

INTERNATIONAL ASSESSMENT OF AGRICULTURAL SCIENCE AND TECHNOLOGY FOR DEVELOPMENT (IAASTD)

LATIN AMERICA AND THE CARIBBEAN

1. INTRODUCTION

Access to adequate, safe and nutritious food is today the main problem facing more than 53 million people who suffer from hunger and malnutrition in mainly rural areas of Latin America and the Caribbean. Moreover, the demand for food in developing countries is expected to double over the next 25 to 50 years, because of high demographic growth rates among relatively disadvantaged groups, a factor that is sure to exacerbate poverty, hunger and their side effects. The international community faces the enormous challenge of improving rural livelihoods and guaranteeing food security in a world where the population is growing steadily and is changing its consumption patterns. At the same time, there is a pressing need to reverse environmental degradation, address social and gender inequality, and guarantee health, human welfare and intercultural harmony. Evaluating the demand for agricultural products¹ and the range of available possibilities for meeting that demand constitutes a multifaceted task that demands attention to a wide variety of economic, environmental, ethical and social factors. To ensure that the people of Latin America and the Caribbean can meet their nutritional needs and at the same time maintain an appropriate natural, social and cultural environment in the 21st century entails a series of important changes and a series of challenges for the region's systems of agricultural knowledge, science and technology (AKST). The variety of opinions on a whole series of issues underlines the need for a critical international assessment that will take a comprehensive, intercultural and multidisciplinary approach to aspects that are vital in diagnosing the situation, and that will explore new policy alternatives for achieving sustainable development.

It is in this context that the International Assessment of Agricultural Science and Technology for Development (IAASTD) was launched, sponsored by several United Nations agencies, the World Bank and multilateral funds², with the goals of improving rural livelihoods and promoting equitable development that is environmentally, socially and economically sustainable, and reducing hunger and poverty by generating agricultural knowledge, science and technology, guaranteeing access to it, and putting it to use. To this end, the partners are conducting a global assessment and five

¹ "Agricultural" in this context includes farming, livestock, poultry, fish and other aspects of the rural economy.

² World Bank, United Nations Food and Agriculture Organization (FAO), World Health Organization (WHO), United Nations Environment Program (UNEP), United Nations Development Program (UNDP), United Nations Educational, Scientific and Cultural Organization (UNESCO), International Fund for Agricultural Development (IFAD) and Global Environment Fund (GEF).

sub-global assessments. The sub-global assessment for Latin America and the Caribbean³ brought together 43 experts from 15 countries who worked for more than two years in a participatory manner to prepare the report.

The purpose of this document, which accompanies the final report for Latin America and the Caribbean, is to provide policymakers with concise information on the contents of that report, in order to promote action to achieve the goals proposed in the IAASTD.

2. EVOLUTION AND CURRENT SITUATION OF AGRICULTURAL PRODUCTION SYSTEMS AND AKST

2.1. Regional diversity and productive systems

The agricultural sector in Latin America is highly heterogeneous with respect to crops, ecosystems, ecological farming conditions, the endowment of resources and means of production, and access to information and other services, and consequently regions vary greatly in their interaction with the AKST system. This diversity entails differences in production systems and worldviews, which imply not only different approaches to cultivating the land and managing production systems but also different ways of relating to the land and the environment and to the social setting.

While the literature frequently draws distinctions between Mexico, Central America, the Caribbean, the Andean region and the Southern Cone, for purposes of this analysis the operative distinction will be between the Southern Cone, the only region where food exports outweigh imports, and the remaining regions, where imports exceed exports⁴. This distinction is important in explaining the role that each system plays in the agricultural and AKST policy that each region adopts, and its impact on the IAASTD goals.

In addition to regional differences, there are three agricultural systems that are quite distinct in their characteristics vis-à-vis the IAASTD goals: traditional/indigenous, conventional/output-maximizing and agro-ecological. The importance of each of these systems varies not only between regions but also within the same region, and even within the same country. These systems have been the target of differentiated support policies: conventional agriculture, highly geared to the market, has benefited most from trade, financial and agricultural research policies.

³ UNESCO provided the Secretariat for the regional assessment, and IICA was the coordinator for the region.

⁴ There may be countries within a given region that export more food than they import.

1
2 The traditional/indigenous system is based on local and ancestral knowledge, it is strongly tied to
3 the land, and to ecosystems, and has few links to the market. The worldview of indigenous
4 communities implies a relationship to natural resources that goes far beyond an economic and
5 extractive activity, and embraces an ecological, cultural and spiritual vision linked to the land. It
6 emphasizes environmental sustainability and energy balance, with moderate or very low levels of
7 productivity. In various regions, traditional/indigenous agriculture has been shunted onto
8 marginal lands and much of the underlying know-how is being lost. In most countries of the
9 region, governments and institutions have failed to promote and boost the system through
10 affirmation of the traditional/indigenous culture.

