

THE GCARD ROAD MAP

TRANSFORMING AGRICULTURAL RESEARCH
FOR DEVELOPMENT SYSTEMS FOR GLOBAL IMPACT



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Transforming Agricultural Research for
Development (AR4D) Systems for Global Impact



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Executive Summary

The Global Conference on Agricultural Research for Development (GCARD) is organized by the Global Forum on Agricultural Research (GFAR), in association with the reform process of the Consultative Group on International Agricultural Research (CGIAR). The GCARD process is radically reshaping agricultural innovation and its significance in meeting key Millennium Development Goals.

The global fragmentation and under-resourcing of public innovation, education and advisory processes and weak linkages with wider development processes and with farmers, NGOs and the private sector, are major bottlenecks constraining the value and impact of agricultural innovation on the lives and livelihoods of the poor.

The contributions and dynamic interaction of thousands of stakeholders from all sectors have created the **GCARD Roadmap**, providing a clear path forward for all involved. The Roadmap highlights the urgent changes required in Agricultural Research for Development (AR4D) systems globally, to address worldwide goals of reducing hunger and poverty, creating opportunity for income growth while ensuring environmental sustainability and particularly meeting the needs of resource-poor farmers and consumers.

The GCARD Roadmap establishes an inclusive, rolling process of reform and capacity development that aims to mobilize the full power of agricultural knowledge and innovation towards meeting

agriculture and food-related development needs. It proposes a **six-point plan for transforming agricultural research for development around the world**, requiring actions from all those involved in the generation, access and use of agricultural knowledge:

- 1 The need for collective focus on key priorities, as determined and shaped by science and society,
- 2 The need for true and effective partnership between research and those it serves,
- 3 Increased investments to meet the huge challenges ahead and ensure the required development returns from AR4D
- 4 Greater capacities to generate, share and make use of agricultural knowledge for development change among all actors
- 5 Effective linkages that embed research in the wider development context and actions enabling developmental change
- 6 Better demonstration and awareness of the development impact and returns from agricultural innovation

The Roadmap shows that this transformation is the responsibility of all those who care about the future of agriculture and its role in development. “Business as usual” is no longer an option; the time for action is now.

1

The New Context of Agricultural Research for Development

Past successes in agricultural research and technology adoption have enabled a growing populace to avoid mass starvation and created much-needed food supplies. Yet, according to FAO and the World Bank, around a billion people still go hungry every day and 1.4 billion live in extreme poverty. Two thirds to three quarters of the poor eke out a living from agriculture and they, and the urban poor, critically need to increase their net incomes and purchasing power and depend on sustainable productivity growth in agriculture for affordable food. For the poorest people, GDP growth originating in agriculture is about four times more effective in raising incomes of extremely poor people than GDP growth originating outside the sector¹. However, at present we are not effectively realizing this potential, nor are we creating sufficient opportunity for those who lack their own land or who seek livelihood opportunities beyond primary production alone.

The Global Conference on Agricultural Research for Development (GCARD 1), and the preceding analyses, consultations and discussions culminating in the Montpellier Conference in March 2010², set out to address the key challenges and opportunities facing agricultural research, technology generation, knowledge dissemination and delivery systems. It identified the changes required in research and innovation systems so that millions of hitherto unreached resource-poor smallholder farmers and consumers can benefit from environmentally sustainable productivity growth and improvement in systems that can increase their food security and incomes to tackle the root causes of poverty, particularly in rural areas³.

GCARD1 recognized that, after decades of stagnation in public-funded agricultural

development investment and capacity, AR4D systems in many countries are weak and ill-equipped to deal with these huge challenges. Average agricultural research investments as a percentage of agricultural GDP in developing countries⁴ are 0.58%, compared with 2.4% in developed economies. By contrast, a few fast-growing economy (FGE) countries have seen very rapid growth in AR4D with consequent improvement in food productivity; China, India and Brazil together now account for nearly half of all public AR4D investments in developing countries.

The GCARD1 process strongly recommended that a radical restructuring and urgent revitalization of AR4D systems is now urgently required for many to effectively contribute to a significant reduction of hunger and malnutrition, to growth out of poverty and to addressing the many new challenges emerging in agriculture. Moreover, GCARD1 achieved a remarkable consensus that “business as usual” is not an option for AR4D and that these aims can be achieved only if:

- i) **All stakeholders work more effectively together** to address needs identified as most important for the poor and see themselves as true partners in AR4D, all playing their best possible roles to help create large scale development impacts worldwide on the lives and livelihoods of millions
- ii) **The capacities and investments required are put in place** to conduct necessary research, and transform its outputs into development outcomes

1 World Bank (2008) World Development Report 2008: Agriculture for Development. pp384

2 All reports and papers from the GCARD process can be accessed at <http://www.egfar.org/egfar/website/gcard>

3 GCARD (2010), *Transforming Agricultural Research for Development*. Report of the Global Author Team: U Lele, J Pretty, E Terry and E Trigo. pp264 www.egfar.org

4 the less economically-developed countries



- iii) **The millions of resource-poor small farmers in diverse environments**, along with all other actors in value chains and food systems, including consumers, form part of innovation processes from the outset, so that the generation of new knowledge is more responsive to development needs and research outputs are more relevant and accessible to the poorest.
- iv) AR4D and related knowledge-sharing actions with key outcome-focused themes are **embedded in the wider development**

agenda, with the required enabling environment to transform innovation into development outcomes

Transforming all AR4D systems thus requires attention **to both**:

- 1 Collective research and knowledge sharing on key outcome-focused themes globally**
- 2 Transformation and strengthening of agricultural innovation systems in developing countries**



Why a Road Map?



The GCARD clearly showed that AR4D systems need urgent transformation to better meet the needs of the poor and in particular those of resource-poor farmers and rural communities. GCARD 1 participants adopted the concept of a “Road Map” to address these challenges. Participants recognized that, rather than hoping for changed behavior in others, all stakeholders must play their own respective roles and commit themselves to action in improving AR4D, as a major contributor to goals of eradicating hunger and poverty while ensuring environmental sustainability⁵.

