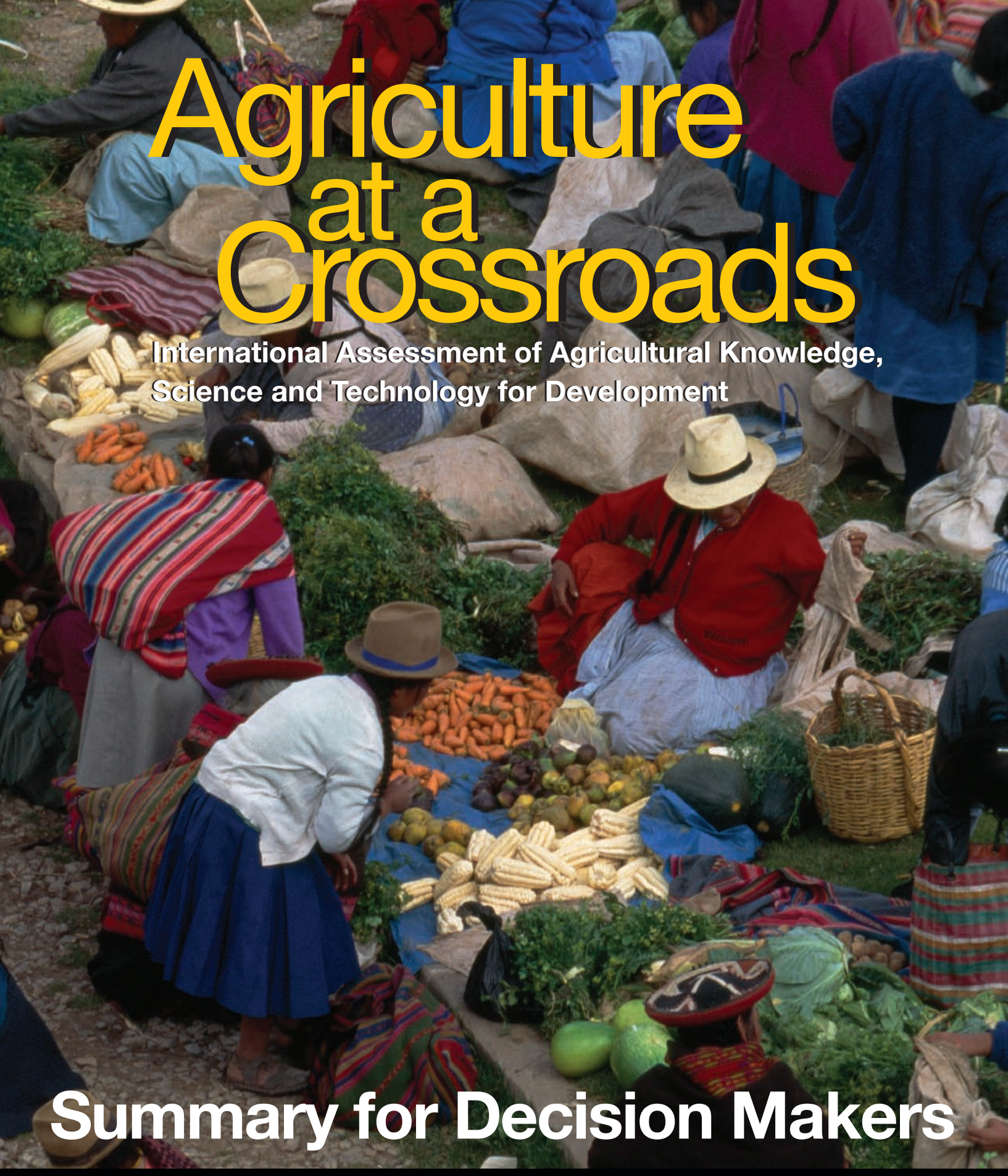

Agriculture at a Crossroads

International Assessment of Agricultural Knowledge, Science and Technology for Development

Summary for Decision Makers

IAASTD

Latin America & the Caribbean

IAASTD

International Assessment of Agricultural Knowledge, Science and Technology for Development

Summary for Decision Makers of the Latin America and the Caribbean (LAC) Report


IAASTD
International Assessment of Agricultural Knowledge, Science and Technology for Development


UNDP
UNEP
UNESCO
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WHO
GLOBAL ENVIRONMENT FACILITY

IAASTD

International Assessment of Agricultural Knowledge, Science and Technology for Development

Summary for Decision Makers of the Latin America and the Caribbean (LAC) Report

This summary was approved in detail by LAC governments attending the IAASTD Intergovernmental Plenary in Johannesburg, South Africa (7-11 April 2008).

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Contents

Foreword

The objective of the International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD) was to assess the impacts of past, present and future agricultural knowledge, science and technology on the:

- reduction of hunger and poverty,
- improvement of rural livelihoods and human health, and
- equitable, socially, environmentally and economically sustainable development.

The IAASTD was initiated in 2002 by the World Bank and the Food and Agriculture Organization of the United Nations (FAO) as a global consultative process to determine whether an international assessment of agricultural knowledge, science and technology was needed. Mr. Klaus Töepfer, Executive Director of the United Nations Environment Programme (UNEP) opened the first Intergovernmental Plenary (30 August-3 September 2004) in Nairobi, Kenya, during which participants initiated a detailed scoping, preparation, drafting and peer review process.

The outputs from this assessment are a Global and five Sub-Global reports; a Global and five Sub-Global Summaries for Decision Makers; and a cross-cutting Synthesis Report with an Executive Summary. The Summaries for Decision Makers and the Synthesis Report specifically provide options for action to governments, international agencies, academia, research organizations and other decision makers around the world.

The reports draw on the work of hundreds of experts from all regions of the world who have participated in the preparation and peer review process. As has been customary in many such global assessments, success depended first and foremost on the dedication, enthusiasm and cooperation of these experts in many different but related disciplines. It is the synergy of these interrelated disciplines that permitted IAASTD to create a unique, interdisciplinary regional and global process.

We take this opportunity to express our deep gratitude to the authors and reviewers of all of the reports—their dedication and tireless efforts made the process a success. We thank the Steering Committee for distilling the outputs of the consultative process into recommendations to the Plenary, the IAASTD Bureau for their advisory role during the assessment and the work of those in the extended Secretariat. We would specifically like to thank the cosponsoring organizations of the Global Environment Facility (GEF) and the World Bank for their financial contributions as well as the FAO, UNEP, and the United Nations Educational, Scientific and Cultural Organization (UNESCO) for their continued support of this process through allocation of staff resources.

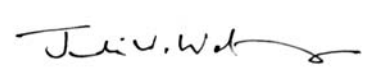
We acknowledge with gratitude the governments and organizations that contributed to the Multidonor Trust Fund (Australia, Canada, the European Commission, France, Ireland, Sweden, Switzerland, and the United Kingdom) and the United States Trust Fund. We also thank the governments who provided support to Bureau members, authors and reviewers in other ways. In addition, Finland provided direct support to the Secretariat. The IAASTD was especially successful in engaging a large number of experts from developing countries and countries with economies in transition in its work; the Trust Funds enabled financial assistance for their travel to the IAASTD meetings.

We would also like to make special mention of the Regional Organizations who hosted the regional coordinators and staff and provided assistance in management and time to ensure success of this enterprise: the African Center for Technology Studies (ACTS) in Kenya, the Inter-American Institute for Cooperation on Agriculture (IICA) in Costa Rica, the International Center for Agricultural Research in the Dry Areas (ICARDA) in Syria, and the WorldFish Center in Malaysia.