11
12 At the other extreme is the conventional/output-maximizing system that is highly geared to the
13 market and based on technological know-how, inputs and labor external to the productive unit,
14 and integrated in some regions into production chains. The system has been supported by the
15 development models and has benefited from support through credit and technological capital. By
16 taking advantage of the results of the AKST system and integrating into domestic and
17 international markets, this system has achieved high levels of productivity and competitiveness.
18 Yet it generates a great many negative externalities in terms of environmental, social and cultural
19 costs, and under current conditions there are serious questions about its sustainability and its
20 energy efficiency.

21
22 As the environmental and human costs of conventional output rise, greater importance is being
23 attached to the agro-ecological system, which is based on knowledge of the agro-ecology
24 resulting from the interaction between scientific and traditional know-how, and is aimed at
25 reducing the negative impacts of conventional systems through product diversification and the
26 use of ecologically sound technologies. It is characterized by the search for sustainability and
27 social, economic, cultural and environmental terms, and while its importance has increased in
28 recent years, its spread has been limited by lack of governmental and institutional support,
29 among other key factors.

30 31 **2.2. Development models and goals of IAASTD and AKST**

32
33 The contextual analysis recognizes that while the positive and negative consequences for the
34 production system and its stakeholders may be determined directly by the characteristics of the
35 AKST system or by the policy decisions adopted, most of them are the result of the interplay of
36 both factors, and individual attribution is very difficult.

1 **As a result of the development model adopted, the policies pursued, and the**
2 **characteristics of the AKST system described, the agricultural production system of LAC**
3 **showed positive economic indicators, with some regional differences, but these were**
4 **accompanied by a sharp deterioration in environmental and social indicators.** The
5 development model pursued until the 1990s was focused primarily on increasing output and
6 productivity in the primary sector of agricultural production. That model took no account of culture
7 or the costs implicit in the inappropriate use of natural resources, and favored the
8 conventional/output-maximizing, market-oriented system as the best approach to agricultural
9 development. The process of insertion into domestic and international markets promoted by
10 those policies as a means of generating rural incomes excluded a great many small farmers,
11 primarily in the traditional/indigenous system, and this exacerbated existing problems of poverty
12 and inequality.

13
14 **The AKST agenda gave priority to expanding output for domestic and export markets, and**
15 **was not sufficiently equitable and participatory, nor was it appropriate for addressing the**
16 **problems of small producers, indigenous communities, poverty, hunger and the**
17 **environment, while on the other hand it produced satisfactory results in terms of**
18 **productivity.** In many countries of the region, this strategy brought with it negative
19 consequences in social, cultural and environmental terms, but these were ignored by the system
20 until, in the 1990s, the costs became too high and a gradual shift of strategy with respect to the
21 two approaches became evident. This change was due, in particular, to the fact that the AKST
22 system was beginning to recognize these impacts, and to the growing influence of civil society
23 organizations and social movements and the phenomenon of globalization, which allowed
24 growing numbers of consumers in developed countries to communicate their preferences and to
25 show that they were prepared to pay a premium for goods produced with alternative technologies
26 that were environmentally friendly or socially more responsible. This phenomenon, which is still
27 evolving, brought about a change in the research agenda and offered small farmers the
28 opportunity to enter the market using agro-ecological technology and giving their products a
29 premium value.

30
31 **The current performance of AKST does not fully satisfy society's new demands, which call**
32 **for a more diverse, complex and holistic agenda. It is now hoped that AKST will be able to**
33 **meet and reconcile apparently conflicting objectives such as competitiveness,**
34 **sustainability and social and cultural inclusion.** The agenda followed by the AKST system
35 left little room for users and civil society to participate in its definition, and it paid insufficient
36 importance to resolving the problems flowing from poverty, which has a negative impact on the
37 nutrition, health and well-being of the urban and rural poor. The lines of research that were given

the greatest priority were those aimed at enhancing productivity. The social, cultural and environmental aspects are still receiving less attention, and not enough has been done to take advantage of the important resources of biodiversity, the availability of arable land and fresh water, and the marine resources that exist in the region.

The reduction in the relative size of the public component of AKST has considerably limited its support for the development of nonproprietary technologies that would constitute "public goods". In nearly all countries of LAC, with a few exceptions such as Mexico, Brazil and Argentina, the public AKST structure has been cut back to a minimum. Some innovative alternatives have recently been developed to promote co-management and joint ventures between various public and private agencies, with participation of civil society. Nevertheless, institutional programming and articulation are not adequate to this complexity and potential.