The GCARD Roadmap is a plan for urgent, collective action in AR4D, derived from the views and analyses expressed through the GCARD process. It matches **solutions** with short and long-term **goals** that can be reached through many paths. This roadmap has three major objectives, to: i) reach a consensus on important needs in transforming agricultural research *for development* and the solutions required to satisfy those needs; ii) provide an inclusive mechanism by which to look forward and iii) provide a common framework to plan and coordinate actions for development impact.

To address these challenges **far-reaching changes are required from all key stakeholders, through** a coherent stepwise approach over a sustained period. Changes in perceptions and behaviour will be required to bring tangible change in AR4D system structure and function. These will need to be objectively monitored and evaluated through end-user perceptions and real impact. Successive GCARD cycles will hence become important mutually accountable vehicles, for reporting and evaluating progress in transforming AR4D and its development impact.

The Road Map provides a plan for collaborative action for transforming and strengthening AR4D systems globally, in which **all stakeholders have vital roles to play**. Millions of smallholders are reliant on agriculture for their livelihoods and for opportunity for economic growth. The Roadmap thus particularly emphasizes **innovations that**

are driven by the needs of poor farmers and consumers and recognizes the needs of poor producers for associated mechanisms to enable rapid adoption of advances and equitable market access. It brings a major focus on improving national AR4D systems across all sectors, supported by international actions, including those of the reformed CGIAR and the restructured FAO.

Agriculture and rural development are highly context-specific and AR4D needs differ around the world. Most of the world’s poor and hungry people live in South Asia and Sub-Saharan Africa, but development needs are present worldwide and are changing rapidly with socio-economic shifts. All are influenced by climate change. AR4D must recognize the **multifunctional role of agriculture** and consider the inter-relationships between poverty, food and nutritional security, health and environmental resilience. Mobilizing and generating agricultural knowledge has a fundamental role in fostering better-informed policy choices and must be strengthened at all levels to **increase food supplies sustainably, keep production costs and food prices low, yet ensure high net returns to farmers and protect the environment worldwide**. These are challenging interactions, requiring collective action and sharing of knowledge, but particular trade-offs and benefits will vary depending on the socio-economic and agro-ecological contexts concerned and the policies followed. There are many lessons to be learned between regions from successes and failures elsewhere.

Transforming AR4D requires clear links between improved knowledge and its greater impacts in development, with innovation pathways, desired milestones and targets. These must also consider the learning and development required around new approaches and knowledge, while taking into consideration farmers’ risks, options and choices. These pathways need to be defined by individual developing countries in the context of their own development needs, plans and commitments. The Roadmap is policy-informing, not policy prescriptive and choices on production systems and institutional roles are made by sovereign governments. The GCARD aims to inform such choices through collective learning and feedback.

⁵ As proposed by Ismail Serageldin, Synthesis statement, GCARD 2010.



What is required of AR4D systems to increase their impact in development?

From GCARD1 it was possible to define **the characteristics of a well-functioning AR4D system** (Box 1). This creates clear expectations for all involved in the innovation process, from intended beneficiaries to advanced research and building out from national commitments. There is

a clear need to avoid past failures of AR4D systems, to contribute to achieving national development targets and to ensure benefits to resource-poor smallholder farmers and poor consumers and thus help meet key Millennium Development Goals (MDGs).

Box 1: A well-functioning AR4D system is one that is committed to action for impact and that:

1. Inclusively defines key AR4D **priorities and actions**, driven by evolving national, regional and global development needs
2. Invests in ensuring **equitable partnership and accountability** among all stakeholders in agricultural innovation and developmental change
3. Actively **achieves increased investments** in human, institutional and financial resources for AR4D **systems to meet demands in development**;
4. Develops required **human and institutional capacities** for generation, access and effective use of agricultural knowledge in development;
5. Effectively **coordinates linkages relating innovation to development programmes** and policies;
6. Demonstrates its value and gains recognition by society through **involvement of stakeholders in effective demonstration and reporting of outcomes**.



4 The Challenges and Opportunities in Transforming AR4D

The constraints and opportunities of AR4D have been well documented in previous analyses, including the World Development Report 2008 and the 2009 report from the International Assessment of Agricultural Knowledge, Science and Technology for Development⁶, as well as in the regional and global reports and synthesis report developed through the GCARD process.

The major challenges to be overcome include:

At the national level in many developing countries:

1 A lack of political commitment to invest in AR4D resulting in a huge gap in investment and capacity required in AR4D.

2 Inadequate attention to the many contextual factors required, including enabling policy environment, good governance, institutional and human resource capacity, capital investment for trade, infrastructure, finance, mobilization of farmer and community entrepreneurship and management of related risks, all of which impact on agricultural production and productivity of smallholder farmers.

3 A poor linkage between research processes and the development agenda, in particular the wider enabling policies, investments and mechanisms of rural development, as well as wider issues such as nutrition, health and markets.

4 A lack of involvement of all relevant stakeholders in agricultural research, technology development and learning frameworks and actions.

6 Agriculture at a Crossroads: The Global Report, (2009) International Assessment of Agricultural Knowledge, Science and Technology for Development Eds: BD McIntyre, HR Herren, J Wakhungu, RT Watson. pp606, Island Press



5 The difficulty of defining national AR4D priorities and actions and lack of effective mechanisms to put these priorities into action through national and regional AR4D organizations, to build equitable partnerships and to conduct relevant research addressing poverty, food security and environmental sustainability needs.

At the regional level:

- 6 The difficulties encountered in integrating actions at regional level**, due to the complexity of social, cultural, political and environmental factors among nations.
- 7 Under-resourced regional organizations and networks**, with limited ownership and involvement across the range of national AR4D stakeholders, compared to what is now required.
- 8 A lack of wider international political commitment** to support regionally-organized actions and development organizations and to share technological innovations

At the global level:

- 9 The as yet incomplete reform of the CGIAR and** challenges in creating operational synergies between CGIAR centers and with their partners.
- 10 Insufficient commitment to collaborative actions on a global scale** and the need for integrated, synergetic mobilization of international stakeholder networks and research and development initiatives.
- 11 Impacts of inequitable trade worldwide, compounded with emerging issues with strong adverse effects** such as climate change, water scarcity and trans-boundary diseases, each leading to increased vulnerabilities of the poor.

