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Introduction by the Vice-Chancellor of the University of Greenwich



The fragility of sustainable global food production and the resulting global food insecurity are hitting the international headlines. Increased use of agricultural products for biofuels, greater consumption of meat in India and China, and the effects of climate change on key producer countries such as Australia have resulted in

increased volatility and uncertainty in the cost of food and its availability. No longer are there mountains of excess food in Europe to help stabilise shortages elsewhere. Nowhere is the effect of these trends felt more than in developing countries, by poor people in particular, and it is this target audience that is the prime focus of the work of the University of Greenwich's Natural Resources Institute (NRI). NRI continues to research ways to increase agricultural productivity and reduce losses in the field, and after harvest, to increase the local availability of food. NRI also specialises in understanding the needs of vulnerable poor farmers and in helping them to sell excess produce by assisting in forging links to local and international markets. This helps poor consumers too. I am therefore pleased that NRI's work continues to receive national and international recognition, including selection by the Bill and Melinda Gates Foundation to lead a multimillion-dollar programme to add value to cassava production in Africa, and a shortlisting for the UK Times Higher Research Project of the Year Award.

Baroness Tessa Blackstone

Vice-Chancellor, University of Greenwich

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A message from the Director of the Natural Resources Institute



The World Community is again focusing on the role of agriculture in development. The 2008 World Development Report published by the World Bank states that “promoting agriculture is imperative for meeting the Millennium Development Goal of halving poverty and hunger by 2015 and continuing to reduce poverty and

hunger for several decades thereafter.” The UK Department for International Development (DFID) in its Research Strategy 2008–2013 states that “The livelihoods of 75 per cent of the world’s poor will continue to depend on agriculture for the foreseeable future. At the same time, rising food prices are likely to make problems of hunger and poverty worse for urban and rural people. Research that produces innovation in agriculture is therefore more important than ever for reducing poverty.” In a recent communication to the Council of Europe and Parliament, the European Commission (EC) concluded that “Broad-based agricultural growth in Africa is key in progressing towards the Millennium Development Goals and in ensuring the affordability of social services in rural areas.” Against this backdrop, NRI has continued to expand its work with a wide range of partners and remains at the forefront of international efforts to harness agriculture and renewable natural resources to increase food availability, raise incomes for poor people and help build the economies of poor countries. We are by the nature of our work a multidisciplinary institute and our work continues to be grouped around our cross-cutting programme themes, as follows.

- Making agriculture work for the poor – developing better agricultural technologies and improved systems that reduce poverty and malnutrition.
- Food and trade – developing improved post-production food management systems, enterprise and marketing to overcome constraints to agricultural growth and achieve poverty reduction.
- Change and vulnerability – understanding, quantifying and mitigating major challenges such as climate change, globalisation, conflict, emergent diseases and migratory pests that threaten the livelihoods and health of poor people.
- Capacity building – carefully targeting interventions to strengthen the capacity of people, organisations and institutions to make a more effective contribution to the development process.

NRI is of course not just about research – we build on long experience of “putting research into use”. We have a unique blend of scientists, social anthropologists and economists, and our groundbreaking work over the years underpins many

currently accepted agricultural practices in Africa and other parts of the developing world. This includes approaches to control of pests and diseases such as locusts, armyworm, cassava mosaic virus and sleeping sickness/trypanosomiasis; current thinking on local procurement, storage and distribution of food aid; and the increased importance of root crops such as cassava in reducing poverty and food insecurity. The latter has had a major boost this year with the signing of a multimillion-dollar contract with the Bill and Melinda Gates Foundation to develop value chains for high-quality cassava flour in Ghana, Tanzania, Uganda, Nigeria and Malawi. A multinational Anglo-African team led by NRI will manage the work, with a team leader based in the offices of the Food Research Institute in Accra, Ghana. The aim of the project is to make a significant and sustainable difference to the livelihoods and incomes of at least 90,000 smallholder households in the five target countries.

Our work on fisheries also continues to expand. Building on our management of a three-year DFID programme of support to global fisheries policy, NRI is now undertaking a one-year scoping study to develop the next phase. The scope of this will be expanded to include trade and aquaculture as well as governance and control of illegal, unrecorded and unregulated fishing. Working with the NEPAD Secretariat, NRI is also preparing a proposal for DFID funding of a Partnership for African Fisheries.

