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Research and innovation for sustainable agriculture and food and nutrition security

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← *COVERPHOTO A cow fitted with repellent collar. This mobile technology developed by ICIPE with funding from the European Commission under the European Development Fund and the Food Security Thematic Programme keeps the cattle and herdsmen safe.* Photo: ICIPE

↑ *Multiple land use in inland valleys. DEVCO supports an initiative of the Africa Rice Centre (CGIAR) focused on inland valleys in West Africa.* Photo: Africa Rice Centre

This working document presents the approach to research and innovation for sustainable agriculture taken by the Directorate General, Development and Cooperation (DEVCO), European Commission.

List of acronyms

ACP	Africa, Caribbean and Pacific (signatories of Cotonou Agreement)
AFAAS	African Forum for Agricultural Advisory Services
(DG) AGRI	Directorate General Agriculture and Rural Development, European Commission
(DG) AIDCO	Directorate General EuropeAid (merged into DEVCO 2011)
AR4D	Agricultural Research for Development
ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Africa
AU	African Union
CAADP	Comprehensive Africa Agriculture Development Programme
CCARDESA	Centre for Coordination of Agricultural Research and Development for Southern Africa
CGIAR	(formerly) Consultative Group for International Agricultural Research
CORAF	Conseil ouest et centre Africain pour la recherche et le développement agricole;
CRP	CGIAR Research Programme
CTA	Technical Centre for Agricultural and Rural Cooperation
(DG) DEV	Directorate General Development and Relations with ACP States (merged into DEVCO 2011)
(DG) DEVCO	Directorate General for Development and Cooperation - EuropeAid, European Commission
EDF	European Development Fund
EFARD	European Forum for Agricultural Research for Development
EIARD	European Initiative for Agricultural Research for Development
EU	European Union
EUD	EU Delegation
FAO	Food and Agriculture Organization of the United Nations
FARA	Forum for Agricultural Research in Africa
FSTP	Food Security Thematic Programme
GCARD	Global Conference on Agricultural Research for Development
GDPRD	Global Donor Platform for Rural Development
GFRAS	Global Forum for Rural Advisory Services
GFAR	Global Forum for Agricultural Research
GPGCP	Global Public Goods and Challenges Programme
HARDS	Heads of Agriculture and Rural Development
HLPD	High Level Policy Dialogue on Science, Technology and Innovation
IARC	International Agricultural Research Centre
ICAR	Indian Council for Agricultural Research
ICIPE	International Centre for Insect Physiology and Ecology
ICRISAT	International Centre for Research in the Semi-arid tropics
ICT	Information and Communication Technologies
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
INCO-DEV	International Cooperation with Developing countries (part of RTD Framework Programme)
INSARD	Including Smallholders in Agricultural Research for Development
IRRI	International Rice Research Institute
ITPGRFA	International Treaty on Plant Genetic Resources for Food and Agriculture
JAES	Joint Africa – EU Strategy
JOLISAA	Joint Learning in Innovation Systems in African Agriculture
JRC	(EU) Joint Research Centre
KARI	Kenya Agricultural Research Institute
KIS	Knowledge, Information and Skills (CAADP)
(DG) MARE	Directorate General Fisheries and Maritime Affairs, European Commission
MDGs	Millennium Development Goals
MFF	Multi-annual Financial Framework
MOU	Memorandum of Understanding
MTOP	Medium Term Operational Plan
NARES	National Agricultural Research and Extension System
NARS	National Agricultural Research System
NGOs	Non-Governmental Organisations
PAEPARD	Platform for African European Partnership on Agricultural Research for Development
PROLINNOVA	Promoting Local Innovation in ecologically oriented agriculture and natural resource management
(DG) RTD	Directorate General Research and Innovation, European Commission
(DG) SANCO	Directorate General Health and Consumer Protection, European Commission
SAAA	Science Agenda for African Agriculture
SCAR	Standing Committee for Agricultural Research
SRO	(African) sub-regional organisation

Executive Summary

Research and innovation in sustainable agriculture and food and nutrition security, called agricultural research for development (AR4D), is essential to addressing the major challenges of poverty and hunger that are concentrated in developing countries. AR4D generates public goods in the form of knowledge, policies and technologies at global, regional and national levels. Enabling policies and institutions, equitable access and capacity are essential to realising the potential impact of public goods on agriculture and rural development objectives.

Photo: N. Palmer/CIAT and X. FONSECA/CIMMYT

The **goal** of the Directorate General for Development and Cooperation (DEVCO)'s approach to AR4D is to harness the power of agricultural research to provide solutions that lead to reduced poverty and hunger, and to make an effective contribution to sustainable agriculture, nutrition and resilience in developing countries.

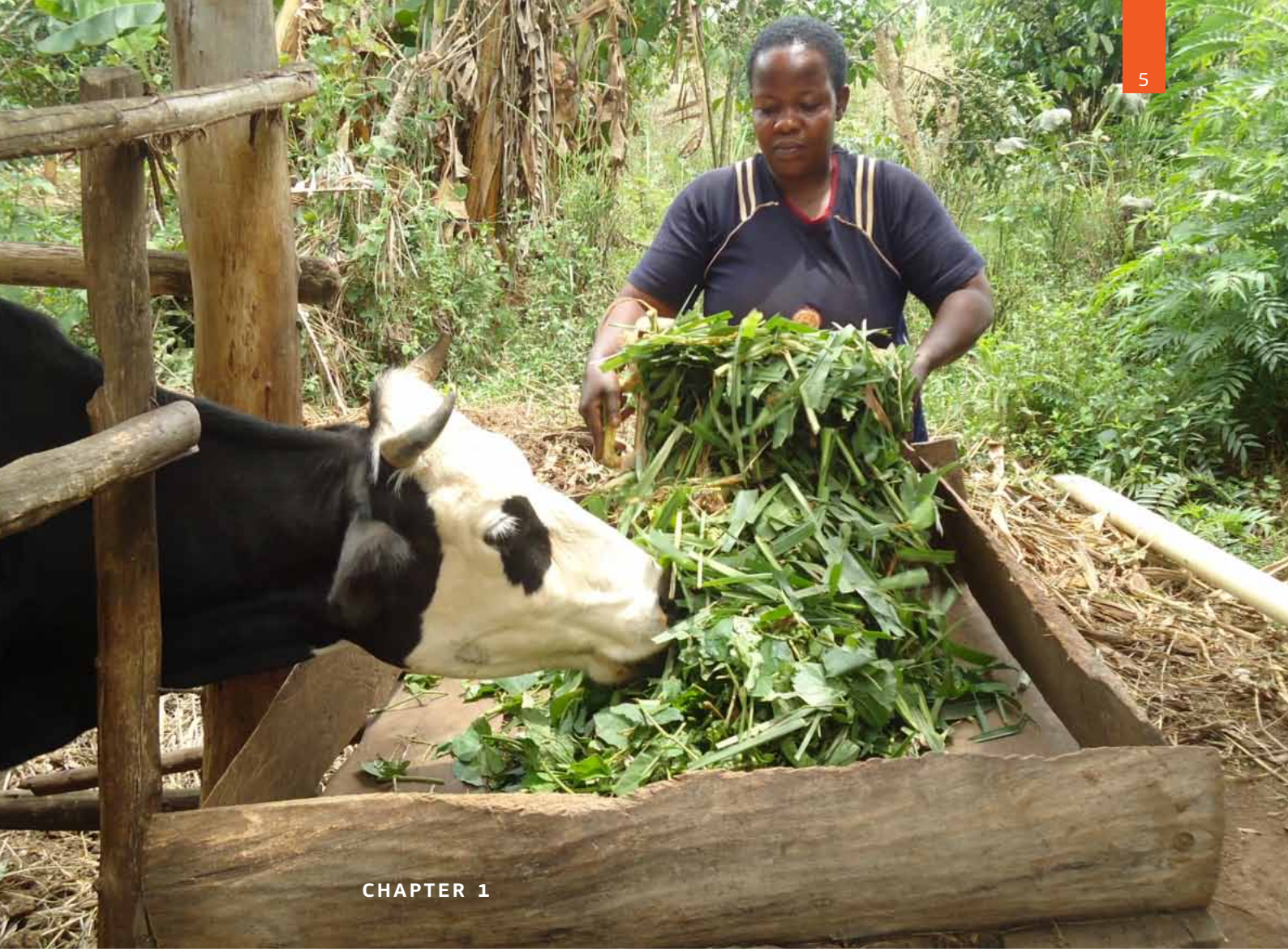
The **objective** is an effective and efficient portfolio of AR4D initiatives delivering impact on food security, nutrition, poverty reduction or resilience goals, consistent with the development policies of the European Union.