2.2.1. Economic indicators

In LAC, the AKST system has helped produce increases in productivity and output, and more recently in the level, value-added and diversity of exports. Yet this performance was uneven across the region. The growth rate in output and productivity has risen in recent years, but the progress has been uneven between regions: the Southern Cone has seen the greatest growth, while the Caribbean and Central America have lagged behind.

Investment in the AKST system also reveals differences between countries: 96% of total investment in LAC is concentrated in six countries, Brazil, Argentina, Chile, Venezuela, Cuba and Mexico. Investment has been inadequate and highly uncertain, and has followed a downward trend in recent decades. The resources of public institutions have also been used inefficiently. Nevertheless, the situation differs among countries and subregions. Moreover, in some countries problems of a political, economic and institutional nature limit investments by the private sector in proprietary technologies. In recent years the public contribution has declined, both in terms of inputs and outputs. The private sector has focused on developing proprietary technologies (genetic materials, machinery, agrochemicals, biotechnology, nanotechnology, ICT', etc.), and "catching up" with local adaptation. NGOs and other private players have replaced the role of public agencies only in part, primarily in environmental and social issues. In all cases, this investment is lower in LAC, in terms of GDP, than in industrialized countries and in some developing countries of other regions.

[Figure top of page 4]

Food crop production per capita (including oilseeds), 1961-2005

Production (kg/capita)

World

Latin America and Caribbean

Source: FAO data

Food crops: cereals, roots and tubers, fruits, vegetables and oilseeds

[Figure middle of page 4]

Latin America: poverty and indigence trends, 1980-2006 a/

Percentage of persons

Population volume

IndigentNon-indigent poor

Source: ECLAC, based on special tabulations from household surveys of the respective countries.

a/Estimate representing 16 countries of the region plus Haiti. Figures in the orange-colored sections of the bars represent the percentage and the total number of poor persons (indigent plus non-indigent poor).

y/Projections

2.2.2. Social and health indicators

The indicators for poverty, malnutrition and health deteriorated in LAC over the last two decades of the 20th century, while the degree of inequality increased⁵. This has augmented vulnerability to diseases and has affected the development capacities of

⁵ In this context, inequality refers not only to income levels but also to structural and institutional factors such as lack of access, use and control of natural resources (land, water, genetic resources) by the rural poor.

1 **countries in the region. The health of the rural population has deteriorated through the**
2 **indiscriminate use of pesticides.** Urban and rural poverty indicators both rose significantly
3 during the 1980s, when most governments in LAC implemented structural adjustment programs.
4 These problems are more acute in rural areas, because there are no occupational health
5 programs in place for farm workers, nor any health services specifically targeted at treating
6 poisoning through exposure to pesticides, which cause various chronic diseases that reduce
7 income earning capacities. Children, the elderly, the feeble and the undernourished are the most
8 susceptible, and their right to life and human dignity is thereby compromised. During the 1990s
9 governments of the region, recognizing the severity of the problem, committed themselves to
10 programs for reducing poverty and malnutrition, which they implemented with varying degrees of
11 success. In this context, some public, national, regional and international research institutions
12 began to incorporate issues relating to poverty and malnutrition as priorities on their agendas.
13

14 **The concentration of wealth and of natural resources has sparked migration and a decline**
15 **in the rural population, the loss of food sovereignty, greater vulnerability for small and**
16 **medium-scale producers, and the loss of biological and cultural diversity, with little or no**
17 **cultural integration.** These impacts have led to a growing number of social conflicts in various
18 countries of LAC. Globalization and structural adjustment programs implemented in the region
19 have created or exacerbated the conditions of unfair competition, favoring the more efficient,
20 larger producers and agribusinesses, and excluding the smaller ones. Subsidized food imports
21 have disrupted local production systems, creating supply shortages and dependency on food
22 produced in other countries. The situation is even worse for the poorest people, primarily rural
23 dwellers whose main source of income is farming, and who have to buy food while their
24 purchasing power is steadily shrinking. In some cases small farmers have reacted by forming
25 cooperatives and developing alternative markets, such as "fair trade", local markets, direct
26 marketing to consumers, and the market for organic products. Yet for the most part these
27 problems have forced small producers, farm workers and indigenous people to sell or abandon
28 their land and seek paid employment, or migrate to the cities, generating even higher levels of
29 inequality, greater concentration of land ownership, and more social and economic insecurity.
30

31 The technologies generated and promoted by the system have displaced local and traditional
32 know-how and knowledge, and this has meant the loss of customs, cultures and local or
33 traditional knowledge. This process of cultural and technological domination has relegated to the
34 sidelines an ancient rural cultural heritage with local content and management. This process has
35 opened the way to outside knowledge and cultures, disseminated systematically by the education
36 systems and by the media, without considering their consequences on the erosion of the
37 respective cultures, knowledge and know-how.

