publishing Company, Inc. 2006.*

Annual reports

Annual Report 2011 & 2012

Annual Report 2013

Feeding the Future newsletters

Chris Dowswell tribute

Issue 28

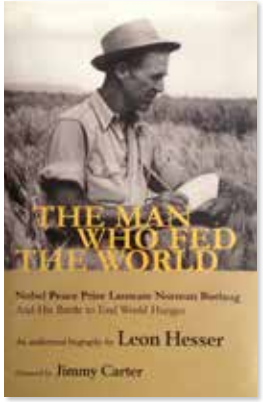
Nigeria newsletter

SAFE – special Anniversary edition

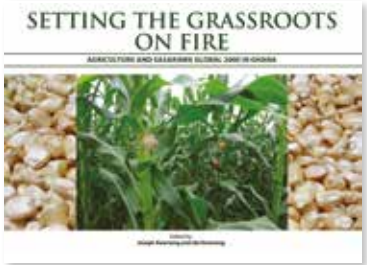
Uganda newsletter

Theme 2 – agro-processing newsletter

Recommended reading



The Man Who Fed the World, Leon Hesser



Setting the Grassroots on Fire: Agriculture and Sasakawa Global 2000 in Ghana, *Joseph Kwarteng and Ida Kwarteng*

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Feeding the Future

"Our history is a reflection of the changing face of African agriculture"

Chris Dowswell, Bamako, 2011

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