This document presents the DEVCO approach to AR4D in the context of how well it responds to current policy priorities in sustainable agriculture, nutrition and resilience, and how it is positioned within the European and global agenda to achieve maximum impact. The approach builds on lessons learned and reviews and evaluations of research under DEVCO's current AR4D portfolio, particularly projects funded under the Food Security Thematic Programme (FSTP). It is focused around four main pillars:

1. **Ensuring the success of global and regional AR4D initiatives**, building on AR4D initiatives such as those led by the CGIAR, the Global Forum for Agricultural Research (GFAR), and African research organisations supporting the Comprehensive Africa Agriculture Development Programme (CAADP) process, both through funding and engagement with governance bodies.
2. **Improving European leadership, coordination and influence**, at the level of the European Commission, in particular complementing the Horizon 2020 programme of Directorate General Research and Innovation (DG RTD), and also with Member States and the broader donor community.
3. **Exploring new strategic directions to put research into use and achieve impact**, particularly on innovation and value chains, engaging with new partners as appropriate, and building nutrition targets into AR4D programmes.
4. **Ensuring that AR4D delivers impact at country and local level**, implying a much greater emphasis on working with EU Delegations in country to support national agricultural research and innovation systems and to foster better linkages between national priorities and the AR4D agenda at regional and global levels.

Pillar 1 is in hand through existing approaches; Pillar 2 is an area in which there is scope to build on our current initiatives; Pillars 3 and 4 are essentially new areas of work.

A main financial instrument for implementing this strategy will be the **Global Public Goods and Challenges Programme** (GPGCP) of the Development Cooperation Instrument (DCI), but contributions are also anticipated from the European Development Fund (EDF) and geographically based instruments of the DCI.



CHAPTER 1

Introduction and policy context

*After receiving advice from ASARECA teams on the nutrient benefits from various feeds, farmer feeds her dairy cows a mix containing napier grass and fodder crops **Lablab**, **Gliricidia** and **Calliandra**. Milk production has increased and she uses the manure for other crops. Masaka district, Uganda. ASARECA receives core support from DEVCO.*
Photo: ASARECA

EU development policy recognises the importance of actions in food and nutrition security in meeting the Millennium Development Goals (MDGs) and subsequent post-2015 goals, particularly in ensuring adequate nutritious food for the one billion people who are under-nourished. Moreover, in order to satisfy increasing food demand, it is estimated that global agricultural production in 2050 will have to grow by 60% over 2005 levels, putting increasing pressure on already scarce natural resources, in particular land, forests, water and oceans.[1] The EU also believes that agriculture and food security can be an engine for growth and resilience. In developing countries with potential for agricultural growth, evidence shows that investment in agriculture results in spill-over effects on job creation and the wider economy.

Food and nutrition security and sustainable agriculture are among the EU's top development priorities for the coming years. The EU development policy paper *Agenda for Change*[2] identifies sustainable agriculture as a key sector driving poverty reduction and economic development. Within this policy context, the EU has defined sectorial priorities related to food security[3], resilience[4] and maternal and child nutrition[5], which are elaborated in recent EU *Communications*. These papers recognise that demand-driven research and innovation are necessary ingredients in addressing key constraints to the achievement of overarching global food and nutrition security goals.

DEVCO regards research as a provider of public goods, at the global, regional and national

level. These public goods comprise knowledge, products, technologies, services, systems of rules, policy regimes or a combination of these factors.[6] In order to mobilise public goods for food and nutrition security and poverty reduction, investment is also needed to ensure these goods are accessible to the poor, and to support their capacity to make use of them.

The importance of agricultural research and innovation in supporting economic growth and in contributing to generating public goods to support food security and nutrition goals is increasingly recognised in initiatives taken by the G8 and G20 Presidencies. This includes the recent Italian and French Presidencies of the G8 and the New Alliance of the US Presidency in 2012. In Africa, countries have made a commitment to contribute 1 per cent of their Gross Domestic Product (GDP) to research[7], implying a similar proportional commitment in the agriculture sector.

At the European level, coordination takes place through the European Initiative for Agricultural Research for Development (EIARD[8]), which is a strong advocate for an efficient results-based international agricultural research system (IARS) responding to demand from developing countries.

The goals of poverty reduction and food and nutrition security require a broader perspective than agriculture alone, including issues of access and utilisation of food and resilience to shocks or crises. Living aquatic resources, including fisheries and aquaculture, play an increasingly important role.[9] Under-nutrition is a persistent problem impacting on the lives of new generations. For convenience the term *Agricultural Research for Development* (AR4D) is used in this paper to be consistent with accepted terminology, but it is intended to be inclusive of the totality of research and innovation, including related advisory services and capacity building, that are relevant to addressing food and nutrition security challenges. While the institutional architecture for international agricultural research is well established, the capacity of national agricultural research and extension systems (NARESs) varies considerably between countries. Addressing the nexus of research, extension and capacity, including the generation of new skills and competencies, is crucial to realising the impact of AR4D.

This paper outlines an approach to AR4D that responds to the current priorities of DEVCO and the European Commission in the broad areas of sustainable agriculture and food and nutrition security. The primary objectives of DEVCO's AR4D are development and the eradication of poverty. These are distinct from, but complementary to, the objectives of the Horizon 2020 programme of the Research and Innovation Directorate General (DG RTD) which focuses on scientific excellence and the mobilising of top class European research.

The paper builds on and updates the DG AIDCO[10] *Information Note on Agricultural Research for Development Tools and Perspectives*, and DG DEV[11] *Guidelines on Agricultural Research for Development*, both issued in June 2008. The approach covers the period from 2014 to 2020, corresponding to the new budget cycle of the European Commission. It is targeted at DEVCO staff in Headquarters and Delegations who are charged with the responsibility of supervising implementation under DEVCO's various funding instruments, and DEVCO's implementing partners.

CHAPTER 2

Why invest in research and innovation for development?

The developing world is currently facing the huge challenge of achieving sustainable food and nutrition security for a growing population with more diverse consumption patterns in the face of increasingly scarce natural resources and impacts of climate change. The challenges of food and nutrition security are most severe in developing countries where rates of poverty and malnutrition are relatively high. Poor people in developing countries are typically the most vulnerable to climate change and natural or man-made disasters, and have less capacity to cope, recover and adapt.

There is a body of rigorous evidence that investment in AR4D impacts positively on poverty reduction and food and nutrition security. Published estimates for the developing world indicate an average return on investment of 43 % per annum for AR4D; about 27 million people are lifted out of poverty annually in Asia and Africa by research-led agricultural growth.[12] Published studies[13] estimate that CGIAR improved crop varieties are responsible for 50% of the yield increases in developing countries. Empirical evidence suggests that without these increases world food production would have been 4-5% lower, grain prices would be 18-21% higher and 13-15 million more children would be malnourished.

In spite of this progress, there is a continued need for further research and innovation. Current demand for products and services is rising due to a combination of population growth and more diverse food preferences, as well as increasing demand for fresh produce and materials for the agro-processing industry. The physical and socio-economic environment is continually evolving. Evidence that the climate is changing is irrefutable. Pests and diseases are developing resistance to control methods and new pathogens are emerging or old ones re-emerging. There is also mounting pressure to produce more from less, as land is degraded or taken out of agricultural production, and to do so without damaging the environment on which future agriculture depends. In addition, increasing urbanisation imposes changes on consumption patterns, while new markets emerge, and new food safety regulations and consumers' concerns

Participatory selection and characterisation of native potato varieties at farmer level in Huancavelica, Peru. DEVCO *supports* ***Innovation for food security and sovereignty in the Andes*** *(IssAndes Project).* Photo: EU-IssAndes Project/ International Potato Centre (CIP)

require increased quality. At the same time, the evolution of the processing industry requires new products. AR4D is increasingly important to keep ahead of these evolving challenges and to combat unexpected crises.

Research cannot solve development problems alone and there is commonly a gap between the results of research and their application by farmers or other beneficiaries. Important lessons are emerging that impacts are more likely to be achieved when research is linked to extension and innovation, and when it is closely aligned with the needs of beneficiaries. Research needs to be accompanied by effective systems of knowledge management, and support continuous generation of competent and skilled human resources. It is now recognised that information flows are not only downwards from the researcher to the farmer, but also involve feedback loops that enable researchers to better tune programmes to satisfying farmer needs. Such systems also need to maximise access to knowledge that already exists, as well as relating this to the socio-economic conditions of the farmer, considering, *inter alia*, such issues as land and water rights.

Multi-stakeholder approaches and impact pathways are key ingredients of recent reforms of the international agricultural research system. The concept of innovation systems is useful as an overarching framework linking research, extension and innovation. An innovation system can be defined as *networks of organisations or actors, together with their supporting institutions and policies that bring new products, processes and forms of innovation into economic use*.[14] In the context of innovation in rural areas in developing countries, actors may be farmers and their organisations, community groups, governmental or non-governmental organisations (NGOs), or private business. The role of domestic consumers, especially those based in urban centres, is increasingly gaining prominence and research also needs to cater for their needs.