2.2.3. Environmental indicators

High indicators of inefficiency in the use and conservation of the abundant natural resources in Latin America. Latin America and the Caribbean represent the world's most extensive reserve of arable land, in proportion to population. The region has 576 million hectares, equivalent to 30% of the world's arable land and to 28.5% of all the land in the region (2.018 billion ha). As well, the region has five of the 10 richest countries in terms of biological diversity, embracing 40% of the world's genetic reserves (plants and animals). Yet there are many difficulties with respect to land holding, economic and technology policies that impede proper exploitation. A portion of these resources is degrading rapidly as a result of expansion of the farming frontier, the intensification of agriculture, and the unsustainable management of natural resources, resulting in soil degradation, loss of biodiversity, environmental pollution and other problems.

Agricultural development has led to a sharp decline in biodiversity and other natural resources. The deforestation of immense areas of high biodiversity, especially in the tropical forests of Meso-America and the Amazon, the use of agrochemicals and soil erosion caused by farming and livestock grazing have had a severe impact on local cultural diversity of peasant and indigenous communities, and on terrestrial, aquatic and marine biodiversity. More diversified farming systems have demonstrated the ability to mitigate these impacts to a certain point, providing habitat and connectivity between patches of natural habitat.

2.2.4. Special issues

The intensification of agriculture has increased producers' vulnerability to climate change. The intensification of agriculture and its negative consequences for the stability of the environment (soil fertility, vegetation, climate) have increased vulnerability, especially among small farmers, to the extreme climatic phenomena that have become increasingly frequent and intense as a result of climatic change. The AKST system, despite its capacity, has no established policy for responding to these problems.

GMOs and intellectual property. Transgenic crops have been used on a commercial production scale, primarily in cotton, soybeans, corn and canola. The social, cultural and environmental repercussions are different for each of these crops, and for different countries. The technology has been swiftly adopted by producers in the conventional/output-maximizing system, where it has significantly expanded output and productivity, reducing the use of

1 agrochemicals and allowing for better soil and water management, but in some cases it has
2 accentuated the social and environmental changes mentioned above. The consequences of
3 emerging technologies for the goals of sustainability are still the subject of much debate. There is
4 currently a dispute over the possible negative or positive impacts of the use of transgenic
5 products, in relation to the goals of sustainability, poverty reduction, and equity, as well as for
6 their possible consequences on the environment, and on human and animal health. The
7 possibility of genetic contamination in some species has been demonstrated and is a source of
8 concern.

10 The debate also extends to issues such as the technological dependency provoked by intellectual
11 property laws, especially bearing in mind the concentration of the transgenic seeds business,
12 which conflicts with collective rights. Even more unclear is the debate over the future of
13 transgenic food crops that might be devoted to nonfood uses such as plastics, pharmaceuticals
14 and energy products.

16 In addition to GMO crops there are some very important developments in other fields of animal
17 and food production. For example, in Europe and the United States as in Latin America, a portion
18 of dairy products are now prepared with GMOs.

20 **Bioenergy. The world energy situation is the source of opportunities and challenges for**
21 **the agricultural sector and AKST.** Agricultural production for use as alternative energies to
22 fossil fuels has expanded rapidly in recent years in LAC, benefiting some economic and social
23 sectors and offering market alternatives for the agro-industrial sector. While the development of
24 these crops is an opportunity for rural revitalization, there are also risks of negative impacts, both
25 environmental and social. In LAC, the expansion of biofuel crops based on a few species such
26 as sugarcane, palm oil, canola, corn and soybeans is displacing other food crops, and is having
27 an impact on food security in certain regions, affecting primarily small farmers and indigenous
28 peoples. Animal and plant byproducts and wastes are another source of biofuels, the use of
29 which attenuates environmental problems.

31 **With respect to the overall population, there has been an increase in the proportion of**
32 **rural women who are poor, without paid work, and heading households in conditions of**
33 **poverty.** While there are differences among the regions of Latin America, in general men are
34 engaging less in agriculture, and the agricultural role of women is increasing. Male emigration is
35 one of the main causes of this phenomenon. The spread of nontraditional export crops, wars,
36 violence and forced displacements are other causes of the so-called "feminization of agriculture",

1 and the consequent feminization of poverty. This also means that women are more exposed to
2 toxic chemicals, which affect their reproductive health and that of future generations

3
4 The AKST system has not paid sufficient attention to women's growing role in managing
5 productive units, or to their potential to take their own initiatives.