Yet there are many opportunities, for example:

At the national level

- 1** Renewed **recognition in government policies of the role and impact of agriculture**

as a major driver of economic and social development for both the rural and urban poor and new investments and funding mechanisms following the recent food price crisis

- 2 Growth of ICTs and new roles of advisory services hastening knowledge access** even in remote areas
- 3 Growing inclusion of resource-poor farmers in markets** and strengthening of small rural-based enterprises and producer companies, creating opportunities for economic growth.

At the regional level

- 4 Integrated regional policies** to improve collective actions, such as the CAADP Pillar IV in Africa
- 5 Value of multi-stakeholder Regional Fora** in facilitating actions for development along the agriculture, food and nutrition value chain
- 6 Collective actions addressing shared challenges** on a larger scale e.g. the Rice-Wheat Consortium for the Indo-Gangetic Plain, international research for development programmes, action-oriented networks and issue-based consortia.

At the global level

- 7 Political recognition of the role of AR4D**
- 8 Reform of international agencies** such as the CGIAR and FAO, to become more smallholder producer and impact oriented.
- 9 Growing recognition of GFAR** as the open and inclusive mechanism for action among all stakeholders and the GCARD being the common instrument for achieving change
- 10 Increased role of the fast-growing economies** as providers of technologies and learning opportunities for other regions.
- 11 Technologies** for more developed agriculture, including those developed by both science and farmers and technologies for processing and value addition that are now finding increasing application in developing countries.

5

Who needs to be involved?

The GCARD2010 identified the stakeholders that need to be mobilized at the national, regional and international levels to meet these challenges with each as an owner of the process of transforming the generation and use of agricultural knowledge and technologies *for* development. Here we consider the needs and aims of resource-poor farmers and consumers to be at the centre of the AR4D system:

- Civil society, including in particular smallholder farmers and farmer cooperatives/producer companies, community organizations and non-governmental organizations at all levels, from local to national, regional and international and with particular need for inclusion of women and the more vulnerable groups;
- National publicly funded agricultural research, education and advisory institutions and institutional combinations of these roles;
- Private sector, including small, medium and large agricultural input and agri-food enterprises, service providers, banks, insurers and the agribusiness and marketing sectors and ethnic diasporas now spread across the world;
- National policymakers of economically developed and developing countries and in regional political and technical organizations;
- Multi-stakeholder Regional Fora, mobilizing advocacy, institutional transformation, knowledge sharing and regional actions towards large-scale development impacts.
- Institutions of international agricultural research, in particular the CGIAR, the national institutions in fast-growing economies, advanced research institutions and professional societies addressing agricultural and associated fundamental science;
- Those supporting the use of agricultural

knowledge in development; e.g. the UN agencies, national rural development institutions, ICT providers, micro-finance and micro-insurance agencies, farmers organizations and legislatures and those concerned with related agendas e.g. health, nutrition, trade and environmental sustainability;

- Donors and other development assistance agencies, including bilateral and multilateral institutions, development banks and investors; and private foundations;
- The media.

Rather than starting from a technology and its potential promise, transforming AR4D requires thinking based on delivering the outcomes desired by and for the poor and how knowledge generation, access and use can help lead to these. Old models of linear innovation pathways and institutional silos no longer hold in today's rapidly changing agricultural systems and stakeholders are interconnected in multiple directions and pathways across a spectrum of interactions, depending on the context concerned.

The GCARD process has redefined the role of the Global Forum for Agricultural Research (GFAR) as the open and inclusive multi-stakeholder mechanism for catalyzing these changes. GFAR is not an implementing agency in itself, but brings together the AR4D institutions, stakeholder networks and practical programmes active across all sectors to address their common strategic needs in: i) policy advocacy, ii) inter-regional and global partnership, iii) institutional strengthening and iv) knowledge sharing. The role of the GFAR mechanism in the transformation of agricultural research *for* development systems worldwide is a crucial function, recognized in the G8 L'Aquila

Statement on Food Security, 2009. This Roadmap establishes the common path to do so, relevant to and involving all sectors and stakeholders and in a frame built through subsidiarity, from local/national needs and actions, to regional and hence to the global frame.

As the main international agricultural research system, the Consultative Group on International Agricultural Research (CGIAR) also has a critical role to play in furthering these changes. The reform of the CGIAR towards outcome-oriented programmes in a more open and inclusive international system creates tremendous opportunity to add value to national capabilities and for working in collective actions via equitable partnerships addressing agreed national and regional development objectives. These principles and the new focus of the CGIAR are laid out in the CGIAR's Strategy and Results Framework (SRF), which defines the goals and expectations of the reformed system and how it aims to work with partners and other stakeholders. The GCARD itself provides a crucial mechanism of public accountability for the value of the reformed CGIAR system and its programmes, to help shape and strengthen the value of the reformed system to better meet its purpose and the needs of national partners of all forms.





Strategic Elements of the GCARD1 Roadmap

Defining actions, required roles, desired outcomes and milestones

The GCARD Road Map aims to transform AR4D globally, from its current fragmented status to more coherent and cohesive systems for greater impact. Its goal is that agricultural knowledge, science and technology should play their fullest possible roles in removing poverty, hunger and malnutrition from the world. To do so, collective actions are required to develop each of the **six essential characteristics** of well-functioning AR4D systems defined through the GCARD 2010 process:

Inclusively defines key AR4D priorities and actions, driven by evolving national, regional and global development

(a) Strategic elements

AR4D systems need to be focused towards achieving defined development impacts,

recognizing the complex realities in which these occur. Defining national development priorities and effective AR4D actions among diverse partners is not a straightforward process. It requires political will to frame innovation in a way that learns from the past. It requires changed mandates that take a broader view of agricultural innovation, new operational norms and methodologies which are both standardized and flexible, better planning and learning from actions and better use of existing knowledge into these processes. It requires accountability to those served by AR4D, as well as those paying for the work. Priorities need to integrate science with development in consideration of issues such as sustainable intensification, better access to safe, nutritious food by vulnerable communities, increasing agricultural incomes through value-adding post-harvest management and creating entrepreneurial opportunities for resource-poor smallholder farmers and producers. In these processes, better use of existing knowledge and generating new knowledge are themselves essential tools for understanding policy trade-offs and useful synergies, to meet both the pressing nutrition

and income needs of the rural poor and the food demand of increasingly urbanized populations, while ensuring the sustainability of production and food systems.