Supplementary irrigation of vegetable crops. Naro Agricultural Development Project, Western Uganda.
Photo: Remy Noe

CHAPTER 3

An approach to agricultural research and innovation for development

The goal of DEVCO's AR4D approach is to harness the power of agricultural research to provide solutions that lead to reduced poverty and hunger, and to make an effective contribution to sustainable agriculture, nutrition and resilience in developing countries. The objective is an effective and efficient portfolio of AR4D initiatives delivering impact on food security, nutrition, poverty reduction, or resilience goals, consistent with the development policies of the EU.

This approach is based on the following principles:

- Publicly funded AR4D generates global and international public goods, including knowledge, technologies and capacity;
- It is most effective if it is gender-balanced and demand driven and is part of an innovation system, integrating social acceptability, access to inputs, services and markets and extension;
- It supports existing global and regional institutions and networks and builds their capacity;
- It seeks more active involvement of farmers, particularly (women) smallholders, decision makers, and civil society in defining priorities and in engaging in research and innovation;
- It focuses primarily on the food and nutrition needs of poor families, women and children and on socially excluded groups;
- It aims to use natural resources efficiently and sustainably, while minimizing any negative environmental impact;
- It includes a realistic vision of how it will translate into the expected development outcomes and impacts (e.g. impact pathways, theory of change, results chain, etc.);
- It includes a sound strategy on outputs dissemination for their use by the target groups, generalisation of its findings, documentation and sharing of lessons learned;
- It seeks coordination and is complementary with related strategies of other Directorate Generals (DGs) of EU Member States and of other donors; and
- It seeks synergies and linkages with national agriculture policies, strategies in developing countries and with rural development programmes and projects.

3.1 Framework for DEVCO AR4D

Strategic choices need to be made in terms of deciding what type of research to carry out, where it should be focused and how it can be most effectively implemented. Decisions are based on policy priorities and available financial instruments (Figure 1). The following sections outline objectives related to these questions, examine the current portfolio of DEVCO's support to AR4D in the context of these objectives, and make recommendations for course correction or adjustments in this strategy.

3.2 Research themes

DEVCO's investments in AR4D respond to development policy priorities. Based on recent development policy *Communications,* the following three broad research themes are identified:

- Sustainable inclusive agriculture for growth
- Nutrition, with particular attention to children and women
- Resilience to food security crises

Objective
The AR4D portfolio should reflect DEVCO's policy priorities.

Sustainable agriculture ranges from market-led to subsistence-based production systems, and from modern technology to systems based largely

on traditional knowledge. DEVCO's AR4D strategy is firmly anchored on smallholder production systems, sustainable intensification, value chains and on the stability of food systems. Smallholders comprise the vast majority of farmers in developing countries and have the potential to be highly productive by using family labour in diversified production systems. Additionally, smallholder farming systems provide an important social safety net function, strengthening resilience in many countries.[15] Sustainable agriculture is taken to include annual and perennial crops, livestock and aquatic resources as well as agricultural systems and the natural resources on which they depend, recognising the significance of landscapes within which systems co-exist and interact. Cash crops are included as they generate income which increases purchasing power, and in some circumstances provide alternatives to illicit drug crops. Sustainable agriculture places emphasis on ecological efficiency, on minimising any adverse environmental impacts such as natural resource depletion or degradation (water, land, biodiversity, forest cover), and on reducing net greenhouse gas emissions.

For **nutrition** there is an emphasis on mothers and children, noting the commitment of the European Commission to support partner countries in reducing the number of stunted children under five years by 7 million by 2025. Recent evidence suggests that accelerated progress in nutrition will require large scale nutrition-sensitive programmes, including those based on agriculture. However, the evidence base linking agricultural interventions to nutritional outcomes is weak.[16] Given the particular role of women in the household economy and the dynamics of intra-household food distribution, a gender sensitive approach is extremely important in pursuing nutrition objectives. New technological products (e.g. biofortified crops) or new institutional approaches may be researched in pursuit of these aims. There should be clear opportunities for better integration of nutrition targets in agricultural initiatives. Since factors such as lack of access to nutritious food, disease and underlying poverty all interact to cause under-nutrition, a holistic approach including collaboration with the health sector in this area is important.

Resilience implies resistance to shocks and the ability to recover from them. It covers aspects of disaster prevention and preparedness. This paper adopts a broad interpretation of resilience to include social and economic aspects as well as factors affecting the resilience of the physical environment, such as soil health and diversity of agricultural production systems. There are clear needs for collaborative research with environmental and social sectors around the theme of resilience. Rights to land, water, forests and marine resources are important issues in the resilience agenda.

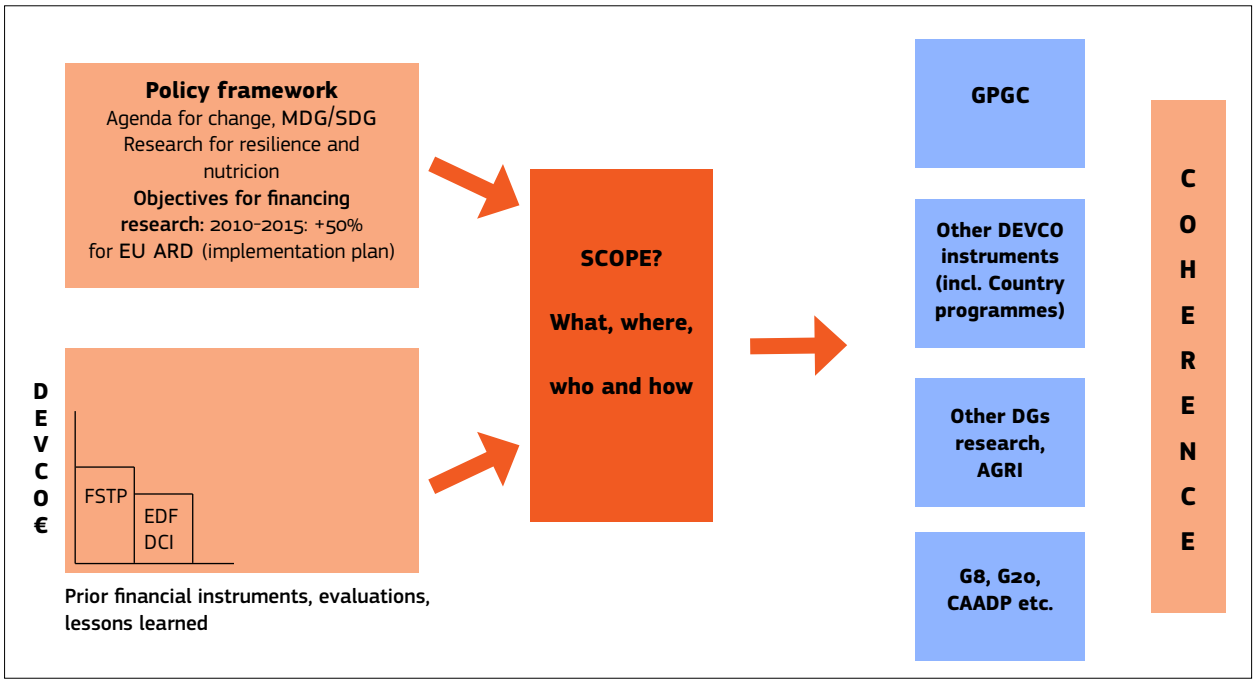


Figure 1: Scope of AR4D strategy

This farmer in Madagascar uses water management and soil management innovations, in addition to other agronomic practices recommendent by ASARECA teams, to grow rice in wetlands without compromising the wetland eco-system.
Photo: ASARECA

It is important to recognise that thematic areas are inter-related and potentially overlapping. For example, reversing land degradation would clearly benefit resilience and sustainable agriculture and, more indirectly, nutrition outcomes. Themes are not intended as silos but as foci for AR4D that is typically cross-disciplinary in nature. Research programmes may have objectives under more than one theme, while issues such as gender and climate change cut across all themes.

Figure 2, based on an analysis of EU support to CGIAR research programmes under the second phase of the FSTP gives a snapshot of some current DEVCO research investments according to these themes. Although attribution is approximate, this analysis suggests that research directed to nutritional outcomes is not as strongly represented as that directed to resilience and sustainable agriculture. This may be attributable to the relatively recent adoption of nutrition as a strategic priority by DEVCO.