The final Intergovernmental Plenary in Johannesburg, South Africa was opened on 7 April 2008 by Achim Steiner, Executive Director of UNEP. This Plenary saw the acceptance of the Reports and the approval of the Summaries for Decision Makers and the Executive Summary of the Synthesis Report by an overwhelming majority of governments.

Signed:

Co-chairs
Hans H. Herren
Judi Wakhungu



Director
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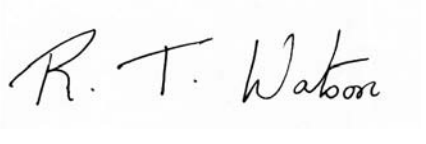

International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD)

Latin America and the Caribbean (LAC) Summary for Decision Makers

Writing Team: Inge Armbrecht (Colombia), Hugo Cetrángolo (Argentina), Tirso Gonzales (Peru), Ivette Perfecto (Puerto Rico)

Statement by Governments

In the view of all the countries, the Reports make a valuable and important contribution to our understanding of knowledge, science, and technology for development, based on recognition of the need to deepen our understanding of the challenges that lie ahead. This assessment is a constructive exercise and makes an important contribution that all countries need to develop further in order to ensure that agricultural knowledge, science, and technology achieve their potential, with a view to attaining the goals of development and sustainable poverty and hunger reduction, thereby improving the quality of rural life and human health and facilitating equitable development in a way that is socially, economically, and environmentally sustainable.

Based on this declaration, the following governments approve the Summary for Decision Makers for the Latin America and the Caribbean Report:

Belize, Brazil, Costa Rica, Cuba, Dominican Republic, El Salvador, Honduras, Panama, Paraguay, and Uruguay (10 countries).

Background

In August 2002, the World Bank and the Food and Agriculture Organization (FAO) of the United Nations initiated a global consultative process to determine whether an international assessment of agricultural knowledge, science, and technology (AKST) was needed. This initiative was prompted by discussions at the World Bank with the private sector and nongovernmental organizations (NGOs) on the level of scientific understanding of biotechnology and more specifically transgenics. During 2003, eleven consultations were held, overseen by an international multistakeholder steering committee, involving over 800 participants from all relevant stakeholder groups such as governments, the private sector, and civil society. Based on those consultations, the steering committee recommended to an Intergovernmental Plenary meeting in Nairobi (September 2004) that an international assessment of the role of AKST in reducing hunger and poverty, improving rural livelihoods and facilitating environmentally, socially and economically sustainable development was needed. The concept of an International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD) was endorsed as a multithematic, multi-spatial, multi-temporal intergovernmental process with a multistakeholder Bureau cosponsored by the Food and Agriculture Organization (FAO) of the United Nations, the Global Environment Facility (GEF), United Nations Development Programme (UNDP), United Nations Environment Programme (UNEP), United Nations Educational, Scientific and Cultural Organization (UNESCO), the World Bank, and World Health Organization (WHO).

The IAASTD's governance structure is a unique hybrid of the Intergovernmental Panel on Climate Change (IPCC) and the nongovernmental Millennium Ecosystem Assessment. The stakeholder composition of the Bureau was agreed at the Intergovernmental Plenary meeting in Nairobi; it is geographically balanced and multistakeholder with 30 government and 30 civil society representatives (NGOs, producer and consumer groups, private sector entities and international organizations) in order to ensure ownership of the process and findings by a range of stakeholders.

About 400 of the world's experts were selected by the Bureau, following nominations by stakeholder groups, to prepare the IAASTD Report (composed of a Global and five Sub-Global assessments). These experts worked in their own capacity and did not represent any particular stakeholder group. Additional individuals, organizations, and governments were involved in the peer review process.

The IAASTD development and sustainability goals were endorsed at the first Intergovernmental Plenary and are consistent with a subset of the UN Millennium Development Goals (MDGs): the reduction of hunger and poverty, the improvement of rural livelihoods and human health, and facilitating equitable socially, environmentally and economically sustainable development. Realizing these goals requires acknowledging the multifunctionality of agriculture: the challenge is to simultaneously meet development and sustainability goals while increasing agricultural production.

Meeting these goals has to be placed in the context of a rapidly changing world of urbanization, growing inequities, human migration, globalization, changing dietary preferences, climate change, environmental degradation, a trend toward biofuels, and an increasing population. These conditions are affecting local and global food security and putting pressure on productive capacity and ecosystems. Hence there are unprecedented challenges ahead in providing food within a global trading system where there are other competing uses of agricultural and other natural resources. AKST alone cannot solve these problems, which are caused by complex political and social dynamics; but it can make a major contribution to meeting development and sustainability goals. Never before has it been more important for the world to generate and use AKST.

Given the focus on hunger, poverty, and livelihoods, the IAASTD pays special attention to the current situation, issues, and potential opportunities to redirect the current AKST system to improve the situation for the rural poor, especially small-scale farmers, rural workers, and others with limited resources. It addresses issues critical to formulating policy and provides information for decision makers confronting conflicting views on contentious issues such as the environmental consequences of productivity increases, environmental and human health impacts of transgenic crops, the consequences of bioenergy development on the environment and on the long-term availability and price of food, and the implications of climate change on agricultural production. The Bureau agreed that the scope of the assessment needed to go beyond the narrow confines of science and technology (S&T) and should encompass other types of relevant knowledge (e.g., knowledge held by agricultural producers, consumers, and end users) and that it should also assess the role of institutions, organizations, governance, markets, and trade.

The IAASTD is a multidisciplinary and multistakeholder enterprise requiring the use and integration of information, tools, and models from different knowledge paradigms including local and traditional knowledge. The IAASTD does not advocate specific policies or practices; it assesses the major issues facing AKST and suggests a range of AKST options for action that meet development and sustainability

goals. It is policy relevant, but not policy prescriptive. It integrates scientific information on a range of topics that are critically interlinked, but often addressed independently, i.e., agriculture, poverty, hunger, human health, natural resources, environment, development, and innovation. It will enable decision makers to bring a richer base of knowledge to bear on policy and management decisions on issues previously viewed in isolation. Knowledge gained from historical analysis (typically the past 50 years) and an analysis of some future development alternatives to 2050 form the basis for assessing options for action on science and technology, capacity development, institutions and policies, and investments.

The IAASTD was conducted according to an open, transparent, representative, and legitimate process; is evidence-based; presents options rather than recommendations; includes risk assessment, management, and communication; assesses different local, regional, and global perspectives; presents different worldviews, acknowledging that there can be more than one interpretation of the same evidence based on different world views (along with an indication, when possible, of doubts harbored); and identifies the key scientific uncertainties and areas on which research could be focused to advance development and sustainability goals.

The IAASTD is composed of a Global assessment and five Sub-Global assessments: Central and West Asia and North Africa – CWANA; East and South Asia and the Pacific – ESAP; Latin America and the Caribbean – LAC; North America and Europe – NAE; and Sub-Saharan Africa – SSA. The IAASTD (1) assesses the generation, access, dissemination, and use of public and private sector AKST in relation to the goals, using local, traditional, and formal knowledge; (2) analyzes existing and emerging technologies, practices, policies and institutions and their impact on the goals; (3) provides information for decision makers in different civil society, private, and public organizations on options for improving policies, practices, institutional and organizational arrangements to enable AKST to meet the goals; (4) brings together a range of stakeholders (consumers, governments, international IAASTD agencies and research organizations, NGOs, the private sector, producers, the scientific community) involved in the agricultural sector and rural development to share their experiences, views, understanding, and vision for the future; and (5) identifies options for future public and private investments in AKST. In addition, the IAASTD will enhance local and regional capacity to design, implement, and utilize similar assessments.