The GCARD 2010 process has identified key AR4D themes and actions

on a global scale, reflecting the research and development needs of developing countries through a multi-stakeholder review and consultation organized by the Agricultural Research Fora in each region of the world (AARINENA, APAARI, CACAARI, EFARD, FARA and FORAGRO), together with issues identified by the analyses of the CGIAR and the international agricultural development priorities agreed by Governments through the processes of FAO, the World Bank and other UN agencies. Despite obvious regional and contextual differences, global integration and GCARD discussion of these analyses has found considerable congruence in priorities identified in key areas where AR4D actions are most required and the form and function these should take. These now need to be taken back into national and regional contexts and mapped against the incidence of poverty, food and nutritional insecurity, environmental degradation, etc. and potential partnerships entailed, to determine where interventions can bring greatest benefits and impacts.



Improved foresight is essential if development needs and future priorities are to be prioritized and create a clear view of new challenges as they begin to emerge. Forward-looking, anticipatory research and analysis needs to integrate a range of perspectives on key issues, making use of the best available data and interpretations from different sources and directly integrating the diverse views of farmers and other stakeholders on specific problems, so that important issues are examined through multiple 'lenses'. Each approach here may resolve only part of the story, but together they can produce collective best-bets on future needs, recognizing the benefits and trade-offs among potential policy options. Climate-change analyses already show the value of such an approach.

(b) Required Roles

National institutions in charge of research priority setting must; i) connect with strategic planning and work from a basis of desired development outcomes identified in rural development, food security and agricultural plans and commitments, ii) adopt an inclusive process involving all relevant stakeholders and centred on meeting the needs of the poor, iii) ensure a diversity of options are considered including use of traditional knowledge, conventional approaches and new technologies, iv) determine actions based on available skills and resources including those from the private sector and the civil society and v) evaluate technologies and knowledge that can be accessed from external sources.

Multi-stakeholder regional and sub-regional fora must be strengthened to better include the perspectives of diverse stakeholders and help shape innovation policies and capacities in each region. This strengthening requires strong engagement with all stakeholder constituencies, commitment and funding support from national and regional development organizations and support from international agencies working across and into regions. AR4D fora must engage with regional policy organizations and development banks to derive regional agricultural research and innovation priorities, which in turn are embedded into wider development processes. Opportunities

for sharing information, including success stories and stimulating regional collective actions, should be examined to enhance both speed and efficacy of change. Potential technologies and actions need to be cross-linked through discussion and agreement among partners that can help fulfill each part of the processes required.

At inter-regional/global level, the GFAR mechanism should catalyze and mobilize the linkages and processes required among international research implementers such as the CGIAR, advanced research institutions, the institutions of the fast-growing economies and international policy bodies such as FAO and UNDP so that these add capacity and value to national and regional prioritization processes through expert advice, analysis and awareness on issues and opportunities affecting the potential of AR4D to better meet national development needs.

The need for improved foresight must be addressed by mobilizing expert analyses within countries to analyze specific themes of concern and bringing together, via GFAR and the regional Fora and on a coherent and regular basis, the diverse national and international initiatives to examine relevant development scenarios through different lenses, learning from the outcomes of the different models and perspectives employed. Alongside this, wide stakeholder consultation will be mobilized through national and regional fora, to 'ground-truth' the realities and impacts of trends among poor rural communities.

(c) Desired outcomes and milestones

- **Current and future AR4D agenda and priority setting at National, Regional and Global levels to be an evolutionary and inclusive process among all AR4D stakeholders, based on use of the best available knowledge.**

By GCARDs 2 and 3, milestones will be measured as:

- i) Experiences and learning in establishing National, Regional and Global multi-stakeholder planning and monitoring systems for AR4D prioritization and implementation.
- ii) Number and quality of Regional and Global Partnership Programmes and initiatives, including, those of the CGIAR, addressing common and cross-cutting challenges through innovative multi-stakeholder actions in agreed frameworks;

- **Future agricultural scenarios projected by multi-stakeholder cross-referenced analyses, to better identify new knowledge needs and shape research required.**

- i) Foresight academy consortia established to address future needs in national and regional contexts.
- ii) Coordinated foresight actions established at international level to stimulate and integrate diverse analyses of key issues and their projections.



6.2

Invests in ensuring equitable partnership and accountability among all stakeholders of agricultural innovation and developmental change

(a) Strategic elements

Food security and agricultural development are the responsibilities of sovereign governments.

Development impacts depend on national strategies and commitments around national innovation systems. These must involve public, private, community and civil society actors and reconcile their different aims and interests through common principles of partnership; developing shared objectives, agreed roles and responsibilities, transparency, trust and understanding and mutual accountability for success.

Effective and equitable partnership is essential to reduce fragmentation in the system and enable each actor to deliver their best value in a wider frame of actions towards impact.

For this, the interests of intended beneficiaries; in particular poor **farmers and consumers** must now be represented directly in the shaping and implementation of research. Farmers are also innovators and should be seen as partners in innovation systems, bringing great returns for the poor and sparking new lines of upstream research.

Traditional partners in the sharing of knowledge and learning are rapidly being enhanced or at times even displaced by ICTs while service delivery is increasingly provided by private and civil rather than public organizations. ICTs are having a tremendous impact in breaking through barriers of language, culture and institutional separation to provide many new linkages and opportunities, even in remote locations.

The increasing role of the private sector, NGOs and professional farmer organizations as service providers linking science and society must be recognized in entrepreneurial opportunities, as well as all being key contributors in generating and transforming knowledge into innovative products

and services. Intellectual property is emerging as a key element to consider in ensuring access to agricultural innovation of all forms. Clarity is needed at all levels as to who benefits from new approaches and how those least able to pay can still be included or protected in the application of new technologies in order to avoid further exacerbating the problems of the poor.