6 7 **3. OPTIONS FOR HAVING AKST MEET THE IAASTD GOALS**

8
9 Using the established analytical framework, we propose two sets of options for enhancing the
10 capacity of the AKST system to achieve the goals of IAASTD. One focuses on the AKST system
11 itself, recognizing that the consequences are the result of its interaction with policies; the other
12 set of options focuses on strengthening and energizing action on the AKST system.

13
14 **Without these options, the goals established by IAASTD -- reducing hunger and poverty,**
15 **promoting sustainable development and food security -- will not be fully achieved under**
16 **any of the plausible future scenarios: Global Orchestration (GO), Imposed Order (IO),**
17 **Adaptive Mosaic (AM) and Techno-Garden (TG) (Table 1).**

18 19 **3.1. Refocusing the AKST Agenda**

20 21 **3.1.1. Refocusing priorities on the target population**

22
23 The process of development followed to date has excluded a vast sector of the population of LAC
24 and has caused sharp environmental deterioration. To meet the goals of IAASTD for sustainable
25 development with greater equity, and to reduce poverty and hunger, the AKST system must be
26 more socially inclusive and environmentally fair and sustainable. A number of options aimed at
27 the public component, which is responsible for generating and disseminating innovations that
28 have the nature of "public goods", are discussed below.

29 30 **Box 1. Status of goals under the different plausible future scenarios**

31
32 **Level and distribution of income in agriculture.** Incomes improve under three scenarios
33 (Global Orchestration, Adaptive Mosaic and Techno-Garden) and decline under Imposed Order.
34 Income inequality is reduced in AM and TG, but grows slightly under GO, and much more under
35 IO.

1 **Social inequality.** Access to education, health, food security and employment is very difficult in
2 IO; GO and TG present problems of access to employment; and AM with respect to urban food
3 security.
4

5 **Environmental sustainability.** IO presents the greatest difficulties because of its reactive
6 approach to sustainability; GO also presents problems with the resilience of ecosystems, but on a
7 lesser scale than IO; AM and TG achieve better results in terms of sustainability, but both still
8 face threats such as the risk to common global resources (AM) and inadvertent environmental
9 fallout (TG).
10

11 **Rural and urban poverty.** Under all scenarios, poverty declines in the countryside, but for
12 different reasons: in GO and IO, the reduction comes because the poor move to the cities; in AM
13 and TG, because incomes rise for these groups. Poverty in the cities is reduced only slightly in
14 AM, rises slightly in TG and GO, and rises greatly in IO
15

16
17 **One way of making the system more inclusive is to reorient priorities towards attention to**
18 **traditional/indigenous agriculture so as to make it more productive and profitable, while**
19 **maintaining its fundamental characteristics and fostering feedback between**
20 **local/traditional and universal worldviews and knowledge.** To do this, it would be advisable
21 for the AKST to develop a participatory intercultural agenda that retrieves and values local
22 knowledge, supplementing it with scientific knowledge when appropriate, thereby contributing to
23 greater sustainability of productive systems, more efficient use of natural resources, and greater
24 yields in the field, while maintaining and promoting the cultural and biological heritage of
25 indigenous/traditional communities.
26

27 **A possible alternative for making the system more sustainable in environmental terms is**
28 **to reorient priorities as well towards strengthening research in agro-ecology and organic**
29 **farming, to facilitate the adoption of these systems, and to improve conventional systems**
30 **for reducing and mitigating the environmental impacts of more intensive farming and**
31 **aquatic systems.**
32

33 Agro-ecological systems have shown themselves to be sustainable and efficient from the energy
34 viewpoint. It requires a great deal of knowledge to manage these systems, and it will be
35 necessary therefore to integrate them into the AKST system and to disseminate them.
36 Conventional systems may continue to evolve towards more sustainable systems through
37 reduction in the use of agrochemicals, diversification, water conservation, maintenance of

1 fragments of natural habitats, etc. There are several options that could be pursued further:
2 sustainable agriculture with low external inputs, integrated pest management, and good farming
3 practices, among others.

4
5 It is essential that the options indicated above for a sharp reorientation towards
6 traditional/indigenous agriculture and agro-ecology be pursued in a properly balanced framework
7 within the AKST agenda, so as not to produce other, unwanted consequences such as greater
8 technological dependency for conventional/output-maximizing agriculture on private businesses,
9 which will place priority on economic results to the detriment of social and environmental
10 outcomes in certain social sectors.

11
12 **Another possible option for enhancing nutrition and income opportunities with positive**
13 **environmental effects is to strengthen urban and peri-urban agriculture.** As a result of rural
14 migration to the cities, around 75% of the LAC population is now urban, and many of the poor of
15 the hemisphere live in the cities. In several cities of LAC, urban and peri-urban agriculture has
16 demonstrated a positive impact on food security and food sovereignty, as well as social benefits
17 such as strengthening community organizations. The challenges of this kind of agriculture
18 include technical aspects that can be resolved through research and in particular through
19 participatory research.