NRI has also played a key role in supporting the Vietnamese fisheries sector. This is one of the fastest growing in the world, with exports alone being valued at almost US\$4 billion per annum. Funded by the Danish International Development Agency, NRI has been assisting the sector to develop strategies for branding its products and has also looked at the viability of establishing a fisheries technology and product development centre.

NRI has also been working in partnership with the International Trade Centre to assist the Yemeni Seafood Exporters Association to develop its exports. Specifically, NRI is looking at branding strategies and the development of a website.

Working in partnership with Marine Resources and Fisheries Consultants from the UK and Econ Pöyry from Norway, NRI was also involved in a major independent evaluation of Norway’s support for global fisheries development over the last 20 years.



Dr Guy Poulter
Director, Natural Resources Institute

Agriculture, Health and Environment Group

Current concern over spiralling agricultural prices and the spectre of food shortage has put the spotlight back on the need for developing sustainable and appropriate crop production systems to underpin social development, mitigate the impact of climate change and protect biodiversity. NRI's work to develop technical solutions to biotic constraints in agro-ecological systems is led by the Agriculture, Health & Environment (AHE) Group. The group's technical innovation and knowledge dissemination is primarily concerned with, but is not restricted to, crop production, livestock and human health issues in developing countries.

Current concern over spiralling agricultural prices and the spectre of food shortage has put the spotlight back on the need for developing sustainable and appropriate crop production systems to underpin social development, mitigate the impact of climate change and protect biodiversity. NRI's work to develop technical solutions to biotic constraints in agro-ecological systems is led by the Agriculture, Health & Environment (AHE) Group. The group's technical innovation and knowledge dissemination is primarily concerned with, but is not restricted to, crop production, livestock and human health issues in developing countries.

The group is composed of a core team of 26 researchers with a wide range of experience in the context of smallholder and large-scale commercial farming systems in Africa, Asia, South America and, increasingly, Europe. With access to extensive networks of partners, projects often involve multidisciplinary research collaborations with international research institutes, national agricultural research stations, NGOs and the private sector. Such activities are supported through a wide range of donor sources. Research activities range from basic molecular work to applied fieldwork on topics as diverse as DNA analysis of clams from Poole harbour and control of quelea birds in southern Africa.

Learning, training and capacity building

Learning and training activities are increasingly important components of the group's activities. Staff run an MSc programme in natural resources and are leading the development of a BSc honours course in ecology and global change management, reflecting a growing awareness of the importance of the ecological principles underlying the climatic changes that disproportionately affect vulnerable populations. The group is actively engaged in teaching and training activities for capacity development in Africa (see the section on SCARDA on page 14). Similarly, the FP7-funded CAAST-Net platform project, led by a group member seconded to the Africa Unit of the Association of Commonwealth Universities, endeavours to develop co-operation between Africa and Europe on science and technology through awareness-raising initiatives, identifying common research priorities, promoting synergy and informing future co-operation policy.

Integrated crop pest and disease management

Modern agricultural practices are dominated by the use of pesticides. Their importance to improved yields and human health are highlighted in a recent review by AHE Group staff. However, the impact of pesticides on non-target organisms, the development of resistance and widespread misuse in developing countries has led to a re-evaluation of their role in agriculture and the concomitant development of alternative, bio-rational approaches to crop pest management.

In order to reduce farmer dependence on pesticides, a range of perceived biotic constraints has to be addressed by introducing efficacious and cost-competitive alternatives. However, requests for assistance often occur only when pesticides have been found to fail, for example through the development of resistance or through legislation that limits market access. The AHE Group has considerable experience in the development, production and, with other groups, marketing of bio-rational pest management products, particularly on high-value horticultural products. Similarly, group members are engaged in fundamental research to address such questions as how plants resist viruses through RNA silencing, a complex eukaryotic RNA surveillance system that forms a potent defence mechanism in plants against invading viruses. This research, funded by the Biotechnology and Biological Sciences Research Council and DFID, builds on links between researchers in Uganda, Peru and the UK and has the potential to advance the disease management of a wide range of globally important crops.

