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FEED THE FUTURE INITIATIVE ACHIEVING FOOD SECURITY IN GUATEMALA: OPPORTUNITIES AND CHALLENGES

USAID/Trade and Competitiveness Assistance Program

September, 2010.

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This document was prepared by Stephen Wingert of Wingerts Consulting, under subcontract to Abt Associates, Inc., for the USAID Guatemala Trade Competitiveness Assistance Program. It summarizes six analyses prepare by Mr. Wingert related to food security in Guatemala.

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1. Introduction

A. L'Aquila Food Security Initiative (AFSI)

The U.S. Government's Feed the Future Initiative is a result of the G8 meeting in L'Aquila, Italy in July, 2009, where the eight leading industrialized nations committed a total of $20 billion over three years to address food security issues worldwide[1]. The summit declaration stated that: "We see a comprehensive approach as including: increased agriculture productivity, stimulus to pre and post-harvest interventions, emphasis on private sector growth, smallholders, women and families, preservation of the natural resource base, expansion of employment and decent work opportunities, knowledge and training, increased trade flows, and support for good governance and policy reform."

The declaration also stated: "Sustained efforts and investments are necessary for enhancing agricultural productivity and for livestock and fisheries development. Priority actions should include improving access to better seeds and fertilizers, promoting sustainable management of water, forests and natural resources, strengthening capacities to provide extension services and risk management instruments, and enhancing the efficiency of food value chains. In this regard, the increased involvement of civil society and private sector is a key factor of success. Investment in and access to education, research, science and technologies should be substantially strengthened at national, regional and international level."

The definition used by the G8 for food security includes both the production of food for consumption, and the generation of income that enables poor people to purchase food. As can be seen in the two quotations cited above from the L'Aquila declaration, the focus is on the entire food value chain, including pre and post harvest interventions and off farm employment.

B. The Feed the Future Initiative

The U.S. Government's guidance for the Food Security Initiative can be found at the following website: http://www.feedthefuture.gov/guide.html. This document highlights the Goals and Strategic Choices to be considered in providing this assistance. The document states that: "Feed the Future pursues two paths: (1) addressing the root causes of hunger that limit the potential of millions of people and (2) establishing a lasting foundation for change by aligning our resources with country-owned processes and sustained, multi-stakeholder partnerships. Through our leadership in this initiative, we advance global stability and prosperity by improving the most basic of human conditions – the need that families and individuals have for a reliable source of quality food and sufficient resources to access and purchase it."[2] The document further identifies the following strategic guidelines for the Initiative:

1. Invest in country-owned plans that support results-based programs and partnerships, so that assistance is tailored to the needs of individual countries through consultative processes and plans that are developed and led by country governments;
2. Strengthen strategic coordination to mobilize and align the resources of the diverse partners and stakeholders – including the private sector and civil society – that are needed to achieve our objectives;
3. Ensure a comprehensive approach that accelerates inclusive agricultural-led growth and improves nutrition, while also bridging humanitarian relief and sustainable development efforts;
4. Leverage the benefits of multilateral institutions so that priorities and approaches are aligned, investments are coordinated, and financial and technical assistance gaps are filled; and
5. Deliver on sustained and accountable commitments, phasing-in investments responsibly to ensure returns, using benchmarks and targets to measure progress toward shared goals, and holding ourselves and other stakeholders publicly accountable.

1. The G8 consists of Canada, France, Germany, Italy, Japan, Russia, the United Kingdom and the United States. The agreement on Food Security was endorsed by 19 other countries, as well as United Nations agencies and other multilateral organizations.
2. US Government, Feed the Future Guide, page 8.

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C. Objective of this Document

USAID/Guatemala is currently carrying out in-depth analyses of issues related to food security in Guatemala, in preparation for undertaking new programs under the Feed the Future Initiative. This document presents a series of analyses in an effort to understand better the causes of rural poverty and malnutrition in Guatemala, and specific constraints to future efforts to remedy these problems. Food insecurity in Guatemala does not result from inadequate national or local food supplies, but instead is caused by inability of the poor to access food due to inadequate incomes, and sometimes by inappropriate consumption decisions by the poor that lead to poor food utilization. In order to assist it to develop a strategy for addressing these issues, given that its resources are limited in relation to the size of the problem, the Mission requested that the Trade and Competitiveness Assistance Program first analyze the following two questions:

1. What are the primary sources of rural income in Guatemala, both agricultural and non-agricultural?
2. What options for geographic focus of its program should USAID consider in order to increase its sustainable impact?

The analysis of these questions is presented in Section III of this document.

Subsequent to the analysis of these two overarching questions, five more detailed analyses were requested that address various constraints to increasing rural incomes, and hence food security in Guatemala. These analyses are:

1. Analysis of the Basic Grain Sector, as basic grains are the primary production crop of poor farmers in Guatemala.
2. Institutional Options for Sanitary and Phytosanitary Regulation, which is a constraint to market access for non-traditional export crops that can enhance rural incomes.
3. Analysis of Access to Water Issues, which is a constraint both because irrigation is essential for non-traditional exports and potable water is essential for health and biological absorption of food nutrition.
4. Access to Agricultural Technology, as improved technology is essential for rural income generation.
5. Access to Rural Finance, as external financing is required if poor farmers are to adopt improved crops and farming technologies.

In Section II of this document, immediately following this introduction, we present a summary of all six analyses.

D. Sources of Information

Annex A contains a bibliography of the various documents and surveys that were consulted in preparation of this report, and these documents are available on a compact disk. There are a number of studies and analyses and digital maps that have been prepared in recent years concerning the issue of food security in Guatemala, as well as the specific technical topics listed above, that have been very useful to the author. The following provides a description of the most useful sources of information.

Cartografía y Análisis de la Vulnerabilidad a la Inseguridad Alimentaria, MAGA y PMA, 2002. While the information in this document is somewhat out of date, it is the most comprehensive analysis of Guatemala's food security issues available.

Spatial Analysis of Rural Economic Growth Potential in Guatemala, World Bank, February 2005. This document, prepared by Jeffrey R. Alwang, Paul B. Siegel, and David Wooddall-Gainey, provides a clear portrayal via maps and concise analysis of the interaction in specific locations of a) rate of poverty; b) number of poor; c) population density; d) agricultural potential; e) roads/population; f) economic potential; and g) vulnerability to food insecurity.

Seguridad Alimentaria y Agricultura en Guatemala, Abt Associates, 2009. This document, prepared by Jaime Carrera, Ottoniel Monterroso y José Luis Jiménez of IARNA, Universidad Rafael Landivar, Guatemala, provides a concise analysis of factors affecting food security and agricultural potential.

Tercer Censo Nacional de Talla 2008, Resumen Ejecutivo Informe Final, Ministerio de Educación y SESAN, Febrero 2009. This document provides detailed and credible information on the incidence of malnutrition in Guatemala based on a census of 459,808 children between the ages of 6 years 0 months and 9 years 11 months in August 2008.

Encuesta Nacional de Condiciones de la Vida (ENCOVI) - Principales Resultados, Instituto Nacional de Estadísticas, 2006. This document provides useful information on the incidence of poverty and extreme poverty by various population sub-sets.

Encuesta sobre Remesas y Medio Ambiente, International Organization for Migration, 2008. This document, as well as other annual reports starting in 2004, provides very useful and detailed information on the role of remittances in rural Guatemala.

Rural Non Farm Employment and Ag Modernization and Diversification in Guatemala, 2010. This document is an unpublished study prepared by a Guatemalan PhD candidate at Michigan State University that analyzes the sources of rural income and the characteristics of the rural poor and extreme poor.

Many other documents were reviewed and are listed in the bibliography, including documents partially describing the tourism and artisan sectors in Guatemala, but the above documents were the most useful for the analysis presented in this document.

II. Summary of the Six Analyses

In this section we will seek to integrate the six different analytical documents presented in the following sections and highlight the principal issues and opportunities that were identified within an overall strategic focus.

The U.S. Government's Feed the Future Initiative is concerned with all aspects of food security, including availability, access, utility, and stability. In Guatemala food availability is not a constraint, either because it is produced locally or imported from more efficient producers given Guatemala's relatively open trading regime. However, access to food is a fundamental and current constraint, as poverty limits the ability of many Guatemalans to purchase food, leading to one of the worst rates of chronic malnutrition in the world. Adequate utilization of the food consumed is also an issue in Guatemala, although not as severe as limited access caused by poverty. The ability to absorb the nutrients in the food is impeded in people suffering from diarrhea and other health problems, and there are anecdotal reports of very poor people using their scarce resources (particularly remittances) for conspicuous consumption of junk food, thus worsening their nutritional status. Stability means that "the ability to access and utilize food must remain stable and sustained over time." There is concern within Guatemala about the long-term stability of food supply as domestic production is affected by deforestation and other environmental degradation, and international supplies are expected to eventually be affected by climate change.

A. Rural Incomes

Although there are other issues on the horizon, the current pressing problem in Guatemala is that very low incomes restrict the ability of a large portion of the population to meet their food security needs. Fifty-one percent of the population is poor, i.e. they lack sufficient resources to purchase the minimal goods and services needed to sustain themselves. Over fifteen percent of the population lives in extreme poverty, i.e. they lack the resources to purchase the food needed to meet their minimal nutritional requirements. As a result, 45.6% of Guatemalans suffer stunting from chronic malnutrition. Guatemala has the third or fourth worse incidence of chronic malnutrition in the world despite being a lower middle income country. The incidence of poverty and extreme poverty is highest in the rural population.

A detailed analysis of the Encuesta Nacional de Condiciones de Vida (ENCOVI) 2000 by Ricardo Hernandez, a Guatemalan PhD candidate at Michigan State University[3], provides very useful information about the sources of income and general conditions of farm families grouped by quartile by income. The ENCOVI data is based on location of residence and the very wealthy agricultural producers do not live in rural areas and are

3. Hernandez, Ricardo, Reardon, Thomas, Guan, Zhegfei, Rural Non Farm Employment and Agricultural Modernization and Diversification in Guatemala. Unpublished paper to be presented to the Agricultural and Applied Economics Association 2010 Joint Meeting.

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therefore not included in this analysis. Hernandez excluded from the analysis all rural residents from the ENCOVI survey who did not produce agricultural crops, so only the incomes and conditions of rural farmers are presented. The following table shows the income from different sources for the four quartiles of income (Table 1):

Table 1. Percent of Annual Farm Family Income by Source and Quartile.

Sources of Income	Poorest 25%	Next Poorest 25%	Next Wealthiest 25%	Wealthiest 25%
Crop income	9%	27%	22%	10%
Livestock income	22	12	7	3
Agriculture wage labor	31	31	27	15
Skilled non-farm labor	2	2	2	8
Unskilled non-farm labor	23	20	35	51
Remittances	5	3	3	9
Other private transfers	4	2	1	1
Social assistance	4	1	1	0
Pensions	1	2	1	1
Total percent (may not add due to rounding)	100%	100%	100%	100%
Total Household Income	$169	$712	$1452	$3613
Average income per economically active member	$79	$326	$608	$1493

Source: Encuesta Nacional de Vida - ENCOVI - (2000), Instituto Nacional de Estadística.

The ENCOVI 2000 survey identifies the extreme poor as those with less than $240 per capita income, and the poor as having between $241 and $540 per capita income, so the lower two quartiles shown above portray the sources of income of the extreme poor and poor rural farmers, respectively. Over half the income of both the extreme poor and poor rural farmers in Guatemala comes from wages earned either working on someone else's farm or providing unskilled non-farm labor. Crop income represents only 9% of total income for the extreme poor and 27% for the poor farmers (only marketed production is counted, not the production consumed by the farm family). Efforts to improve current crop production could potentially help the poor, but would have little impact on the extreme poor. Livestock is a significant source of the limited income for the extremely poor farmers, and we assume this to mainly be small animals raised by the household.

Additional information on each quartile of farmers is available in the Hernandez document. Comparing the wealthiest quartile of farm families with the poorest quartile, the Hernandez analysis found that while the relatively wealthy farmers own twice as much land, all quartiles of producers farm about the same extension of land; the poorer farmers rent land to complement what they own. The wealthier quartile of families own over twice as much non-land agricultural assets and use much higher quantities of agricultural inputs. As a result, the wealthiest rural farmers produce 33% more basic grains and more than 3 times as much horticulture crops, and market 63% of their production compared to only 24% for the extreme poor. Average income from crops per household for the wealthiest quartile of farmers is 24 times that of the poorest farmers. The wealthiest farmers live closer to roads and to urban areas and have slightly higher levels of education, which facilitates their access to wage employment.

On average agricultural wage income represents 31% of total income for both the extreme poor and poor rural farmers, compared to only 15% of total income for the wealthiest quartile of farmers. The wealthiest farmers earn more agricultural wages, but they are less dependent on this source of income. Four times as many wealthy farmers have access to skilled labor wages than the poorest farmers, and the average earnings from unskilled non-farm labor for the wealthiest quartile of farmers is 47 times that of the poorest farmers.

Ricardo Hernandez in his analysis stated, "…the poorest and smallest farmers tend to be most dependent on farm wage-employment…(and)…the higher the commercialization rate of the zone, correlated with the more labor-intensive horticulture, the greater the opportunity for this work for the poorest." In addition, higher education and rural density correlate with greater reliance on hired labor, and greater participation in skilled rural non-farm employment correlated with greater participation in horticulture.

Improved wage opportunities probably represent the best way to alleviate poverty among poor and extremely poor rural farmers.

The Hernandez analysis complements the studies prepared by Dr. John Mellor, who argues that support for horticulture and coffee production by small farmers in Guatemala is an essential starting point for poverty alleviation, as the earnings generated are spent locally and generate non-farm employment, stimulating the entire economy. The Hernandez data show that wage employment is also an essential source of income for farmers, and in fact is a precursor to modernization and diversification.

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B. Basic Grains as a Potential Source of Increased Rural Incomes

Although almost all Guatemalan farmers grow basic grains, yields have stagnated for more than a decade and corn yields in Guatemala are low even by Central American standards. The primary constraint to increased basic grain productivity is poor plant nutrition, much more than plant genetics. Yields can be increased through improved soil conservation and management and appropriate application of appropriate inputs, which requires an effective technology transfer system and an effective source of financing for the fertilizer and other required inputs. As will be discussed below, the Government of Guatemala's agricultural research service is very weak, and is only doing research on corn varieties for medium sized farms on the South Coast and the northern region, not for the small highlands farmer.

As of 2002, according to the IV National Agricultural Census, there were 780,000 corn producers and 293,000 frijol producers in Guatemala, so any effort to improve basic grain production will require a massive technology transfer effort. The Government of Guatemala (GOG) abolished its agricultural extension service in 1997, and the Guatemalan university system discontinued all courses on agricultural extension shortly thereafter. The GOG is now attempting to quickly reestablish the extension service but will likely be constrained by lack of financial and trained human resources.

Given the small land area and other assets available to the extreme poor and poor farmers, increasing basic grain production will do little to increase their incomes. Hernandez shows that only 19% of the basic grains produced by the extreme poor and 40% of that produced by the poor are marketed, with the remainder consumed by the farm household. Assuming that any increased production would be sold and assuming the average price of about Q100/quintal of corn would not decrease significantly with the increased marketable surplus (a questionable assumption – see discussion in next paragraph), a 25% increase in corn production would add about $82 to the annual household sales for the extreme poor and about $110 for the poor. Deducting the costs of inputs (but not deducting the cost of labor) this represents an increase in annual income of $60 for the extremely poor family and $79 for the poor. (note: I deleted a sentence and substituted the above) These amounts are not insignificant compared to the 2000 household incomes shown above, and an effort to increase basic grain productivity through a massive technology transfer program may be warranted. However, these amounts would not move the extreme poor up to just being poor, nor lift the poor out of poverty.

In addition to the fact that it would be extremely difficult to significantly increase the productivity and production of basic grains by the very large number of small producers, expanded production of these crops would face market constraints. As its population shifts increasingly to urban areas, Guatemalans are consuming more bread and fewer tortillas. The nation and its neighbors are basically self sufficient in white corn, although depending on climate fluctuations in any given year it may export or import small quantities. Guatemala does not produce enough frijoles or rice to meet its demand, but commercial production of these crops tends to be concentrated on medium sized farms in other regions of Guatemala, not in the Western Highlands where poverty is most severe. The demand for corn in Guatemala is relatively inelastic, and a significant expansion of production would therefore result in depressed prices.

C. Horticulture and Other Activities as Potential Sources of Increased Rural Incomes

In contrast with basic grains, horticulture offers much higher potential to increase rural incomes, both in direct returns to the producer and increased agricultural wage employment. One manzana of corn produces a profit of Q,1784 for a farmer, plus day labor wages worth Q4,300. One manzana split evenly between corn and horticulture crops (French beans and snow peas) produces a profit to the farmer of Q16,921 and day labor wages of Q20,090. The combination of profit and paid labor from horticulture production and limited basic grains is six times that from just basic grains on the same plot of land. A significant portion of this income goes to hired labor, which as shown above is a primary source of income for the extreme poor.

Another source of both increased income for rural farmers and agricultural wage labor is specialty coffee production. Production from one manzana of coffee has a profit of Q9,624 plus labor wages of Q10,816. This is not quite as good as horticulture, but the investment cost is less, as is the risk.

In section III of the full food security document we comment on a number of other sources of rural income, including artisan production and tourism, but none of these offer the income potential that is found in horticulture and specialty coffee, both in terms of profit to the farmer and payment of wages. The remaining four analyses described in sections V through VIII of the full document look at issues that constrain the expansion of horticulture and specialty coffee production in Guatemala, i.e. access to markets, water, technology, and finance. The results of these analyses will be summarized in the remainder of this document.

D. Access to Markets

Guatemala is recognized as a leader in the development of non-traditional agricultural exports in Central America. These exports grew by 1135% between 1990 and 2008 and were worth $950 million in 2009. A Guatemalan non-profit organization, AGEXPORT, has played a leading role in developing market access for this industry, and further expansion of exports is presently limited mainly by production constraints, rather than markets. However, there is increasing concern among Guatemala's trading partners about Guatemala's ability to meet international sanitary and phytosanitary (SPS) standards. The number of containers of Guatemalan produce exported to the United States that have been found to contain prohibited pests has risen from 1100 in 2007 to 1900 in 2009. The European Union, which recently signed an association agreement with all Central American countries, is concerned that Guatemala's institutional framework for assuring compliance with SPS standards is inadequate to assure compliance with its regulations. If Guatemala fails to improve its institutional capacity to enforce compliance with international standards, the country risks loss of market access, which would result in an economic, political, migratory, and humanitarian crisis.