20 21 **3.1.2. Refocusing research priorities and outreach activities on special issues**

22
23 Changes in the public AKST system should not be limited to its priorities with respect to the target
24 population, but should also involve changes in the lines of research that need strengthening in
25 order to achieve sustainable development from the social, cultural and environmental viewpoints.
26 Some options for important lines of research that should be strengthened are discussed below.

27
28 **Climate change.** One alternative for improving conditions for small farmers is to promote
29 alternative production systems to mitigate the negative effects of climate change. Given the
30 vulnerability of the poorest segments of the population to such impacts, it is important to
31 strengthen this line of research to offer viable alternatives for this class of producers.

32
33 **Biodiversity.** An alternative for improving income levels and preserving biodiversity is to
34 promote research and dissemination for making sustainable use of agricultural biodiversity and
35 integrating it into productive systems and their market links.

1 **Emerging and process technologies.** A possible alternative for making the AKST system more
2 inclusive is to focus research in new fields of knowledge (e.g. biotechnology, information,
3 precision agriculture, nanotechnology) for meeting the goals of reducing poverty, hunger and
4 malnutrition, promoting human health and conserving the environment. Small producers could
5 benefit from these technologies, provided they do not require too much capital investment and
6 that their potential social, cultural, economic, environmental and health impacts are carefully
7 studied.

8
9 **Technologies, especially process technologies) for addressing sanitary, environmental**
10 **and biosafety barriers, appropriate for the most vulnerable social groups.** These
11 mechanisms must be based on research not only into socioeconomic conditions but also into the
12 cultural conditions of these groups, so as to facilitate or restrict the adoption of specific
13 technologies; this should also involve programs for transferring these technologies for use by
14 these groups.

15
16 **More specific protocols for identifying potential epidemics** and reducing the contamination of
17 food, and low-cost technologies for identifying pathogens and for decontamination.

18
19 **Assessment of consequences.** One viable solution for improving decision-making on the social
20 value of promoting emerging technologies is to produce and disseminate critical assessments of
21 their potential positive and negative impacts in environmental, social, cultural, economic and
22 health terms. Currently, the debate is focused on transgenic crops and the use of food crops for
23 energy production. Incorporating these assessments into the research process would help
24 ensure that research in new technologies takes account of the socioeconomic and environmental
25 context at which they are targeted.

26
27 **Enhancing sustainability.** An alternative for improving the environmental sustainability of the
28 system is to promote research for the sustainable restoration of areas that have been degraded
29 through mismanagement of natural resources, for example overgrazing, deforestation, and
30 excessive irrigation. Another alternative is to stress research into emerging technologies based
31 on agro-ecological principles (e.g. ecological crop, soil and pest management, biofertilizers).

32
33 **Feminization of agriculture.** An alternative for making the system more inclusive is to adopt or
34 strengthen AKST intervention strategies (research and extension services) to promote AKST
35 among women in the productive systems.

36
37 **3.1.3. Other issues**

Beyond the special research issues addressed, two important issues were identified that have received too little attention from AKST in the past, and that offer good options for promoting sustainable and equitable development.

Nonagricultural rural activities.. One alternative for improving income levels for small farmers in an environmentally friendly way is to promote research and dissemination for diversifying rural activities. Among the activities that could generate additional incomes for producers are agro-tourism and handicrafts.

Mitigating the effects of fragmentation. Most of the region's natural habitats have suffered a high degree of fragmentation. To mitigate the loss of biodiversity in these fragmented habitats requires a focus on the landscape, with greater understanding of water, soil and biological dynamics, and the ecological and social interactions between systems. Because of fragmentation, production systems are frequently a patchwork surrounding fragments of natural habitat. The AKST system must recognize this reality and examine the interactions between production systems, natural systems, and social dynamics. Because all agro-systems were originally natural ecosystems, it is essential to reinforce ecological, indigenous and traditional knowledge in the context of farming systems (livestock, aquatic and land) and their interactions with natural systems, in order to enhance the impact of AKST in LAC.

Competitiveness. An alternative for improving the export capacity of the agricultural sector in general, and for small farmers in particular, is to develop methods for food traceability and safety, methods for the control and detection of sanitary problems, in order to meet export standards. Organic production is one important route for enhancing the competitiveness of small-scale agriculture.