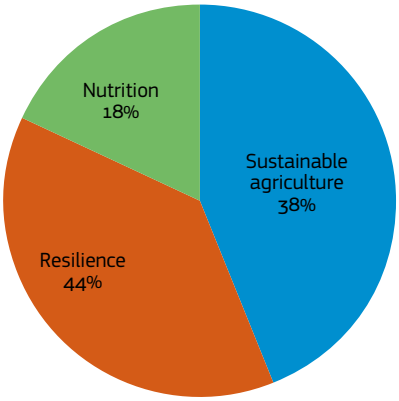


Figure 2: Current support to CGIAR (2011-13) by theme (total €80 million)

Conclusion
While maintaining strong programmes on sustainable agriculture and resilience, opportunities to build nutritional indicators and targets into programmes and to track nutritional outcomes should be sought.

3.3 Strategic cross-cutting issues

3.3.1 Gender and pro-poor focus

In many developing countries, and particularly in Africa, the majority of farmers are women, and women are disproportionately represented among the poorest groups. Recent evidence indicates that development targeted at women results in better development outcomes than that which is not gender-targeted.[17] DEVCO's AR4D approach will encourage recognition of the different needs and constraints faced by women and men; the active participation of women in setting the research agenda and in implementing research; and, where possible, disaggregation of impact targets by gender. Some of DEVCO's main implementing partners, such as CGIAR and Forum for Agricultural Research in Africa (FARA), have adopted gender strategies. The International Food Policy Research Institute (IFPRI), together with the Oxford Policy and Human Development Initiative, has developed a Women's Empowerment in Agriculture Index[18] that can be used to track progress. GFAR has taken a lead with the Gender in Agriculture Programme (GAP).

DEVCO also recognises that the rural poor are not one homogenous category and that the benefits of research more commonly accrue to the slightly better off farmers who are more easily able to access services, manage risk and adopt new technologies. Although research in sustainable agriculture will address needs of both women and men farmers, DEVCO's particular thematic priorities of nutrition and resilience demand some specific targeting of women and children, as well as targeting of poor and vulnerable people. DEVCO will work with its implementing partners to ensure that effective gender strategies are in place, and that indicators and targets are disaggregated by gender where this is relevant and possible. DEVCO recognises that many of the poorest

and most vulnerable people live in marginal or conflict prone environments where research may face additional challenges.

3.3.2 Climate change

Agriculture is very susceptible to the impacts of climate change, but is also a significant contributor to emission of greenhouse gases.[19] This inter-relationship affects the potential for meeting global development challenges such as food security. Adaptation to climate change will be most challenging in developing countries where impacts of climate change are more likely to be adverse and where growth in demand for agricultural products, due to increased population and rising affluence, will be greater. However meeting such rising demand will increase greenhouse gas emissions from agriculture unless lower emission alternatives can be found, or carbon sequestration in biomass or soils substantially increased.

Long term trends in warming and precipitation, the incidence and severity of extreme events and rising sea levels are likely to change the areas that are suitable for production of particular crops and livestock. There are also likely to be many indirect effects such as changes to the distribution ranges of pests and diseases that impact on production and public health. Ocean acidification may adversely affect marine eco-systems and aquatic resources.

DEVCO recognises the European Commission requirement to ensure that 20% of budget commitments are climate-relevant. Within its research portfolio, DEVCO supports major programmes that focus on climate change directly, such as the Climate Change, Agriculture and Food Security Programme of the CGIAR, and also initiatives for development of specific products, such as drought or flood resistant crop varieties. These initiatives are relevant to climate change adaptation and to building resilience as well as strengthening food security. Tropical countries host a large number of domesticated and wild plant and animal species that are well-adapted to harsh environments and extreme climatic variations. Research to investigate their potential as sources of food and to promote their use or domestication should be considered in the research agenda.

3.4 Types of research

Within each of these overall themes, three broad types of research can be considered:

- longer term strategic research;
- adaptive research leading directly to tangible impacts in the field;
- policy research, based on analysis to generate evidence.

Climate change exerts additional stresses on cropping systems. DEVCO supports research on drought resistant rice varieties at IRRI.
Photo: IRRI

Objectives:
The balance between strategic, adaptive and policy research should be coherent and based on an understanding of impact pathways.
Complementary to investment in research there should be investment in supporting activities to maximise potential impact.

New **strategic research** is needed to keep up with emerging challenges. **Adaptive research** is needed to tailor solutions to particular agro-ecological conditions, productions systems, consumer demand and preferences, and socio-economic circumstances. These categories can be regarded as points on a continuum, and some actions support both strategic and applied activities. **Policy research**, including analysis of institutions and markets is necessary to generate evidence for subsequent policies and actions, and to create an enabling environment for agriculture and rural development.

Investments in institution building, capacity development, generation of new skills and competences, information management and extension services are complementary to investments in research. These supporting activities enhance the probability that positive impacts will be realised. Appropriate governance of agricultural research is needed to ensure that the interests of the poor and food insecure are addressed.

Figure 3 shows the approximate distribution of current DEVCO investments in research and supporting activities. It is worth noting that just over half the investments go to the research types outlined above. The remaining funding goes to supporting activities such as agricultural extension and information management, institutional development and capacity building and governance.

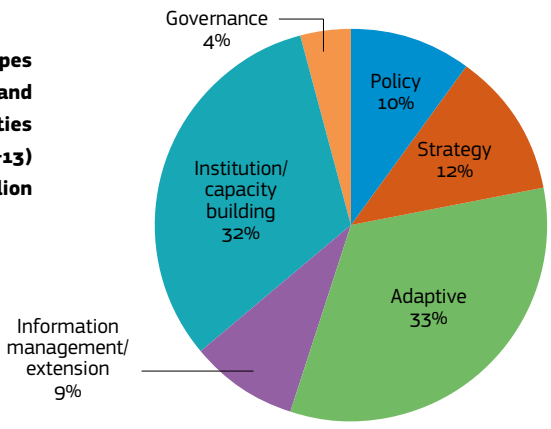


Figure 3: Types of research and supporting activities (2010-13) Total €320 million

Decisions on types of research relate to the thematic priorities described in Section 3.2. Taking these themes as starting points, Table 1 maps some key researchable issues in terms of enabling policies, strategic issues and topics for adaptive research. This framework can be used to identify research questions that are relevant to DEVCO priorities. Some examples are:

- Where are common bottlenecks in value chains and how can they be addressed so that they are more effective in generating income and creating jobs for the rural poor? (sustainable agriculture: strategic research)
- How can agro-forestry systems be matched to local agro-ecological and socio-economic conditions? (sustainable agriculture: adaptive)
- How can food insecure families improve their nutritional status? (nutrition: strategic research)
- What are the most effective interventions in combatting maternal and child under-nutrition in poor rural communities? (nutrition: strategic)
- How can smallholder agricultural systems be more resilient, including to climate change? (resilience: strategic research)
- How can the livelihoods of poor forest dwellers be supported by better access and use rights to land and forest resources? (resilience: policy)
- How can the livelihoods of traditional fisher folk and pastoralists be supported by better access to markets, services and tailored research? (resilience, environmental services, policy)

This approach does not attempt to establish targets or norms for investment in the types of research that should be carried out, either in total or under the three thematic headings. It is more important that research is geared to developing solutions to problems that are identified with the participation of relevant stakeholders, including smallholder farmers and poor, rural communities. Foresight initiatives such as the GFAR coordinated *Global Foresight Hub* and foresight activities undertaken by Standing Committee on Agricultural Research (SCAR), the EU Joint Research Centre (JRC) and by European member states (UK Foresight, France Agrimonde) will also inform research priorities in the strategy period.

In addition to supporting research, DEVCO also aims to support innovation, drawing on existing

Table 1: Themes for research and innovation (examples)

Theme	Theme objective (general)	Key policy questions	Strategic issues	Adaptive research topics
Sustainable inclusive Agriculture for growth	Promote sustainable and inclusive agricultural growth to generate income and jobs	Policies to support smallholders, traditional fisher folk and pastoralists and small scale food processors and traders Enabling policies for private sector engagement Government regulatory roles	Sustainable intensification Access to markets and trade Efficient value chains Reduction of waste Rural employment (agriculture and related sectors) Biodiversity and environmental services	Improving productivity of crops, livestock, bees, domesticated wild plant and animal species, living aquatic resources and farming systems Input markets Processing and marketing of products Developing new skills and competences
Nutrition	Prevent chronic under-nutrition and address acute under-nutrition (target to reduce stunted children by 7 million by 2025)	Enabling policies/ institutions	Delivery methods Evidence on, and development of, the effectiveness of nutrition sensitive programmes Analysis of under-nutrition causes. Measuring nutritional impact Food safety	Biofortification Diversity of agricultural systems (including livestock) Aquaculture systems Environmental services Unconventional sources of food Social transfers Consumer preferences and behaviours
Resilience	Address causes of food insecurity, while preventing and managing food security crises	Land rights/tenure Empowering farmers Social protection Trade Post-harvest losses Storage infrastructure & warrantage	Risk management Access to resources (including land, water) Sustainable natural resource management Adaptation to climate change Social safety nets Emerging and re-emerging pathogens for plants, animals and living aquatic resources Pandemic diseases Smallholders' bargaining power	Crops/animals resistant to environmental stresses Living aquatic resources Managing land and water sustainably Climate smart agriculture Efficiency/ sustainability of social safety nets Grain reserves Effectiveness of insurance

knowledge to scale up promising technological or institutional approaches, and by promoting an enabling environment for local innovators.