Based on discussions with GOG officials, private sector horticulture export leaders, and various donors, in Section IV of the full document we discuss three options for addressing Guatemala's institutional weaknesses for SPS management. The best of these options is to establish an autonomous public sector institute, under the Ministry of Agriculture, with independent authority to collect fees for its services and spend these resources, along with GOG budget allocations, in the effective delivery of services. It should also have autonomous ability to hire and fire staff based on technical qualifications. While the institute would need to be a public sector entity in order to meet international standards for transparency, the private sector should have a formal role in monitoring its activities and be able to require remedies if shortcomings are detected. The GOG contemplated creation of an institute of this nature when it implemented a reform of public agricultural sector institutions in 1997, but never completed the process.

Other options for improving the credibility of SPS management in Guatemala would be to expand and make permanent the role of the PIPAA office within AGEXPORT, which has been delegated authority to perform selected SPS tasks. A third option would be for the Government of Guatemala to contract the services of the regional OIRSA organization to assume the role of SPS enforcement for Guatemala.

Although creation of adequate institutional capacity to assure that SPS enforcement meets international standards is the highest priority for GOG attention, the GOG should also increase its investment in promotion of these exports. Although presently there is more market demand for Guatemalan produce than supply, there is a continuing need to expand markets. At this point the Guatemalan private sector is supporting market expansion with little assistance from the GOG. Guatemala's competitors in other Latin American countries enjoy more effective and sustained support from their governments. Given the critical importance of this industry to addressing the income limitations that cause food insecurity in Guatemala, the GOG should become much more supportive.

E. Access to Water

Dependable access to water contributes to food security in three ways. First, production of horticulture crops for export requires irrigation, as the best market prices for most produce occur during Guatemala's dry season. Secondly, access to clean potable water reduces diseases that limit the biological absorption of the food. Finally, effective watershed management not only increases water availability, but also reduces crop losses due to landslides, flooding, soil degradation, etc.

Guatemala's rainfall and its underground water resources could normally provide up to ten times the nation's annual water consumption. However, there is great geographic and seasonal variability to water supply. The GOG estimates indicate that of 1.3 million hectares that are appropriate for irrigation, only a quarter presently have access and almost all this is planted in large scale commercial crops. Guatemala has storage (dam) capacity for only 1.5% of its annual rainfall, and small farmers seeking to produce horticulture crops for winter export markets must rely on artesian springs or groundwater brought to the surface via pumps. There has been extensive development of natural springs in recent years so there are few such sites now available, and drilling wells and paying the energy costs to pump water can be very expensive. The Hernandez analysis of ENCOVI 2000 data cited earlier found that only 1% of rural based farmers have access to irrigation.

Guatemala has invested significant resources during the past twenty years in construction of potable water systems for urban and rural communities, and 95% of the nation now has access to this resource (although for a third of rural residents potable water is only available at a community spigot). However, 80% of urban potable water systems only supply water for 12 hours a day, which can lead to compromised water quality.

The primary constraint to increased access to water in Guatemala is the lack of an appropriate policy environment that defines water rights, encourages investment in resource access, generates resources needed to protect watersheds, and fairly allocates the costs of groundwater access between public and private interests. There have been multiple attempts over many years to formulate and obtain passage of a water law, but vested interests have successfully impeded these efforts. Such a law is necessary in order to assure that water rights are

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protected and the needed investments are made to improve access to irrigation and to assure the sustainable management of the resource.

At a minimum, a stable policy needs to be in place that will clearly define what costs the public sector will cover in drilling wells for irrigation, and what portion of the costs should be paid by private interests. There is a risk in drilling any specific well as it is impossible to predict where water will be found, and it is appropriate that the public sector absorb a portion of this risk as part of creating a public good (water for irrigation).

F. Access to Agricultural Technology

Analyses by the World Bank and other institutions have repeatedly demonstrated that investment in agricultural research produces very high economic returns. On average, developed countries invest 2% of the agricultural sector's gross domestic product in agricultural research. In 2009 the Government of Guatemala invested only 0.037% of the sector's GDP in agricultural research (the lowest ratio in all of Latin America). There is some private sector investment in agricultural research, but this is either by large farm industries (i.e. sugar) or it is sporadic without a long-term agenda that would assure optimal and consistent results.

The budget of the Ministry of Agriculture's Instituto de Ciencias y Tecnología Agrícola is barely able to meet salary costs and maintenance of its research installations, with little left for actual research. As noted earlier, the GOG abolished the public agricultural extension service in 1997 and left it to the private sector to meet farmer needs. Initially the plan was to establish a fund that would subsidize farmer groups to contract private suppliers of agricultural technology, but the required resources were diverted to other priorities. Some agricultural input suppliers (fertilizers, pesticides, improved seeds) do invest in adaptive research and technology transfer, but often the technology constraint has to do with plant and soil management rather than application of inputs. Since research on these issues would not generate a profit for the commercial firms, it does not happen. Nor is there a source of adaptive research to introduce new crops in Guatemala that could expand the nation's rural employment and incomes, and its exports.

At a symposium on private sector led agricultural research sponsored by USAID through the TCAP program, Guatemalan agribusiness leaders acknowledged that further development, and even the preservation of, Guatemala's non-traditional agricultural export industry depends on access to improved agricultural technologies. These leaders adopted a resolution supporting creation of a new non-profit entity to fill this need, and the initial steps are now being taken to establish the organization. The organizers anticipate strong private sector financial support, but it is also clear that additional support will be needed if the institution is to undertake a long-term research agenda. Based on the experience of the past forty years, it is not possible to rely on the Government of Guatemala to provide this support, and the organizers of the new entity will seek international support.

It is encouraging that the Government of Guatemala has committed itself to reestablish a public agricultural extension service, as the costs of such a service cannot be sustained with private resources on a continuing basis. However, at this time too little attention is being given to the training of the new extension agents and to creating the linkages that would assure that the agents respond to local community priorities.

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G. Access to Finance

Expansion of non-traditional horticulture and specialty coffee exports requires financing. Many of these investments are medium term in nature, for example construction of infrastructure such as irrigation distribution systems, plastic covering of crops to reduce pests, packing houses, and cold storage, or planting and care for tree crops that take a long time to enter production. The agricultural inputs required for a manzana planted 50% in corn and 50% in horticulture (French beans and snow peas) cost $2,536 compared to $290 if the land is just planted in corn.

In contrast to the crisis that has faced the financial systems of the developed world over the past few years the Guatemalan banking system is surprisingly healthy. It is the most profitable sector of the Guatemalan economy, the ratio of total credit to the private sector divided by GDP has doubled since 1990, and the percent of loans in arrears is low. The sector is going through a consolidation via bank mergers, but at the same time is rapidly expanding its outreach. The number of bank agencies more than doubled between 2006 and 2008, and two of the leading banks have established programs where agents (local store owners, pharmacists, etc.) are commissioned to provide services in the bank's name in small communities. The banking system currently has a high rate of liquidity (about 16% of total assets).

Only 5% of private bank loans are made to the agricultural sector. Although there are several other sources of financing for this sector, only the private banking sector has the capacity to significantly expand lending. The Government of Guatemala has established a large number of trust funds designed to support specific objectives, with current liquidity of over $90 million, and some of these resources target agriculture. The Federación Nacional de Cooperativas de Ahorro y Crédito (FENACOAC) and its member cooperatives have a total loan portfolio of $475 million, 10% of which funds projects in the agricultural sector. Seventeen percent of the credit provided to agricultural sector comes from off-shore financing. For many smaller producers, the primary source of financing comes either from input suppliers (fertilizer, seed and pesticide dealers) or from agro-processors and exporters. These sources have a financial interest in the success of the producers as this will assure future commercial activity. However, there is evidence that the cost of this type of financing is extremely high.

Agriculture is one of the most dynamic sectors in Guatemala, responsible for 50% of employment and 60% of exports, and loan delinquency in the agriculture sector is lower than the average for all private sector loans. However, while the agricultural sector produces 13.5% of Guatemala's GDP, it only receives 5% of bank loans. Why do banks prefer to keep their excess liquidity in government bonds paying 4.5% interest rather than increasing their loans to the agricultural sector? The answer is that there is limited effective demand for loans from the agricultural sector under present conditions, and the banking system does not have appropriate policies and procedures to provide an effective supply of credit to the sector.

Although the agricultural sector desperately needs credit, agricultural producers often do not qualify for loans given the way they are structured and the technology they use (and therefore their demand is not effective). It is very costly to provide loans to dispersed small farmers, as the costs of reaching them, processing their loans, and monitoring performance are very high in relation to the size of the loans. Small farmers also lack effective loan collateral, since even if they have title to their land the cost to the bank (both financial and political) of foreclosing on the holdings of poor small farmers would be very high. There are also significant risks in agriculture, particularly with the production of perishable horticulture products. Also, the banks have difficulty obtaining credible information about who is a potential good agricultural borrower and who is not. Most bankers grew up in urban areas and have little understanding of rural life and of agriculture. There are no futures markets for Guatemalan horticulture products so price fluctuation cannot be predicted or hedged. While viable small farmer organizations can reduce the transaction costs of providing financing to individual producers, most of these lack credible financial statements and stable management.

There are examples in Guatemala of effective farmer organizations, and technologies and procedures exist that can address many of the constraints that limit the effective demand for agricultural loans. However, Guatemalan banks often do not have an effective supply of credit, and cannot distinguish between those borrowers who present acceptable credit risks and those that do not. As noted earlier bank credit agents have very limited exposure to life in rural areas, which limits their ability to identify viable clients. The recent dramatic expansion of bank agencies in Guatemala, and the adoption by the two largest banks of a system of commissioned agents, has the potential of greatly increasing banker understanding of the rural financial market.

However, in addition to the need for bankers to understand agriculture and rural borrowers, bank norms and procedures designed for serving the manufacturing or commerce sectors need to be adjusted to serve agriculture. Most banks refuse to provide financing for labor costs, but these costs are often significant in agriculture. Banks often require payment of loans immediately on harvest, depriving the borrower of the opportunity to delay sales until prices increase. Interest rates on agricultural loans are frequently very high, which is again a result of the inability of bankers to adequately differentiate between the qualities of potential agricultural borrowers. Bankers appear to have limited understanding of the potential for using moveable assets as collateral for loans, despite the fact that these assets are now legally acceptable. Finally, bank financing is normally only available for short-term loans, although many of the potential investments in the agricultural sector require medium term financing.

As noted earlier the expansion of Guatemalan banks into rural areas is very encouraging, and eventually the system may overcome the constraints on its own. However, it also may be possible for donors and the Government of Guatemala to accelerate this process. Perhaps the most important intervention would be to expand the number of viable, well managed farmer organizations, as it is essential that the transaction costs of providing credit to individual farmers be reduced. Secondly, as noted in the previous section, the Guatemalan agro-export sector desperately needs a reliable source of productivity enhancing and risk reducing technologies, and if an effective institution can be established to provide this support then agribusiness will be more creditworthy. Donors could also support human resource development within the banking sector to increase understanding of the agricultural sector, support the creation of a credit rating service to improve banks' ability to differentiate between potentially good and bad borrowers, integrate banks into value chains so that they can take advantage of the information available through these networks, encourage the FENACOAC system to become more committed to meeting the needs of the agricultural sector, and consider the possible replication of successful guarantee fund mechanisms and the creation of risk capital funds.

H. Conclusion

In summary, a large portion of the Guatemalan population suffers from extreme poverty, chronic malnutrition, and food insecurity, and these problems particularly affect the rural population, especially in the Western Highlands region. While some improvement in the incomes and living standards of this population could be achieved by increasing the productivity and production of basic grains, this would have very limited impact given their small landholdings and other assets, and the relatively inelastic demand for these crops. In order to address the food insecurity of this population, increased wage employment is needed as well as a shift in production to higher value horticulture and specialty coffee products. The market for these diversified crops is very large and Guatemala is known as a quality producer. However, the institutional capacity to assure that worldwide sanitary and phytosanitary standards are met must be improved, or Guatemala risks exclusion from these markets. In addition, attention must be given to improving the access of small and medium producers to irrigation, appropriate agricultural technology, and finance, if Guatemala is to expand the production of these crops sufficiently to raise its malnourished population out of extreme poverty.

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III. Analysis of Rural Income Sources and Potential Geographic Focus

A. Overview

The Department of State Consultation Document on the Global Hunger and Food Security Initiative identifies five criteria that the U.S. Government will use in selecting countries to receive assistance. These are: (1) Level of extreme poverty, (2) Vulnerability to food insecurity; (3) Level of hunger and under nutrition, (4) Natural resource (potential for agriculture, and (5) Investment opportunities. In this section we will apply the first four of these criteria (in a slightly modified order) to Guatemala's 331 municipalities, in order to obtain an overview of the severity of the country's food security problem. An analysis of investment opportunities will be addressed in a later section.

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1. Rural Poverty

According to the World Bank, Guatemala is classified as a middle income country with a per capita gross national income of $2400 (2007). According to the ENCOVI 2006 survey, the poverty line in Guatemala, i.e. the amount of money required to purchase a basic basket of goods and services, is Q6,574 (approximately $822) per capita per year. The line for extreme poverty is the amount of money required to purchase a basic basket of food needed to meet minimal nutritional requirements for human beings, and this amount is Q3,206 per person per year, or about $401. Incomes below the extreme poverty line will result in malnutrition.

In 2006, of Guatemala's total population of 12,987,829, the ENCOVI survey found that 6,625,892, or 51%, fell below the poverty line, and 1,976,604, or 15.2%, fell below the extreme poverty line, i.e. they did not have enough money to meet their basic nutritional needs. The percentage of the Guatemalan population living in poverty and extreme poverty declined between the 2000 and 2006 ENCOVI surveys, but due to population growth the absolute numbers of poor and extreme poor grew. Seventy-two percent of the poor live in rural areas, and 74% of people working in agriculture are classified as poor (compared with 44% of those working in industries and 25% of those in commerce and services). The indigenous population of Guatemala has a higher incidence of poverty than the non-indigenous. Annex B-1 provides a map of extreme poverty in Guatemala by municipality based on the 2002 census. The ENCOVI survey sample was not large enough to allow disaggregation of poverty rates below the Departmental level, however the concentration of extreme poverty shown at the Department level in ENCOVI is consistent with the data from the 2002 census.

In considering approaches to addressing poverty in Guatemala, one factor that should be taken into consideration is population density, or better stated poverty density. In some municipalities of Guatemala there is a very high percentage of the population living in poverty, but the total population of these municipalities is a relatively low. By focusing attention on those departments that have high rates of poverty and relatively high concentrations of people, the poverty programs have a greater potential for lowering the overall national rate of poverty. Annex B-2 provides a map that shows the density of poverty by municipality.

2. Chronic Malnutrition

There are two types of malnutrition that are tracked internationally: chronic malnutrition (short height for age) and severe malnutrition (low weight for height). In normal times, severe malnutrition or emaciation is not a significant problem in Guatemala, affecting only about 2% of the population. However, as will be discussed below, segments of the population are vulnerable to food insecurity when natural disasters strike, and in these situations severe malnutrition can become a major concern.

Of greater concern is the fact that a very high percentage of Guatemala's population suffers from chronic malnutrition, caused by inadequate nutrition over a prolonged period. According to the Tercer Censo de Talla 2008, 45.6% of the 459,808 school children measured suffered from stunting caused by chronic malnutrition. Guatemala has the highest rate of chronic malnutrition in Latin America, and has the third highest prevalence in the world. The census also demonstrated that the incidence of chronic malnutrition increased with age, with a higher portion of children aged 8 and 9 suffering chronic malnutrition than those aged 6 and 7. With age the children had more time to be malnourished. As is the case with extreme poverty, chronic malnutrition is much more prevalent in rural areas and among indigenous populations. The incidence of chronic malnutrition in children whose mother's native language is Spanish is 34.6%, while for those whose mother's native language is not Spanish the incidence is 62.5%.

The map in Annex B-3 shows the data from the Tercer Censo de Talla 2008 by municipality. There is a striking overlap between the municipalities that suffer high levels of chronic malnutrition with those that suffer high levels of extreme poverty. Experts note that malnutrition in Guatemala is not caused by lack of available food, but instead is due to inadequate access to the food due to low purchasing power and to poor absorption of the nutrients in the food that is consumed, due to disease (Table 2).

Table 2. The ten departments that have the highest incidence of poverty are also those with high rates of chronic malnutrition.

Department	Poverty (%)*	Chronic Malnutrition (%)**
Quiche	81	64
Alta Verapaz	79	52
Sololá	75	65
Totonicapán	72	69
Huehuetenango	71	63
Baja Verapaz	70	46
San Marcos	66	55
Jalapa	61	48
Chimaltenango	60	54
Chiquimula	60	50

* ENCOVI 2006. Encuesta Nacional de Vida -ENCOVI- (2006), Instituto Nacional de Estadística.

** Tercer Censo de Talla 2008. Resumen Ejecutivo Tercer Censo de Talla (2008), Ministerio de Educación y Secretaría de Seguridad Alimentaria y Nutricional Presidencia de la República - SESAN -.

The one anomaly in the close correlation between poverty and chronic malnutrition is the department of Quetzaltenango, which is tied with Baja Verapaz as the department with the 10th highest rate of chronic malnutrition, but ranks 18th among departments in terms of poverty.

3. Vulnerability to Food Insecurity

In the *Cartografía y Análisis de la Vulnerabilidad a la Inseguridad Alimentaria*, 2003, the Guatemalan Ministry of Agriculture and Livestock (MAGA) and the World Food Program (WFP) created an index of Municipal Food Vulnerability (Vulnerabilidad Alimentaria Municipal - VAM). The result of this analysis is presented as a map in Annex B-4. The objective was to identify those municipalities in greatest danger of food insecurity and thus hunger and severe malnutrition, and potentially social disorder, migration, and loss of life. People are considered to be vulnerable to food insecurity if they are either permanently or for specific periods negatively affected by economic, social, environmental, or natural disasters that cause them to have inadequate access to food. They are most vulnerable when negative conditions reduce their capacity to respond due to repeated events that affect their livelihoods, destroy crops and other productive assets, and reduce their access to food. The severity of the natural disaster is affected by the degree of degradation of the natural environment. The ability of people to respond to disasters is influenced positively by the diversity of income sources, savings, family and communal support, and government and other organizational assistance, as well as by transport and communication infrastructure, local social networks, and insurance.

To construct the index, the MAGA/WFP team identified three variables that measured the food situation, three that measured environmental risk, and two that measured response capacity, and each of the variables was assigned a weight in order to construct a formula that would be indicative of the level of food vulnerability for each of Guatemala's 331 municipalities. The three variables used to determine the food situation were availability (deficit in the production of corn and beans compared to the municipality's consumption requirement based on population), access (percent of the population living in extreme poverty), and consumption (percent of the population with chronic malnutrition). The three variables used to determine the environmental risk, based on prior frequency of occurrence, were drought, frost, and flooding. The two variables that were used to measure the response capability were access to roads and availability of land suitable for agriculture.

The authors of the analysis acknowledge that it over simplifies the real status of municipal food vulnerability. Food availability is only measured in terms of corn and beans; no weight is given to the potential for obtaining imported food; the ability to obtain nonfarm employment; social networks that can help individuals respond to disasters are not taken into account; etc. However, the resulting index does provide a useful indication of municipal exposure to food vulnerability.