In this assessment, "agriculture" is used and understood in the widest sense of the term. However, as in all assessments, some topics were covered less extensively than others (e.g., livestock, forestry, fisheries, and agricultural engineering), largely due to the expertise of the selected authors.

The IAASTD draft Report was subjected to two rounds of peer review by governments, organizations, and individuals. These drafts were placed on an open access Web site and open to comments by anyone. The authors revised the drafts based on numerous peer review comments, with the assistance of review editors who were responsible for ensuring the comments were appropriately taken into account. One of the most difficult issues authors had to address was criticisms that the report was too negative. In a scientific review based on empirical evidence, this is always a difficult comment to handle, as criteria are needed in order to say whether something is negative or positive. Another difficulty was responding to the conflicting views expressed by reviewers. The difference in views was not surprising given the range of stakeholder interests and perspectives. Thus, one of the key findings of the IAASTD is that there are diverse and conflicting interpretations of past and current events, which need to be acknowledged and respected.

The Global and Sub-Global Summaries for Decision Makers and the Executive Summary of the Synthesis Report were approved at an Intergovernmental Plenary in January 2008. The Synthesis Report integrates the key findings from the Global and Sub-Global assessments, and focuses on eight Bureau-approved topics: bioenergy; biotechnology; climate change; human health; natural resource management; traditional knowledge and community-based innovation; trade and markets; and women in agriculture.

The IAASTD builds on a number of recent assessments and reports that have provided valuable information relevant to the agricultural sector, but have not specifically focused on the future role of AKST, the institutional dimensions, and the multifunctionality of agriculture. These include FAO State of Food Insecurity in the World (2004); InterAcademy Council Report: Realizing the Promise and Potential of African Agriculture (2004); UN Millennium Project Task Force on Hunger (2005); Millennium Ecosystem Assessment (2005); CGIAR Science Council Strategy and Priority Setting Exercise (2006); Comprehensive Assessment of Water Management in Agriculture: Guiding Policy Investments in Water, Food, Livelihoods and Environment (2007); Intergovernmental Panel on Climate Change Reports (2001 and 2007); UNEP Fourth Global Environmental Outlook (2007); World Development Report 2008: Agriculture for Development (World Bank 2008); IFPRI Global Hunger Indices (yearly); and World Bank Internal Report of Investments in SSA (2007).

Financial support was provided to the IAASTD by the cosponsoring agencies, the governments of Australia, Canada, Finland, France, Ireland, Sweden, Switzerland, US and UK, and the European Commission. In addition, many organizations have provided in-kind support. The authors and review editors have given freely of their time, largely without compensation.

The Global and Sub-Global Summaries for Decision Makers and the Synthesis Report are written for a range of stakeholders, i.e., government policy makers, private sector, NGOs, producer and consumer groups, international organizations, and the scientific community. There are no recommendations, only options for action. The options for action are not prioritized because different options are actionable by different stakeholders, each of whom have a different set of priorities and responsibilities and operate in different socioeconomic and political circumstances.

Latin America and the Caribbean (LAC) Summary for Decision Makers

A critical but balanced assessment indicates that over the past 60 years, the agricultural knowledge, science, and technology (AKST) system successfully generated knowledge and produced technological innovations that were adopted and used by some producers and helped boost productivity and agricultural production and enhance the competitiveness of the conventional/productivist market- and export-oriented system. However, the AKST system did not prioritize or allocate adequate resources to issues related to the environment, social inclusion, reducing hunger and poverty, equity, diversity, and cultural affirmation. Indigenous/traditional systems have not been included on the AKST agenda, while agroecology has existed and remained peripheral to AKST. This assessment provides options aimed at managing and strengthening the AKST system and reorienting its agenda with a view to furthering development and sustainability goals.

Societies and governments are facing the challenge of attributing greater importance to agriculture not only as an engine of economic development that generates employment and income, but also as a multidimensional asset. The rural sector is making an actual and potential contribution in the form of environmental and recreational products and services, which are being sought by society to provide well-being and quality of life. AKST alone is not a panacea for the host of political and economic constraints that stymie sustainable and equitable economic development or poverty and hunger reduction in the region. However, investment in AKST can contribute to and facilitate improvement of the living conditions of the people of Latin America, particularly in rural areas, where poverty is more abject. Findings suggest that public investment in and institutional reforms of AKST can help countries meet their development and sustainability goals.

To achieve positive results, AKST will have to undergo sweeping change in order to move toward a system of innovation and inclusive development that incorporates, in particular, small-scale producers, agroecological producers, and indigenous producers. The current environmental situation calls for urgent action oriented toward transition to sustainable models that draw on the strengths of the knowledge of the three productive systems: the traditional/indigenous, the agroecological, and the conventional/productivist systems. At the same time, in order to meet the urgent needs associated with rural poverty in a way that allows this population segment and marginalized areas to benefit from development, it is essential to devise a territorial rural development strategy that enhances the value of this social environment from the standpoint of both production and its lifestyle.

In order to be able to respond to these multifaceted challenges, AKST will have to adopt a holistic, multidisciplinary, and multisectoral agenda. The problems in the agricultural sector should be of interest not only to producers but to society as a whole. The rural sector plays a critical role in the context of a comprehensive poverty reduction strategy. However, the unstructured and inequitable interaction between rural and urban areas warrants consideration based on comprehensive visioning given its impact on sustainable development, and in an equitable manner, in the interest of present and future generations.

CONTEXT, TRENDS, AND CURRENT SITUATION

What are the main production systems in Latin America and the Caribbean and how have they performed?

In the agricultural sphere in Latin America, the means of production are heterogeneous and cultural approaches and actors, diverse. This diversity leads to differences in production systems, which entail not only different approaches to cultivating the land and managing productive resources, but also to complex and heterogeneous ways of interacting with the land, the environment, and the social, economic, and cultural milieu and, in some instances, to starkly different worldviews [Chapter 1].

For purposes of this assessment, three major categories of agricultural systems are reviewed: the *traditional/indigenous system*, which includes the indigenous, rural, and Afro-American system and is based on local/ancestral knowledge and is rooted in the land. The *conventional/productivist system* includes intensive production practices and is oriented toward monoculture, the use of external inputs, and production geared toward a broad market. In the *agroecological system*, productive systems are viewed as ecosystems where mineral cycles, energy processing, biological processes, and socioeconomic relations are studied and analyzed not only to maximize production, but also to make optimal use of the agroecosystem as a whole. It is based on agroecological science and productive diversification, enhancing the value of traditional knowledge, and knowledge sharing. These systems interact and some reveal a blend of characteristics, as well as varying levels of market integration [Chapter 1]. Historically, the development of these three systems in the region has been heterogeneous.

The traditional/indigenous system is based on the management and use of biodiversity and discovery-oriented and

lifestyle systems, and has generated varying levels of production (ranging from high to very low). Its worldview links nature and culture (Figure LAC-SDM-1). External conditions demonstrate that sustainability is not always possible [Chapter 1].

The conventional system is based on high levels of production and competition for external and domestic markets (Figure LAC-SDM-2). However, in general terms, the system has not been sustainable from an environmental standpoint, efficient from an energy standpoint, or equitable from a social standpoint [Chapter 1].