3.4.1 Supporting activities: extension, knowledge management, capacity building

Complementary investment is needed to manage the knowledge resulting from research and innovation, to promote the dissemination of new knowledge and technologies to farmers and the rural community, and to develop the capacity of beneficiaries to innovate and to use the knowledge from research to make informed choices, whether these are at the level of household livelihoods or national policies.

Based on current experience, there is a need to give specific attention to rural advisory services and similar mechanisms that may help improve access to, and uptake of, research products intended to improve the livelihoods of smallholder farmers and rural people. Research products and innovations must be relevant to local contexts, and uptake may be constrained by any number of factors. These include lack of capacity of the beneficiaries; inadequate services

DEVCO supports CABI's Plantwise Programme to establish networks of plant health clinics in seven African countries.
Photo: CABI

or infrastructure; inadequate training institutions to generate the relevant competencies and communications skills; affordability or lack of incentives. DEVCO's approach aims to increase the level of support to advisory services. It will explore ways of constructively engaging with the private sector, NGOs and other key stakeholders in making products and services available to consumers and operators along the supply chains on a continuing basis. The approach will also include support to identify new market opportunities and the value chains necessary for their realisation.

Investment in the NARES and in tertiary agricultural education is weak in many developing countries. Capacities have typically declined as a result of the structural adjustment policies of the 1990s. Although some NARESs receive significant support through sub-regional organisations (SROs), there is a need for a critical mass of capacity at country level to set national research and innovation priorities and to be a knowledgeable user of regional and global public goods. Such capacity development may be addressed using an approach based on agricultural innovation systems.

Beneficiaries of research – from high level decision makers to poor rural people – should be able to acquire sufficient knowledge and to access technologies so that they can make informed choices based on their needs. Frequently, users of research products are faced with either no information or an information overload, with little guidance on how to assess the relative quality of information or how to identify that which is most relevant to their needs. DEVCO places considerable emphasis on knowledge management and on linking this to communication strategies and learning processes. The rapid development of information and communication technologies (ICTs) greatly accelerates and extends information flows.

Furthermore, the recent G8 initiative on open data policies should ensure that developing countries have full access to knowledge generated through research. G8 members, including the European Commission, have drawn up action plans related to the implementation of open data policies. The CGIAR is committed to implement fully an open data policy from 2014.

DEVCO's focus on capacity building in AR4D is mainly grounded in Africa, through support to organisations such as FARA (Forum for Agricultural Research in Africa), ASARECA (Association for Strengthening Agricultural Research in Eastern and Central Africa), CORAF (Conseil ouest et centre Africain pour la recherche et le développement agricole), CCARDESA (Centre for Coordination of Agricultural Research and Development for Southern Africa) and AFAAS (African Forum for Agricultural Advisory Services) where it is linked to the CAADP process. A needs assessment on capacity building for sustainable food security in Africa will be conducted by FARA, with DEVCO funding and support from the African Union Commission, from 2014.

Conclusions

- **Researchable questions should be formulated based on foresight and stakeholder participation.**
- **There should be complementary investment in activities such as knowledge management, extension, capacity building and in supporting the innovation process.**

3.5 Where should research be carried out?

Public goods are relevant at all levels – from global to sub-national – and they can be produced at all these levels, including through local actions. All these categories of public goods are complementary and inter-dependent. The linkages between them, and the enabling policy and institutional environment are crucial in ensuring that impacts are delivered.[20] DEVCO

invests in AR4D at global level, in priority regions and, currently to a lesser extent, at the country level.

Objectives

Geographical distribution reflecting:

- **the political commitments of the EU,**
- **demographics of food insecurity, and**
- **research capacity of beneficiary regions/countries.**

Coherence between support for AR4D at different levels (global, regional, national etc.).

Analysis of current programmes (Figure 4) shows that DEVCO has a clear geographical focus in Africa. Assuming that a large proportion of intra-ACP programmes are also Africa focused, it is estimated that around two thirds of DEVCO's investments in AR4D go to Africa, while Asia, Latin America and the neighbourhood countries of the Middle East and North Africa (MENA) are weakly represented.

The EU has political commitments to intra-ACP countries through the Cotonou Agreement and to Africa in particular through the Joint Africa-EU Strategy (JAES). It is in Africa where food insecurity is most entrenched, where capacity to address these food security challenges is weakest, but where there is still considerable potential for agricultural growth. A focus on Africa is also consistent with EU commitments under the G8 New Alliance for Food Security and Nutrition. African agricultural research priorities are being articulated under a Science Agenda for African Agriculture (SAAA) which is scheduled for approval at the African Union (AU) Summit in 2014. DEVCO aims to align its support for AR4D in Africa with the SAAA. However, there are large variations in the incidence of poverty and food insecurity in different African countries. These explain DEVCO's sub-regional prioritisation of the Horn of Africa and the Sahel, both areas which are particularly vulnerable to crises.

South and South East Asia has the largest share of stunting worldwide, with very high rates of children affected in a number of countries. Further focus on nutrition for these two regions will be necessary to support the efforts of the countries to reduce under-nutrition and to strengthen our related programmes.

The focus on Africa and South and South East Asia does not exclude other parts of the developing world where food and nutrition insecurity is a problem. Problems of food insecurity are present

The families of these children in Bukoba, Tanzania, followed advice from ASARECA research teams on how to control banana diseases; bacterial wilt and xanthomonas wilt which devastated banana crops in the region from 2005 to 2010. They were taught how to control the spread of the disease by disinfecting farming tools, destroying sick plants to remove the source of disease and cutting affected corms from the banana mat.
Photo: ASARECA

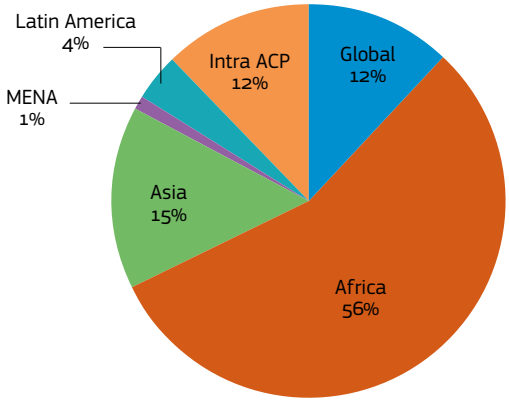


Figure 4: DEVCO support to AR4D 2010-13: geographical distribution - Total €320 million

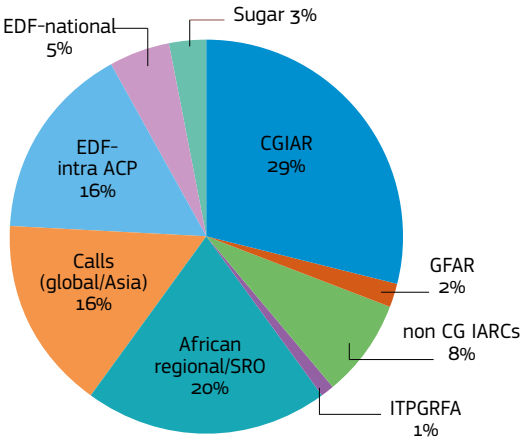


Figure 5: ARD Commitments by implementing partner: 2010-13 - Total €320 million

in several countries elsewhere in Asia and in Central and Latin America, including those in the middle-income category. Although some of these countries may not benefit directly from EU development assistance they are eligible beneficiaries of global and regional AR4D initiatives.

Conclusions

Food security is a global, but geographically differentiated challenge. AR4D will focus at four levels of detail:

- **global;**
- **regional, with Africa as priority for all themes; South and South East Asia for nutrition theme;**
- **sub-regional and country, noting Sahel and Horn of Africa as priorities; and**
- **countries where the EU Delegation has adopted agriculture or food security as a focal sector.**

Flexibility to consider other regions and countries with chronic or transient food security challenges.

Linkages, synergies and complementarities should be sought between levels.

3.6 DEVCO's implementing partners?

DEVCO's AR4D approach is firmly located within the institutional architecture of international agricultural research.

Objectives

- **To promote EU leadership and influence on global and regional initiatives;**
- **To select implementing partners based on comparative advantage; and**
- **To identify and promote opportunities for European research partners**

Figure 5 gives a breakdown of current DEVCO implementing partners.