Transboundary migratory pests

Climate change has highlighted the importance of migratory pest species that take advantage of changing global weather patterns to colonise new environments. Europe is no exception, with bluetongue disease, dispersed by an insect vector, reaching the UK for the first time last year. Similarly, palm trees in southern Europe are being decimated by the introduction of the Asian red palm weevil, a pest to which indigenous palm species have no resistance. The AHE Group has created the Transboundary and Emergent Pests Research Team to respond to this challenge with the specific aim of advancing research into major and emerging

agricultural pests whose impact is multinational, and implementing the sustainable solutions to these pests in affected agricultural systems in both developed and developing countries. An example of the group's work in this field is the development of a natural strain of a highly infectious nuclear polyhedrosis virus (NPV) to target the economically significant migratory African armyworm. Other targets for research and training include control of quelea birds as well as emerging pests such as the biotype 2 whitefly and the globally important diamondback moth, which are rapidly expanding their ranges.

Vector-borne animal disease challenges

The impact of climate change is not restricted to crop pests: in conjunction with greater movement of people and livestock there is a growing threat from exotic diseases that has an increasingly global dimension. Endemic insect-borne diseases have not been a significant problem in the UK since the disappearance of malaria nearly a century ago. However, pests and diseases once restricted to countries with Mediterranean and tropical climates now pose an increasing threat to Europe and other developed countries. Because of the historically low threat from insect-borne diseases in the UK our national capacity to study and control them is, in general, poorly developed. But UK-based institutions such as NRI have a long history of working in the tropics to develop and apply methods for control of such vector-borne diseases. Accordingly, in collaboration with other UK research institutions and companies we are posed to adapt these novel methods to monitor and control such potentially important disease vectors as mosquitoes and midges, based on approaches originally developed for use in the tropics.

Public-Private Partnerships

Agriculture, Health & Environment Group staff increasingly work with industry on a range of Public-Private Partnerships (PPPs). These highly productive collaborations have resulted in the development of appropriate pest management technologies, as well as linking farmers to technology producers in a manner that leads to the development of sustainable markets for these products. Examples of this work include assisting UK farmers to obtain a Defra-specific off-label approval (SOLA) for use of a natural insecticide (spinosad) for control of flea beetles on leafy brassicas (tatsoi, chinese leaves, etc.). Similarly, researchers have assisted a UK company to develop a novel pheromone-based product for controlling rice stem borers that is now poised to enter the market in India. The product has the potential to enable farmers to produce pesticide-free rice, which is particularly important in the high-value export market for aromatic rice, but as costs decrease it is anticipated that it will also be more widely adopted for use in the production of high-yielding varieties for domestic consumption. The group leads an international PPP that includes Cornell University to evaluate transformed cabbage and cauliflower lines resistant to diamondback moth – a pest that has been estimated to be responsible for more than US\$1 billion in lost production globally. Agreements have been signed to put Intellectual Property Rights ownership and licensing rights into public hands for dissemination to seed producers on a “public good” basis.



Enterprise, Trade and Food Management Group

Trade in primary commodities and natural products is seen as a key factor in economic growth, offering income and enterprise opportunities to both small- and large-scale producers and processors, and employment for rural and urban labour. The Enterprise, Trade & Food Management Group has a team of 20 market and commodity economists, value-chain specialists and natural scientists that aims to support farmers and their organisations, traders, processors and exporters' associations covering a wide variety of agricultural, natural and agro-industrial products.

Trade in natural products: everybody wins

The fruit of the iconic baobab tree could be the next nutritious food to appear on the UK supermarket shelves, providing income for millions of rural people in Africa and promoting sustainable resource management. Baobab fruit flour, a traditional food and relish across Africa, has exceptionally high vitamin C and calcium content and is therefore potentially a fantastic health food ingredient.

NRI has been working with an African trade association, PhytoTrade Africa, and the International Union for Conservation of Nature to develop value chains and to overcome market barriers for plants harvested from the wild. The work has involved reviewing the tariff and non-tariff barriers for a range of novel products, including cosmetic oils, food oils, industrial ingredients, fibres, herbal remedies, colourants, flavours and food ingredients from sustainably harvested plants in Southern Africa. The research is now branching out into non-tangible benefits that might be available from trading natural products, such as intellectual property.