The agroecological system is environmentally and socially sustainable, energy efficient, and capable of achieving high levels of productivity when properly managed. This system has been stymied by a dearth of government/institutional support programs and by the greatly unmet need for the knowledge and expertise that are required for its implementation [Chapter 1].

What has been the relationship between the agricultural models of development and the sustainable development goals in the region?

The development models of the last 60 years accorded priority to the conventional/productivist system, resulting in a sharp increase in productivity and agricultural production, without a significant reduction in poverty and undernutrition. In the LAC region, approximately 209 million persons are poor and 54 million, undernourished. These figures represent 37 percent and 10 percent of the total population, respectively, despite the fact that three times more food is produced than is consumed [Chapter 1]. In addition, the region has the highest rates of inequality in the world. (Figure LAC-SDM-3)

Some of the factors that have prevented production levels from reducing hunger levels and a proportional reduction in poverty include a lack of access to and poor distribution of food, weak purchasing power of a significant sector of the population and, until recently, low prices paid to producers as a result of a policy to keep food prices low in urban areas [Chapter 1].

Despite the fact that the LAC region does not face a chronic shortage of such available natural resources as arable land, water, and biological and crop diversity, these resources have been underutilized or poorly utilized, as demonstrated by the large estates [*latifundios*] or poorly utilized land. More and more, this situation has led to a loss of soil and biodiversity, owing to problems of erosion, urbanization, contamination, and the intensification and expansion of agriculture toward land that is less productive [Chapter 1].

Figure LAC-SDM-1. *Andean Worldview.* Source: Gonzales 1999; Gonzales, Chambi and Machaca, 1999.

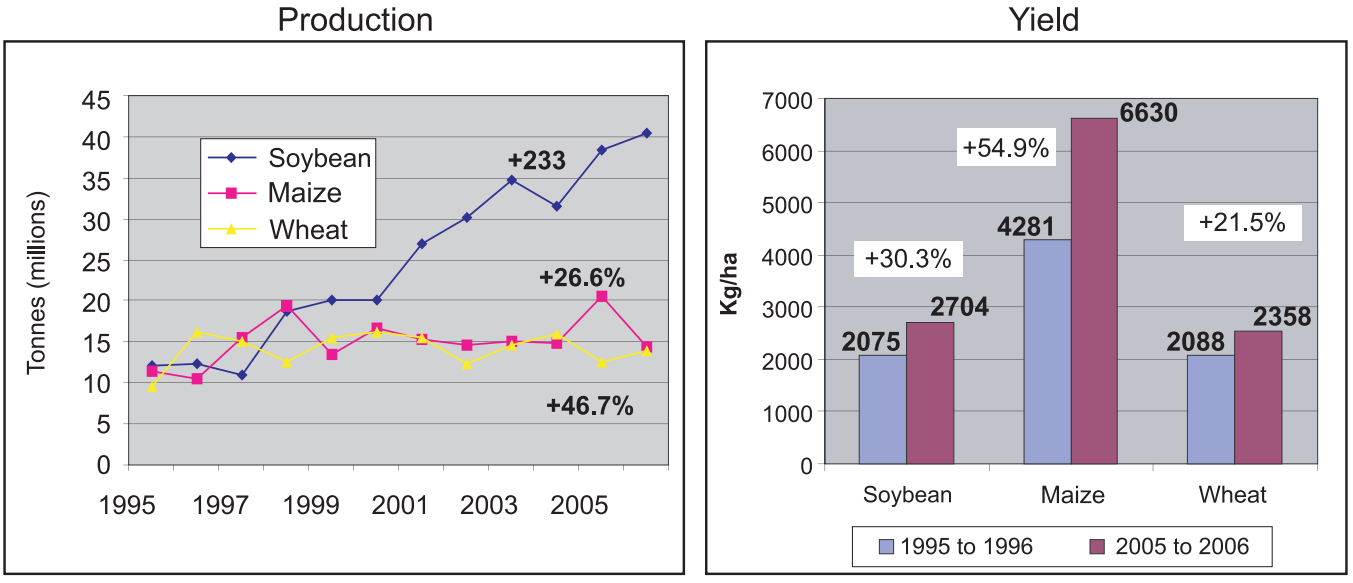

Figure LAC-SDM-2. *Production Trends and Agricultural Yield of the Conventional/productivist System - the Case of Argentina.* Source: FAOSTAT.

Cultural modernization and the emphasis placed on the conventional/productivist system have undermined sociocultural diversity, local/traditional know-how, and agrobiodiversity, all of which are essential for the development of intensive knowledge-based agroecological systems. The dominant conventional technologies have supplanted local/traditional knowledge and expertise. This process of cultural, genetic, and technological erosion has led to the rejection of the rural and ancestral cultural heritage that is in harmony with the surrounding environment and the adoption of external knowledge and cultures that are relatively homogenous [Chapter 1].

Agricultural policies and commercial processes that promote the exploitation, privatization, and patenting of natural resources have curbed access to and control over these resources (land, water, and seeds) by small producers and the rural poor. As a result, wealth and land concentration, marginalization, exclusion, and poverty have increased. While trade liberalization policies have created market opportunities for the region and, in a number of cases, have produced significant upward trends in GDP, they have also heightened the vulnerability of small and medium-sized producers, and have favored, with a few exceptions, big producers, thereby increasing economic inequality in the region [Chapter 1].

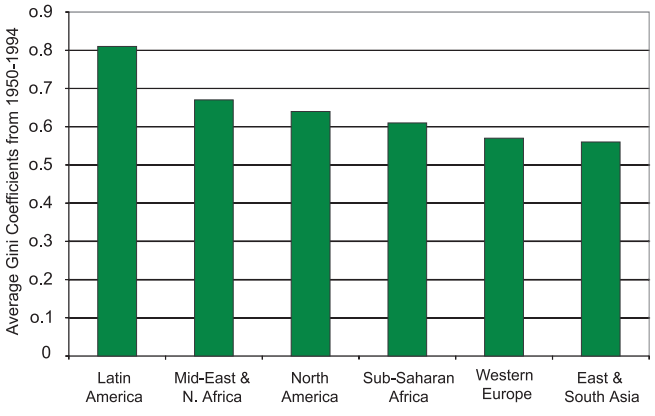

Figure LAC-SDM-3. *Unequal Land Distribution.* Source: Deininger and Olinto, 2000.

In general terms, the importation of subsidized food has led to the disruption of local production systems, creating a high level of dependence on food produced in other countries. This situation is exacerbated when the food-related purchasing power of the rural population declines, whether this food is local or imported. This situation has led to a loss of food sovereignty, and of access to and social control over communal public goods, particularly in the most vulnerable sectors [Chapter 1].

The problem has grown worse in recent years owing to unequal trade relations which, in most cases, have led to unfair competition and situations where local producers had to compete with producers of other countries where production is either subsidized or takes place with more sophisticated technology. "Dumping" has played a role in the displacement of many small producers and has prompted a rural exodus. In some cases, these producers reacted by forming cooperatives and associations and by developing market alternatives such as fair trade markets and organic products, despite the difficulties encountered with gaining access to credit, markets, and transportation. However, many big producers and some countries in the region managed to become active players in the international market, achieving high levels of competitiveness. In most cases, however, the wealth generated by these opportunities has not trickled down to the poorest population sectors, a factor that has served to heighten economic inequalities [Chapter 1].