The choice of implementing partner relates both to funding instruments and geographical scope as well as to their roles, comparative advantages and past performance. CGIAR and GFAR are the currently preferred partners at global level, funded under the Food Security Thematic Programme (FSTP). The CGIAR is the major international provider of agricultural research focused on developing countries. GFAR has a mandate to lead on the governance of AR4D and to ensure that all stakeholder groups are adequately represented. However there are some AR4D topics of interest to DEVCO where non-CGIAR international research centres such as CABI and the International Centre for Insect Physiology and Ecology (ICIPE) have a comparative advantage.

The EU recognises the mandate of the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) on the stewardship of genetic resources of essential staple crops, and supports the Benefit Sharing Fund of this Treaty.

The EU Joint Research Centre (JRC) is the Commission's in-house science service, with a mission to provide EU policies with independent, evidence-based scientific and technical support throughout the whole policy cycle. DEVCO harnesses the expertise of the JRC to address development issues in its areas of comparative advantage. Memoranda of Understanding (MoUs) have been signed with JRC to provide support to DEVCO thematic units and EU Delegations through JRC centres in Ispra and Seville.

DEVCO also recognises the range and depth of expertise on AR4D residing in the public and private sector in EU member states. It draws on this expertise for strategic guidance and

Farmers participating in pigeonpea variety selection in Tanzania. Through ICRISAT, DEVCO is supporting the development of pigeon pea and groundnut based cropping systems in Tanzania, Uganda and Mozambique.
Photo: ICRISAT

also to implement or co-implement research and innovation actions, either resulting from competitive calls for proposals or as partners to African or global institutions. For example, projects to support agricultural innovation by smallholder farmers are funded under a global call for proposals and implemented by research consortia, most commonly led or co-led by European research institutions.

In Africa DEVCO currently provides core support to FARA and its associated sub-regional organisations (SROs: ASARECA, CORAF, CCARDESA) to implement their Medium Term Operational Plans (MTOPs). Support is also provided to FARA to implement innovative projects such as the Platform for African-European Partnership on Agricultural Research for Development (PAEPARD) and the Sub-Saharan Africa Challenge Programme. It is worth noting that a substantial amount of funding to SROs (around 75 per cent) is devolved to national agricultural research systems (NARSs) through competitive and commissioned regional research projects. It is also worth noting that the CGIAR is active in Africa and, under the auspices of the Dublin Process[21], a MoU was signed between the African Union Commission and the CGIAR in March 2013. The MoU calls for alignment of CGIAR research in Africa with African priorities, particularly those expressed through CAADP. The CGIAR is currently working closely with FARA and other African partners on the formulation of the SAAA and on the implementation of the African Agriculture Technology Platform.

Future research on marine fisheries may be most appropriately carried out at regional level, using regional fisheries management organisations as implementing partners.

At the national level support to agricultural research and innovation largely depends on the National Indicative Programmes agreed with host governments, and a variety of funding instruments may be engaged depending on the circumstances of the country programme. Implementing partners are mainly national agricultural research institutes, including those dedicated to commodity crops such as coffee or sugar.

The European Development Fund (EDF) covers country programmes and programmes in African, Caribbean and Pacific states that are signatories of the Cotonou Agreement (ACP states). The Technical Centre for Agricultural and Rural Cooperation (CTA) is a major partner in institutional strengthening and information management for ACP countries and regional networks. A science and technology call for proposals in ACP countries also supports research and capacity building, focused on food security and agriculture activities.

Recent performance reviews and current trends in institutional reforms indicate that DEVCO retains confidence in its main implementing partners. At the global level, both CGIAR and GFAR have been set up by agencies of the United Nations to lead on international agricultural research for development. These roles have been reinforced by recent G8 and G20 presidencies.[22] While accepting these institutional commitments at global and African level, DEVCO will retain flexibility to select the best partners for any particular initiative or programme that is in line with thematic development priorities.

Conclusions

- **Exercise European influence in major international AR4D initiatives such as GFAR, CGIAR, African AR4D institution building (governance and support programme);**
- **Maintain flexibility to select implementing partners based on comparative advantage; and**
- **Draw on EU in-house scientific capacity of JRC, and of relevant institutions in EU member states, and promote opportunities to engage European researchers and research stakeholders in AR4D initiatives**

CHAPTER 4

Taking the approach forward

Section 3 analysed DEVCO's current approaches in the context of the institutional architecture of AR4D and the development policy priorities of the EU. The following four pillars are identified for taking the approach forward:

1. **Ensuring the success of global and regional AR4D initiatives**, building on AR4D initiatives such as CGIAR, GFAR, and on African research organisations supporting the CAADP process, both through funding and engagement with governance bodies.
2. **Improving European leadership, coordination and influence**, at the level of the European Commission, as well as with Member States and the broader donor community.
3. **Exploring new strategic directions to put research into use and achieve impact**, particularly on innovation and value chains, engaging with new partners as appropriate, and on building nutrition targets into AR4D programmes.
4. **Ensuring that AR4D delivers impact at country and local level**, implying a much greater emphasis on working with EU Delegations in countries to support national agricultural research and innovation systems and to foster better linkages between national priorities and the AR4D agenda at regional and global levels.

Pillar 1 is in hand through existing approaches; Pillar 2 is an area in which there is scope to build on DEVCO's current initiatives; Pillars 3 and 4 involve substantially new areas of work.

The following sections outline how DEVCO aims to strengthen engagement in these areas by working with partners within and outside the EU as appropriate.

4.1 Ensuring success of global and regional AR4D initiatives

Global and regional initiatives should take account of the emerging post 2015 development agenda which will integrate development and sustainable development objectives. It is anticipated that goals will be universal, valid for developing, emerging and developed countries, but with different targets according to the different situations. Coherence between different policies should become more structural, particularly when addressing global challenges, such as food security, climate change and biodiversity conservation. This agenda provides an overarching framework for global AR4D organisations, such as the CGIAR, to set their goals.

There is both a political[23] and strategic argument for the European Commission, through DEVCO, to continue its currently high profile, both as a donor and as a contributor to the governance mechanisms of the CGIAR. Europe has taken a lead in recent reforms and currently holds seven seats on the CGIAR Fund Council.[24] Similarly DEVCO is well embedded in a leading role[25] in supporting GFAR and CAADP, providing a unique opportunity to leverage global research for Africa's agricultural development. DEVCO also represents the Commission and Europe in the 'Dublin Process' building coherence between CGIAR research and CAADP priorities.

As part of reforms undertaken between 2009 and 2012, the CGIAR adopted system-level outcomes related to poverty reduction, food security, nutrition and the management of natural resources, which correspond closely to DEVCO policy priorities. Fifteen[26] new CGIAR Research Programmes (CRPs) are under implementation, of which 10 currently receive support from DEVCO. Impact pathways are currently being developed to link the outputs of these programmes to measurable progress against these outcomes. GFAR has a complementary role to that of the CGIAR in articulating the demand for research products, in catalysing partnerships for scaling-up research products and in capacity

building. GFAR is also responsible for convening the GCARD (Global Conference on Agricultural Research for Development) process every two years. The GCARD is strongly supported by the European constituency of GFAR, known as EFARD (European Forum on Agricultural Research for Development). EFARD has taken a leading role in foresight, capacity building and the pioneering of innovative partnerships.

The generation and management of regional public goods are well developed in Africa, under the leadership of FARA and the SROs: ASARECA, CORAF and CCARDESA. MoUs with the African Union Commission and with the relevant regional economic communities define the role of these organisations in the CAADP process that is intended to drive Africa's agricultural growth and economic development. These continental and sub-regional organisations have undergone significant strengthening both in strategic direction and in capacity over the past few years. The SAAA is being prepared under the leadership of FARA and is scheduled for adoption by the AU in 2014.

4.2 Improving European leadership, coordination and influence

Europe is the largest regional donor to both agriculture and rural development and the biggest international donor to AR4D, as well as being a major provider of AR4D expertise and a significant trading partner for many developing regions and countries.

DEVCO will support Europe's strategic role by:

- Working effectively with other Directorates General of the European Commission to capture synergies between respective instruments and programmes;
- Coordinating policies and programmes with European member states and other donors;
- Creating opportunities for greater involvement of European researchers and research stakeholders in AR4D.

4.2.1 Coordination across Directorates General

The Lisbon Treaty states that supporting developing countries' efforts to eradicate poverty is the primary objective of development policy. While this is essentially DEVCO's mandate there are areas of complementarity and common interest with the programmes of other Directorates General (DGs) of the Commission. Within the scope of AR4D, the closest links are with DG Agriculture and Rural Development (AGRI) and DG RTD. AGRI has an interest in global food security in the context of the EU Common Agricultural Policy and trade issues with Europe, and also works actively in several international fora (such as the Food and Agriculture Organisation of the UN, G8, G20, UN process) on a post 2015 development agenda and the Joint Africa-EU Strategic Partnership. RTD's main focus is on improving Europe's competitiveness, growth and job creation while tackling the main current and future societal challenges. DEVCO also consults with other DGs such as MARE (DG Fisheries and Maritime Affairs) and SANCO (DG Health and Consumer Protection) on particular sub-themes of AR4D.