A key aspect of the work has involved engaging with the European Union to promote changes in the novel food legislation to allow plants and their extracts that have a long history of safe traditional use to enter the lucrative EU market. Baobab has been the trailblazer for this work.

Fisheries trade, food safety standards and value chains

Global trade in fisheries products has grown significantly during the last three decades, with current trade worth about US\$71.5 billion. While the world's principal markets are located in the European Union, United States and Japan, developing countries account for approximately half of the export value, and their net foreign exchange earnings from fishery commodities far outweigh earnings from other food commodities such as coffee or bananas. Trade has expanded against a backdrop of increasing food safety standards and the development of Fisheries Partnership Agreements. The NRI multidisciplinary fisheries team has undertaken a range of projects in trade and business development, including:

- policy research on the implications of fish trade liberalisation for developing countries;
- sustainability impact assessment of the WTO Doha Round on the fisheries sector;
- impact assessment of EU commercial fisheries policies and practice on international trade in fisheries;
- branding of seafood products, and a pre-feasibility study for the establishment of a fish product development centre;
- fisheries management; illegal, unreported, and unregulated fishing; and trade-related measures;
- support in attaining GlobalGAP compliance for shrimp producers.

Further information is available at www.nri.org/projects/fishtrade/index.htm.

Fostering efficient agricultural markets and mitigating farm risks: a market-based approach

Agricultural producers, especially smallholder farmers, face many production risks as well as market uncertainties. These risks often jeopardise the livelihoods of the 2.5 billion people in developing countries who depend on agriculture and hamper efforts to improve household food security as well as reduce rural poverty. NRI has, since the early 1990s, emerged as an internationally recognised multidisciplinary centre of expertise for research, consultancy and training in the development of institutional innovations and systems that improve agricultural markets. One of the major innovations that NRI has played a key role in promoting is the warehouse receipts system (WRS), which simultaneously helps to ease access to finance and reduce transaction costs in agricultural trade. Building on this, NRI is fostering the development of agricultural commodity exchanges that are accessible and beneficial to smallholder farmers.

NRI is also collaborating with other European researchers in a programme that aims to expand the breadth of sustainable risk management tools available to smallholder farmers in developing countries and to strengthen their risk-management



capacity. This will involve identifying, improving, replicating and/or developing innovative risk-management systems and instruments for the benefit of smallholder farmers. Allied to this is another collaborative programme involving other European research institutes, the aim of which is to strengthen the capacity of producer organisations as a means of empowering smallholder farmers in markets.

Further information is available at www.nri.org/projects/wrs/index.htm.

Ensuring new products meet acceptance by poor consumers

Programmes seeking to introduce new products, and those who are involved in their promotion and marketing, require knowledge about consumer acceptance and sensory testing in order to ensure they are more effective. This is particularly true for new foods that have nutritional advantages and hence can also contribute to improved health. However, there has been little systematic work on understanding consumer acceptance in developing countries – particularly with regard to the most vulnerable consumers on the lowest incomes.

Rural communities in Africa are thought to be cautious about accepting foods that are substantially different in colour and taste from those they are used to.

Scientists at NRI have undertaken advisory work and research in these areas worldwide for some 30 years on behalf of government departments and international agencies. Examples of our work include consumer acceptance of sweet potato in Tanzania, cassava products in Nigeria, rice in Ghana, sorghum pastes in Tanzania and Zimbabwe, peanut butters in Zimbabwe, tea in Malawi and cocoa in Ghana. NRI is currently supporting the introduction of new biofortified products with enhanced nutritional characteristics, orange-flesh sweet potato and orange maize, in order to improve the well-being of the poor, particularly women and young children. Understanding consumers' acceptance of these products, their willingness to pay for them and how to provide appropriate product information is crucial in ensuring their uptake.

Further information is available at www.nri.org/work/sensory.htm.