How has the AKST agenda responded to the development model and production policies implemented over the last sixty years?

In response to the development model and production policies implemented, the priority of the AKST agenda was to increase production in order to meet the demands of the

domestic and export markets. While the results were satisfactory from a productivity standpoint, they failed to address the problems faced by small producers, and traditional and indigenous communities, or those pertaining to poverty reduction, hunger, or environmental degradation. Until the 1990s, the development model primarily sought to increase production and productivity in the agricultural sector and facilitate entry into national and international markets. In many countries, this strategy had negative social and environmental effects, which were ignored by the system until the last decade, when AKST began to gain a better understanding of these effects, influenced in part by demands from civil society organizations and social movements. At the same time, the phenomenon of globalized communication resulted in the coalescence of preferences of a growing number of consumers in developed countries, who were willing to pay more for products generated using alternative technologies that are environmentally friendly and socially just. This phenomenon prompted changes in the research agenda and paved the way for a number of small producers to enter the market using agroecological technologies and developing a heritage-based value for their products [Chapter 2].

Does the AKST system currently meet the demands of society?

The current AKST system does not fully meet the new demands of society, which require a more diverse, complex, and holistic agenda that reconciles seemingly conflicting objectives such as competitiveness, sustainability, and social and cultural inclusion. The AKST agenda allowed for limited participation by users and civil society, and failed to attach sufficient importance to small producers or the issue of poverty. High priority was accorded to lines of research that sought to promote increased productivity, neglecting social, cultural, and environmental aspects [Chapter 2].

Is the AKST structure suitable for the development of technologies to promote the common good?

The reduction of the public component of the AKST system has limited its contribution, which is necessary for the development of technologies that cannot be acquired and seek to promote the common good. The LAC region has made limited investments in research and development (Figure LAC-SDM-4), and in most countries, with the exception of Mexico, Brazil, Colombia, Uruguay, and Argentina, among others, the public component of the AKST system was reduced to a minimum. Innovative alternatives that promote comanagement between public and private organizations, along with civil society participation [Chapter 2], were recently developed, but must not replace significant public sector participation in research and development.

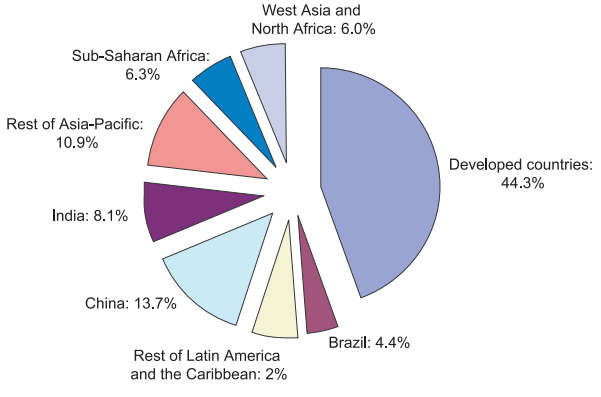

Figure LAC-SDM4. *Investments in Research and Development.* Source: Pardey et al., 2006.

CONDITIONS AND OPTIONS FOR MEETING THE DEVELOPMENT AND SUSTAINABILITY GOALS

What modifications need to be made to the AKST agenda and its execution in order to meet the development and sustainability goals?

The general objective of the proposed reforms is to reorder research priorities and provide information on the public component of the AKST agenda in order to make it more inclusive and sustainable from a social, economic, cultural, and environmental standpoint. A number of options are outlined below:

- *Promote greater participation and democratization in the definition and execution of the AKST agenda with a view to integrating sectors that have been excluded.* Actions should therefore seek to expand access to information, build or strengthen their capacities to participate in decision making, and provide institutional forums for discussion and decision making [Chapter 4].
- *Promote interaction between traditional, agroecological, and conventional knowledge and expertise.* To this end, it would be appropriate to develop an intercultural participatory agenda that preserves and enhances the value of local knowledge, supplements it with scientific knowledge where relevant, and contributes to greater sustainability of productive systems, more efficient use of natural resources, and higher land yields, while maintaining, promoting, and enhancing the cultural and biological heritage of local communities. The current AKST system must be bolstered in order to make its agenda more holistic, complex, and diverse, which will address the problems faced by traditional and conventional systems, so that they will both evolve toward a more agroecological model [Chapter 4] (Figure LAC-SDM-5).
- *Redirect priorities toward strengthening research for greater environmental and social sustainability without compromising productivity.* AKST must scale up investment in the development of knowledge-based systems in order to support agroecological systems. This would facilitate greater development of all systems (agroecological, indigenous, and conventional), and would, in particular, reduce and mitigate the environmental and social impact caused by more intensive agricultural and aquatic systems, thereby reducing the adverse effects of agriculture on climate change [Chapter 4].
- *Redirect research in new fields of knowledge in order to meet the sustainability and development goals without neglecting productivity (e.g., the complexity of biological systems, biotechnology, information technologies, precision agriculture, biomedicine, and alternative medicines).* Tap into the potential of new fields of knowledge in order to find solutions to poverty and its effects.