Horizon 2020 is the research Framework Programme for the period 2014-20. Through its Societal Challenge: *'Food Security, Sustainable Agriculture, Marine and Maritime and Inland Water Research and the Bio-economy'*, which is jointly managed by RTD and AGRI, it has the potential to mobilise top class European research in areas that include AR4D. There is clear complementarity between support to global research programmes, such as those of the CGIAR, and core support to research organisations, such as FARA, and the project-based work and ERA-NETs supported by Horizon 2020.

In a parallel initiative, RTD is leading for the EU on the implementation of an EU–Africa High Level Policy Dialogue (HLPD) on Science, Technology and Innovation. This includes issues related to agriculture and food security within the framework of the Joint African Union – European Union Strategy (JAES). The HLPD has chosen food security, nutrition and sustainable agriculture as its first priority for 2013-15.

The synchrony of the Framework Programme, DCI and EDF funding instruments, all of which start new cycles in 2014, and the priority focus of the HLPD, provide a unique opportunity to capitalise on the potential synergies between these instruments in improving research related outcomes for developing countries.

However the abolition of the INCO-DEV (International Cooperation with Developing Countries) which was a feature of RTD's Framework Programmes up to 2006, has created something of a gap in terms of opportunities

DEVCO supports research along value chains, improving income for producers and small entrepreneurs and creating jobs. This entrepreneur is a member of an innovation platform in Masanze District, northern Rwanda, supported by the Sub-Saharan Africa Challenge Programme led by FARA. She buys and grades potatoes from the local farmers group, packages them using locally available materials and sells them on the local market. Eight people are employed in the micro enterprise. Photo: David Radcliffe

for EU – developing country collaboration on AR4D. DEVCO, RTD and AGRI need to work on addressing this gap through a combination of Horizon 2020 and DEVCO instruments.

DEVCO will network with AGRI and RTD to take forward issues of common interest. Some particular opportunities for follow up are:

- Greater involvement of DEVCO in defining the research topics for inclusion in the Horizon 2020 road map and annual work programmes, taking account of the interests of developing country partners;
- Facilitating the participation of developing country partners in research consortia;
- Drawing experience from existing innovative projects to define research led by farmer needs (e.g. PAEPARD – Platform for African European Partnership in Agricultural Research for Development), to design new funding instruments and the Innovation Partnership models of RTD. Lessons can also be drawn from the INSARD and JOLISAA programmes under the 7th Framework Programme.

4.2.2 Coordination across Europe

The European Initiative for Agricultural Research for Development (EIARD) coordinates policies, investments and approaches to AR4D between the Commission, Member States, Norway and Switzerland. DEVCO holds the permanent vice-chairmanship of EIARD and the Secretariat is hosted by DG RTD which also supplies the Executive Secretary (an expert seconded from a Member State). A Joint EIARD-SCAR[27], Strategic Working Group is working on the convergence of agricultural research in Europe with agricultural research for development. EIARD also collaborates with the Global Donor Platform for Rural Development (GDPRD) and the HARDS[28] Group, linking AR4D to the broader rural development agenda.

EIARD is unique in representing the largest regional donor block to AR4D and to global initiatives, and in having an established community of practice in AR4D in developing countries. A new EIARD strategy is being developed for 2014-18. Elements of this strategy mirror the current DEVCO strategy, including coordination of support to CGIAR, coordination of support to AR4D in Africa and linkages between

AR4D and broader agricultural and rural development initiatives. Particular efforts will be made to ensure that EIARD addresses the wider AR4D agenda, including links to the bilateral AR4D and development programmes of member states. Coordination with multiple European stakeholders on AR4D takes place through EFARD, which is also supported by DEVCO.

4.2.3 Promoting opportunities for European research stakeholders

DEVCO will work with RTD, AGRI and other relevant DGs, and in the framework of EIARD, to identify opportunities for European research institutions to optimise their role in AR4D and to exercise their comparative advantages, particularly in pioneering new approaches.

As the research body of the Commission, the JRC is already providing support to Delegations and a MoU has recently been drawn up for JRC to provide support to DEVCO Unit C1 in various areas of policy.

Additionally there is a wealth of relevant expertise in AR4D residing in European institutions, and there are some research areas in which Europe has a clear comparative advantage and established partnerships with developing country institutions. Agrinatura, a consortium of European research institutes and universities from 18 Member States, acts in a pan-European capacity as the implementing arm of EFARD. It has provided independent monitoring of EU support to the CGIAR for a number of years, developed studies and policy briefs for the EIARD, and implemented specific actions. New initiatives are also emerging driven by EU member states, such as 'Intense Africa', a pan European initiative co-led by CIRAD and the University of Wageningen, in association with FARA, to address sustainable intensification in Africa. European AR4D expertise is not limited to the public sector and opportunities will be explored to engage the European private sector in innovative research partnerships.

A particular challenge is to facilitate the participation of European research institutions in global, international programmes, such as the CGIAR research programmes. The location of the CGIAR Secretariat in Montpellier, and the Independent Science and Partnership Council secretariat, Independent Evaluation Arrangement and GFAR in Rome may open opportunities for increased European engagement.

4.3 New strategic directions

4.3.1 Putting research into use

DEVCO is funding research because of its potential impacts on poverty reduction, food security, adequacy of nutrition and other development goals. While not all research can be expected to deliver impacts in the short term we need a clear vision of how research is intended to lead to eventual impact – the impact pathway. With the exception of some of the public goods that are clearly global in nature, such as reduced greenhouse gas emissions from the agricultural sector, most impacts will be felt at the national level and below.

Achieving impact requires research programmes to link up with development programmes so that support to their implementation can be provided by development agencies, or in the case of policy research, by key decision makers in governments or global/continental bodies.[29] Partnerships are vital but roles and responsibilities of partners need to be clearly defined.

Partnerships to translate research outputs into tangible impacts may also depend on involving the private sector, NGOs, farmer organisations or other actors. Such partnerships may be most effective if placed in the context of innovation systems or value chains, which recognise complementary roles of partners along the chain from provision of inputs to marketing of produce. Current experience shows there are many pockets of success but there are often major challenges in scaling up and scaling out these impacts. Differences in agro-ecological conditions and in the socio-economics of smallholder farming systems need to be taken into account, and the policies, institutions and regulatory environment required to support innovation must be considered.

Research results may be promoted either through partners working within the research programme, or by linking with agencies or programmes that are external to it. Some examples from programmes currently supported by DEVCO are given in Table 2.

DEVCO is engaged in current debates on the most effective models for agricultural advisory services. It is supporting global and regional networks such as GFRAS (Global Forum for Rural Advisory Services) and AFAAS (African Forum for Agricultural Advisory Services), and is

Table 2: How can research outputs be translated into development outcomes? (examples)

Model	Actors	Programme/ project	Comment
Partnerships that are internal to the research programme	FARA, CORAF, CGIAR centres, farmers organisations, private sector	Sub-Saharan Africa Challenge Programme	Innovation platforms identify opportunities to build value chains and link farmers to markets.
	ICIPE, KARI, Heifer International	Push-pull mechanism	Both government and NGO partners, media (radio), farmer to farmer exchange
	ICRAF, African Conservation Tillage Network	Evergreen agriculture (CRP 6)	Conservation agriculture with trees model.
Dissemination through extension service	FARA, CORAF, national extension systems	Sub-Saharan Africa Challenge programme	Sierra Leone, Burkina Faso adopted innovation platform model of SSA-CP in extension services
Uptake by private sector	NOVELLA Partnership: UNILEVER, ICRAF, IUCN, TechnoServe, Novel Development Ltd. ,	Allanblackia Development	Development of value chains and creating markets.
Link to larger project with greater scaling up potential	IRRI, ICAR, Gates Foundation	Stress tolerant rice varieties	Collaboration with STRASA project of Gates Foundation offers greater potential for scaling up.
Link to development programme funded by IFI loan instrument	ICRISAT, IFAD	Groundnut and pigeon pea cropping systems in East Africa	Links with IFAD Agricultural technology and agri-business advisory services project (Uganda) and Marketing infrastructure, value addition and rural finance support (Tanzania)

piloting innovation platforms which are gaining increasing acceptance as a new model for agricultural extension.