Livelihoods and Institutions Group

NRI's Livelihoods & Institutions Group is a multidisciplinary group of ten professionals and a leading centre of expertise in social and sustainable development. Using our skills in social, institutional and policy analysis we aim to understand the circumstances in which poor people create livelihoods for themselves, including the institutions and policies that constrain or empower them. This is key to addressing problems of poverty and ensuring sustainable economic development.

We contribute to the strategy, design and implementation of research and innovation programmes for international development. We seek to ensure that programmes and policies are responsive to the development needs of poor people and are sensitive to difference and disadvantage relating to gender, age and ethnicity. We encourage the participation of key stakeholders in the design and implementation of research, development and policy initiatives and work to ensure that research results are delivered on an efficient and sustainable basis.

Innovation, institutional development and capacity strengthening

Building partnerships with, and among, institutions in developing countries is fundamental to stimulating networks of innovation and action. We are closely involved in international debates on agricultural innovation and the role of agricultural advisory services in the evolving institutional landscape. We have contributed to the Neuchatel Initiative work on Market-Oriented Agricultural Advisory Services, which is developing integrated approaches to production and marketing and linkages among farmers, traders and public and private service providers. We have also recently completed a major review of methods and conditions for getting research products into use for the DFID-funded "Research Into Use" programme.

To improve the quality of advisory services to farmers, we have supported Makerere University to develop a degree programme to meet the needs of private-sector service providers, local government and NGOs in Uganda. We are supporting a programme of the Forum for Agricultural Research in Africa to strengthen the capacity of agricultural research and development in sub-Saharan Africa (see SCARDA, page 14). With partners from sub-regional research networks, we are helping to implement and monitor the programme as well as providing key inputs into institutional appraisal and mentoring, and communication and gender strategies.

Assessing impact on poverty and livelihoods

We have worked with government, international agencies, research and civil society organisations in some of the

poorest and most vulnerable countries and regions of the world to increase the impact on poverty of policies and programmes in agriculture and natural resources. We have analysed complex current livelihood patterns; advised on developing alternatives; and undertaken monitoring, evaluation and impact assessment of research and development programmes. Examples include a review of the networks, programmes and projects of the Association for Strengthening Agricultural Research in Eastern and Central Africa, and the monitoring of EC support to projects within the International Agricultural Research Centres. Most recently we have been developing monitoring and evaluation systems for the C:AVA project in order to assess benefits with respect to, and impacts on, poverty and gender.

Risk, vulnerability and adaptation to climate change

The risk of climate disasters such as drought and floods is a central fact in the livelihoods of hundreds of millions of rural people and will become more important as the impacts of climate change are felt. But vulnerability to these disasters is felt differently by poorer and better-off households, men and women, and is shaped by the broader context of policies, institutions, economic and environmental trends. For example, the resilience of pastoralists and dryland farmers to drought has been eroded in recent decades by insecurity of land tenure, increasing levels of conflict, misplaced policies supporting unsustainable crop production and failure to support more sustainable systems.

There is a need for multiple forms of external assistance: long-term policies to reduce vulnerability but also well-planned and well-targeted relief and mitigation measures. NRI has applied these insights in a range of recent research and consultancy projects. We have investigated the impacts of drought on pastoralists in Southern Ethiopia for Save the Children (USA), authored a Policy Options Paper on drought management in the livestock sector for the World Bank, and produced a scoping study on a possible pastoralist policy for DFID.

The impacts of climate change on rural livelihoods will go well beyond the increased likelihood of major disasters. A Livelihoods & Institutions Group member served as lead author on the 2007 Fourth Assessment Report of the

Intergovernmental Panel on Climate Change and co-authored a study on climate change impacts in dryland agrarian societies for the World Bank. NRI is a partner in a major research project on strengthening local agricultural innovation systems in Tanzania and Malawi to adapt to climate change and variability, and is actively developing work on other themes within climate change adaptation and mitigation.

Natural resources policy and governance

NRI has worked extensively on land and natural resource tenure and its links with poverty reduction for over ten years. We have provided advisory support services on land policy to DFID, and have produced a wide range of land-related analytical papers and policy documents. NRI has also provided technical assistance to the African Union Commission and the United Nations Economic Commission for Africa in developing a land policy framework for Africa. We assist in delivering multidonor projects that aim to strengthen tenure security and facilitate economic development for ordinary land users, notably the Community Land Initiative in Mozambique and the Land Administration Programme in Ghana. We have explored the links between climate change and land issues and the role that land institutions need to play in adaptation to climate change.