The results of the municipal food vulnerability analysis were that 13 municipalities were classified as having very high vulnerability, and 96 were classified as having high vulnerability. The very high vulnerable municipalities were in the following departments: San Marcos (7), Totonicapán (4), Huehuetenango (2), Quiche (2), Quetzaltenango (1), and Jalapa (1). As can be seen in the map in Annex B-4, all of the municipalities that are classified as being either very high or high in food vulnerability are in a band that stretches from the northwestern Department of Huehuetenango and northern San Marcos southwest across the highlands of Guatemala. The analysis prepared by MAGA and WFP noted that almost all of the at risk municipalities are at elevations of 1200 meters above sea level or greater, and the region is characterized by extensive environmental degradation due to deforestation, high population density, very small farming units, and highly intensive use of the land. The region also has a high percentage of indigenous population.

4. Rural Economic Potential

In 2005 the World Bank produced a report titled *Spatial Analysis of Rural Economic Growth Potential in Guatemala*. This document includes three maps that portray, by municipality, the agricultural potential, the road density, and economic potential.

The map of agricultural potential (B-5) was created with a composite of variables representing soil type and quality, soil depth, and slope, and categorizes the results for potential by very high, high, medium, low, and very low. The very high agricultural potential land is located on the Pacific coast, and the high agricultural potential land is on the volcanic slopes of the *boca costa*, with some outlying high agricultural potential areas in Santa Rosa, Izabal, Alta Verapaz, and certain portions of the Petén. The World Bank analysis notes that while the Western Highland's region has excessive slopes, the depth and quality of the volcanic soils cause a band along the southern part of this region to be counted as having medium agricultural potential. There are other municipalities with medium potential in the eastern highlands.

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The map of road density (B-6) was constructed by dividing the total number of kilometers of roads in a municipality by the municipality's geographic area, and then adjusting the resulting number slightly to take account of the population density of the municipality. The municipalities with high road density are either those near major population centers or in areas of intensive, high value agricultural production, where the roads have been extended in order to facilitate delivery of production inputs and extraction of produce. Road densities are very low in the Northern region of Guatemala, the North East, the border with Honduras, and the mid to northern part of the Western Highlands.

The map of economic potential (B-7) was constructed by creating a composite of the maps of agricultural potential and road density. The World Bank report notes that while there is no systematic methodology for mapping economic potential in rural areas, these two variables have been used in previous studies, given the importance of agriculture to the rural economy, as well as the importance of road infrastructure for all economic activity. The map again shows the high potential of rural areas in the South Coast and *boca costa* areas. The map shows medium to high potential along a band extending around the Pan American highway from Guatemala City to San Marcos, and in portions of the Southeastern region.

B. Sources of Rural Income

As noted in Section I.B, USAID/Guatemala is seeking information on the sources of rural income (both agricultural by crop and non-agricultural), in order to help identify future investment opportunities, which is the fifth selection criterion for the USG Global Hunger and Food Security Initiative. Obtaining timely and meaningful information on the sources of rural income in Guatemala is extremely difficult, although useful information is available from the Encuesta Nacional de Condiciones de Vida.

To establish a context, the following chart provides Guatemala's estimated 2009 gross domestic product for selected sectors (Table 3). The agricultural sector's contribution to GDP has been steadily declining for a number of years, which is typical of an urbanizing society. Unfortunately, the Bank of Guatemala does not disaggregated GDP by Departments, as this would greatly facilitate analysis of the sources of rural income.

Table 3. Guatemala's estimated 2009 gross domestic product for selected sectors.

GDP for Selected Sectors	2009 Estimated (Q million)
Agriculture and livestock	35,325.9
Mining	4,572.9
Industry and manufacturing	56,615.2
Commerce	49,756.4
Services	46,044.5
Sub-total	192,314.9
Total GDP	304,604.3

Source: Banco de Guatemala.

1. Rural Income

A second source of context information is the 2006 ENCOVI survey that provided information on the percent of all the people working in different economic activities who are poor. As noted earlier, 74.4% of people working in agriculture are poor, compared with 43.6% in industry and 23.1% in commerce and services. 51.9% of Guatemala's population live in rural areas, and logically those working in agricultural and livestock sectors are concentrated in rural areas, and most of the people working in industry, manufacturing, commerce, and services live in urban areas. The Government of Guatemala's definition of rural areas includes all dispersed population and people living in aldeas, caseríos, parajes, fincas, etc. The GOG definition excludes cabezeras municipales and departamentales, and other population centers with more than 2000 residents.

A recent in-depth analysis of the 2000 Encuesta Nacional de Condiciones de Vida (ENCOVI) data provides very useful information on the nature of Guatemala's rural economy and the sources of rural income for farmers.[4] This analysis is contained in a paper that has just been presented to the U.S. Agricultural and Applied Economics Association Annual Meeting. The lead author of this paper is a Guatemalan PhD. candidate at Michigan State University, Ricardo Hernandez, and the other authors are his major professor, Thomas Reardon, and another graduate student, Zhengfei Guan. Hernandez started with the pool of 3,852 rural households covered by ENCOVI 2000 (households are counted as rural in Guatemala if they are in agglomerations of 2,000 people or less). Mr. Hernandez then removed the 1,183 respondents that did not report any cropping activity, as well as respondents who were large cattle ranchers and a few respondents whose level of remittances placed them

4. Hernandez, Ricardo, Reardon, Thomas, Guan, Zhegfei, *Rural Non Farm Employment and Agricultural Modernization and Diversification in Guatemala.* Unpublished paper to be presented to the Agricultural and Applied Economics Association 2010 Joint Meeting, p. 25.

outside the norm. This left the pool of all Guatemalan farming households living in rural areas in 2000, i.e. the pool does not include those households whose economic activity is farming but who live in urban areas.

Hernandez then separated the respondents by income quartiles and analyzed the differences between those in each income quartile, from the lowest to highest, in terms of sources of income, assets, farm production, wage earnings on other farms, skilled and unskilled non-farm employment, wage rates, type of farming (grains or horticulture), use of agricultural inputs, surplus marketed, etc. Annex C includes a table from the Hernandez et al paper that shows the sources of income by quartile of income. The average annual income per economically active family members of the families in the lowest income quartile was $79, which places these individuals well below the ENCOVI 2000 threshold of $240 or less in per capita annual income for the category of extreme poverty. The average in the next higher quartile was $326, which places these individuals in the ENCOVI classification of poor in Guatemala (incomes of $241 to $540). The other two quartiles are above the poverty line.

The following are some of the important findings shown in the table in Annex C:

1. On-farm income for the extreme poor represents only 9% of their total income and only 27% of the income for the poor. This is a startling statistic that calls into question GOG and donor focus on addressing poverty in Guatemala by fomenting increased agricultural production and productivity by poor farmers. However, the ENCOVI data does not include as income products produced for household consumption, only sold commodities.
2. Livestock represents 22% and 12% of total income respectively, which the author assumes includes mainly small livestock like chickens, pigs, goats, and sheep, but could include an occasional cow. A case might be made for programs built around small animals like poultry, rabbits, sheep and goats as a way of raising income, and more importantly, of raising the consumption of animal based protein
3. Agricultural wage income (work on someone else's farm) is on average 31% of total income for both the poor and extreme poor. However, only about a quarter of the extreme poor farmers have agricultural wage income, compared with half for each of the other income quartiles. Table 2 in the Hernandez document (not included in the annex to this paper) shows that the average number of months worked by the extreme poor is 1.5, whereas the farmers in the other three income quartiles work 5.7 to 8.5 months. Because of their extreme poverty, agricultural wage income is very important to the extreme poor, but they do not get very much of it. It is not very clear why this is the case, but perhaps it has to do with their isolation and inability to get to the locations that pay the higher agricultural daily wages and only are able to migrate seasonally to assist with coffee and sugar cane harvests.
4. Unskilled nonfarm employment is 23% and 29% of income respectively for the extreme poor and poor. Again only a quarter for the extreme poor have unskilled nonfarm employment, compared to 40% of the poor. 81% of the highest income quartile has unskilled nonfarm employment income (this will be discussed further below).
5. Almost none of the poor and extreme poor have income from skilled nonfarm employment, compared to 14% of the highest income quartile. This could suggest that investment in development of skills needed for nonfarm employment would be of considerable benefit to the extreme poor.

6. Remittances represent only 5% and 3% of the income of the extreme poor and the poor (average annual household amounts of only $9 and $23 respectively). Compared with 9% ($333) for the highest income group. It appears that at least in 2000 it was more likely that the relatively well off migrated to Guatemalan urban centers, Mexico, and the U.S. to work, perhaps because they could afford the high fees charged by the "coyotes" who facilitate the trip. Or perhaps because the wealthier group contains more risk takers?
7. Social assistance and pensions benefit the wealthier farmers more than the poorer ones.

The Hernandez paper contains a number of other tables and extensive analyses that cannot all be replicated here. But the author will attempt to highlight a number of important points. Nonfarm employment income represents a significant portion of the income of all quartiles, is close to the agricultural wage income for the poorest households and greatly exceeds it for the wealthier ones. For all quartiles the off-farm income greatly exceeds the on-farm income (although as noted earlier it is unclear if the on-farm income includes production consumed in the household). The highest income quartile earns 85% of the skilled nonfarm employment income, which one would think might be a return on greater education but in fact average education levels are fairly uniform across all quartiles at just two years. The top half of the income quartiles also captures 93% of the unskilled labor market, which may reflect the fact that they tend to be located closer to urban centers and also have more vehicles (the author assumes vehicles includes bicycles), so the transaction costs of obtaining urban or semi-urban employment are lower. Therefore construction of roads and bridges, which would reduce the transaction costs of selling surplus production and accessing the labor market, could be a very beneficial investment.

The analysis also shows that on average 29% of the farming households are landless, and this is fairly constant across quartiles, indicating that there is a very active land market. The total land harvested (which includes owned and rented land) per household is almost constant across all of the quartiles at 3.4 hectares, and only 1% of the households has access to irrigation. For anyone familiar with the agricultural economy of the Western Highlands, this quantity of land resources is surprising, and it would be important to narrow the analysis to that region. While an almost constant 92% of the farmers grow beans and grains across all quartiles, 39% of the extreme poor households produce horticulture crops compared to over 50% for the other three quartile households. Yields of beans and grains improve slightly with household wealth but are consistently very low (1.3 metric tons per hectare for the extreme poor compared to 1.6 MT/Ha for the wealthier). Yields of horticulture increase dramatically from 2.2 MT/Ha for the extreme poor to 3.7 MT/Ha for the wealthiest. As expected, use of agricultural inputs increases significantly with income. Although the Hernandez paper does not indicate the division of land holdings between bean and grains versus horticulture it can be calculated using total production and yield information. The extreme poor and the wealthiest both have on average about a hectare of land in beans and grains, but the poor only have 0.23 hectares of horticulture crops compared to 0.4 hectares for the wealthiest. Only 24% of the poorest households have a market surplus for horticulture crops, compared to 40% for the wealthiest. The presence of significant horticulture crop activity on 39% of the extreme poor household farms is a surprise to the author. Although much of it is probably in *huertos familiares* for family consumption, the average production per extreme poor household is 0.5 metric tons, or about 275 pounds per capita per year.

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Participation in skilled nonfarm employment activities correlate closely with the population density of the municipality and the percent of urban population. Participation in unskilled nonfarm employment correlates with the presence of electricity, and with the percentage of total crop production that is commercialized, as well as with the degree of urbanization or population density. There are indications that those who work in the skilled nonfarm labor market hire more labor on their farms and produce more horticulture crops. Participation in unskilled labor also directly correlates with increased use of agricultural inputs (fertilizer, pesticides, seeds), which indicates that this income source is a substitute for access to credit. Thus there are several indications that participation in nonfarm employment contributes positively to on farm agricultural modernization and diversification, and to creation of agricultural wage opportunities for the poor and extreme poor.

In looking at the correlations between various attributes of the households in the different quartiles, Hernandez drew several conclusions that are important to USAID. One is that "…the results taken together suggest that investments in cash cropping (of grains but more specifically of horticulture), combined with investments in infrastructure, generate opportunities for income diversification that have relatively low entry barriers in unskilled rural nonfarm employment." Secondly, "…the poorest and smallest farmers tend to be most dependent on farm wage-employment…(and)…the higher the commercialization rate of the zone, correlated with the more labor-intensive horticulture, the greater the opportunity for this work for the poorest." Finally, greater participation in skilled rural nonfarm employment (RNFE), higher education, and rural density all correlate with greater reliance on hired labor, and greater participation in skilled RNFE correlated with greater participation in horticulture.

The Hernandez document concludes with the following summary: "In sum, the results are positive and exciting in the sense that we demonstrate the presence of a 'virtuous circle' of diversification of income and agriculture, commercialization, rur-urbanization, and income increases. The flip side of that result, however, is the concern that rural nonfarm employment is relatively concentrated. Policies and programs that broaden the ability of the poor to have access to rural nonfarm employment will have positive repercussions on farming and incomes."

John Mellor is well known in Guatemala for his thesis that economic growth and increased incomes in rural Guatemala can best be achieved by stimulating high value crop production (specialty coffee and export horticulture) on small farms, since this increased income will be spent locally and the multiplier effect will raise rural incomes generally. This is to be achieved through investment in technical assistance to the farmers and in infrastructure. Hernandez would probably agree, but would also argue that attention should be given to stimulating nonfarm employment, as this is seen as a critical element in achieving the skills, market connections, and funds needed for agricultural modernization and diversification.

2. Agricultural income potential

The maps in Annexes B-5 to B-7 provide information published by the World Bank based on work done by MAGA on agricultural potential based on soil quality, slopes of the production areas, and access to roads. As noted above, these maps show that the highest level of agricultural potential is in the South Coast region of Guatemala, and medium to high potential in an economic corridor from Guatemala City to San Marcos, and in the southeastern region of Guatemala. Medium level potential can be found in other sub-areas of Izabal, Alta Verapaz, and the Petén.

The most recent information on agricultural production by municipality is from the 2002 agricultural census. There have been several shifts in production since the time of the census, and therefore some allowances need to be made when interpreting this data. There has been an expansion of sugar production both on the South Coast of Guatemala and in Polochic Valley and Izabal, which has reduced the area planted in some other crops, particularly corn. Similarly, there has been a dramatic expansion of African oil palm plantations in the Ixcan region of northern Quiche, Alta Verapaz and Izabal, also with a reduction of other crops – again including corn. A third shift is the continuing expansion of production of horticulture products in the Western Highlands, as demand for these high quality products continues strong in the U.S., Central America, and among the expanding Guatemala middle class. As good quality land has been shifted to export agriculture, basic grains on average are more and more grown on less productive land, with negative implications for total production and productivity.

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However, despite these shifts, the 2002 agricultural census data still provides a useful starting point in attempting to analyze agricultural income opportunities in Guatemala. With support from the Guatemalan Universidad Rafael Landivar's Instituto de Agricultura, Recursos Naturales, y el Ambiente (IARNA), we have constructed tables showing production of 133 agricultural crops in each of Guatemala's 331 municipalities. We then multiplied the production quantities by the prices for these products in 2004/2005 to obtain an estimate of the relative values of production of each of these commodities. We then grouped the production values of the commodities into eleven product categories and obtained Departmental totals for these product categories. The results of this analysis are shown in a table in Annex D. What we were not able to do was apply cost of production information by crop by municipality. Even at the national level cost of production information is not available for this wide range of crops. We are therefore analyzing value of production information, i.e. sales, rather than income.

We also should note that some of the data for production of specific crops in some municipalities appear unusually high. Examples include a reported production of over 67,600 cwts of citronella/lemon tea in Puerto Barrios, Izabal, and 53,160 cwts of huisquil (chayote) in Guatemala municipality, Guatemala Department. The authors did not have time to examine such figures more closely (there are a very large number of data entries for all the crops in all the municipalities) and we need to just use the official Guatemalan government data. However, we note that if this information is used for more detailed project planning, it would be useful to ground truth the data with local stakeholders.

According to this analysis, the Departments with the highest value of agricultural production are Escuintla, San Marcos, Suchitepéquez, Alta Verapaz, and Izabal. This confirms the information on agricultural potential of the South Coast region shown in the World Bank maps. The high value of production in Alta Verapaz corresponds to coffee, cardamom, basic grains, ornamental plants, and other products. In Izabal the high values are due to bananas, lemon grass, and other product.

The agricultural products that have highest value nationally in Guatemala are basic grains, fruits, coffee, bananas, sugar cane, other annual crops (flowers, etc.), and vegetables. We will analyze this information further as we discuss options for geographic focus of future USAID investments below. The fact that this information is available by crop by municipality will enable the Mission and future program implementers to target activities toward improving production and marketing of crops that will have the highest impact on improving rural incomes. As an example of the analysis that can be carried out for specific locations, the expansion of non-traditional agricultural export crops over the past twenty-five years has been due in part to USAID's consistent investment in this activity. As a direct result of this, the value of vegetable production in Chimaltenango is nearly twice that of corn.

Among the eleven crop categories shown in Annex D, bananas, sugar cane, and rubber are not crops grown by USAID's target group. This is also the case with African palm, which is included in the other permanent crop category, and flowers (annual crop category), which require an investment level beyond the reach of small producers (although there is some small farmer production for the local market). The categories that small farmers produce are basic grains, coffee, cardamom, fruits, and vegetables. A separate document will be prepared analyzing the Mission options for possible future assistance for basic grain production. The only regions where large scale commercial basic grain production might be justified are on the South Coast and perhaps the South East, Izabal and Petén, where large extensions can be planted. The corn production in the Western and Eastern Highland tends to be on very small farms. If USAID provides assistance to this crop, it would be to support family consumption concerns, and not increased income.

The selection of potential geographic areas would therefore appear to require an analysis of their comparative advantage for coffee, fruit, and vegetable production, with cardamom as a possible activity in the Alta Verapaz region (assuming that the current market decline reverses).

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3. *Tourism, handicrafts, fisheries and mining income*

The author of this document was unable to obtain information on income other than at the national level for tourism, handicrafts and mining, and even some of this information appears partial. The discussion of income opportunities by regions of Guatemala in this document is therefore based more on discussions with knowledgeable sources.

a. Tourism

Tourism as an industry is growing in importance in Guatemala, although there are few useful statistics. As of 2007 the total foreign exchange earnings from tourism were estimated to be approximately $1.2 billion, which makes it an important industry in Guatemala. The earnings have declined somewhat since then as the global financial crisis has reduced the number of tourists. Tourism in Guatemala is concentrated on three locations: Antigua Guatemala, Tikal, and Lake Atitlan/Chichicastenango. There is some international and Central American regional tourism, as well as tourism by Guatemalans, at locations in Lake Izabal/Rio Dulce, San Jose, and Alta Verapaz. There is a growing presence of Spanish language schools in Quetzaltenango, Huehuetenango and Cobán that attract tourists to these destinations.