Innovation at the farmer level is being pioneered through PROLINNOVA[30], a programme that DEVCO supports through GFAR. PROLINNOVA makes local innovation support funds directly available to farmers or farmers' groups who prioritise and implement their own research and innovation needs, drawing on technical support where needed.

4.3.2 Improved targeting on nutrition

Agriculture has great potential to contribute to improvements in nutrition but current evidence linking agricultural interventions to nutritional outcomes is weak. This is due to a variety of reasons: often nutritional outcomes from agricultural interventions were not taken into account nor systematically measured. Due to the complex nature of agricultural systems it is usually difficult to apply the same degree of scientific rigour to experimental design as might be expected by researchers in the health field. However there is clear evidence from some case studies that agriculture has contributed to nutrition in areas such as dietary diversity and increased uptake of certain minerals and vitamins.

Agricultural research has a key role to play, both in developing and testing new technologies in the context of food systems and in building the evidence base for what does and what does not work from a nutritional standpoint. We need to know which nutrition-sensitive interventions, particularly those that are based on agriculture, are most likely to result in positive nutritional impacts in particular geographic or socio-economic circumstances, and to elucidate and understand the pathways leading to these impacts. In addition to strengthening the evidence base, new partnerships with the private sector or NGOs may be needed to ensure the delivery of knowledge and technological products for improving nutrition. Since long-term causes of under-nutrition are dependent on a combination of factors including lack of access to nutritious food, disease and poverty, DEVCO also recognises the importance of collaborating with partners in other sectors, such as health and sanitation, to maximise positive outcomes.

4.4 Enhancing capacity and impacts at the country level

To result in tangible impacts, AR4D initiatives, including those at global and regional level, need to be grounded locally. This requires close coordination between levels of operation. Furthermore, the Commission stresses that thematic activities, such as AR4D, should add value to programmes at country level that are supported by geographical instruments. There is an imbalance between support to AR4D at global and regional level, and support at the country level, that results in a comparative shortage of funds and also, in some cases, to imperfect matching of wider research agendas to national priorities.

From an AR4D perspective there are two over-arching needs at the national level. On the one hand the capacity of national agricultural research and extension systems (NARESs) needs to be strengthened, and on the other hand there is a need to improve coherence between research and broader agriculture and rural development. Both of these objectives require DEVCO's thematic units to work closely with the EU Delegations (EUDs) which are charged with the management of programmes in-country. Adopting an agricultural innovation systems approach will facilitate the integration of research, extension and capacity building at country level.

EUDs should be in a position to assess the strengths and weaknesses of NARESs and how weaknesses may be addressed, either within the scope of country programmes or through regional initiatives. Tackling the potential linkages between research and development projects is usually a more complex issue. Current disconnects may be due in part to the different drivers of research programming, linked to the generation of public goods at global and regional level and the development priorities perceived by individual countries. In some cases, the country priorities negotiated with host Governments did not include food security, agriculture or rural development. In other cases, the importance of AR4D in these sectors may not have been considered. A key issue is to improve mutual awareness between Headquarters and EUDs so that relevant opportunities can be grasped.

DEVCO will prioritise AR4D in countries where agriculture, food and nutrition security is a focal sector in the programming, so that potential synergies between country level activities and global or regional research can be fully captured. This approach will make specific efforts to share knowledge with country programmes and to foster mutual awareness of priorities at global/regional and country level. We recognise that circumstances vary greatly between countries, along with the capacity and comparative

Participation in a gastronomic fair, Mistura, in Lima promoting native potatoes and their nutritional characteristics to consumers. Photo: EU-IssAndes Project/ International Potato Centre (CIP)

advantage of different actors, including government agencies, NGOs, private sector, development banks and other donors.
Some key points to consider are:

1. Improving information flows, to ensure that EUDs are fully informed of relevant AR4D programmes/ projects at global or regional level that may impact, or potentially impact on their countries, but also to improve DEVCO's knowledge of priorities at the country level;

2. Providing technical support to EUDs that are managing regional AR4D projects;

3. Supporting EUDs in identifying priority needs for strengthening the NARS or extension systems;

4. Helping EUDs to identify, jointly with national partners, opportunities for taking up or up-scaling successful research products from global/regional programmes in the framework of national plans. This involves working with government agencies, non-state actors or private sector as appropriate;

5. Obtaining feedback from EUDs on priorities at national level that require agricultural research as part of their solution;

6. Supporting EUDs in the formulation of projects in country that build the capacity of national agricultural research or extension systems; and

7. Supporting EUDs in innovation, particularly in relation to the supporting platforms and value chains promoting the uptake of tried and tested research products.

It is suggested that a number of countries are selected to pilot the development of closer links between centrally-managed AR4D and country programmes.

4.5 Funding instruments and resources in the new Multi-annual Financial Framework

The new Multi-annual Financial Framework (MFF) marks the initiation of a new financial instrument, combining the previous thematic instruments that included the FSTP. This is the Global Public Goods and Challenges Programme (GPGCP). GPGCP includes a component on Food Security and Sustainable Agriculture, as well as one on environmental sustainability and climate change. There is also scope for flagship programmes that cut across two or more thematic areas. In addition to the GPGCP, the MFF also includes a Pan-African instrument that may be relevant to some parts of the AR4D portfolio and other geographical instruments that address regional or national programmes in non-ACP countries. The 11th EDF, which provides support for the country programmes and for intra-ACP initiatives also commences in 2014. Synchrony of these funding instruments and also with Horizon 2020 provides a unique opportunity to maximise synergies and programme effectiveness so that development outcomes can be optimised.

Current DEVCO investments in AR4D are estimated at around €80 million annually, averaged from 2011-13.

4.6 Monitoring and evaluation

The strategy will develop suitable indicators for monitoring progress and include these in the first report of the Implementation Plan for Food and Nutrition Security, which is currently being developed jointly by the Commission and Member States. Targets will be established and progress monitored annually. Programmes and projects will be subject to Results-Oriented Monitoring and other evaluations as specified in the relevant project documents.

4.7 Conclusion

This approach sets out a framework within which thematic priorities can be debated, partners identified and programmes designed with the aim of delivering on the policy targets established by the EU and the global community. A particular push will be required on nutrition and resilience, which are relative new priorities for the Commission and may require new partnerships and ways of working. Closer working across the Commission, across Europe and, in particular, between the centre and EU Delegations in country is needed if investment in AR4D is to fully realise its development impact.

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13 For example Raizer (2003), Evenson and Rosegrant (2003), Renkow and Byerlee (2010)
14 Adapted from Hall, A., Dijkman, J, and Sulaiman, R. Research into Use: Investigating the relationship between agricultural research and Innovation. RIU Discussion Paper 1. DFID
15 *Investing in smallholder agriculture for food security.* Report of the High Level Panel of Experts on Food Security and Nutrition, Committee on World Food Security, Rome. June 2013.
16 Ruel, M, and Alderman (2013). Nutrition-sensitive interventions and programmes: how can they help to accelerate progress in improving maternal and child nutrition. The Lancet. 382. 536-551.
17 FAO. State of Food and Agriculture Report, 2012
18 http://www.ifpri.org/sites/default/files/publications/weai_brochure.pdf
19 Latest estimates suggest that agriculture contributes to around 15% of total greenhouse gas emissions or to around one third of total emissions if land use change is included.
20 George Rothschild (2012). *Op cit.*
21 The Dublin Process was initiated under the chairmanship of USAID and World Bank. It is now the CAADP-CGIAR partnership co-chaired by AUC and CGIAR.
22 Such as the L'Aquila Declaration of 2009 and the New Alliance for Food and Nutrition Security (2012)
23 Some Member States that are small donors to the CGIAR support the presence of EU in the Fund Council to represent them.
24 The EU seat is currently assured at least to end 2015.
25 DEVCO currently leads the CAADP Development Partners Task Team and represents Development partners on the FARA Board. DEVCO also is an observer on the Board of CTA.
26 Management of ex-situ genetic resources, under the oversight of the Global Crop Diversity Trust, is sometimes regarded as the 16th CRP.
27 SCAR: Standing Committee on Agricultural Research
28 Heads of Agriculture and Rural Development
29 Such as G8, G20, UN Conventions, FAO etc
30 Promoting Local Innovation in ecologically oriented agriculture and natural resource management

This working document presents the DEVCO approach to AR4D in the context of current policy priorities in sustainable agriculture, nutrition and resilience and how it is positioned within the European and global agenda to achieve maximum impact.

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This farmer in Masaka district, Uganda, harvests and stores water from the roof of her house and runoff using simple innovations. This enables her to grow crops all-year-round for household nutrition and for sale. She also grows fodder and grass to feed the livestock and uses banana leaves and other foliage to mulch and fertilise the soil besides animal residue manure. These improvements result from research supported by ***ASARECA*** *which receives core funding from* ***DEVCO****.* Photo: ASARECA