The international architecture of agricultural research is changing rapidly. In line with the Paris and Accra Declarations, the active participation of **developing countries** in the design, implementation and definition of targets for international research and in establishing shared objectives and commitments, is essential for maximizing value addition and impact from international actions. In return, identifying global targets can be useful catalysts in helping countries to revisit their research and development objectives and frameworks and examine how best international AR4D might help deliver desired national outcomes. **Advanced research institutions** (ARIs) are important partners to national systems, either directly or via international research intermediaries and leading-edge science has much to offer if harnessed towards development objectives. ARIs now include institutions of the fast growing economies (FGEs) and it is important to determine how these new international actors can best support AR4D capabilities in other countries and participate in inter-regional activities.

(b) Required Roles

True partnership requires investment of time and attention and equitable relationships that have to accommodate vastly different scales of resources and very diverse perspectives, knowledge and contexts. **National AR4D** policymakers and research institutions must develop bottom-up

decentralized processes to engage effectively with communities and stakeholders, to better understand their needs and perspectives and integrate these into effective and equitable partnerships.

Strengthened Regional Fora, equitably inclusive of all sectors, will catalyze international actions between countries and inclusive partnership with actors such as farmers organizations, NGOs and the private sector (SMEs, input suppliers and markets), into regional and inter-regional actions geared to meeting development objectives. **International Centers in and beyond the CGIAR, including ARIs and FGEs, must** exploit to their fullest their partnership potential with national systems, regional and global networks and the private and other sectors and development organizations, so that each plays its most effective role, complementing and adding value as a global pool of capabilities and with clear strategies for enabling transition of innovations and roles to national partners. For success, funding bodies will need to invest more in the equitable formulation of and learning from AR4D processes and not just their implementation. GFAR, through mentoring the GCARD process, will catalyze structured in-depth consultations to examine **the**

opportunities and implications of the new AR4D architecture in addressing and resourcing major themes.

(c) Desired outcomes and milestones

Development outcomes enhanced through national AR4D systems that fully recognize the multi-stakeholder nature of innovation in their planning, delivery and learning and work through common principles of effective partnership:

- Documented shifts in research funding & monitoring systems to incorporate partnership principles.
- Equitable Partnership Principles and IP procedures put into practice at all levels, within the new AR4D architecture and equitable partnerships fostered by strengthened multi-stakeholder Regional Fora.
- Change in attribution and reward systems used by AR4D institutions to better value development objectives and contributions of each partner.



6.3

Actively achieves increased investments in human, institutional and financial resources for AR4D systems to meet demands in development

(a) Strategic elements

The CGIAR estimates that to deliver developmental outcomes on the scale required to meet the major challenges that lie ahead

and in view of the enormous investment backlog already caused by the under-funding of the past two decades, it will be necessary to **triple the global scale of investment** in AR4D over the next 15 years⁷. Beyond direct national AR4D investments, increased national investments and aid flows will also be needed in the wider rural development (e.g. in rural infrastructure, water access and education) and food systems required to achieve large-scale impacts from AR4D outcomes.

For agricultural innovation to deliver effectively towards desired development outcomes, it is also essential to pursue **more integrated and effective investments, based** on the principles of Paris and Accra. This also requires coherent and effective **investments** among AR4D actors supporting national actions and their outcomes, including the CGIAR, the ARIs and the research centers in the FGEs. Increased funding will require strong **evidence-based advocacy** to demonstrate the value of increased and sustained investment in research, training and delivery systems.

(b) Required Roles

Government commitments must lead these processes and stimulate efforts from others, also mobilizing contributions from the private sector and civil society and international development assistance and AR4D actors.

National Agricultural Research and Innovation Systems

should consider their investment commitments in light of the new societal needs and priorities identified, via inclusive processes involving all relevant stakeholders. National systems should develop strategies on what technologies and knowledge can be generated or mobilized nationally, what capacities and investments are needed to do so and how to access new capabilities, technologies and knowledge from external and international sources.

International and national funding agencies

together need to greatly increase their investments from the 2010 base, while also improving expenditure quality and accountability. Financial support for AR4D must provide flexibility for institutions to innovate and recognize the long-term nature of research and development investments. More integrated strategies must be developed for improving the effectiveness of aid flows for national and global AR4D systems, explicitly aligning bilateral and multilateral investments in research with those in wider development.

Regional fora should document and track investments and returns

from research and development investments, building from national to regional commitments, linking with the policy and investment bodies responsible and working with governments, regional development banks and supporting donors as well as the farmer, private and NGO sectors. Regional **and global intergovernmental policy organizations** must commit to increase well-coordinated investment and human resource development in AR4D and help ensure that national and international efforts attain the levels of investment required to meet nationally-established targets towards key MDGs. Multi-country arrangements must be

⁷ A Draft Strategy and Results Framework for the CGIAR. For discussion at the Global Conference on Agricultural Research for Development (GCARD) 20 March 2010, CGIAR <http://alliance.cgiar.org/strategy-and-results-framework-and-mega-programs>

developed within and between regions and sub-regions, to increase the spillover effects of existing investments and capacities, making use of new 'South-South' opportunities for sharing knowledge and advances.

International research actors including CGIAR, ARIs and research centers in FGEs have valuable roles to play, in mobilizing and leveraging investments for international research and in advocating the need to build national AR4D system capacities to effectively fulfill and sustain actions required. Experiences of FGEs in the development of agricultural research, education and advisory systems can also provide valuable supporting arguments for leveraging national and international resources and investments in AR4D systems globally.

GFAR provides the inclusive and objective mechanism and GCARD the regularized process required **for monitoring investments and high-level advocacy for increased investment** in the sector, on behalf of all AR4D stakeholders

(c) Desired outcomes and milestones

National research investments reach a target value of 1% of agricultural GDP by 2025 and rural development investments to reach 10% of agricultural GDP by the same date.