There have been some recent initiatives to promote cultural tourism where tourists are invited to stay with and learn from rural families in isolated areas. While there have been some positive experiences, this does not appear to have significant income potential. The primary deterrent to increased tourism in Guatemala is concern about personal security, and the demand by those tourists with significant spending capacity for comfortable accommodations.

USAID has supported efforts to develop tourism activities through micro, small, and medium enterprises, through the organization Counterpart International. The director of this program commented that the fact that most of these businesses are in the informal sector makes it difficult to gather information on their total tourism income. He indicated that a survey carried out by SNB of Holland found that the Atitlan region is where the highest percent of the population depends on tourism for income. This portion of the tourism industry is very susceptible to negative impact from external events, such as the infrastructure losses caused by Agatha, which were publicized worldwide. The appearance of Avian Influenza in Mexico has a very negative impact on tourism in Guatemala, especially the Petén. And the reports of crime and violence and algal contamination in the Atitlan area have also caused loss of tourism. A final interesting comment made by the Counterpart Director was that in some regions of Guatemala, like Chisec, 90% of the tourism is internal, i.e. Guatemalans visiting their own country.

As USAID narrows its geographic focus for its future income generation investments, tourism could be a viable complementary activity within an integrated zone that is primarily focused on other income sources. To become a major focus of income producing activities, USAID would need to invest significant resources to help create the conditions that would attract tourists with money to new and different locations in Guatemala, and the Mission is likely to have greater income impact by focusing on other activities. However, as a complementary activity, tourism could help expand program impact, and could particularly have a positive gender impact. An example of such an activity would be an initiative that encouraged and facilitated having tourists from the main tourist sites (Antigua, Lake Atitlan) to make day excursions to visit groups of small scale horticulture producers and enjoy a typical meal.

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b. Handicrafts

The only useful source of information on the handicraft industry in Guatemala that we were able to consult was a document prepared with support from the USAID/Washington EGAT bureau in 2005[5]. This document indicates that the total value of handicraft exports from Guatemala in 2001 was $8.1 million. This seems a very low amount, and of course does not include the handicrafts purchased by tourists and exported in suitcases, nor the items adorning the walls of the diplomatic community. The study indicates that there are between 700,000 and 900,000 weavers in Guatemala, primarily in the Western Highlands and the Verapaces, which would make this industry a source of labor remuneration for a significant portion of Guatemala's population. We have not been able to identify information on income from handicraft activities either nationally or at the Departmental level.

Most handicraft activities in Guatemala represent part-time, in-house labor, performed principally by women and often in conjunction with other activities (especially child care). Many of the woven garments are used by family members and not sold. However, the large number of weavers produces an abundance of merchandise that appears to exceed the effective demand. There are large inventories of weavings in the many commercial outlets. The USAID study notes: "Exports of these handicrafts expanded rapidly throughout the 1980s, peaking in 1992. Exports then declined for the next decade, due to factors such as changes in consumer taste and heavy Asian competition." Tourists who visit Guatemala are happy to purchase and take back a nice weaving as a memory, but few people seek out these products in outlets in the United States or Europe.

The USAID study outlines various different approaches that could be taken to improve the microenterprises that produce and market these handicrafts, including upgrading production techniques and product design, vertical integration, and horizontal integration. While weavers who are able to supply upscale buyers are able to earn a respectable return for their labor, reportedly most weavers receive far less than the rural minimal wage for the time it takes to produce a weaving. In part the weavers carry out this activity because they are able to do so in their spare time in the household, and in effect place a very low value on their labor.

The head of the AGEXPORT Comisión de Artesanías, Aida Fernandez, commented that there are a total of 1 million artisans in Guatemala, of whom 25,000 are members of the commission. Productivity in the sector tends to be very low, due to the informal nature of the activity. Ms. Fernandez commented that as the artisans do not work in factories no one controls their time, and they themselves do not pay attention to making certain they use their time intensively, all of which results in very low pay per hour worked. Guatemala increasingly has problems with competition from other artisan markets that are investing more in modern designs that appeal to the international market. Finally, she commented that the focus of artisan projects is always on the same locations (Antigua, Sololá, Chimaltenango, Quetzaltenango), but that there are very good artisans in other areas, such as Jalapa, Chiquimula, Totonicapán, Huehuetenango and the Petén.

As with tourism, any future USAID program interventions should probably contemplate handicraft activities as a sideline to other more ambitious undertakings. Finally, it should be noted that the 19% export tax (primarily VAT) on commercial exports of handicrafts serves as a significant disincentive, considering the limited market demand.

c. Fisheries

The technical advisor to the AGEXPORT Comisión de Pesca and Acuicultura indicated that the $100 million shrimp industry is concentrated in a few large businesses. The fishing industry concentrates on tuna ($30 million in exports), and dorado (mahi mahi $5 million). Honduras has developed a very large tilapia fish farming industry, but it is also concentrated among a limited number of very large producers. Guatemala has not successfully undertaken tilapia farming, and the few attempts had relatively high costs and were not competitive. There have been many attempts to develop very small scale fish farming initiatives with tilapia but there is no good data on the impact. Reportedly there has been a boom in small scale tilapia production in the Eastern Region and other places that have good water supply, with strong local demand. There are definite economies of scale in fish farming, particularly in meeting sanitary requirements for export.

5. Dunn, Elizabeth and Villeda, Lillian, Weaving Micro and Small Enterprises into Global Value Chains – The Case of Guatemalan Textile Handicrafts, USAID/EGAT, July 2005.

d. Mining

Mining has gradually become an increasing source of employment in certain areas of rural Guatemala, although there is considerable political controversy concerning these activities. The 2007 *Anuario Estadistico Minero* indicates that the sector had 2,761 permanent employees and 881 part time employees. The total value of its contribution to GNP in that year was estimated at Q3.75 billion. The U.S. Geological Service publishes a map that shows the following mining operations:

1. Northern San Marcos: Antimony, tungsten
2. Southeast Huehuetenango: Antimony processing
3. Northern Alta Verapaz: Copper, gold, zinc, lead, silver
4. Chiquimula and southern Zacapa: iron, kaolin, lead, silver, bentonite, and gold

Although USAID needs to be aware of mining operation in an area it selects for future assistance, this should not be the primary reason for selecting the region. Mining can provide some employment, but it does not appear that it will reach the industrial size to provide sufficient employment to contribute significantly to addressing food insecurity.

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4. Manufacturing and Services Income

Most manufacturing industries are located in or around the major population centers, especially Guatemala City and the expanding commercial economic corridor between there and Escuintla. The drawback (maquila) industry has expanded into the Chimaltenango region and to a limited extent elsewhere, but this industry has suffered due to competition from China and elsewhere. In any case, USAID is effectively prohibited from assisting firms in the maquila industry.

We are again hampered by a lack of statistics concerning small scale manufacturing enterprises by Department or municipality in Guatemala. Certainly some small scale enterprises exist outside of Guatemala City, such as the two hand blown glass firms in Quetzaltenango. In addition, agribusinesses are investing in new and expanded packing and storage facilities, and it is possible that processing plants could follow. We earlier noted that the percent of people working in agriculture who are poor is much higher than the equivalent ratio of poor among total employees working in manufacturing, commerce, or services. One could argue that instead of working to increase the incomes of the large number of poor farmers, a more effective approach might be to get them to abandon agriculture and move to other industries where they are likely to earn more. The reality is that both approaches are needed.

While it would not be consistent with the "agricultural led" tenet of the Global Hunger and Food Security Initiative to focus primary attention on assisting these firms, assistance to them could form a collateral activity if USAID adopts an integrated approach to economic growth in a given geographic area. Such an approach could also include assistance to supporting increased employment in the service industry. Such an effort would focus on new initiatives to increase agricultural income, but would also support complementary investments in urban areas that would take advantage of rural production and employ excess rural labor. Such a strategy would have to be developed around the specific target location. Probably the locations outside of Guatemala City where manufacturing employment would most easily be promoted would be in fairly large towns such as Escuintla, Quetzaltenango, Cobán, and Chimaltenango, but there may also be opportunities for smaller scale enterprises in a number of smaller towns, such as San Francisco El Alto, in Totonicapán.

5. Remittance Income

Although USAID did not mention remittances as one of the types of non-agricultural income to be examined, the author felt that some consideration should be given to it. In fact, remittances are the unmentioned elephant in the rural income parlor. The Organization of International Migration has produced reports on remittances in Guatemala every year between 2004 and 2008. These studies helpfully contain considerable information on who receives remittances by location of the recipients and provide useful information on them. The study estimates that Guatemala received $4,393,550,000 in remittances in 2008, which benefited an estimated 4,172,987 individuals (the amount of remittances is estimated to be 10.5% lower in 2009). As such, the income from remittances closely approximates the GNP contribution of the entire agricultural sector in Guatemala. The Departments that received the largest amounts of remittances were Huehuetenango, San Marcos, and Guatemala, followed by Quetzaltenango, Alta Verapaz, Jutiapa, and Izabal.

Clearly, USAID will not work to increase remittance income. However, the convergence of the probable areas for geographic focus of USAID activities with the areas that receive remittances, the fact that the majority of the recipients are poor, and the sheer volume of these resources, make this a factor that should be considered in developing a food security strategy in Guatemala. The IOM survey indicates that 47.5% of the remittances are used for consumption, 25.4% for investment in homes and machinery, 15.2% for investment in other economic activities, and 11.9% in education and health. The total amount of remittances is at least two orders of magnitude larger that the amount of funds that USAID will likely have available to support food security activities. To the extent that USAID can facilitate getting beneficiaries to invest a portion of the remittances as co-funding for new income generation activities, the program will be able to have a larger impact.

C. Options for Geographic Focus and Approach

In this section we will bring together the information provided in the previous sections, offering options to USAID as to how it could focus its future program efforts, what activities to support, and where.

1. Western Highlands

The Western Highlands region of Guatemala encompasses the Departments of Huehuetenango, Totonicapán, Quiché, Sololá, Chimaltenango, and parts of San Marcos and Quetzaltenango. USAID has a long history of providing assistance in this zone and in particular its support for non-traditional agricultural export development in this zone is recognized by other donors as one of USAID's trademarks. The region is characterized by relatively high elevations, good soils, generally good rain patterns and access in many locations to potential sources of gravity irrigation.

As is demonstrated in the maps in annexes B-1, 2, 3, and 4 this region of Guatemala has a high prevalence of extreme poverty and poverty density, chronic malnutrition, and vulnerability to food insecurity. A band along the southern edge of the Western Highlands region is shown in the map in annex B-7 to have good economic potential. At least portions of this region therefore meet the five selection criteria for food security funded assistance. However, since the Western Highlands is a relatively large area, and USAID's resources may be modest at least in the early stages of the FSI, some targeting would be important. This could be done by simply seeking the best targets of opportunity within this region, which is basically the strategy the Mission has followed over the past several years with the Encadenamientos Rurales program through AGEXPORT, and via the Mercy Corps/Wal-Mart/Fundación Agil alliance. This approach has the advantage of seeking those investments with the greatest chance of success. But it has the disadvantage of scattered impact, without the ability to achieve synergies between different actors. This can be seen by comparing the impact of non-traditional export promotion that is concentrated around Chimaltenango with the impact of more isolated investments.

Another approach would be to target a smaller subset of municipalities. As noted above, the analysis by the World Bank of economic potential identified a band of municipalities along the southern portion of the Western Highland's region as having good economic potential. Most of the municipalities along this corridor also have high incidences of extreme poverty, poverty density, chronic malnutrition, and vulnerability to food insecurity.

The exact parameters of such a region would need to be studied via field inspection, but in theory a band of approximately 50 kilometers north and south of the main highway extending from Chimaltenango to San Marcos would coincide with the region identified in the World Bank map. Such an economic corridor would build on past investments in non-traditional agricultural exports, many of which have been concentrated within this area. The relatively close access to the major transport route to export markets makes production of perishable crops in this region feasible. Complimentary assistance with development of non-agricultural enterprises in the major towns along this route would also be beneficial, especially Chimaltenango, Quetzaltenango, and San Marcos, with some activities assisting targets of opportunity in smaller towns along the corridor. By strengthening and expanding the economic corridor between Chimaltenango and San Marcos, USAID would be creating a development pole that would benefit more outlying communities, particularly as the road network gradually improved.

Another option would be to pick a limited number of entire Departments within this region and pursue integrated development activities throughout each Department. Another consultant recommended that the Mission focus its resources on four Departments: San Marcos, Huehuetenango, Quiché, and Alta Verapaz, since these Departments have the highest number of poor people in the country. Our fear is that this region is still very large in relation to USAID's expected resources. One of these Departments, Huehuetenango, is already receiving significant support from the European Union. Large portions of the northern parts of San Marcos, Huehuetenango, Quiché, and Alta Verapaz have very limited road networks, which makes getting produce to market risky.

Selecting specific Departments within the Western Highland region (or perhaps the upper portion of an entire watershed as the Cooperación Española is doing in Quetzaltenango and San Marcos) is a viable approach. However, the Mission might want to select a group of more contiguous and ecologically similar Departments like San Marcos, Quetzaltenango, Totonicapán, and Quiche. All of these show high levels of extreme poverty, chronic malnutrition, and vulnerability to food insecurity. And they show greater economic potential than Huehuetenango.

2. Northern Region

The Northern Region of Guatemala encompasses the three Departments of Petén, Alta Verapaz, and Baja Verapaz. There is considerable geographic variation between these Departments. The Petén and northern Alta Verapaz have only begun to be developed within the past three or four decades, and they still lack basic infrastructure and have very low population density. The chart in Annex C shows Alta Verapaz as having the fourth highest value of agricultural production in Guatemala, while Baja Verapaz is the Department with the lowest.

Agricultural production has been growing in the Petén and Alta Verapaz, but often due to expanded area in production and consequent deforestation. The eastern portions of Alta and Baja Verapaz show a prevalence of very high rates of extreme poverty, and other municipalities in those Departments and southern Petén show high rates.

An exclusive focus on all three Departments of the Northern Region would be difficult to justify, given low production potential in Baja Verapaz (although there are opportunities in Salamá, San Jerónimo, and Rabinal), and small population density and sensitive environmental issues in the Petén. However, including Alta Verapaz in a small group of target Departments, as discussed above, is worth considering, unless its ecology and agricultural activities are so different than the other departments so as to make it difficult to deal with them as an integrated whole

3. Corredor Seco

The Government of Guatemala has placed particular attention on addressing the food insecurity issues of the corredor seco region, and particularly the Chortí Indian regions. The actual corredor seco geographic area encompasses parts of eight Departments: Santa Rosa, Jutiapa, Chiquimula, Jalapa, Zacapa, El Progreso, Baja Verapaz, and southern Quiche. This region normally experiences little rainfall, and last year and in other recent years there has been very little. There is fear that with global warming this region will become even more food insecure. The corredor seco does have access to significant amount of ground water, but the cost of pumping the water to the fields makes this uneconomical for many agricultural activities. Finally, the soils in parts of the corredor seco are of poor quality.

The chart in section III.B shows that the incidence of severe poverty and chronic malnutrition in Chiquimula and Jalapa are significantly lower than those in the Western Highlands

Departments, although there are a few municipalities that are classified as having very high rates of extreme poverty. What is informative is map B-2 which shows poverty densities. Due to the relatively low population in Chiquimula and Jalapa, they are classified as having a low density of extreme poverty when the incidence of poverty is adjusted for population density. Despite the problem of repeated droughts, the World Bank map of municipal food vulnerability (B-4) shows only a few municipalities in this region with very high vulnerability. Finally, the World Bank maps portraying economic potential (B-5, 6, 7) show low prospects in the area of Chiquimula and Jalapa, although there is greater potential around the Departmental capitals. The total agricultural production in Chiquimula and Jalapa in 2002 was only about 12% of that of San Marcos, Huehuetenango, Quiche, and Alta Verapaz.

4. Pacific Coast

In a meeting the author had with the Subsecretaria de Politicas Globales y Sectoriales of SEGEPLAN (Lic. Ana Leticia Aguilar Theissen), she indicated that USAID should consider a program that would focus on those municipalities along the South Coast of Guatemala that border the Pacific Ocean. She indicated that the GOG has become increasingly concerned about this region, which is showing a rapidly increasing incidence of poverty and signs of desertification. When the author noted that the current maps of severe poverty and chronic malnutrition indicate that his region is doing relatively well, she noted that this is because the maps are based on out of date information.

In the 1960s, the South Coast of Guatemala was considered to have the potential of being the bread basket of all of Central America. Large plantations in the area had been confiscated during land reform programs in the early 1950s and were subsequently divided up among small producers. Lic. Aguilar indicated that much of this land is no longer in production, or has been repurchased and dedicated to large scale sugar operations. The rivers that cross this region carrying high run off from the boca costa region to the ocean are used heavily for irrigation of the sugar cane plantations, and in the dry season very little water actually makes it to the ocean, or to the communities in the coastal region.

The World Bank maps of economic potential show that this region has very positive prospects. If USAID Guatemala decides to give this region serious consideration, it would be important to gather additional information through field study. Successful assistance to this area would probably require passage of a water law that would lead to reestablishment of annual flows of rivers in the regions.

5. Program Integration

Finally, it is important to comment on the need to achieve real integration of program investments across the USAID/ Guatemala portfolio in order to achieve the objectives of the food security initiative. Recent surveys of food assistance beneficiaries have reported that many of the recipients use the little income they have to purchase items that have little positive impact on their nutrition. Any assistance provided to stimulate increased production and more efficient marketing of agricultural produce, or the creation of urban and semi-urban job opportunities, should incorporate a strong message on the importance of good consumption practices to human health and wellbeing. Similarly, the regions that show the highest rates of extreme poverty and chronic malnutrition are also regions that have had limited access to education over the years. Finally, it would be hard to overestimate the importance of local government leadership and services in overcoming the obstacles to improved food security in the future. All of these investments should be closely coordinated within whichever geographic region is selected by the Mission.

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IV. Analysis of the Basic Grain Sector Guatemala

A. Background

1. Role of basic grains in Guatemala

Guatemala's primary basic grain crop is corn, although sorghum and rice are important crops in certain geographic areas. Although black beans are a legume rather than a grain, they are usually grouped with corn in discussions of basic grains in Guatemala, and will also be included in this analysis.

The role of corn in Guatemala is amply documented by agronomists, agricultural economists, and anthropologists. The Popol Wu'u, the written mythological history of the K'iche' people, records the creation myth of the Mayans that Mankind was created from cornmeal, after previous attempts by the gods using wood and mud had failed. The Mayan population of Guatemala has a very strong cultural tradition of planting corn, and many semi-urban people with other occupations (such as truck drivers) reportedly still seek a small parcel of land to plant corn. An analysis of the 2000 Encuesta Nacional de Condiciones de Vida found that of 2,443 agricultural producers surveyed, 92-93% produced grains[6]. As the Director of the Guatemala Government's ProMAIZ program stated, "El que deje de sembrar maíz deje de ser hombre."