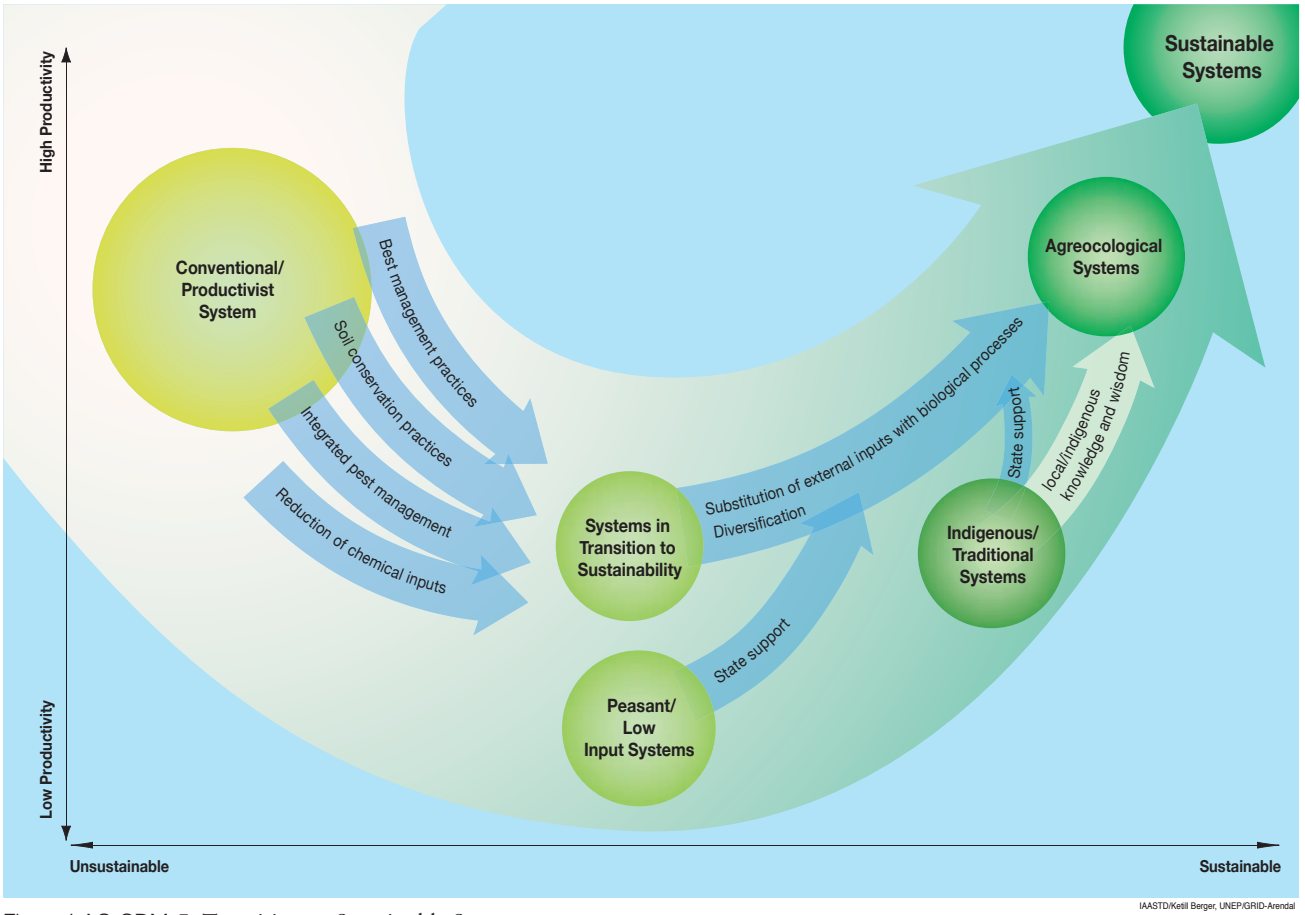

Figure LAC-SDM-5. Transition to Sustainable Systems.

This would allow the proposed options to achieve the goals of poverty reduction, hunger, undernutrition, human health, and environmental conservation, provided they adhere to the precautionary principle and select technologies that facilitate simultaneous achievement of the greatest number of sustainability and development goals. The foregoing would entail the creation of funds to finance the production of regional and global public goods [Chapter 4].

- *Strengthen research activities in urban and periurban agriculture.* These activities have had a demonstrated positive impact on food security and sovereignty, in addition to producing social benefits such as the strengthening of community organizations and others in the third sector [Chapter 4].
- *Focus AKST strategies on conservation (in-situ and ex-situ) and the sustainable use of biodiversity.* Biodiversity, both domestic and wild, is the main source of opportunities for the development of new products and ecological functions that help to meet the growing demand for food and other products, in a context of economic and climate change [Chapter 4].
- *Promote integrative research methods for better understanding of the dynamic relationship between water, soil, and biological processes (e.g., pest management, recycling of nutriments), and interactions between ecological and social systems.* Most of the region's natural habitats have undergone a high degree of fragmentation. Consequently, production systems often serve as a matrix that includes natural habitat fragments or patches. AKST should take this situation into account and examine the interactions between the production systems, natural systems, and the social dynamic. [Chapter 4].
- *Develop and strengthen innovations that foster sustainable competitiveness, internalize environmental and social costs, and improve access to markets (domestic and export) for all sectors, but for the most vulnerable social groups in particular.* Included among these innovations are those that:
  - Organize and empower small producers;
  - Add value and contribute to sustainable productivity and product differentiation;
  - Encourage consumers to use those products;
  - Develop traceability and food safety systems; and
  - Address health, environmental, and biosafety barriers through the development of low-cost health protocols and technologies.
- *Strengthen intervention strategies aimed at expanding participation to primarily disseminate knowledge among disadvantaged communities to help meet sustainable development needs.* This process must consider the cultural identity of communities. Moreover, public AKST must also take into account expansion needs in conventional production systems in order to appropriately validate the technologies generated by private re-

search and development and offer alternatives for the transition to sustainable systems. Bringing producers together through networks contributes to an exchange of experiences, knowledge, and technologies.

- *Promote greater participation of women in managing organizational models, in generating and disseminating knowledge, and in the various strategies for culturally appropriate development*. The needs of women in productive systems must be addressed, given their important role in society and rural areas. AKST has a key responsibility in enhancing the participation and leadership roles of women, which, despite improvements in recent years, are still very limited in producer organizations and within the AKST system itself.
- *Promote research and outreach to diversify activities in rural areas*. Producers can earn additional income in other areas such as local agroindustries, handicraft, agrotourism, ecotourism, and forest ranger activities, the use of native or overlooked species and varieties such as medicinal plants that have not been commonly used, textile production, the establishment and maintenance of in-situ seed banks, and the use of plants in dyes, essences, fragrances, and other products.

What modifications are needed in the AKST institutional framework (management and capacities) in order to meet the development and sustainability goals?

Consideration should be given to the following options:

- *Promote intercultural education institutions in order to encourage ongoing local capacity and skill building and development*.
- *Promote and strengthen the development of networks with a view to establishing decentralized governance models, focusing on small producers, the rural and urban poor, and civil society, in order to achieve collective benefits that take into account private and public interests*. Synergetic and complementary capacities must be developed in order to achieve the objectives that cannot be accomplished in isolation. Increased civil society participation will result in better and greater social control of AKST, with respect to its agenda and performance, adhering to the principles of transparency and "accountability." The promotion of structures that facilitate dialogue between peasant farmers, social movements, and other stakeholders and the AKST system will replicate the positive impact already achieved by them.
- *Strengthen AKST interactions at the regional and global level, based on solidarity and joint responsibility, to generate public goods*. Promoting interaction among AKST systems in the LAC region at the local and international level will help build the relative strengths of each one of the countries in the region. This would require the coordination of international cooperation programs that take into account the rural sector and, in particular, the small-scale production and traditional/indigenous production sectors. These programs must be assessed in order to identify the most effective way of gaining access to them and streamline as much as possible the wide variety of models, ensuring that these programs will provide benefits for the target countries and their most vulnerable communities.
- *Strengthen, through AKST, direct links between food producers and consumers*. It is important to promote dialogue among these stakeholders, which will help producers enter the market, particularly the smaller producers, in areas such as participatory organic certification. AKST can contribute to the development, productivity, and competitiveness of shorter production chains, where producers and consumers interact and focus on mutual needs, primarily in the local markets.
- *Promote the conduct and dissemination of critical assessments of the possible environmental, social, cultural, economic, and health impact of new technologies*. AKST impact assessment studies must have two main objectives: (1) report to the society on investments made; and (2) demonstrate to the society the importance and impact of outputs generated. The incorporation of these impact assessment studies into the research process would prompt research in these new technologies to take into account the socioeconomic, cultural, and environmental context where they are to be applied. These studies must include the analysis of all the effects of their outputs (economic, social, environmental, and others), and must be linked to a program in order to communicate findings. For example, the current impact of transgenic crops and the use of food crops to generate energy need to be assessed.

What support policies are required for AKST to meet the development and sustainability goals?

In order to meet the development and sustainability goals, AKST Public Support Policies must transcend models based on the assumption that the market alone can address the issues of economic and cultural poverty, hunger, and inequality. For example, Figure LAC-SDM-6 presents a set of public policy options pertaining to food sovereignty. In order to implement public policies, it is necessary to achieve broad political and social consensus that will establish a legitimate strategic framework that can be sustainably applied in the short, medium, and long term. This framework must be based primarily on decentralized governance models at the local and regional level, and on participatory mechanisms for *ex-ante* and *ex-post* assessments of the impact of the various public policy instruments. This is crucial for adapting and implementing instruments in each specific situation.