- **Adapt the organizational and management models of AKST to achieving the IAASTD goals of sustainability and development**

- **Develop AKST capacities for implementing the agenda**

3.2.1. Participation in decision-making

One possible alternative for making the system more inclusive and equitable is to encourage AKST stakeholders and beneficiaries to participate in managing the system, from setting the agenda right through to implementing it. Historically, AKST agendas have

1 been defined by government and by academic/scientific circles, in response to macro
2 development policies, consequently offering technology appropriate for medium- and large-scale
3 producers in conventional/modern systems. Because there has been little interest in
4 traditional/indigenous and agro-ecological production systems, the sustainable logic of those
5 systems has gone unappreciated, and this has tended to increase poverty and social, political
6 and cultural exclusion among majority sectors in LAC.

7 8 **3.2.2. Enhancing the exchange of knowledge and know-how among system stakeholders**

9
10 **One possible way for making the AKST system more productive in terms of generating**
11 **new knowledge is to foster research networks.** Demands as diverse and complex as those
12 placed on AKST make it necessary to pursue projects through research networks to optimize the
13 use of scarce resources in the region.

14
15 **One possible strategy for moving the current AKST systems towards systems of**
16 **innovation for development is to assure dialogue and linkages between those who**
17 **generate knowledge and technological innovations and those responsible for other links**
18 **or factors indispensable for development, productivity and competitiveness of the**
19 **productive chain,** such as marketing, credit, infrastructure, public policies, producer organization
20 and empowerment.

21
22 **Another viable alternative is to promote and strengthen direct links among producers, and**
23 **between producers and consumers.** Interlinking producers will encourage the exchange of
24 experience. Networking between producers and consumers will alert the first to the needs and
25 requirements of the second, and ensure stability in the supply of goods or services that producers
26 offer consumers.

27
28 **Another option for consideration is to create systems for the exchange and dissemination**
29 **of know-how and to encourage interaction among the AKST systems of LAC, and between**
30 **them and the rest of the world, so that they can take advantage of the relative strengths of**
31 **each country in the region (experience).** Synthesizing and disseminating knowledge and
32 know-how in the three models identified (conventional, traditional and agro-ecological) requires
33 the use of new institutional tools adapted to each context. There should be emphasis on
34 developing new applications (such as ICTs) for promoting communication between producers and
35 the circulation of knowledge.

1 **Finally, a fourth feasible alternative is to recognize and make use of local knowledge and**
2 **know-how.** Local knowledge and know-how can be important elements for generating
3 technologies appropriate to varied ecological production systems that are not addressed by
4 conventional technologies. Hence the interrelationship of local/indigenous knowledge and know-
5 how with scientific knowledge should be promoted for the sake of reciprocal enrichment, under
6 conditions of mutual respect.

8 **3.2.3. Strengthen social control and ownership of the AKST system**

10 **One possible alternative for securing greater social support for AKST is to promote**
11 **greater visibility and influence for the AKST system in preparing public policies.** Society
12 needs more information on activities and achievements and on the impacts of new technologies
13 on sustainable development goals.

15 **4. POLICIES TO SUPPORT AKST**

17 There are many factors that fall outside agricultural technology development but that limit the
18 potential of AKST for reducing poverty and developing more sustainable production systems.
19 These include market access, landholding, organizational capacity, education, extension
20 services, access to information, and other public policies. Policies are more important than
21 technological development for reducing poverty and in this sense AKST has not had sufficient
22 impact on the formulation of appropriate policies that will contribute directly to meeting the goals
23 of development and sustainability.

25 **4.1. Public policies**

27 The policy options listed are intended to help the AKST system to meet the goals. In this sense,
28 **public policies should place their priority focus on reducing poverty, hunger and**
29 **inequality, and on promoting sustainable development, with an emphasis on small-scale**
30 **peasant/indigenous agriculture and agro-ecology. It is important here to create a**
31 **favorable macroeconomic and commercial context for agricultural production and to give**
32 **greater importance than in the past to small farmers, traditional/indigenous agriculture,**
33 **and agro-ecology.**

35 **Another relevant recommendation is to establish intellectual property rights or other legal**
36 **provisions to guarantee the right of peasant and indigenous communities to conserve and**
37 **make use of their genetic resources.** This does not rule out access for others to genetic

resources, provided all the profits and benefits derived from those resources and the associated traditional knowledge are equitably distributed, so as to help reduce existing inequalities.

The development of policies for improving access to productive resources (landholding, water etc.) and the promotion of education programs for strengthening indigenous cultures and ecological knowledge can help to reduce inequality in LAC.

Other possible options have to do with creating mechanisms to promote:

- a) The integration of vulnerable social groups into organized productive chains.
- b) Education and training for groups of vulnerable producers, in low-cost and sound practices for mitigating the effects of climate change, and managing natural resources.
- c) Support for vulnerable groups at risk of losing their production or their productive capacity.
- d) Organizing groups of vulnerable producers to enhance their scale of production and their capacity to market their output.
- e) gearing agricultural production to lucrative market niches, in which vulnerable groups have a good chance of succeeding.