Research by the FAO indicates that between 69% and 73% of the energy derived from food in Guatemala comes from carbohydrates, which is a higher proportion than in the other Central American countries. Proteins supply only 10% and fats between 16 and 21%. In the 1960s research by the Instituto de Nutrición de Centroamérica y Panamá (INCAP) demonstrated that the simultaneous consumption of tortillas and black beans produced all of the amino acids necessary to meet human protein requirements. In synthesis, corn and black beans form the basic components of the diets of a large proportion of Guatemalan society (Table 4).

Table 4. The National Agricultural Census, from 2003, demonstrates the importance of corn and beans to the Guatemalan agricultural sector.

Number of Farms and Surface Area for Annual Crops
Agricultural Census 2003.

Crop	# of Farms	% of Farms	Surface Area (manzanas)	% of Surface Area
Total	1,273,173	100.00%	1,401,392	100%
White corn	589,377	46.3%	800,890	57.15%
Black beans	292,961	23.0%	298,235	21.28%
Yellow corn	190,622	15.0%	128,233	9.15%
Sorghum	21,266	1.7%	37,200	2.65%
Sesame	7.018	0.6%	23,960	1.71%
Other Annual Crops	171,929	13.5%	112,885	8.06%

Source: IV Censo Nacional Agropecuario, Tomo II. INE, Guatemala 2004.

6. Hernandez, Ricardo, Reardon, Thomas, Guan, Zhegfei, *Rural Non Farm Employment and Agricultural Modernization and Diversification in Guatemala*. Unpublished paper to be presented to the Agricultural and Applied Economics Association 2010 Joint Meeting, p. 25.

There are two confusing elements of the statistics from the 2003 census. One concerns the relative number of farms and size of surface area for white and yellow corn. The author has understood that white corn is predominantly grown on very small plots of land, particularly in the Western Highlands, whereas yellow corn is grown more by commercial farmers. But the above table shows that the 46% of farms that grow white corn use 57% of the total surface area in annual crops, whereas the 15% of farms that grow yellow corn use only 9% of the surface area, implying that the plots where white corn is grown are on average larger than those where yellow corn is grown. Secondly, the percentage of farms that grow grains is 63.6%, whereas the 2000 ENCOVI data cited on the previous page indicates that 92-92% of farms produce grains.

The following chart also from the 2003 agricultural census report shows an interesting shift in use of surface area for selected annual crops between 1950 and 2003.

Table 5. Percent of Guatemala Land Surface Dedicated to Selected Annual Crops-Four National Agricultural Censuses.

Crop	1950	1964	1979	2003
Corn	77	69	59	67
Frijol	10	11	15	21
Wheat	4	3	2	-
Sorghum	3	3	6	3

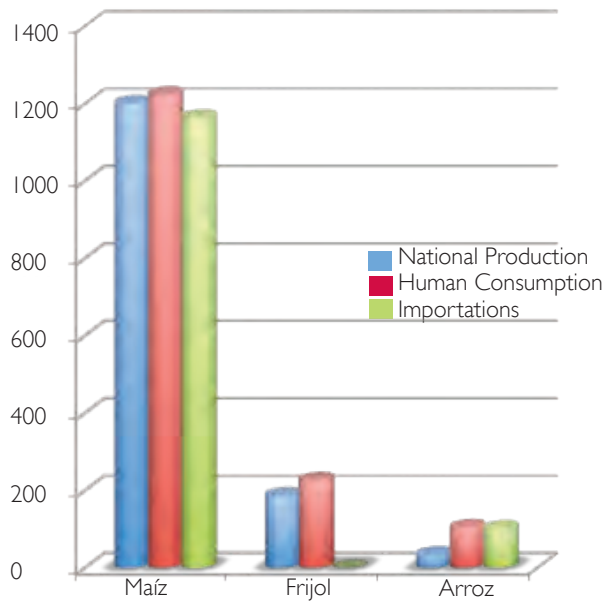
Source: IV Censo Nacional Agropecuario, Tomo II. INE, Guatemala 2004.

The decline in area planted to corn between 1950 and 1979 is probably due to the shift of population toward urban areas where bread is often preferred to tortillas. The increase in area in 2003 is probably due to planting of yellow corn for poultry feed. The steady increase in the percent of surface area dedicated to beans reflects the popularity of this product with both rural and urban populations.

A recent analysis by RUTA-FAO[7] indicates that between 1987 and 2005/7, the number of basic grain producers in Guatemala grew by 93%. The analysis attributes this increase to population growth with a reduction of average farm size from 11.4 manzanas in 1979 to 6.4 in 2003 (the decline in average farm size of producers who have less than 5 manzanas of land was even more pronounced). Average land planed in corn in 2006 in Guatemala was 0.84 hectares per producer, for beans it was 0.47 hectares, and for rice 6.9 hectares, which shows that rice tends to a larger farmer crop. As a nation, the production of basic grains decreased from 170 kilograms per person in 1979 to 111 in 2007. The total area planted in basic grains in Guatemala grew only slightly between 1987 and 2006, from 1.03 to 1.09 million hectares. 85% of basic grain producers are men and only 15% women, although female spouses assist with some phases of production, and particularly with the harvest.

The following chart is from an April 13, 2010, SESAN presentation titled "Existencia de granos básicos en el Mercado nacional" (Figure 1).

Figure 1. Relation between national production, human consumption and importations.



Source: SESAN 2010.

Guatemala is basically self-sufficient in white corn which is used for human consumption, although in any given year there may be a surplus or deficit depending on growing conditions. The nation imports almost all of the yellow corn that is used primarily as poultry feed. Another source indicates that the total imports of corn in 2008 were 63 times the level in 1992. This table also indicates that Guatemala does not produce enough black beans and rice to meet domestic consumption needs.

7. RUTA-FAO, *Pequeños Productores de Granos Basicos en América Central*, January 2010.

A number of individuals interviewed by the author commented that basic grain yields in Guatemala have not improved as they have elsewhere in the world. The following table shows Guatemala's ranking among the top 50 corn producers in the world (Table 6).

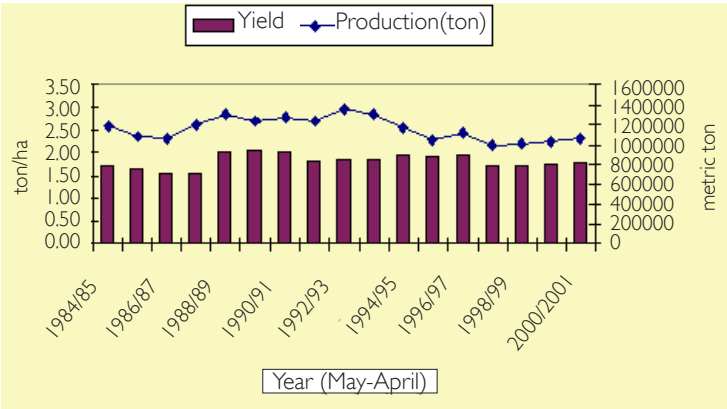
Table 6. Top 50 Corn-Producing Countries, Average National Yield, 2004-2006.

7-11 t/ha	4-7 t/ha	2-4 t/ha	< 2t/ha
Chile	Argentina	Thailand	India
Spain	Croatia	Russian Fed.	Zambia
USA	Turkey	North Korea	Cameroon
Austria	Serbia	Vietnam	Kenya
Italy	Poland	Indonesia	Nigeria
Germany	China	Venezuela	Tanzania
France	Poland	Brazil	Uganda
Canada	Bulgaria	South Africa	Guatemala
Egypt	Bosnia & Herzegovina	Mexico	Malawi
Iran	Romania	Pakistan	Benin
Hungary	Ukraine	Peru	Mozambique
		Philippines	Congo, Dem Rep.
		Ethiopia	
		Nepal	

Source: Memo from Norman Borlaug, CIMMYT, to Senators Leahy and Kohl and Representatives Lowey and De Lauro, June 1, 2008.

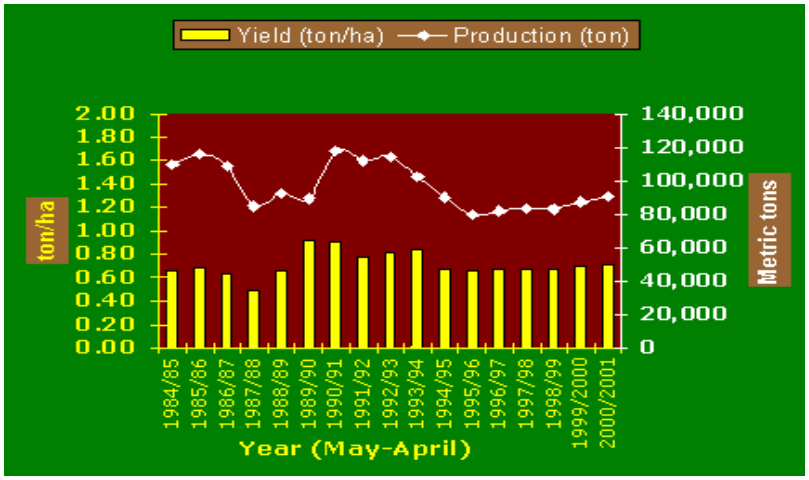
A recent analysis prepared by Ing. Jaime Carrera of the Universidad Rafael Landivar indicates that the average yields in Guatemala compared to those of the other five Central American countries and Panama rank it 4th for corn and rice, 3rd for frijoles, and tied for last along with Honduras for sorghum (see Annex E for the data). The following charts show the yield and production figures for corn, frijoles, and rice for 1985 to 2000, which confirms that yields have not increased, and for corn they have decreased since the early 1990s (Figures 2, 3 and 4).

Figure 2. While corn yield and production in Guatemala from 1985 to 2000.



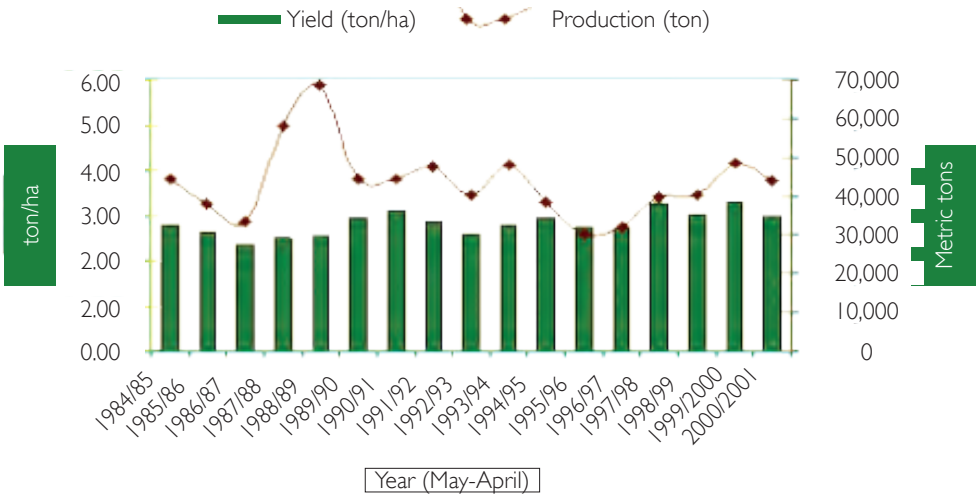
Source: Instituto Nacional de comercialización Agrícola-INDECA- and Banco de Guatemala.

Figure 3. Beans yield and production in Guatemala from 1984 to 2000.



Source: Instituto Nacional de comercialización Agrícola-INDECA- and Banco de Guatemala.

Figure 4. Rice yield and production in Guatemala from 1984 to 2000.



Source: Instituto Nacional de Comercialización Agrícola -INDECA- (1984/85 - 1992/93); Asociación Guatemalteca del Arroz -ARROZGUA- y Banco de Guatemala.

The stagnation of basic grain production in Guatemala since the early to mid 1990s coincides with the decline and eventual elimination of the Ministry of Agriculture extension service, and the continuing weakening of the agricultural research institute (ICTA). Recent research efforts by ICTA have concentrated on development of new corn hybrids with improved yields and higher protein content. However, these hybrids are designed for use by commercial producers and not by the subsistence producers who retain corn kernels from prior crops as seed. Hybrid seeds have to be replaced each year from commercial sources. ICTA research on corn has concentrated totally on varieties that are appropriate for the South Coast region, which are also appropriate for the Ixcan and Izabal. No research is being carried out to develop new corn varieties for the Western Highlands region. A commercial firm, Monsanto, at one point indicated that it would bring to Guatemala varietals developed for the highlands of Mexico, but this has not happened.

It is also apparent that GOG policies and programs intended to stimulate increased production, such as the provision of free fertilizer, have not had a noticeable impact on either production or productivity of basic grains.

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2. The Economics of Basic Grains in Guatemala

In his 2000 document titled *Elements of a Poverty Reduction Strategy for Guatemala* (p.9), John Mellor wrote: "Export horticulture production in the highlands of Guatemala is on the order of 15 times as profitable to small farmers as traditional crops of maize, beans and squash (von Braun et al. 1989). Horticulture on average uses 50 percent more labor per hectare than the traditional crops. Thus, it meets the basic requirement for a major role in poverty reduction... The constraint to rapid expansion of horticulture production is in marketing and technology."

The following chart prepared by AGEXPORT for a March 2010 presentation to the Minister of Agriculture provides specific data on the relative profitability of basic grains versus horticulture crops, taking into consideration that producers are unlikely to totally stop producing some basic grains:

Table 7. Comparison of Economic and Financial Returns-Basic Grains versus Mixed Production (Quetzales).

Costs and Value of Sales	Traditional Small Farmer	Modern Small Farmer		
	1 Manzana (Mz.)	½ Mz.		½ Mz.
	Corn	French Beans (2 harvests)	Snow Peas (1 harvest)	Corn
Costs				
- Agricultural inputs	2,316	12,600	6,531	1,158
- Day labor	4,300	12,300	5,640	2,150
Total Costs	6,616	24,900	12,171	3,308
Sales	8,400	35,100	18,000	4,200
Profit (sales less costs)	1,784	10,200	5,829	892
Income (profit plus day labor)	6,084	22,500	11,469	3,042
Total profit for the farmer	Q1,784	Q16,921		
Total income generated (farmer plus laborers)	Q6,084	Q37,011		

Source: AGEXPORT 2010.

This table confirms the Mellor analysis that indicates that a shift away from basic grains is advantageous both to the financial returns for the farmer, and the economic returns to society.

The Ricardo Hernandez paper cited earlier indicates in table 4 that the average production of basic grains by the poorest quartile of Guatemalan rural farmers is 1.2 metric tons, or 2,640 pounds. If the Guatemala Government were to undertake a massive technology transfer program that resulted in a 25% increase in basic grain production by small farmers, this would result in 660 pounds of additional production by the average

poorest farmer. At a normal price of 100 Quetzales per hundred pound bag, this would mean increased sales of Q660, or $82.50, assuming that all the additional production is sold rather than consumed. After subtracting the cost of inputs this would equal $59.73 in additional annual income, assuming that no labor must be hired. If labor is hired the additional annual income would only be $17.49. Neither of these amounts is sufficient to lift the extreme poor up to just being in the poor category. In addition, the demand for corn in Guatemala is relatively inelastic, and if the hundreds of thousands of small farmers all increased their production by an average 25%, the price of corn would decline, so the income increase would be even less than calculated above.

Another issue that is frequently addressed in discussion of basic grains in Guatemala is the impact of recent free trade agreements, particularly DR-CAFTA. A meeting of the Consejo Agropecuario Centroamericano (CAC), which includes all of the Ministers of Agriculture of the region, produced a document with support of IICA and the FAO titled *Alza de precios de los alimentos básicos en Centroamérica, Reflexiones desde los Programas Especiales para la Seguridad Alimentaria (PESA) en Centroamérica, 7 de mayo 2008*. After analyzing factors that caused a significant increase in basic grain prices in 2007/2008, this document indicated that "*Por este motivo, los Ministros a través del CAC, demandaron la elaboración de una Estrategia de Granos Básicos a mediano y largo plazo que pretende incrementar la producción regional de granos básicos de manera significativa, gradual y sostenida, con el fin de reducir la dependencia y alcanzar el autoabastecimiento*". The document notes that the production of basic grains between 2001 and 2005 met only 59% of the consumption for corn, 85% for frijoles, and 60% for rice.

A common sentiment among popular based organizations in Guatemala is that the DR-CAFTA free trade agreement is damaging domestic grain production, and that the nation should pursue "food sovereignty" rather than food security. The argument is that the free trade agreement places Guatemala at a disadvantage compared to the United States, where basic grain production enjoys government subsidies and therefore has artificially low prices. In the background section of the proposed Guatemalan Ley de Desarrollo Rural, which has passed in the first two of the three required readings in the Guatemalan Congress, the following argument is made: "El DR-CAFTA establece que, con excepción del maíz blanco, en un marco de 10 a 15 años, todos los productos puedan entrar libremente al país. Debido a que esto no queda condicionado a modificaciones en el sistema de subvenciones de Estados Unidos, pone en alta vulnerabilidad a la producción nacional de alimentos básicos." The draft Law implicitly calls for renegotiation of the free trade agreements, and adoption of policies that would assure that fiscal and monetary policies favor rural development and give the Government of Guatemala a direct role in supporting the production and marketing of basic grains.

The emphasis on food sovereignty implies that Guatemala should focus on assuring adequate availability of specific commodities, rather than focusing on increasing rural incomes to assure that the poor have the resources needed to purchase food. Subsistence farmers in Guatemala are net consumers of basic grains, as they lack the land resources necessary to produce sufficient corn and beans to meet their consumption needs. Importing cheap grains in effect benefits these farmers, rather than penalizing them. And it benefits the overall economy of Guatemala by lowering the cost of living and thus the wage cost, making the country's exports more competitive. It is argued that land poor small farmers should be granted more land via agrarian reform, along with the capital and technology needed to make it productive, but the analysis of the feasibility of such a policy approach and its consequences is beyond the objective of this paper. Within the context of the present agricultural economy of Guatemala, it does not appear that the free trade agreements represent a negative for small producers, although they may eventually hurt medium sized commercial farmers. Given the significant income advantages from producing horticulture crops for those who are favored with access to the needed technology, water, capital, and markets, a focus on food sovereignty would be counterproductive. And it would also be counterproductive for those with insufficient capacity to produce enough to meet their basic consumption needs.