To achieve these, GFAR constituencies must work together to address the vast investment gaps in AR4D and linking research investments to wider development commitments:

- Advocating, monitoring and reporting investment commitments by both developing and developed countries from the baseline year of 2010.
- Mobilizing expertise to help national, sub-regional and regional research organizations to improve and track the quality and performance of AR4D investments and partnerships, with enhanced accountability for results.
- Advocating the strong potential contribution of AR4D into high-level policy fora.



6.4

Develops required institutional capacities for generation, access and effective use of agricultural knowledge in development

(a) Strategic elements

The need for greatly increased local and national capacities of AR4D actors is clear and urgent in many countries, most critically so in countries recovering from protracted conflict or crisis. Developing the required new AR4D capacities demands better analysis of needs and concerted policies and actions at all levels along the innovation pathways concerned. The reform and strengthening of national AR4D systems must help them to be more inclusive, more coherent, more focused and more accountable to those they serve.

Agriculture is an ageing and undervalued profession in many countries and special attention must be given to encouraging young people into careers in all aspects of AR4D and to encouraging and involving women into roles in AR4D, in particular into senior positions. Better career incentives, including financial reward systems,

infrastructure/facilities and societal worth need to be provided to attract the best talent at all levels and to retain trained researchers and advisers. It is important that young people themselves help express what changes are needed in agricultural education and incentives to make careers more attractive and valued and better recognize the range of roles now required in AR4D. This also requires a shift in thinking and knowledge generation to bring best opportunity in roles that will bring aggregate value to agricultural production, including marketing, processing and distribution and their associated innovation, knowledge and financing needs.

Research and innovation value and reward systems, for both institutions and employees, need to be radically revised to take better account of development value and 'client' relevance, encourage collective capacities and foster coherence, integrate new approaches with



agricultural realities and increase the contribution of agricultural science to society.

Actors and capacities involved in the dissemination of knowledge and sharing of learning are changing significantly. Civil society and the private sector are playing increasing roles and research/extension/education institutional divides are disappearing. Farmer's own innovation is increasingly recognized in participatory research and experiential-learning, but these need to be linked to wider AR4D knowledge and input access for farmers to benefit from the range of opportunities available. The new roles and partnerships of those compiling, integrating and transforming agricultural knowledge into innovative practices, technologies and enterprises, need to be adequately resourced and supported to deliver the impacts at scale that are now required. Developing collective capacities to engage with markets through producer companies and enabling inputs on farm and in value addition processes, such as by micro-finance and micro-insurance, are increasingly important capacity requirements for market supply and quality needs to be met.

Regional capacity development partnership is needed to: i) generate economies of scale in collaborative AR4D, ii) foster inter-country and inter-regional cooperation, learning and exchange of experiences and develop national capacities and iii) promote more effective regional and sub-regional collaborative research and networking to make better use of available resources and enhance capacity development in the smaller and weaker national systems. Countries devastated by protracted conflicts are particularly vulnerable and warrant particular attention in rebuilding trust systems and capacities in AR4D, as essential elements of both enhancing their food security and rebuilding communities and livelihoods.

(b) Required Roles

At national scale, clear policies and principles for capacity development must be applied to transform and build up national systems, **linking education systems directly with research and advisory institutions** and bringing together

public, private and civil actors and the required policy and investment commitments to:

- Better meet development demand, particularly recognizing the needs of the disadvantaged;
- Promote better AR4D incentives, including new value and skills rewards systems directly relevant to development;
- Improve awareness, mentoring and rewards to attract the brightest and best into agricultural careers.

Regional and global intergovernmental organizations, CGIAR, ARIs and FGEs must optimize capacity development through coherent and shared actions, targeting countries where the needs are greatest and quickly overcoming capacity needs through learning from experiences and capabilities elsewhere. The convening role of Regional and Global Fora and their functions in the sharing of knowledge and innovation between regions is crucial in facilitating capacity strengthening and networking of skills where required to support national development processes and hasten development through inter-regional learning.

(c) Desired outcomes and milestones

Effective scale of national AR4D systems established to meet agriculture-related development needs, educational systems linked directly with agricultural innovation and new value systems for a development outcome focus:

- i) National policies integrate roles of education, research and advisory institutions, with curricula and reward systems revised to better meet new and future AR4D career needs, particularly for women;
- ii) Concerted international platforms/networks enable learning and tangible capacity outcomes between countries and regions;
- iii) Capacity needs of states emerging from protracted conflict addressed via learning from experiences elsewhere and mobilization of international supporting efforts.

6.5

Effectively coordinates linkages relating agricultural innovation to development programmes and policies

(a) Strategic elements

To contribute effectively towards development outcomes, it is essential that the generation and use of new agricultural knowledge is linked with the enabling environment required, in particular to enable resource-poor producers to grow from poverty through on- and off-farm opportunities related to agriculture and food (e.g. in market opportunity, producer companies, microfinance, value addition, land access etc.) to translate innovations into changes and impacts on the ground and in particular among the intended beneficiaries of research: the hitherto un-reached farm households, consumers and public. Poor linkages between research processes and those enabling wider rural development and between national, multilateral and bilateral development assistance in support of these, are collective failings of AR4D systems around the world.

Resolving these needs requires a clear outcome-based approach, integrating research into development processes and linking actions in each. Outcome based planning and coherent actions, aligned with national strategies and plans, must make use of pathways of innovation and research that address the value chain from seed to plate and aim to increase returns to poor farmers at all levels, as well as identifying and developing viable alternative livelihood opportunities for those unable to take up innovation products and be competitive producers. This also enables identification of key interventions required to remove blockages and barriers to large-scale impacts.

Closer linkages with other development sectors are required, particularly with health and nutrition, education, governance, infrastructure and finance, recognizing the vital multiple functions

that successful agricultural systems, and in turn agricultural knowledge, play in development, societal growth and stability. A more holistic approach is needed, going far beyond productivity alone, to integrate food security and nutrition, livelihoods and environmental sustainability, recognizing the mutual synergies and trade offs in achieving each. An example of such an integrated policy and practical approach already exists in Africa, with the Comprehensive African Agricultural Development Programme (CAADP) and within this the Framework for African Agricultural Productivity.