4.2. Financing policies

Financing policies are one of the most effective tools for supplementing AKST in meeting the IAASTD goals. These policies need to be targeted at several levels

4.2.1. Strengthening AKST capacities

Promote greater investment in:

- Agricultural research and development in general.
- Strengthening agro-ecology programs and research centers, national and local universities and other educational institutions that foster cultural diversity in LAC.
- Personnel training.
- Upgrade and maintenance of research and outreach infrastructure

Given the low levels of investment in AKST systems in LAC and the trend observed in most countries, greater investment is needed, under democratic conditions, to foster user participation in the various components of the AKST system for countering that trend, and reducing dependency on technological innovations from abroad. Greater investment is also needed at the

1 subregional and regional level to capitalize on experience and minimize duplication of R&D effort.
2 Since indigenous and agro-ecology systems have received virtually no financial support, and
3 recognizing that agro-ecology systems in particular have made great progress over the last
4 decade, investment in these AKST systems could have a valuable impact on some of the
5 IAASTD goals.

6 7 **4.2.2. Strengthening the capacities of rural people and vulnerable groups**

8
9 It is suggested that financing policies targeted at rural people can promote employment in
10 agricultural enterprises that promote sustainable production and the integration of small farmers
11 into productive chains operating with a focus on sustainability and equity.

12
13 **Development of financial services for rural people as a condition for enhancing their**
14 **productive capacities and thereby relieving poverty, exclusion and vulnerability.** This
15 implies addressing problematic aspects such as the thin demand for financial services, high
16 information and transaction costs, inadequate institutional capacity of rural lenders, the fact that
17 much of farming activity is seasonal in nature, and that many crops take a long time to maturity;
18 risks relating specifically to cultivation of the land; absence or insufficiency of usable collateral
19 because of lack of clarity in ownership rights and institutional factors. At the same time, there is a
20 need to improve the institutional channeling of remittances to support the development of regional
21 and local financial services systems.

22
23 **One viable solution could be to provide differentiated financing for the extremely poor and**
24 **for the creditworthy poor.** The first group are unable to borrow, and they require specific
25 solutions along the lines of the Grameen Bank in Bangladesh. The second group, on the other
26 hand, can access financial services under certain assumptions, primarily the resolution of
27 property rights, education, management capacities.

28
29 **Promote capitalization through savings, access to credit, farm and life insurance, and**
30 **financial support for developing infrastructure and cooperation in the use of S&T and**
31 **ICTs.** All of this should help to retain people in the countryside and intensify land occupancy
32 through the development of family enterprises.

33 34 **4.2.3. Financial support programs for the transition of communities to a sustainable** 35 **productive system.**

1 National, regional and local governments should pool their efforts to design and implement
2 programs that will finance activities to help communities make the transfer to a new configuration
3 based on an agro-ecological system. In effect, moving from the conventional system to a
4 sustainable system will entail a transition period during which support will be required.

5
6 **In summary**, a critical but fair assessment indicates that the AKST system of the last 50 years
7 was successful in increasing agricultural productivity and improving the competitiveness of the
8 conventional market-oriented system. Yet it had sharply negative impacts on the environment
9 and did not do enough to reduce hunger and poverty in the region. Indigenous/traditional and
10 agro-ecological systems have existed but they have remained at the margin of the AKST
11 system's research agenda. To help achieve the IAASTD goals, this assessment puts forward a
12 series of options aimed at managing and strengthening the AKST system and refocusing its
13 agenda. Although the AKST system cannot by itself resolve all the political and economic
14 constraints that are holding back sustainable and equitable economic development or the
15 reduction of poverty and hunger in the region, investment in AKST can nevertheless help to
16 improve living conditions for the people of Latin America, in particular those living in the
17 countryside where poverty is most severe.

18
19 The evidence certainly suggests that investment in AKST remains the "best bet" for developing
20 countries to meet the development goals.. If this investment is to have positive results in terms of
21 those goals, the AKST system will have to be democratized and will have to incorporate those
22 sectors that until now have been marginalized, in particular small producers, agro-ecological
23 producers, and indigenous producers. Only with the inputs, knowledge and experience of these
24 sectors can the AKST agenda be refocused on the IAASTD goals.

25
26 At the same time, to address the urgent needs of the rural poor in ways that will allow the benefits
27 of development to be extended progressively to this population and to marginalized regions, it is
28 essential to have a multicultural and intercultural strategy for rural development that will recognize
29 and value this social milieu both for its productive potential and for its way of life.