At the same time, it must be recognized that not all small producers have access to the technology, water, capital, and markets needed to make horticulture production a viable alternative. Eventually, many of these farmers may need to exit the sector and be absorbed by the growing urban economy (or by emigration outside of Guatemala). In fact, this is apparently already occurring, as the analysis by Ricardo Hernandez cited in Section II of this document shows that for the extreme poor farmers, only 9% of their income comes from their own production activities. Even without undertaking a major shift to horticulture production, there may be options to assist these farmers in the interim with technical advice to diversify part of their holdings into tree crops and other higher value crops for the domestic market, and to supply them with improved seeds and production technology to increase marginally their basic grain production (as well as the capacity to reduce post harvest losses).

3. USAID experience assisting the basic grain sector in Guatemala

The U.S. Government, through the International Cooperation Agency and later USAID, was a primary supporter of increased Government of Guatemala investment in improving basic grain productivity, production, and storage and marketing from the 1950s through the mid-1970s.

The "servicio" model was the core of US agricultural development strategies in Latin America during the 1950s and 60s, and it was the first time that the Government of Guatemala and those of many other LAC countries assumed a formal responsibility for providing assistance to the sector.

The U.S. agricultural research and extension models were promoted in Guatemala, including support for home economics and 4-H programs in the extension effort. It is remarkable that the latest GOG initiative to reestablish the extension service will place agricultural technicians, educadores para el hogar, and 4-S advisors in each municipality, reflecting the original U.S. model.

By the late 1960s USAID became disillusioned by the institutional weaknesses that inhibited the effective provision of services by the Ministry of Agriculture, Livestock and Food (MAGA) and promoted the reorganization of the public agricultural sector. The revised structure was based on an agricultural sector assessment carried out by Lee Fletcher, Bill Merrill, and Eric Graber of Iowa State University in the late 1960s. The Iowa State team surprised Guatemalan policy makers by recommending a concentration on increased basic grain production in the Western Highlands region rather than on the South Coast, which at the time was considered to be the bread basket of Central America. The Iowa State team based their recommendation on the economic advantage of increasing grain production close to where it was consumed given the high population density in the Highlands, thus saving transportation costs.

The reorganization of the public agricultural sector shifted MAGA to a policy and oversight role, and created autonomous or semi-autonomous institutions to provide public sector services. These institutions included:

1. Instituto de Ciencias y Técnología Agriocla (ICTA), an autonomous institution dedicated to discovering and developing appropriate agricultural technologies for Guatemalan producers.
2. Instituto de Comercialización Agrícola (INDECA), an autonomous institution dedicated to purchasing and storing basic grains in order to improve farm gate prices at time of harvest and lower consumer prices off season.
3. Dirección General de Servicios Agrícolas (DIGESA), a directorate within MAGA for management of the agricultural extension service.
4. Dirección General de Servicios Pecuarios (DIGESEPE), a directorate within MAGA for management of the livestock extension service.
5. Banco Nacional de Desarrollo Agrícola (BANDESA), a autonomous pulic sector institution that was organized by merging the GOG Banco Rural and the Servicio Cooperativo Interamericano de Crédito Agrícola Supervisado (SCICAS).

USAID provided a sector loan to support the implementation of the public sector reorganization through the mid-1970s, but eventually did not renew this support. The reduction of US economic assistance by the Carter Administration in the late 1970s, due to democratic governance and human rights concerns, made it impossible to continue the level of assistance that was needed. And the Government of Guatemala was increasingly unable to extend its presence in the countryside as the insurgency became prevalent during the late 1970s and 1980s. These phenomena, along with the policy shift of the Reagan administration away from assistance to public sector institutions and redirection of support toward the private sector, spelled the end to several decades of USAID assistance to the

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Ministry of Agriculture in Guatemala (although this support was reinitiated for five years starting in the late 1980s through the Highlands Agricultural Development project).

Since the early 1980s, USAID assistance to the sector has concentrated on support for the promotion and development of non-traditional agricultural exports. This assistance has been instrumental in transforming the rural economy and increasing rural incomes in certain regions. However, the absence of an effective public agricultural institutional structure has hindered rural development in Guatemala. It remains an open question whether the Government of Guatemala structures created with the support of USAID during the early 1970s could have evolved into the effective entities that exist in Chile, Costa Rica, and other Latin American countries, if the internal violence and the U.S. policy shifts had not aborted U.S. support. By the late 1990s the Government of Guatemala formally abolished both the agricultural and livestock extension services and privatized BANDESA and the INDECA grain silos, and it has reduced annual funding to ICTA to the point that the institution is ineffective.

The only U.S. assistance to small basic grain producers since the early 1980s has come through the work of Private Voluntary Organizations managing Public Law 480 food assistance programs. These organizations have promoted soil conservation and low input production of basic grains and other commodities as part of an integrated food security program. However, the PVOs have limited capacity to sustain the support needed to consolidate and expand the application of these technologies, absent a Guatemalan public sector outreach capacity that can continue to support the initiatives after the PVO's involvement comes to an end.

4. Other Donor Activities

No donor has a program that specifically targets improved basic grain production and/or productivity, but several donors are supporting activities that can indirectly affect this sector. The Spanish Government's assistance program works with municipal governments and especially with the *mancomunada* structures where several small municipalities establish an entity that can implement various services jointly. Through this mechanism they have provided support for potato and horticulture production, but not basic grains. The European Union has proposed provision of a food security facility that would provide budget support to the relevant GOG entities based on compliance with predefined conditionality. Although this program was signed in December 2009, the budget authority required for its implementation was not approved by the Guatemalan Congress and the future of the program is in question. This facility could provide resources that the GOG could dedicate to improved technology, but the EU is worried that the GOG is not addressing structural problems. The EU is also supporting municipal and *mancomunidad* development in Huehuetenango which supports small infrastructure activities that could benefit basic grain producers. In summary, it does not appear that the donor community has undertaken programs designed to improve basic grain production and productivity in Guatemala.

5. The ProMAIZ Program

The Government of Guatemala's Programa de Desarrollo Rural (ProRural) was established in September 2008 with the objective of leading an integrated approach to addressing the rural development issues in Guatemala's 125 poorest municipalities. One of its programs is ProMAIZ, which is designed to increase basic grain production in Guatemala among farmers "con potencial." The program has three areas of geographic focus:

1. The south coast and northern parts of Guatemala,
2. The Western Highlands, and
3. The corridor seco region.

The program only works with farmers who are organized into legally recognized associations or cooperatives. On the south coast the program supports use of appropriate hybrid seeds and use of chemical fertilizer adapted to the specific needs of the soils (including the minor elements often missing in the fertilizer used by the majority of farmers). In the highlands region the program focuses on assisting the farmers to select the best native corn seeds and improve soil conservation. In the corridor seco the focus is on use of ICTA seeds developed for the region, along with minimal tillage technologies that help conserve soil moisture. The program's strategy is to begin activities focusing on basic grains and beans and once established to begin introducing other crops.

In 2009 the ProMAIZ program reportedly worked with 25,000 farmers in 32 producer organizations, with a total budget of Q60 million. They had planned to work with 42 organizations in 83 municipalities in 2010, but their budget was not approved. Similarly, the ProRural extension service, which planned to continue support for 230 extensionists and 880 promotores working in 955 communities in 12 departments of the Western Highlands and Corredor Seco, was left without funding. The author of this report understood from interviews with the new chief of agricultural extension in the Ministry of Agriculture

that the ProRural agricultural extension program had been transferred to MAGA, but it appears instead that an entirely new program has been established, and the existing program in ProRural left to wither. The MAGA program is establishing new agencies in the same municipalities where the ProRural program was working last year, despite the fact that ProRural's understanding was that MAGA would initiate its activities in a different set of municipalities.

The leader of the ProMAIZ program gave examples of effective efforts to stimulate improved basic grain productivity. Many of the programs require a minimal amount of externally supplied agricultural inputs, and mainly focus on improving farming techniques and incorporation of organic matter to the soil. However, a problem uncovered by the ProMAIZ program is that the promotion of farming techniques such as building terraces for soil conservation are labor intensive, and many farmers are unwilling to implement these techniques unless they are paid, even if they are working on their own land.

Finally, the ProMAIZ Director commented one of the negative impacts of the 1998 elimination of the MAGA extension service (DIGESA) was that the public and private universities teaching Ingenieros and Peritos Agrónomos no longer offer courses in agricultural extension techniques. Any effort to reestablish an agricultural extension service in Guatemala will require intensive training of the new field agents in how to work with farmers.

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B. USAID Program Options

1. To Support or Not to Support the Basic Grain Sector

For thirty years USAID has concentrated its support for agricultural development in Guatemala on the non-traditional agricultural export sector, primarily through AGEXPORT and ANACAFE or via private contract firms. The resources that USAID had available to support economic growth in Guatemala during this period were very limited, and the public sector counterparts (with a few exceptions) were extremely weak. Under these circumstances, USAID was forced to carry out a triage to determine where its limited resources could be applied with the greatest impact. Given, on the one hand, the high incomes and employment that could be generated from non-traditional agricultural exports in combination with the effective private sector organizations that could implement programs, and on the other hand the limited income potential and the high costs that would need to be incurred to overcome the institutional weaknesses of the public agricultural institutions to provide assistance to the small basic grain producers, USAID opted for the non-traditional agricultural export sector.

The new USG Feed the Future Initiative presents a new operational situation, given the anticipated large resources that could become available. Therefore, USAID is questioning whether it should reassume a role in supporting the basic grain sector, either as a supplement to or a substitution for its support to non-traditional agricultural exports. Such a potential change in program strategy requires careful analysis.

There are no specific policies or regulations in the guide recently published for the Feed the Future (FtF) program that can help USAID Guatemala respond to this question. As a country, Guatemala does not have a shortage of food, but many of its citizens have insufficient income to buy the food that is available. This fact requires that the FtF program focus on increased incomes for the poor rather than simply on expanded food production. Given the very small land units available to the extremely poor and chronically malnourished population that is the anticipated target of the FtF initiative in Guatemala, a focus on basic grains would generate very limited new income and thus only marginally improve access to food. However, some would argue that an exclusive focus on promotion of non-traditional exports is similar to that of the French princess before the French revolution who commented upon learning that the peasants did not have bread to eat, "Let them eat cake."

Clearly, small farmers who have access to technology, water, capital, and markets are better off producing non-traditional export crops. But many of the extreme poor and chronically malnourished in Guatemala lack access to these factors of production. Water is abundant in Guatemala, but in many places it is very costly to access it during the dry season when the markets for non-traditional exports demand produce. Only those producers who are close to roads will have ready access to technology and to markets, and few producers have access to credit. The public policy question is whether those who cannot participate in the non-traditional agricultural export industry (at least at this time) should just be forgotten? Although assistance to improve small farmer basic grain production would perhaps only postpone abject poverty for a few years or a single generation, this may allow enough time for these producers to transition into other productive activities, either on or off the farm.

Others would argue that abject poverty is here already for the segment of rural farmers who are extremely poor, and assistance to improve basic grain production is an expensive, indirect way to address it. Another alternative would be to fund make-work programs such as infrastructure construction, soil and forest conservation, water systems, etc. that would be a better answer to providing income to the very poor, and would perhaps get the infrastructure built that the poor areas need for their development.

If an investment in basic grain production by small producers is the option the Mission decides to pursue, the following are brief descriptions of two possible approaches that USAID could consider.

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2. *Support for the Reestablishment of an Agricultural Extension System*

The fifth paper in this series will provide a more in-depth analysis of issues related to access to technology in Guatemala. However, an analysis of options for possible assistance to small basic grain producers in Guatemala must at least briefly address the issue of technology transfer. As shown in the chart on page 34, as of 2002 there were 780,000 corn producers and 293,000 black bean producers in Guatemala, and there probably are more now. Any effort to increase basic grain production and productivity must confront the issue of how to reach this large mass of producers on a sustainable basis. Even if USAID's program focuses on a limited geographic area, significant outreach capacity would be required if the program attempts to assist small basic grain producers. And to meet the FtF's sustainability criteria, USAID's program cannot be simply contracted to a firm or granted to a non-governmental organization, as assistance to improve basic grain productivity must be ongoing and not cease with USAID program completion.

As mentioned earlier, the Government of Guatemala has now embarked on the reestablishment of agricultural extension service within MAGA. Initially, we understood that these services would be incorporated within local government structures of selected municipalities, in the same way that the Técnicos Forestales service has been established by INAB. However, we have now been informed that the new agricultural extension agents, although assigned to specific municipalities, will work directly for MAGA under the supervision of departmental extension supervisors.

The MAGA program is being initially implemented in the Corredor Seco region with agencies already established in 9 municipalities in Chiquimula and 8 in Baja Verapaz. By the end of July 2010, 9 are to be established in Zacapa, 7 in El Progreso, and 3 in Quiche (in the Ixil triangle). By the end of 2010 a total of 82 agencies are to be established, and the GOG envisions a total of 275 by the end of 2011. This geographic focus duplicates, and in effect replaces, the extension service that had been established by ProRural.

The head of the new extension program within MAGA has requested that the USAID/TCAP contractor make available the services of a short-term senior technical advisor on strategic planning for the agricultural extension service. There will be further discussions about this initiative during July 2010 and a more in-depth analysis will be submitted to USAID by the end of that month.

However, USAID will need to exercise caution in deciding whether it should support this initiative. In the past, public sector agricultural extension agents in Guatemala were often foot soldiers in the election campaigns of the parties in power. The new extension service appears to lack a training program for the young (age 18 to 25) extension agents and field promoters. Such training would be essential since the Guatemalan agricultural universities and technical training schools dropped the courses that addressed this topic after the GOG eliminated the extension service in 1998. Donor support for this new initiative would have to take into consideration whether it is a viable program designed to effectively transfer agricultural technology.

If the municipal level extension service proves to be an effective technology transfer system, then the question of what technology to extend becomes relevant, and this too will be analyzed in more depth in following section that addresses constraints to access to agricultural technology.

3. On Farm Basic Grain Storage

Agricultural experts in Guatemala note that 20 to 30% of the small farmer basic grain harvest is lost due to inadequate post-harvest techniques and storage capacity. This is a significant loss of food for a population that has some of the highest rates of chronic malnutrition in the world. It has been claimed that fairly simple technologies are available that could dramatically reduce these losses. One approach is to encourage use of a small metal household silo that can assure that the grain is protected from pests. Use of these silos is not recommended for the South and Northern Coast regions of Guatemala, since the high heat and humidity in these locations can accentuate the development of aflotoxin, a fungus that makes the stored grain unfit for consumption. However, in the dryer, higher elevation Western Highlands the use of such silos has proven effective.

Whereas dissemination of improved production technology requires a permanent institutional capacity (as technology issues constantly evolve), assistance with small farmer acquisition and use of small silos is a one off initiative. USAID could therefore provide support to such a program through PVOs or other program implementers.

However, when the author of this document discussed this option with the Director of ProMAIZ, he cautioned that the corrugated metal used in the small silos is not a recommended storage vehicle as it accentuates the damage due to moisture, and that it is very difficult to reduce moisture to acceptable limits even in the Western Highlands. Additional technical input would be needed before USAID adopted this as a program strategy.

C. Conclusion

Basic grain production and productivity have stagnated in Guatemala, and the public sector institutional structures designed to address the needs of this sector have either been abolished or have become moribund. USAID has opted for the past thirty years to focus its support on non-traditional agricultural exports, which have the highest potential for improving rural incomes. The Feed the Future initiative may provide USAID with an opportunity to complement its focus on non-traditional agricultural exports with assistance to improve small farmer basic grain productivity and production and post-harvest management. However, any such effort would be totally dependent on the reestablishment of a viable technology transfer system, which will be analyzed in-depth in a subsequent paper.

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V. Institutional Options for Sanitary and Phytosanitary Regulation

A. Background

1. International SPS Requirements

The effort to create an international system to regulate the risks to health and livelihoods from the trade of agricultural commodities, livestock, and processed food began in 1948 with the negotiation of the General Agreement on Tariffs and Trade. This agreement set out basic principles that govern SPS issues today. A World Trade Organization (WTO) online document states: "Article I of the GATT, the most-favoured nation clause, required non-discriminatory treatment of imported products from different foreign suppliers, and Article III required that such products be treated no less favourably than domestically produced goods with respect to any laws or requirements affecting their sale. These rules applied, for instance, to pesticide residue and food additive limits, as well as to restrictions for animal or plant health purposes.

The GATT rules also contained an exception (Article XX:b) which permitted countries to take measures "necessary to protect human, animal or plant life or health," as long as these did not unjustifiably discriminate between countries where the same conditions prevailed, nor were a disguised restriction to trade. In other words, where necessary, for purposes of protecting human, animal or plant health, governments could impose more stringent requirements on imported products than they required of domestic goods."[8]

The agreement to establish the WTO in 1995 incorporated a separate agreement on SPS, titled: Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement). One of the principal concerns during negotiation of the WTO agreement was that as tariffs declined, non-tariff barriers would become more prominent mechanisms to protect domestic producers from international trade. There are three types of issues addressed in the SPS Agreement:

1. human or animal health from food-borne risks (sanitary);
2. human health from animal- or plant-carried diseases (sanitary);
3. animals and plants from pests or diseases (phytosanitary).

The SPS Agreement does not create a formal role for the WTO in setting international SPS standards, but instead acknowledges that this role is the responsibility of three other international organizations: for food safety, the joint FAO/WHO Codex Alimentarius Commission; for animal health, the International Organization of Epizootics; and for plant health, the FAO International Plant Protection Convention.

The standards set by these international organizations are not mandatory for signature countries, but instead are recommended guidelines. The various international agreements formally recognize that each country has the right to adopt regulations that it feels appropriate to safe guard the health of its population and to avoid importation of pests that could harm its agricultural and livestock production. However, under the SPS Agreement, countries are permitted to impose only those requirements needed to protect health that are based on scientific principles.

When a WTO member country proposes a new regulation, or modifies an existing one, that establishes a standard inconsistent with the international standards adopted by the three organizations mentioned above, then it must advise the WTO secretariat, which will circulate the information to all member countries for comment.

8. http://www.wto.org/english/tratop_e/sps_e/spsund_e.htm

The problem for developing countries is that setting up the required protocols, conducting risk assessments, and adopting measures needed to meet the varying international standards, is very costly. In an online publication the representative of the Peruvian Association of Mango Producers and Exporters noted: "If it took a year to enter Mexico and cost $10,000, for Japan it took five years and an investment of $100,000, as in this case more infrastructure and equipment to verify scientifically the effectiveness of our hydrothermal treatment were required." In order to avoid conflicts of interest, international standards require that a public sector entity have overall responsibility to monitor and enforce compliance with domestic and international regulations and standards. While some functions, including inspections, can be delegated to private contractors, they must be effectively supervised by a public sector agency.

A further complicating factor is that while inspection of produce is an important component of a viable SPS system, it alone will not satisfy the long-term needs of SPS management.. The SPS agency must first enact legislation required to regulate pest in the origin country, maintain accurate inventories of the pests present in the different agricultural producing areas, and have systems in place to detect invasive pest species as soon as possible after they have been introduced to the country. Simply inspecting for the absence of known pests is not sufficient. Any fee structure established to cover the costs of inspection must also carry an overhead sufficient to cover the other costs of the SPS system, or else these costs must be met with public resources.