An essential complement to secure tenure and improved land access at household level is improved governance of rural development at a wider, landscape scale. As developing economies grow, poor rural regions are often poorly integrated into increasingly urbanised and globalised economies, with a consequent increase in rural inequalities and rural poverty. Our recently completed DFID-funded project examined the interface between land access and wider territorial development and the significance of land reform for local economic development in South Africa and Brazil. NRI contributed a background paper on territorial development in Africa for the World Development Report 2008 and we have begun collaboration with RIMISP (the Chile-based Latin American Centre for Rural Development) on a five-year research-and-capacity-building programme on rural territorial dynamics in Latin America, funded by the International Development Research Centre.

NRI is sustaining land reform measures in Namibia by providing policy advice on resettlement, land registration and the development of information and data systems. We are also involved in programmes to strengthen customary land tenure for all communal land users and in influencing policy on resettlement of former commercial farms, in order that land productivity is not reduced at the expense of land redistribution. A programme to build the managerial capacity of government land-administration staff is also being assisted.

NRI has been providing advice to DFID on international fisheries policy since 2004. Following a consultation process and strategy development, a three-year programme was

implemented in collaboration with the Marine Resources Assessment Group and Chatham House. Based on successful outcomes from this work, a further long-term programme has been developed, jointly implemented by DFID's Policy and Research Division and Defra's Marine Strategy and Evidence Division. The main themes are: fisheries access agreements, illegal unreported and unregulated fishing, and governance and management (including the development of fisheries as a key contributor to pro-poor economic growth). In addition, a new programme on fisheries governance and trade is addressing best international practice related to renewable marine and fisheries resources, and ways to strengthen capacity to manage these resources. The programme will focus on wealth-based approaches to fisheries management; tackling illegal, unreported and unregulated fishing; African fisheries policy; aquaculture and climate change.

Institutions and urban water management

Urbanisation and urban poverty are growing rapidly in many developing countries. We are continuing our research on urban livelihoods, urban natural resource use and agriculture and planning processes through involvement in SWITCH, a multi-partner EC-funded project that covers ten cities in Europe, Latin America, Africa and Asia, aimed at developing more integrated approaches to urban water management. We are focusing on issues of governance, social inclusion, water use in urban livelihoods and inter-institutional learning in order to build alternative approaches to water management that better meet the needs of poor people.

Communication for development

Information and communication play a vital role in development, enriching and improving many aspects of our lives. But poor and marginalised people in less developed countries have limited access to information, and their capacity to make their voices heard is also constrained. NRI has been exploring the potential for information and communication technologies, including the Internet and radio, to benefit the rural poor. A recent NRI-led project, TeleSupport India, has facilitated the exchange of information and knowledge between farmers, community groups, research institutes and intermediary organisations (e.g. NGOs and government extension agencies). Two-way communication between users and suppliers of information was facilitated by strengthening links between stakeholder groups and supporting direct interaction through a question-and-answer service. Fixed and mobile telecentres (using laptops), managed by trained operators, were made available to farmers, including women. All information can be accessed through the TeleSupport website: <http://telesupport.org>.

Professional development and learning with NRI

NRI has a long history of providing teaching and training in the field of international development, natural resources and food safety and quality.

We now offer the following:

- a new BSc Hons Programme: Ecology and Global Change Management;
- postgraduate degree, diploma and certificate programmes taught at NRI;
- postgraduate research degrees;
- short courses delivered at NRI and overseas, tailored to local needs.

The new BSc programme is based on an interdisciplinary approach to addressing the increasing need for graduates who are literate in the causes and consequences of global change, and who can fill the career gaps in the employment market for advisers and practitioners of global change management. The new courses being developed by NRI staff draw on the wide range of experience and expertise within NRI in the promotion of economic and social development in both developing and developed countries through sustainable natural resource management. Half the courses will be provided by the Environmental Sciences degree programme in the School of Science. Graduates will have a sound background in the basic scientific “first principles” of ecology, environmental monitoring, resource management and economic aspects of global warming, and they will have gained experience in relevant practical skills, e.g. assessing carbon/ecological footprints, and modelling ecological and economic consequences of changes in management practices.