Macroeconomic policies

Public policies must seek, on an ongoing basis, to ensure macroeconomic stability, which does not distort the relative price structure in LAC economies with respect to their long-term equilibrium levels. Otherwise, there is a risk of bolstering only the sectors that already possess export capacity; discouraging those that lack this capacity, either because they have not yet been able to build it, or because their production is geared toward the local market or for consumption by the producers; or promoting import sectors that compete fiercely with national producers.

Sectoral regulation policies

Sustainable natural resource management policies. Territorial development and ecological/economic zoning should be utilized as tools for this policy in order to formulate rules for

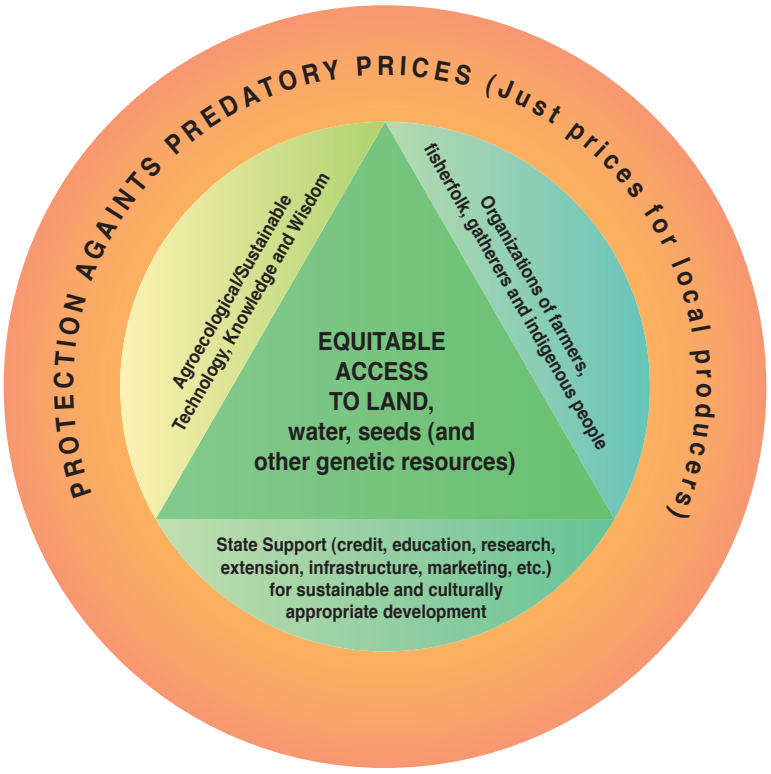

Figure LAC-SDM-6. *Public policy options that contribute to food sovereignty.*
Source: Rosset, 2006

land use, ranging from conservation to intensive agricultural use, with a view to achieving a mosaic of sustainable agroecosystems [Chapter 5]. The socioeconomic context must be taken into account in order to offer viable alternatives with AKST support.

Land access and land tenure policies. Despite agrarian reform efforts in several LAC countries, the region has the most unequal land distribution system in the world. Agrarian reform and land tenure are topical issues that affect the region's agricultural development. However, given the heterogeneity of the LAC region, the significance of this issue should be addressed at the country level. Land tenure is closely linked to poverty, hunger, and the displacement of small farmers, peasant farmers, and indigenous farmers from rural to urban areas, and cultural and biodiversity erosion [Chapter 5].

Policies governing access to genetic resources and the equitable distribution of benefits generated by their use. Compliance with international agreements in this area (for example, the Biodiversity Convention), as well as the development of other complementary national and international legal frameworks, should be promoted in order to guarantee access by local communities to genetic resources and the equitable distribution of benefits among the custodian communities [Chapter 5].

Biosafety policies that establish regulatory frameworks and instruments that regulate the consumption of transgenic organisms, and ensure prevention of genetic contamination in the centers of origin and genetic diversity. At the discretion of each country, the regulatory framework may prevent use in centers of origin and genetic diversity. In regions or countries that choose to produce GMOs, regulations should be based on the precautionary principle and the right of consumers to make an informed choice, through labeling, for example. Transgenic crops have been gradually adopted in the LAC region, producing effects on sustainability, poverty reduction, and equity goals perceived by some as negative and by others as positive [Chapter 1]. Transgenic crops are used primarily in the commercial production of cotton, soybeans, corn, and canola. The social and environmental effects differ for each of these crops and for each country in the region. While the technology has been quickly adopted by producers in the conventional/productivist system, thereby increasing yields, it has also helped to exacerbate the aforementioned social and environmental degradation in a number of regions. The effects of emerging technologies on sustainability goals are still widely debated. The possibility of genic contamination in some species has been demonstrated and must be an integral part of biodiversity policies, which should also avoid genic contamination of other transgenic-free productive systems. Edible transgenic crops used to produce nutraceuticals, biopharmaceuticals, or nonedible industrial products must also be taken into account [Chapter 5].

Alternative energy supply policies based on renewable sources prompted by the global energy crisis provide opportunities for and pose threats to the agricultural sector; their externalities should therefore be carefully analyzed. Agricultural production for use as energy alternatives to fossil fuels has surged in recent years in the LAC region,

benefiting a number of socioeconomic sectors and providing alternative markets for the agroindustrial sector. While these crops present an opportunity for rural revitalization, they also undoubtedly involve environmental and social risks. In a number of LAC countries, the expansion of crops for agrofuels based on a few species such as sugarcane, palm oil, soybeans, and forest products, has led to the reduction in the land area earmarked for food production, owing to substitution or displacement, which has had an impact on food security in some regions, and affected primarily small producers, indigenous populations, and other traditional communities. However, the use of animal and plant byproducts and waste as a source of biofuels has helped to mitigate environmental problems [Chapter 5]. AKST must make a much more significant contribution in terms of providing more information for and increasing access to clean energy by rural communities.

Policies to mitigate impact and reduce emissions that exacerbate climate change. Urgent measures are needed to reduce emissions and their adverse impact, particularly on the most vulnerable communities, and establish regulations for more responsible energy use [Chapter 1]. Agroecological systems that increase the soil's organic matter, thus enhancing carbon sequestration, should be promoted. Clean development mechanisms provide opportunities for the producers in the region [Chapter 5]. Other alternatives include carbon sequestration in forest species, the protection of native forests, energy source substitution, the use of animal and plant waste to generate energy, and the recognition of environmental services and benefits.

Regulations on health, good agricultural practices, and regional public goods. Governments must implement specific policies for producers and indigenous farmers who wish to enter the market, in order to help them adapt to the changing patterns of agricultural and agroindustrial competitiveness. These changes, among others, stem from new regulatory standards for plant and animal health, food safety, environmental care, and quality control, and go beyond aesthetics.

Incentives for entry of small producer products into large-scale distribution (supermarkets). The growth of globalized large-scale distribution has created problems in several countries for small retailers and the agrifood industry, and thus for producers [Chapter 1]. Owing to considerable disparities in purchasing power, government intervention is required with respect to regulations and the strengthening of producer organizations. Furthermore, the requirements of these chains are too stringent and thus cannot be easily met by smaller producers; however, there are cases where producer organizations have met the requirements and gained access to global markets.

Regulations on pesticide use. Despite the fact that most countries have regulations governing the use of agrochemicals, many rural communities in the LAC region are still grappling with the problem of acute and chronic poisoning because it is difficult to enforce these regulations at the individual level [Chapter 1]. It is essential that AKST propose education and training programs for producers and their families on the appropriate use of these products and their dangers.