Wider perspectives themselves throw up innovative AR4D, for example in value addition, reducing food chain losses and greater understanding of constraining factors such as land rights that may otherwise negate AR4D impacts for the poor. For all stakeholders in poor-farmer agriculture & food systems and along value chains to be able to take advantage of new knowledge, we need greater understanding of the organizational requirements of collective actions and enterprises. This requires organization from local through to global levels, to better articulate collective needs and demands and engage more effectively with the shaping and implementation of AR4D.

(b) Required Roles

GFAR stakeholders should examine the policy and investment linkages between innovation and development at all levels; country by country and region by region and work to ensure that i) AR4D investments and innovation pathways are directly contributing towards wider development commitments and ii) that development policies take full account of agricultural research and knowledge sharing in their formulation. Some FGEs provide useful illustrations of the returns to be obtained from such an approach and their



experiences need to be shared.

- **Smallholder farmers and poor consumers**, at the centre of the agenda, need to be better involved to better understand and manage risks and opportunities in the adoption of new practices.
- **Policy makers** will examine linkages between agriculture, health, finance, environment and other sectors to create more joined up systems of planning and investment that relate to policy frameworks.
- **AR4D actors will review and seek to improve** alignment of investments in research and innovation with those in rural development, food systems and markets, with a particular attention to public-private and public-CSO partnerships for effective delivery.

(c) Desired outcomes and milestones

Agricultural research for development actions embedded and institutions integrated with processes enabling rural development.

- Research elements successfully incorporated into national strategies and investment plans such as those prepared in Africa under the CAADP process.
- AR4D mapped against national development and investment plans and Ministries brought together for coherent actions on key development agendas relevant to AR4D.
- Strategies developed for regional actions and investments that address key large scale AR4D themes through regional and inter-regional actions, aligned with government roles and regional policy commitments.
- Better documenting the impact and returns from agricultural innovation and knowledge in development processes, so that these are better recognized in the formulation of strategies and investments.
- International agendas such as the L'Aquila Food Security Initiative on investment and policy actions of UN agencies incorporate medium-long term research and knowledge-sharing components within their thinking and planning.

6.6

Demonstrates its value and gains recognition by society through involvement of stakeholders in effective demonstration and reporting of outcomes

(a) Strategic elements

Effective transformation needs processes with clear reporting and accountability against time-bound aims. These must be built on objective data and key indicators that enable (i) keeping track of changes and their results, and (ii) transparent feedback to all concerned stakeholders about progress on the transformation strategy and its implementation. At present, baselines are limited and appropriate measures are lacking beyond crude production data. The link between research outcomes and development impacts also lacks the hard evidence needed to convince investors of the value of the sector. M&E systems should also recognize the evolutionary nature of any research programme and track changes and perceived development value as part of the management of innovation processes themselves. There is a clear need to mobilize and integrate the systems and networks that monitor and report on investments and impacts in AR4D at local, national, regional and global levels.

(b) Required Roles

National

- Develop a baseline analysis of the state of the AR4D system, starting with 2011 and including all partners (Private Sector, Universities and Foundations) currently not included in the research and reporting and report on global commitments at the strategic level;
- Track improvement in the capacities, incentives and management systems in which national and regional organizations seek reforms. Ensure countries are able to develop and use the databases concerned as tools for policymaking for their countries;

- Develop and report a transparent registry of actions, commitments and responsibilities by national and international actors in strengthening the role, value and impact of agricultural research for development;
- Develop innovative bottom-up feedback systems that directly engage the perspectives of intended beneficiaries in the evolution of, and learning around, large-scale programmes as they are implemented and replicated;

Regional

- Support a permanent region-by-region mechanism for the development of key indicators on investments and capacities in research, human resource development and institutional innovations in support of food security, poverty reduction and increased environmental sustainability;

Global

- GFAR to facilitate the above linkages in partnership with key stakeholders and ensure the wide dissemination of results to those concerned with AR4D at least every two years at successive GCARDs and to policymakers in the G8 and G20; and
- Continue to develop new means of determining impact from international research that consider environmental and social impact measures and outcomes, that can be applied to assessments of investments in international research including the CGIAR Research Programmes.



(c) Desired outcomes and milestones

Innovative impact assessment processes and demonstration of transformed AR4D systems and their development benefits, with mutual accountability and participatory monitoring by intended beneficiaries to document impacts of AR4D and increase its societal value, using measures and media that go beyond scientific publications to include criteria relevant to a broad

range of development impacts and their public communication.

- Collective success stories captured and disseminated at national, regional and global levels.
- Mechanism established for monitoring key indicators and investments by 2012.
- Beneficiary feedback systems piloted in at least 2 major AR4D programmes by 2012.

Roadmap Conclusion

The six-point plan for action outlined in this GCARD Roadmap and developed via the GCARD process, sets out collective principles and actions for all those involved in AR4D systems. These are essential changes to meet the agriculture-related needs of the poor and to create



effective policies and practices through knowledge and interventions. Transforming and strengthening AR4D will require our collective actions across these areas, with stakeholders learning and innovating together, a convergence of policies and resources, changing institutions, attitudes and values, and creating innovative systems for accessing and transforming agricultural knowledge into impacts. Developing required capacities and attracting and retaining skilled young people in new and rewarding agricultural careers is a key need.

GCARD participants highlighted very practical actions for the transformation of agricultural research *for development* across these six key principles and at all levels, from national to global. The Roadmap recognizes that rural poverty is determined by many factors, for which agricultural innovation can only provide a part of the answers. Enabling rural development requires direct national support to the AR4D sectors concerned and that governments also address issues such as availability of land and water assets, access to financial services, farmer skills and organization, integrating local and regional markets and better managing risks.

Moving away from business as usual requires all involved to make these processes specific to their own contexts and needs. As the Roadmap challenges institutional divides and transcends the conventional boundaries of disciplines, effective collaboration must be forged among diverse stakeholders to provide technological, socio-economic and policy solutions. The GCARD process and strengthened local, national, regional and international fora are crucial to working beyond institutional self-interest, promoting collective actions and bringing mutual accountability for progress at all levels.