Our two university-validated Master’s-level programmes, Natural Resources, and Food Safety and Quality Management, draw upon the research and consultancy experience of NRI’s groups and our close teaching links with the School of Science. We have similar links with the School of Humanities & Social Sciences through their MA programme World Trade and Development: Regulation and Responsibility.

The Natural Resources MSc is geared to meeting current environmental and developmental challenges and career opportunities. Courses make full use of NRI’s geographically and thematically diverse experience in natural resources, with specialisations in plant health and protection, sustainable agriculture and sustainable environmental management. A new route on climate and environmental change is in preparation.

The Food Safety and Quality Management MSc has been developed to meet the rapidly changing requirements of the food supply chain. Participants are provided with the skills

needed to assess existing food safety and quality management systems, introduce improvements, and communicate effectively with policymakers and colleagues in multidisciplinary teams. We also offer specialist routes in post harvest technology and MSc Food Safety and Quality Management (by Research).

Postgraduate research degrees

Programmes leading to research degrees in the above subject areas are offered at MSc, MPhil and PhD levels. These benefit from supervision by NRI research staff, with active research projects commissioned by a wide range of clients in industry and in international development.

Short courses

NRI is registered as a training and examination centre by the Royal Institute of Public Health and offers Foundation, Intermediate and Advanced Certificates in Hazard Analysis and Critical Control Points (HACCP) and Hygiene. In addition, short courses of up to six weeks in length are offered in a range of subjects, some being components of the taught postgraduate degree programmes. Topics include aspects of natural resource management, climate change and ecological footprinting, food technology, food safety and quality management. Bespoke courses are also developed to meet specific client training needs.

Courses may be accredited as part of continuing professional development. Where appropriate, NRI delivers courses overseas as a contribution to institutional capacity building. Typically, these courses are individually designed to the particular needs of trainees and use local case-study material. Building on our course portfolio and experience of delivering courses to suit local needs, NRI is working as part of the SCARDA project (Strengthening Capacity for Agricultural Research for Development in Africa) to strengthen the institutional and human capacity of African agricultural research and development systems to identify, generate and deliver research outputs that meet the needs of poor people. A major component of this work involves developing training courses in association with universities in Africa for local delivery.

Training and technology transfer

NRI scientists spend time with counterpart staff overseas, providing detailed and practical instruction in specialist skills and techniques. Such training may be laboratory or field based, and can cover any of NRI’s areas of expertise. These

activities have included chemical and biological analyses, operation of specialist equipment, and methods of survey data collection and analysis.

We ensure that all training is designed with the counterpart staff to meet the specific needs of their trainees. Training elements therefore vary enormously in approach and duration. Recent examples include a highly intensive, formal, one-week course on food safety improvement in Ghana, culminating in HACCP accreditation; and bespoke training courses in sustainability, conservation, and management of tropical forests delivered to Chinese trainees in the UK.



Research at NRI

Leading-edge research, carried out in the field, on agricultural stations and in the laboratory, lies at the heart of the work of all NRI's operational groups and underpins the development and capacity-building work that the institute undertakes. NRI staff carry out research on behalf of a range of development donors and research funders, and also supervise a cadre of more than 50 MPhil/PhD students based in the UK and overseas.

NRI carries out its research in collaboration with partners from all round the world: national agricultural research services in developing countries; universities in developing countries, UK, Europe and elsewhere; NGOs; the private sector and farming communities. NRI has on-going partnerships with many organisations.

NRI's research work is both high quality and has practical impact on the ground. For example, Don Reynolds was a joint author of a paper on honeybee searching flight (Reynolds *et al.* 2008) that was awarded the Journal of Experimental Biology's Outstanding Paper Prize for 2007, while for nearly 40 years Professor Bob Cheke has been working on river blindness, particularly in areas of Equatorial Guinea. This culminated in a successful vector elimination programme in 2005, and, following a three-year post-elimination period, the World Health Organization will announce the certification of the vector's elimination. The underlying science on this activity has recently been reported by Bob at a conference held in Vilnius and in Cheke *et al.* 2008. Bob's dedicated work in this area has effectively contributed to protecting some 68,000 people from infection, hopefully in perpetuity.