Policies for the transition of productive systems

Policies to promote and support the transition from productive, conventional, and traditional/indigenous systems to sustainable agricultural models, while maintaining efficiency and productive competitiveness, and internalizing environmental and social costs. While certain traditional production systems link culture to environmental preservation, policy tools should be designed for each stage of the transition of systems that need them—chemical input reduction, efficient energy use, higher levels of diversification, and agroecological management—in a bid to maintain efficiency, sustainability, and productive competiveness [Chapters 4, 5].

Financial support programs for the transition of communities to a sustainable productive system. One very important aspect that must be considered in financial policies designed to support AKST systems is the fact that in many parts of the LAC region, the situation entails one of starting a process under challenging conditions that are very much characterized by urgent subsistence needs, and where access to own resources is significantly lacking. It is virtually impossible for these rural communities to tackle, on their own, the challenge of lifting themselves out of their current situation and developing an economically and environmentally sustainable productive system. Financial support should be generated in order to pave the way for organized and gradual transitions [Chapters 4, 5].

Marketing and market access policies

Strengthening the local market and the rural-urban link. Processes to allow producers to establish links with local markets must be made easier, by simplifying the process of complying with trade and health standards and promoting various forms of linkages between consumers and producers, and the market and traditional cultures.

Active commercial policies for the domestic and international markets aimed at generating market power through the creation of differentiated assets. A number of promotional instruments (appellations of origin, collective marks, internationally recognized protocols, eco-labeling, organic production, and integrated production, among others) should be applied. For producers who so desire, these strategies are implemented with a view to building specific assets, which are different from commodities, thus leveraging the specific characteristics and advantages that small-scale production and traditional/indigenous production can offer. This will require appropriate institutional frameworks that promote the marketing of these ventures (environmental standards, certification standards, appellations of origin, etc.), and bolster their negotiating power with sectors that are "at an advanced stage" in the marketing chain [Chapter 5].

Policies to gain access to international and regional markets, including entry into protected agricultural and agroindustrial markets in developed countries. These policies should seek to gradually eliminate the competitive inadequacies of

small- and medium-scale production and traditional/indigenous production sectors in the region, and mitigate the effects of trade agreements on the more fragile sectors. Implementation of these policies requires complete transparency in international and regional negotiations in the LAC region from the initial stages of managing negotiation processes, and organizations of small producers and peasant and indigenous farmers must acquire the capacities needed for negotiations and adequate representation in these processes [Chapter 5].

Policies for investment in AKST, innovation, and its financing

Policies to raise the low levels of investment observed in AKST systems in the entire LAC region and in a number of countries. These policies should seek to increase the positive effects in order to alleviate poverty and the difficult conditions faced by rural populations in the region, and reduce AKST dependence on technological innovations generated outside the region. Financing should be achieved through budgetary autonomy and independence [Chapter 5].

It is necessary to implement policies that ensure the stability of AKST and its projects, so that this system can formulate and implement long-term policies, such as those pertaining to adaptation to climate change, pest and disease control, and the quality of agricultural products [Chapter 5].

Subregional and regional cooperation policies designed to ensure that increased investments in AKST systems will derive benefit from experiences, generate economies of scale (strategic partnerships), and minimize duplication in research and development (R&D).

Policies for the development of institutions to promote culturally appropriate innovations. Such policies should be implemented through coordination among various government agencies tasked with formulating innovation policies at the local, regional, and national levels, grouping together agricultural and rural development in clusters, and linking them to knowledge, science, and technology [Chapter 5].

Policies to finance investments in AKST, innovative networks, and the development of participatory mechanisms to guarantee not only adequate and timely financing, but also the coordination of viable instruments to channel these resources toward the specific objective of strengthening the AKST with respect to the rural sector, and its impact on poverty reduction in this sector.

Policies to promote access to financial services

Policies to provide access by poor and low-income sectors to financial services are required, because this will provide key support to enable the AKST system to meet the development and sustainability goals. Policies should promote training and strengthening of financial systems that have been tailored to the conditions and needs of these sectors, in terms of encouraging savings, financing, and insurance, taking into account their ability to gain access to these financial services. However, formulation of these policies should take into account and reflect the different conditions and needs of the various sectors. For example, the extreme poverty sector faces the challenge of building basic capacities and institutions, while the poor and low-income sectors need to establish or strengthen existing institutions (credit unions, etc.); guarantee systems, property rights, risk management, and certification for livestock are also areas requiring improvement [Chapter 5].

Policies for institutional development and capacity building in several areas

Policies aimed at establishing a legal, institutional, and economic framework that promotes and facilitates actions by agents involved in the AKST system. These policies include:

a. *The development of different types of networks* for horizontal relationships (between farmers) and vertical relationships (producers with consumers and the industry), and for all of these with the AKST system, civil society organizations, and political institutions.
b. *The promotion of international coordination.* It is common in LAC countries to implement various programs with international cooperation, which are not interconnected or coordinated, and are executed by various administrative units and ministries. The policy should seek to facilitate coordination among the sectors involved in order to incorporate the AKST system that is appropriate and relevant for the region.
c. *The promotion of access by and joint participation of civil society in order to improve and benefit from social control of the AKST system by democratizing the decision-making process and integrating excluded sectors.* Such actions will require a legal and institutional framework that facilitates and does not hinder change; policy instruments that allow these stakeholders to have greater access to relevant information will therefore be needed.
d. *The development and promotion of ongoing and intercultural education that also fosters and strengthens cultural affirmation, and develops appropriate capacities for the various productive systems.* Access by rural populations to labor markets should be facilitated through policy instruments such as educational reforms for the target communities, which include intercultural and multilingual training, training for specialized teachers, the development of physical and IT infrastructure, and scholarships and training programs for skill development.
e. *Build awareness among and educate decision makers about the potential contribution of knowledge and innovations to development.* Given that decision makers are often not specialists in this area, the system must make a considerable effort to ensure that they understand its potential to meet the development and sustainability goals.

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"Although considered by many to be a success story, the benefits of productivity increases in world agriculture are unevenly spread. Often the poorest of the poor have gained little or nothing; and 850 million people are still hungry or malnourished with an additional 4 million more joining their ranks annually. We are putting food that appears cheap on our tables; but it is food that is not always healthy and that costs us dearly in terms of water, soil and the biological diversity on which all our futures depend."

—Professor Bob Watson, director, IAASTD

The International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD) , on which *Agriculture at the Crossroads* is based, was a three-year collaborative effort begun in 2005 that assessed our capacity to meet development and sustainability goals of:

- Reducing hunger and poverty
- Improving nutrition, health and rural livelihoods
- Facilitating social and environmental sustainability

Governed by a multi-stakeholder bureau comprised of 30 representatives from government and 30 from civil society, the process brought together 110 governments and 400 experts, representing non-governmental organizations (NGOs), the private sector, producers, consumers, the scientific community, multilateral environment agreements (MEAs), and multiple international agencies involved in the agricultural and rural development sectors.

In addition to assessing existing conditions and knowledge, the IAASTD uses a simple set of model projections to look at the future, based on knowledge from past events and existing trends such as population growth, rural/urban food and poverty dynamics, loss of agricultural land, water availability, and climate change effects.

This set of volumes comprises the findings of the IAASTD. It consists of a *Global Report*, a brief *Synthesis Report*, and 5 subglobal reports. Taken as a whole, the IAASTD reports are an indispensable reference for anyone working in the field of agriculture and rural development, whether at the level of basic research, policy, or practice.

IAASTD
International Assessment of Agricultural Knowledge, Science and Technology for Development

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