However, the endemic weakness of public sector institutions in many developing countries impedes their ability to carry out a credible SPS function. In addition, the high cost of full compliance with international norms must be met by someone, and this places strain on both the public and private sector stakeholders.

2. Guatemala Institutional History

The Guatemalan Ministry of Agriculture and Livestock (MAGA) went through a significant reorganization in 1998 that included the establishment of the Unidad de Normas y Regulaciones (UNR). The intent at that time was that the UNR would only be a transitional institution responsible for adoption of sanitary and phytosanitary regulations, monitoring their enforcement, and applying appropriate remedies. The intent was that within two years an autonomous institute would be established that would assume the role of the UNR in meeting domestic and international sanitary and phytosanitary responsibilities. Successive Governments of Guatemala have not given consistent commitment to establishing the Institute and consolidating GOG capacity to meet international sanitary and phytosanitary standards. At this time there is no active effort to enact legislation required to create the Institute.

There are presently 160 employees of the UNR (without counting the UNR paid employees of PIPAA (discussed below). All but one of these is hired as a short term contractor, as only the UNR Director is a formal employee of the Ministry of Agriculture. Because of budget difficulties, UNR normally contracts its technicians for three month intervals, while it seeks budget expansions to extend the contracts through the year. These contracts provide no job security, and every time there is a new Minister of Agriculture, the UNR contractors are at risk of being replaced. During the first two and a half years of President Colom's administration, there have been four Ministers of Agriculture. The role of UNR inspectors is highly technical, as it requires knowledge of their scientific discipline and of international standards and norms. Replacement of experienced and knowledgeable technicians with individuals who lack this background represents an enormous cost to the GOG, and causes trading partners to question the integrity of the system.

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The UNR is able to charge fees for it services, and it reportedly generated last year approximately Q23 million. However, the income it produces goes into the GOG general fund, and is not available to the UNR to cover its costs and expand its services. Instead, the UNR is only provided budget authority for approximately Q12 million per year (and this through multiple budget amplifications).

In the late 1980s, the Guatemalan private sector pesticide industry became sufficiently concerned about inappropriate use of their products, and the potential backlash this could produce, that they promoted creation of the Programa Integral de Protección Agrícola y Ambiental (PIPAA). Initially the intent was to establish a self-regulating organization that would promote the appropriate use of pesticides, with participation of the GOG, the private sector pesticide industry, and leading agricultural export organizations. PIPAA eventually received support from the Asociación Guatemalteca de Exportadores (AGEXPORT). PIPAA's primary role initially was to provide training and information to exporters to assure that they were aware of international standards affecting their markets. However, after various negative experiences where specific markets were closed to Guatemalan exports due to pesticide residues, infestation of insects banned by importing countries, etc., PIPAA's role in relation to some specific commodities shifted to include pre-export inspection and authorization.

Although PIPAA was from the beginning a mixed public/private entity, as it gradually assumed more public functions its structure and financing came under scrutiny. An arrangement eventually evolved where PIPAA remained under the direct management and supervision of AGEXPORT, but the salaries of most of its employees are covered by the Ministry of Agriculture. The private sector through AGEXPORT is able to lobby to reduce the staff turnover with changes of government. The private sector also pays fees through AGEXPORT that are used for transportation and other expenses for the PIPAA inspectors.

PIPAA has improved Guatemala's capacity to meet international SPS standards; however, it is inherently weak because its staff does not enjoy job security.

3. Importance of SPS Management to Guatemala

The horticulture and shrimp industries that have led the expansion of Guatemala's agricultural exports over the past two decades are highly susceptible to insect pests that cause phytosanitary concerns, and to pesticide residue and post-harvest contamination that are major sanitary concerns. Non-traditional agricultural exports have maintained a positive market position even during the recent world-wide economic downturn, and these exports grew by 1135% between 1990 and 2008.

The total value of Guatemalan horticulture and shrimp exports in 2009 was $1,049,000,000. The full time equivalent number of jobs in these sectors is approximately 109,000, which is more than the employment in either of the coffee or sugar cane sectors[9]. As described by John Mellor[10], growth of employment in agriculture has a strong multiplier effect on employment in the non-agriculture sector, so the overall risk to employment in Guatemala if market access is reduced or eliminated due to poor sanitary and phytosanitary management could be as much as three times this figure.

In Guatemala's impoverished Western Highlands region, further expansion of horticulture crops for export represents virtually the only effective strategy for increasing rural incomes, and if this option is closed due to inadequate sanitary and phytosanitary management, it would have serious economic, political, migratory, and humanitarian implications.

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9. The full time equivalent jobs were calculated by the Bank of Guatemala by dividing the total number of work days reported by the producers by 280 days. The actual number of workers would be larger, as many of the crops involve only seasonal work.
10. Mellor, John W., *Faster, More Equitable Growth – The Relation between Growth in Agriculture and Poverty Reduction, Abt Associates, Inc. October 1999.*

4. SPS Issues

Although combined into a single theme, there is considerable difference between the requirements, status, and market relevance of sanitary and phytosanitary concerns. For the U.S. market, the current principal concern is with phytosanitary controls to assure that pests do not accompany the rapidly expanding horticulture exports from Guatemala. Sanitary concerns are mainly with pesticide residues on horticulture exports. For the European Union market the primary concerns are with sanitary certifications of Guatemala's seafood exports and fresh fruit and vegetable pesticide residues.

The U.S. entity that sets the standards and import permission requirements for products that have potential phytosanitary issues is the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (APHIS). The Food and Drug Administration (FDA) has the lead role concerning sanitary (i.e. food safety) issues.

USDA and USAID have provided funding to support trade capacity building as part of the DR-CAFTA free trade agreement, and this has included support to improve sanitary and phytosanitary capacity. The U.S. Trade Representative (USTR) recently asked each of the DR-CAFTA countries to conduct a survey to quantify the degree of compliance with the relevant sanitary and phytosanitary requirements, and Guatemala has submitted its response to this survey. The survey focused on four parameters of the sanitary/phytosanitary requirements, i.e. laboratory capacity, food safety, animal health, and plant health. The results of this survey are presented in Annex F. Note that Guatemala failed to report the status for animal health, and in Annex F we are including data from an initial estimate prepared by FAS in 2009 of where the expected that Guatemala would be in 2010.

It remains to be determined whether USDA/FAS and APHIS and the FDA will concur with the GOG's self assessment, and it would be interesting to know the opinion of the European Union. However, taking the survey results at face value they show that while Guatemala has improved its capacity for sanitary and phytosanitary management, it still falls well short of meeting international standards.

The following is the USDA/FAS agenda for improving SPS trade capacity in DR-CAFTA countries:

1. Laboratory Capacity
   - Increase the diagnostic capabilities of official laboratories
   - Ensure labs can meet international standards and U.S. regulations
   - Increase lab certification and accreditation
2. Food Safety
   - Assist countries in writing inspection legislation
   - Help create an inspection system that meets FSIS regulations
   - Reach equivalence for beef, swine, and poultry
   - Improve Dairy Processing
   - Develop Pesticide Regulations & Tolerances
   - Expand Processed Products
3. Animal Health
   - Declare regions free of specific trade constraining diseases through inspections
   - Ensure ability to meet World Animal Health Organization (OIE) standards and APHIS regulations for exported animal origin products
   - Increased risk assessment capabilities
4. Plant Health
   - Assist countries meet International Plant Protection Commission (IPPC) Requirements
   - Help countries meet APHIS regulations in order to achieve market access for new, fresh products
   - Maintain admissibility for those products currently being exported
   - Increased risk assessment capabilities

USDA/APHIS is very concerned about the status of Guatemala's SPS capacity. The number of interceptions, i.e. products found to contain pests or in other ways unfit for entry into the US market, increased from about 1100 in 2007 to over 1300 in 2008 and over 1900 in 2009. This deteriorating performance has caused APHIS to consider imposing a 100% inspection requirement on Guatemalan fresh fruits and vegetables. Such a measure would effectively destroy Guatemala's ability to export these commodities, as the delays it would cause would seriously increase costs and shorten shelf-life. It would in effect take away Guatemala's competitive advantage.

USDA has long sought to assist Guatemala to improve its institutional capacity in order to assure that it can meet the U.S. importation standards. It recently provided very significant local currency from the PL 480 Food for Progress resources

to support construction and equipping of an improved UNR laboratory and other related SPS expenses, but the budget authority to use these resources was shifted from MAGA to the GOG Cohesión Social program, preventing MAGA from implementing the improvements. Because of this, Guatemala was not provided with additional Food for Progress funding in 2010. In total, USDA has provided close to $10 million to MAGA to support SPS in recent years.

The UNR only has inspection protocols for five products: mangos, papayas, peppers, tomatoes, and ornamental plants. It is important to note that there have been relatively few pest interceptions of imports of these commodities, indicating that the systems do in fact work when adopted. Protocols need to be established, pest risk assessments need to be regularly conducted, and effective inspection systems need to be implemented for other vegetables and fruit commodities.

Some of the inspectors involved in the current programs are being paid with resources from an Inter American Development Bank loan to the Government of Guatemala, which expires in August 2010 and cannot be extended. While the head of the UNR is seeking increased funding from the national budget to replace these resources, this has yet to be approved.

Some USDA Guatemala officials believe that the biggest constraint to creation of an effective SPS system in Guatemala is that the private sector is unwilling to pay sufficient fees to make it self sustaining. They argue that if AGEXPORT/PIPAA generated sufficient resources it would be able to overcome the Ministry of Agriculture's bureaucratic constraints. AGEXPORT, however, has statistics indicating that its members currently expend nearly $4 million on SPS related certification procedures, and that the private sector is committed to achieving a credible SPS system.

The European Union reportedly has both a technical and legalistic approach to sanitary and phytosanitary issues. They first look at the national laws to see what agency has been designated as the responsible entity (entidad competente), and then examine whether that entity has adequate procedures and capacity to carry out its responsibilities. They then carry out an audit to determine whether the required inspections have actually happened. If a private sector firm or organization is found to have played a role in supporting the inspection process, this is judged to be a conflict of interest affecting the integrity of the inspection system. EU concern with the integrity and effectiveness of Guatemala's SPS system has come close on several occasions to causing a ban on Guatemalan seafood imports into the EU, threatening a hundred million dollar industry.

5. International Donors

Besides the U.S. Government's commitment to assist Guatemala to meet international SPS standards, through USDA and USAID support, two other donors are either currently targeting this issue or are considering additional assistance. The Inter American Development Bank has identified improving SPS capacity as its first priority for future assistance in the agricultural sector, followed by improved capacity to produce and disseminate agricultural productivity enhancing technology, and access to irrigation. As noted earlier, IDB resources from a current loan program are being used to pay salaries of UNR and PIPAA staff, but this program ends in August of 2010. A follow on project to address the IDB's top three priorities is not currently in the 2011 pipeline. The GOG and the IDB have yet to define the agricultural sector pipeline for the upcoming years. In addition to loan resources, the IDB may be able to provide some grant funding to help identify/design an appropriate permanent institutional arrangement for SPS services in Guatemala.

The other potential source of international support for improving Guatemala's SPS capacity is the European Union. An Association Agreement will soon be signed between the EU and the five Central American countries and Panama. It is anticipated that the EU will expand its support to SPS compliant trade capacity in conjunction with this agreement. Finally, the Government of Canada has repeatedly offered to provide support to create a permanent institutional mechanism to assure proper regulation of sanitary and phytosanitary standards in Guatemala.

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B. Options for Institutional Stability

Clearly, measures must be taken to establish a reliable and stable institutional capacity in Guatemala to assure that exports of agricultural and food commodities meet the SPS requirements of importing countries. Failure to do so could seriously undermine the tremendous gains that have been made in diversifying agricultural exports and benefiting thousands of impoverished Guatemalans. In addition, one of the few viable strategies to achieve significant future reductions in Guatemala's abysmal statistics of extreme poverty and chronic malnutrition would be seriously handicapped.

To achieve a more coherent and effective SPS system, several constraints must be overcome, including:

1. Chronic public sector institutional weaknesses, including lack of a civil service and stable budgetary practices.
2. Lack of continuity in national political agendas.
3. Government of Guatemala financial constraints.
4. Unwillingness of the Guatemalan private sector to increase payment of fees for services without assurance that the resources provided will actually be used for the intended services.
5. Scarce human resources with appropriate training and experience.

In order to overcome these constraints, a coordinated effort to achieve an effective institutional framework for SPS is needed involving the Government of Guatemala, the Guatemalan private sector, and international donors. The following are several options for such a framework.

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1. Autonomous Institute

All of those stakeholders interviewed during preparation of this document that were asked about this issue considered the creation of an autonomous Guatemalan public sector institute for SPS as the only viable permanent solution to the chronic instability that endangers Guatemalan agricultural and food exports. When the Ministry of Agriculture's Unidad de Normas y Regulaciones was created in 1998, it was intended to serve as an interim entity during the two years it would require to create an autonomous institute. However, constraint number two mentioned above (Lack of continuity in national political agendas) caused this effort to be aborted due to a change in Guatemalan administrations, with the incoming administration focused on other priorities.

The primary advantages of a properly established autonomous institute would be its ability to establish its own personnel policies, thus assuring employment stability for trained staff, and the capability to charge fees for services and dedicate this income to cover the costs of the institute, rather than having the funds transferred to the GOG general fund.

Some of the stakeholders who were interviewed felt that, while efforts should be undertaken to draft the legislation required to establish the institute, they doubted that this could be accomplished before the next change of Guatemalan administrations in early 2012. Before then the Congressional agenda will be too dominated by political considerations to obtain a consensus on this reform. And of course, once a new administration assumes office, efforts to create the institute would be subject to its political agenda.

Another option that could be considered would be to establish the autonomous institute via a governmental acuerdo signed by the President of Guatemala. This is seen as an interim approach pending legislative action, but it would in effect create a fait accompli, which would increase chances for subsequent legislative action. The disadvantage of this approach is that current law assigns responsibility for SPS management to the Ministry of Agriculture. Until legislation is passed that modifies this, the European Union would still look to the Ministry of Agriculture as the "entidad competente," not the institute. This concern could be addressed by maintaining a small unit within MAGA with responsibility for adopting formal standards and overseeing the effective implementation of the SPS system, while formally delegating actual inspections to the institute.

Care would be required to assure that creation of the institute would meet the objective of a stable institution that could have autonomous authority over resource management (subject of course to public audit) and personnel policies. Successful examples in Guatemala of such institutions are the Instituto Nacional de Bosques (INAB), Empresa Portuaria Nacional Santo Tomás de Castilla, and the Crédito Hipotecario Nacional bank. However, other examples of efforts to establish autonomous institutions have been less successful. Examples include the Instituto de Ciencias y Tecnología Agrícola (ICTA), which has no independent budget authority and whose employees are organized into a public sector union, and the Ministry of Health laboratory, which was granted independent budget authority but was not able to make this independence effective.

2. PIPAA

Until such time as an autonomous institute can be established, an interim solution would be to expand the function of PIPAA, the Programa Integral de Protección Agrícola y Ambiental supported by the Guatemalan Exporters Association (AGEXPORT). This Program effectively manages SPS protocols for various agricultural commodities. Its staff is paid for by the Ministry of Agriculture UNR, while its operating costs are paid for from a fund established with fees charged to exporters. USDA APHIS argues that the simplest short term solution to the current lack of inspections would be to expand the role of PIPAA to cover additional commodities. APHIS also recognizes the need for a stable secure workforce for PIPAA and supports the development of Government of Guatemala institutions for a long term solution as opposed to outside sources such as OIRSA (see below).

The disadvantage of this approach is that as long as PIPAA staff is paid for by the Ministry of Agriculture, under individual contracts, the technicians lack job security. There is also concern that the PIPAA model may not meet EU standards for independence from inappropriate private sector influence. Finally, Guatemala has a law that regulates what public sector functions can be delegated to other organizations, and it would be necessary to separate out only those functions that are delegatable, while leaving the others within MAGA.

AGEXPORT also manages the Ventanilla Única para Exportaciones (VUPE), which enables exporters to obtain export permits on line, meeting all GOG legal requirements and paying required fees. The Ministry of Agriculture could establish a new list of export fees that would include fees needed to cover the costs of effective SPS inspection, and authorize AGEXPORT to collect these fees via VUPE and apply them directly to improved SPS enforcement. The private sector would thus be assured that the resources it paid for these services would in fact be used to cover the costs of the services. It would be appropriate that different fees be charged for different services, based on degree of inspection required, and the Ministry could even subsidize a portion of the inspection costs for a limited period of time for new agricultural commodities, in order to encourage their development and export.

PIPAA currently functions under the authority granted by a Ministerial *Acuerdo*. AGEXPORT has been lobbying for some time for issuance of an *Acuerdo Gubernativo,* which would insulate the program somewhat from the instability caused by frequent changes within the GOG.

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3. OIRSA

A second possible interim solution would be a contract delegating most of the SPS functions from MAGA to the Organismo Internacional Regional de Sanidad Agropecuaria (OIRSA). OIRSA was established in 1953 as an institution to provide technical assistance to the Ministers of Agriculture of the five Central American countries and Panama. It subsequently expanded to include support to Mexico, Belize, and the Dominican Republic. Its Mission is to facilitate social and economic development in the region, through agricultural and livestock production that is healthy, high quality, and environmentally appropriate, in order to satisfy the requirements of the region's human population.

OIRSA currently implements a number of bilateral and multilateral agreements with institutions within the nine member countries. In Guatemala it has an agreement with the Ministry of Agriculture, through which the Ministry has delegated to OIRSA the responsibility for providing border inspection and quarantine services for agricultural and livestock products entering the country. Importers of these products pay an inspection fee, which OIRSA uses to cover the costs of its services. The author is unclear whether there is an additional fee paid by the Ministry of Agriculture for the services, but the important point is that OIRSA has legal authority to charge fees to individual importers and use these fees directly, without the funds going to the GOG general fund.

The option to be considered would be a three part contract between MAGA, AGEXPORT, and OIRSA. Under this contract, MAGA would delegate to OIRSA authority to implement SPS inspections and certifications. Most of the MAGA UNR staff would become employees of OIRSA, with only a small core staff remaining to exercise public sector monitoring and supervision, and standard setting authorities (in keeping with the Guatemalan law governing what public sector functions can be delegated). In addition, the PIPAA staff would also transfer to OIRSA. The AGEXPORT VUPE office would charge inspection fees on agricultural and livestock exports, as described above, and the proceeds of these fees would be paid to OIRSA to cover its costs, including pest risk analyses. OIRSA might also need authority to charge fees for specialized services not covered under the export permit process.