NRI research is energetically disseminated at all levels, ranging from practical materials for farmers and their front-line advisors, through briefings for policymakers, to prestigious academic papers for our peers in the international research community.

Some examples of our work for a range of research funders are summarised below.

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Strengthening Capacity for Agricultural Research for Development in Africa (SCARDA)

NRI is contributing to an important DFID-funded initiative that aims to strengthen the capacity of key agricultural research and training organisations in sub-Saharan Africa.

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The project is entitled Strengthening Capacity for Agricultural Research for Development in Africa (SCARDA) and is led by the Forum for Agricultural Research in Africa. The project has a decentralised structure, in accordance with the principles of subsidiarity, and capacity-strengthening activities are being implemented in each of the three subregions in sub-Saharan Africa. So far, “focal” organisations in the following countries are participating in the activities: Botswana, Burundi, Congo-Brazzaville, Gambia, Ghana, Lesotho, Mali, Rwanda, Sudan and Zambia.

During 2007–08, the emphasis has been on planning capacity-strengthening interventions to meet the specific requirements of the focal organisations and their key partners. NRI has contributed to this process by helping to develop and apply methodologies for analysing the capacity-strengthening needs of the focal organisations. Experienced NRI staff have been assigned to work with these and other partner organisations in the subregions. Based on the organisational analyses, annual work plans have been prepared and formal training activities began in September 2008. NRI staff will continue to work with the focal organisations and act as mentors to support them in the institutional development process.

NRI is leading the project-wide services on monitoring and evaluation (M&E) and communications systems, and has developed strategies for each of these areas. In consultation with other partners, detailed plans are now being prepared to implement the strategies at the continental, subregional and national levels. A learning-based approach is being adopted that will support the process of institutional development.

A key objective of SCARDA is to strengthen the capacity of focal organisations to manage their research activities in a way that enhances their performance and allows them to take advantage of new opportunities. NRI has worked with other partners to develop a strategy for addressing the focal organisations’ research management needs. NRI staff are currently working with other service providers to develop packages of capacity-strengthening measures. These packages will involve a “core” course followed by practical work-based assignments and subsequent participatory workshops. More specialised short courses will also be run to complement this core course.

NRI will also support SCARDA’s aim of enhancing the quality of scientific research carried out by the focal organisations and their partners. This will be done through joint supervision of postgraduate students, mentorship and the delivery of short courses in specific areas.



Cassava: Adding Value for Africa (C:AVA)

In early 2008 The Bill and Melinda Gates Foundation awarded NRI a US\$13.1 million grant to work in close partnership with organisations in five African countries to significantly boost the incomes of small-scale African cassava farmers by linking them to new markets. The vision of the project is that after four years more than 90,000 smallholder households, employees of more than 135 village processing units, and at least ten intermediates in two areas per country will increase their incomes by improvements to high-quality cassava flour value chains.

The project, called Cassava: Adding Value for Africa (C:AVA), focuses on using high-quality cassava flour as a partial replacement for wheat flour in bakery products, other food products or in the commercial manufacture of products such as plywood and paperboard. A major innovation is supporting intermediary secondary processing to link smallholder farmers with end users. The new project will enable farming households to partially process their cassava at household level, so adding value at this level. Women are expected to specifically benefit from the initiative.

The project will work in partnership with the Food Research Institute in Ghana; the University of Agriculture, Abeokuta in

Nigeria; Tanzania Food and Nutrition Centre, Tanzania; Africa Innovations Institute, Uganda; Chancellor College, University of Malawi; and many other national partners. The International Institute of Tropical Agriculture is providing backstopping support.

In the first six months of operation the project team has taken forward the project in Ghana and Nigeria, where country-specific strategies are based on detailed situation, value-chain, gender and diversity analyses. Activities in Tanzania commenced in late 2008, and will start in Uganda and Malawi in early 2009.





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