The widespread food riots in many parts of the world 2 years ago and the recent return of high food prices clearly show that food security is essential for the maintenance of peace, prosperity and stable governments. Adoption of this new holistic approach to AR4D will make significant contributions to the attainment of all eight Millennium Development Goals. Stakeholders must

commit at all levels if the future value of agriculture is to be achieved. GCARD 2010 provided a powerful and vocal launch-pad to secure the required commitments for the Road Map. These concepts must now be made constantly known by all involved to developing country governments, policy makers, the media and the farming community. It is only through such concerted efforts that change will happen.

Building from the GCARD outcomes, the constituencies brought together in GFAR must now focus on rolling out the Road Map's implications, transforming global principles into concrete local, national and regional actions. Our collective progress will be reported at GCARD 2012, against our joint aims to foster collective research and knowledge sharing on key development-outcome focused themes and transform and strengthen agricultural innovation systems in developing countries. The GCARD also provides a clear mechanism for the reform of the CGIAR to be linked with wider processes of AR4D as a catalyst for wider collaborative action and impact and as a means of transparent public accountability for the work of the CGIAR.

The successive cycles of learning and reflection established through the GCARD process will enable all parties involved in generating and using agricultural knowledge to determine their collective progress in fulfilling these aims.

This roadmap enables and requires all involved, from resource-poor farmers and consumers to researchers, to now take up their own responsibilities and actions, working collaboratively with others to better meet the huge development challenges ahead. GFAR involves all of us and depends on all of us working together and each playing the roles required to make real change. The Roadmap is relevant and empowering for all of us and tackles the issues that no one institution can solve by itself. Only in this way can we rethink and revitalize systems for the generation and use of agricultural knowledge and ensure that agricultural innovation plays the role it must, if key development goals are to be met.

Annex 1: Acronyms

AARINENA	The Association of Agricultural Research Institutions in the Near East and North Africa
APAARI	Asia-Pacific Association of Agricultural Research Institutions
AR4D	Agricultural Research for Development
ARIs	Advanced Research Institutes
CAADP	The Comprehensive African Agriculture Development Programme
CACAARI	The Central Asia and Caucasus Association of Agricultural Research
CGIAR	Consultative Group on International Agricultural Research
CSO	Civil Society Organisations (as defined on p6),
EFARD	European Forum on Agricultural Research for Development.
FAO	Food and Agriculture Organization
FARA	Forum for Agricultural Research in Africa
FGE	Fast Growing Economies
FORAGRO	Regional Forum of Agricultural Research in Latin America and Caribbean
G20	Group of Twenty
G8	Group of Eight leading economies (France, Germany, Italy, Japan, United Kingdom, United States, Canada, Russia)
GAFSP	The Global Agriculture and Food Security Program (a multilateral financing mechanism)
GCARD	Global Conference on Agricultural Research for Development
GDP	Gross Domestic Product
GFAR	Global Forum on Agricultural Research
IAASTD	International Assessment of Agricultural Knowledge, Science and Technology for Development
IAR4D	International Agricultural Research for Development
ICT	Information and Communication Technologies
M&E	Monitoring and Evaluation
MDGs	Millenium Development Goals
NGOs	Non Governmental Organizations
R&D	Research and Development
SMEs	Small and medium enterprises
SRF	Strategy and Results Framework
UN	United Nations
WBR	World Bank Report

Photo captions

Cover: A young Maasai herds-woman enjoys a cup of fresh milk as she tends the family herd, in the village of Makutere, Morongoro district, Tanzania. ©FAO/*Giuseppe Bizzarri*

Page 4: Farmers digging terraces with hand tools in Zheng Jia Lou, Sichuan Province, China. ©FAO/*Antonello Proto*

Page 7: Woman sifting hybrid rice in Hyderabad district, India. ©FAO/*Giuseppe Bizzarri*

Page 8: Women from the Lalari Karfi village in the Zinder region of Niger, collecting water from a communal well. ©FAO/*Issouf Sanogo*

Page 10: Cattle waiting to be fed at a national livestock development board farm in Mahaberiyathenna, Sri Lanka. ©FAO/*Ishara Kodikara*

Page 11: A farmer from the Mount Kenya region tends her potato field ©CIAT/*Neil Palmer*

Page 12: A worker collecting eggs at a poultry farm in Gharbia Governorate, near Cairo, Egypt. ©FAO/*Giulio Napolitano*

Page 15: A scientist transfers a sample into a vial to be used as a marker in the analysis of chemicals present in water samples from nearby farming communities in Dakar, Senegal. ©FAO/*Olivier Asselin*

Page 16: A young child enjoys his meal, a result of work to improve the nutritional value of foodstuff in Latin America. ©CIAT/*Neil Palmer*

Page 18: A farmer woman cultivating a rayo crop (big leaf mustard) in Arman-6, Nepal. ©FAO/*Sailendra Kharel*

Page 19: Upland rice growing near Caranavi, Bolivia. ©CIAT/*Neil Palmer*

Page 21: Improved techniques of animal traction using new steel implement to remove weeds and Bermuda grass in Tunisia. ©FAO/*Florita Botts*

Page 23: The cassava harvesting tool, which is gaining popularity in Dak Lak province on Vietnam. ©CIAT/*Neil Palmer*

Page 24: Women workers in a nursery of an institute of the vegetable and flower development centre near Beijing, China. ©FAO/*Antonello Proto*

Page 27: A farmer feeding cattle with multi-nutrient lick blocks containing urea, molasses, vitamins, minerals and other multinutrients in Chiffra Woreda, Ethiopia. ©FAO/*Giulio Napolitano*

Page 29: A farmer in Durlung-7, Nepal, carrying a watering can and gardening tool to the field to work on crops. ©FAO/*Sailendra Kharel*

Page 30: Farmer sorting harvested maize inside the home in Esidzakeni, Swaziland. ©FAO/*Giuseppe Bizzarri*

Inside back cover: Indian woman harvesting hybrid rice in Hyderabad district. ©FAO/*Giuseppe Bizzarri*





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