In effect, this option builds on an existing, functioning model, as it is not conceptually different from the role that OIRSA has been given in managing the border inspection and quarantine program. This option is superior to the expanded PIPAA option, as the SPS technicians would have job security for at least as long as the interim solution was in effect. A formal contract also has greater legal longevity than a Ministerial or Government *Acuerdo*, as it cannot be unilaterally modified without penalties. Finally, since OIRSA is a regional public sector organization, it would have a degree of impartiality that would probably be more acceptable to the EU. USDA believes that to assume this role, OIRSA may need to receive specialized technical assistance to assure that its personnel can effectively meet international standards.

In an initial informal conversation with a leading Guatemalan active in the private agricultural sector, the head of OIRSA expressed interest in having OIRSA assume the role described above.

4. Role of Ministry of Health and Municipalities

Finally, in looking for permanent institutional fixes for weaknesses in provision of SPS services in Guatemala, it is necessary to note that there are other actors that have some degree of involvement. First, the Ministry of Health has a specified role for food safety in relation to the Unidad de Normas y Regulaciones functionss. In effect, the Sanidad portion of the UNR reports to both Ministries, although the Ministry of Salud's interest is entirely focused on food safety within Guatemala, not on exports. Any modification of the UNR role and responsibilities will require consultation with the appropriate officials in the Ministry of Health.

Secondly, modifications to the Código Municipal that are being considered in the Guatemalan Congress give municipal governments a formal role in assuring security of food sold within the municipal jurisdiction. While this role should only affect food sold for consumption within the municipality, it will be important to monitor the implementation of the revisions to the Código to assure that a modification of the status of the UNR does not contradict this legislation.

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C. Political Will

While the reasons for establishing a more stable and effective SPS system in Guatemala appear self evident, it has not happened over the past twelve years since initial reforms were attempted. What is required to mobilize the political will to make the necessary reforms?

The Government of Guatemala has at any one time far more urgent priorities that it is capable of managing. For this reason, the important often takes second priority to the politically urgent. Often, only when a problem has reached crisis status is it guaranteed of receiving the degree of attention warranted. As long as non-traditional agricultural exports are expanding, and people in the countryside are happily receiving increased wages and income, then the complicated issues of reform of SPS management can be delayed.

Reforming the SPS system will require concerted political will within the Government of Guatemala and the Guatemalan private sector, and the support of the U.S. Government and other bilateral and multilateral governments and institutions. Those officials within the Government of Guatemala and within the Guatemalan Congress who are aware of the drastic consequences that Guatemala could suffer if it fails to adopt an effective SPS system must become proactive in pursuit of the required reforms. An information campaign that heightens public and official awareness of this issue would help create an environment more propitious to reform. In addition, assistance with drafting the implementing documentation and detailed system design would facilitate creation of an environment for reform.

The Guatemalan private sector also must demonstrate the will to make reform happen. Although in the short term there are winners and losers to enactment of an effective SPS system, in the long term all will benefit. Unless the private sector speaks with a strong voice in support of an effective SPS system, and does so actively, it will be difficult to achieve it.

Finally, the international community, and particularly the USG and the EU, needs to support reform. A 100% inspection of all Guatemalan fresh fruits and vegetables entering the U.S. would cripple the fresh fruit and vegetable industry, and some of the benefits that could accrue to Guatemala from Central America's association with the European Union will not materialize unless it has an effective SPS system. The USG and the EU are committed to assisting Guatemala to improve food security, and this can only be achieved if it is possible to further expand non-traditional agricultural exports. Of the options for reform discussed above, representatives for the EU indicated during interviews that they felt it essential to focus on achieving a permanent solution to this problem, rather than interim solutions.

In order to achieve this objective, the Guatemalan public and private sectors need to reach agreement on a viable institutional reform process and proceed to its enactment and implementation, with the full support of the international community.

D. Other Access to Market Issues

Although improved institutional capacity to manage Guatemala's compliance with worldwide standards for product sanitary and phytosanitary compliance, there are other issues that affect market access that also need attention. The primary of these is the need to invest in farm to market roads to allow the more marginal rural farmers to improve their market access. The analysis of ENCOVI 2000 data by Ricardo Hernandez cited earlier demonstrates that those rural farmers who live close to a road have much greater income potential than those who are more isolated.

A second issue requiring attention is the need for greater Government of Guatemala investment in market promotion. This task is almost exclusively carried out by the Guatemalan private sector at this time. While it is appropriate for the private sector to have a leadership role, in other Latin American countries (and in most developed countries, including the United States) the public sector absorbs a significant portion of the costs. Creation of market opportunities is in fact a public good, as otherwise access to such opportunities would be restricted to the wealthy.

VI. Access to Water

A. Background

1. Objective of Analysis

Access to water has a dual direct role in helping address food security concerns. Irrigation is needed to successfully produce non-traditional horticulture crops, especially to supply U.S. winter markets during the periods when U.S. production is not available. Such production is a primary potential source of increased rural incomes needed to increase access to food and adequate nutrition. Secondly, access to potable water is a key determinant of human health, and the ability to absorb the food that is consumed. There is a third, less direct connection between adequate water management and food security, as the environmental degradation of Guatemala's watersheds increases the impact of tropical storms and hurricanes and thus increases both short-term emergency food requirements and undermines productive capacity.

This document will focus primarily on issues related to access to irrigation in Guatemala, but will also be provide information concerning access to potable water. One of the programming options outlined in section C also would help address the need for improved watershed management.

2. Water Resources

Water is a relatively abundant resource in Guatemala, with reliable and plentiful rainfall in most years in most regions of the country. An assessment prepared in 2006 indicates that the total supply of water in Guatemala is over 96 billion cubic meters a year. This is about 8,000 m^3 per person per year, which is three times the availability in El Salvador and 8 times the minimum level of availability below which a country is considered to be at water risk. An analysis by SEGEPLAN in 2006 indicates that current consumption of water in Guatemala is 9.6 billion m^3, and at current rates of increase will reach 17.8 billion m^3 in 2025, which is still only 19% of the currently available water.

No region within Guatemala is classified as arid, as all regions typically receive at least 400 mm of rain per year. However, there is a band of semi-arid land from southern Quiche and northeastern Guatemala Departments, extending across the Departments of El Progreso and Zacapa and south into portions of the Departments of Chiquimula, Jalapa, and Santa Rosa. This region is referred to as the Corredor Seco. A narrow band of semi-arid land has also developed along the Pacific Coast of Guatemala. There is concern in Guatemala that climate change could increase water shortages within this region, and to a lesser extent within the nation as a whole.

Although water is abundant in Guatemala, there are marked differences in seasonal availability. Unfortunately, the hydrological measurement capacity in Guatemala is weak, so adequate data to quantify the seasonal shortages is not available. Guatemala can physically capture and store behind man-made dams only about 1.5% of the total rain water available annually.

There are four distinct hydrogeological regions in Guatemala:

1. The alluvial lowland on the South Coast, which has geological formations with the highest potential for groundwater relatively near the surface;
2. The volcanic highlands with aquifers that are relatively far below the surface;
3. The high mountain ranges with the least occurrence of groundwater in the country; and
4. The sedimentary northern region with limestone deposits where groundwater appears in caves and other underground channels.

Annex G presents a map prepared by the Ministry of Agriculture's PLAMAR unit that shows the areas where irrigation is required either to supplement rainfall or as an essential factor of production during the dry season. Annex H shows the potential number of hectares of agricultural land that could be irrigated for each of the country's three water regions (defined by whether water flows south toward the Pacific, east toward the Caribbean, or north toward the Gulf of Mexico). A total of 1.3 million hectares of land are identified as appropriate for irrigation, and Guatemala as of 2006 had 311,557 hectares of irrigated land, or about 24% of the potential.

There are four potential sources of water for irrigation:

Natural and man-made storage in lakes and ponds. Guatemala has 7 natural lakes and 7 man-made water basins, plus over a hundred small ponds. Four of the lakes are large but none of these are located in areas where the water can be used appropriately by small producers for irrigation, either because they are in regions where rainfall is abundant through most of the year (Lake Izabal, Chixoy), or use of the water would create ecological issues (Atitlan, Amatilan). However, Guatemala has a number of sites where investment in small multiuse dams could be economically viable for electricity generation and irrigation, as well as to meet human demand.

Rivers. As noted above, water in Guatemala flows in three directions: south to the Pacific, east to the Caribbean, and north to the Gulf of Mexico. The region that flows to the Pacific has 18 watersheds, the Caribbean region 7, and the Gulf of Mexico region has 10. Fifty-five percent of Guatemala's watersheds cross international borders, which complicates their management. The Pacific region has the most developed use of river water irrigation, and in fact many of the rivers in this region no longer reach the ocean in the dry season due to excessive use of water to irrigate sugar cane plantations. The Government of Guatemala developed several large scale irrigation projects in the Rio Motagua watershed in the Caribbean region during the 1960s and 1970s. In recent years private resources have developed extensive irrigation capacity for African palm oil production in northern Alta Verapaz and southern Petén.

Springs and small streams. During the late 1980s and early 1990s USAID, through its Highlands Agricultural Development Project, funded construction of a number of micro irrigation systems in Guatemala, primarily using water fed by gravitation from natural springs and small streams. The Ministry of Agriculture continued to construct such projects after the HAD program ended, and by 1996 a total of 456 systems had been constructed providing irrigation to 4,042 hectares. Water from these systems was used principally for production of horticulture crops as non-traditional agricultural exports. It is not clear what the current status of these systems is, and an evaluation is under consideration to assess the extent to which they are still functioning and their economic impact.

Groundwater. USAID recently funded through TCAP an in-depth analysis of the quantity and quality of ground water resources in Guatemala that shows that these resources are abundant. Some of the USAID/HAD micro irrigation projects used wells to access groundwater. Although Guatemala is blessed with extensive fields of ground water, its fractured geography makes it very difficult to predict the depth of the resource even in close proximity to an existing well. Ground water on Guatemala's south coast is very near the surface, so the cost of accessing it is relatively low. In other regions wells of 800 to 1000 feet deep are required, and the pumping costs can be very large.

Of 64,562 farms with irrigation, 57.6% use water from rivers, small streams or springs, 16.7% from lakes and ponds, and 24.2% from groundwater wells (the rest use combinations of these three sources).

Guatemala has invested significant resources in developing municipal water systems in recent years, and according to WHO/UNICEF access to improved water sources increased from 79% of the total population in 1990 to 95% in 2004 (officially it is claimed that this water is potable, but experts question this claim). Annex I shows that, with the exception of eight municipalities in the northern region, water is reasonably available even in the country's 125 poorest municipalities (although access is clearly concentrated in urban or semi-urban areas) (Table 8).

Table 8. Percent of the population with access to water systems in Guatemala, disaggregated urban/rural.

Access to Water	Urban	Rural	Total
Broad definition	99%	92%	95%
House connections	89%	65%	76%

Source: IARNA, Seguridad Alimentaria y Agricultura en Guatemala, 2009

However, a Pan American Health Organization survey in 2000 indicated that access to water in urban areas is irregular, as 80% of urban water systems function for an average of 12 hours per day. It is worth noting that water systems that do not maintain constant positive water pressure are more susceptible to filtration of contamination into the tubing.

3. Institutional Roles

a. Government of Guatemala

Overall responsibility for water resources in Guatemala is assigned to the Ministerio de Ambiente y Recursos Naturales (MARN). Responsibility for planning and developing irrigation projects is assigned to the Ministerio de Agricultura, Ganadaría, y Alimentación (MAGA). Design, construction, and maintenance of potable water systems is the responsibility of municipal governments, with support and policy guidance from the national Instituto de Fomento Municipal (INFOM), although there is confusion concerning the relative roles in potable water policy between INFOM, the Ministry of Health, MARN, and SEGEPLAN.

MAGA's support for irrigation is implemented through the Plan de Acción para la Modernización y Fomento de la Agricultura Bajo Riego (PLAMAR). PLAMAR has approximately 40 employees who are responsible for designing and overseeing construction of irrigation projects and repair of systems damaged by natural disasters.

b. Civil Society

Most civil society activity related to water is directed toward increased access to potable water. The following are some of the organizations active in this area: Fundación Solar, SHARE, CRS, CARE, and Acción Contra el Hambre. The primary non-governmental organization that has promoted expanded use of irrigation is the Asociación Guatemalateca de Exportadores (AGEXPORT). Approximately 75% of the total irrigated land in Guatemala has been irrigated totally with private sector funding.

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c. International Donors

A number of international donors have provided assistance with improved access to water in Guatemala. As noted above, USAID in the 1980s and 1990s was the lead donor assisting with construction of mini-irrigation projects. BCIE provided $40 million in 2007 for a revolving trust fund to be used to finance construction of irrigation projects, as well as institutional strengthening. The IDB funded major irrigation projects in Zacapa and other parts of Eastern Guatemala in the 1960s and 1970s, and has provided further assistance nationally under its PARPA project. Japan provided funding to rebuild irrigation systems damaged by Tropical Storm Stan, and these efforts are still underway and likely will be redirected somewhat to address losses due to Agatha. Other donors that have provided assistance, primarily with potable water, are the European Union, OEA, the World Bank, and FAO.

4. Policy Constraints to Increased Access to Water

An article prepared by Marco Morales-de la Cruz for Jornadas Técnicas de Ciencias Ambientales at the Universidad Politécnica de Valencia is titled "Cuando Un País con Agua se Puede Morir de Sed." This title typifies the concerns of those who have studied water issues in Guatemala, i.e. although the country has abundant water resources, poor management makes its availability precarious. The only large dam in Guatemala was built in the 1970s. There are a number of suitable sites for small to medium sized dams that would greatly expand the availability of water for irrigation, electricity generation, and human consumption. However, the inability of Guatemala to harmonize conflicting concerns between those who would benefit from the energy and water such projects would produce, and those who would lose land or are concerned by potential environmental impact has kept these projects from going forward.

Water is basically managed as a free resource and no water law exists to adjudicate and regulate between the upstream and downstream rights to water. The sugar industry (and associated alcohol industry) has over half of the hectares of irrigated land in Guatemala, and its extraction of the water from rivers is done simply by building intake valves and distribution systems, with no payment for the water resource. The owners of some sugarcane plantations are now recognizing that by paying a fee to those living at the higher elevations in their

watersheds to preserve the sources of water, these sources will be more sustainable. However, absent a water law obligating such payment structures, these voluntary efforts are unlikely to prevail. The sugar industry also absorbs so much water that the rivers no longer flow to the ocean in the dry season, and such water that is released back into the rivers from sugarcane processing and alcohol production severely contaminates the rivers. These practices cause environmental damage and severe health problems for the downstream populations.

There is also no policy that clarifies the public and private sector roles in irrigation. AGEXPORT recently promoted construction of 200 small irrigation systems based on well access to aquifers. They proposed that the Government of Guatemala be responsible for drilling the wells and install pumps, and that the water users be provided loans to pay for construction of the distribution system. The Minister of Agriculture later declared in a speech that the Government would cover all the costs of these systems, and he was then replaced by a Minister who decided that the projects be entirely funded by loans to the producers. Later Ministers proposed variations where the Government would cover 60% or 65% of the total cost and lend the rest to the producers. Given the lack of a clear policy many of the prospective users of the system withdrew.

AGEXPORT's vision was that the 200 systems would irrigate a total of 8-10,000 hectares, benefiting 25,000 small farmers and creating 68,000 jobs. They estimated that the total cost of the program would be Q600 million over four years, and proposed that the public/private funding split be 75%/25%. TCAP assisted with planning efforts including the identification of the 100 most feasible projects, followed by development of profile descriptions of 25 and detailed feasibility studies of 11 projects (Table 9).

These projects will facilitate increased horticulture production and will significantly increase the incomes of the 307 farmers who will directly benefit. The 4,452 beneficiaries shown include the farmers plus anticipated annual hired labor to work on the irrigated land, and all of their family members. The other six projects for which feasibility studies have been prepared would irrigate 244 hectares and benefit 5,304 people at a cost of Q18,059,000. However, the future of this investment is now uncertain, due to the lack of clear and consistent policies concerning the public/private split of the investment cost.

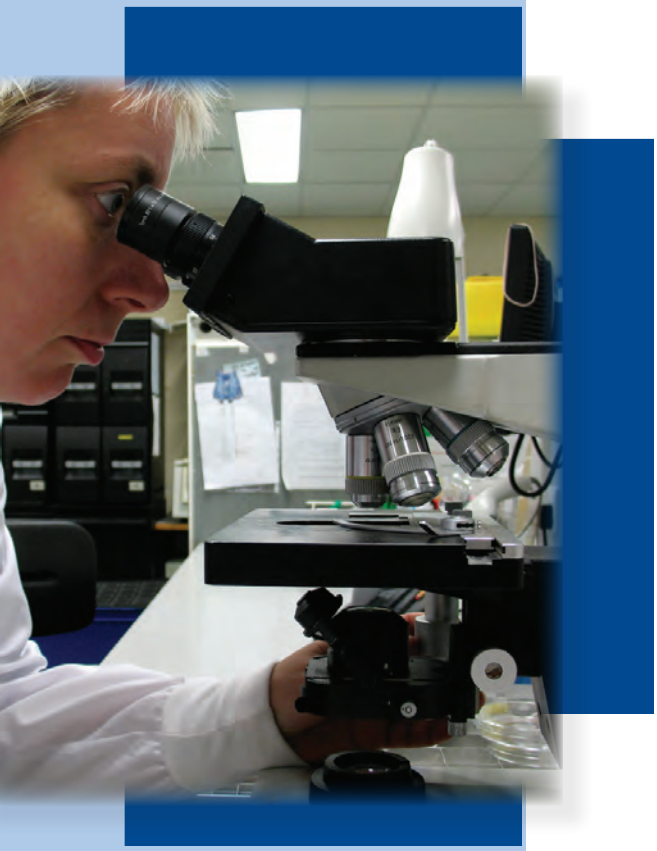
The riskiest part of an irrigation project is the drilling of the well, as there is no assurance that water will be tapped, and if it is at what depth. This risk inhibits private investment in wells for irrigation, despite the abundance of underground water. A reasonable argument can be made for public sector investment in wells, just as the public sector normally assumes the costs of constructing dams. In one of the AGEXPORT promoted projects, which was to provide water to irrigate 50 hectares, once the policy inconsistency caused most of the prospective participants to withdraw leaving only those with a total of 5 hectares, they were not willing to proceed with a 60 public/40 private funding split as the well drilling costs greatly exceeded their planned investment in water distribution. The Ministry of Agriculture's PLAMAR unit has reportedly dug wells for free to provide irrigated water to plots as small as 2 cuerdas, but it is questionable whether the potential yield from this area could justify the investment. Several experts interviewed stated that the cost and complexity of groundwater wells limits this as a technology appropriate for small farmers.

Table 9. Feasibility studies for the five projects that have been completed.

Location	Cost to MAGA	Hectares	Farmers	Beneficiaries	Water Source
Las Canoas	3,000,000	42	84	504	Well
El Tesoro	2,370,000	40	54	1,248	Surface
Panabajal	3,139,000	40	63	918	Well
Paraxaj	1,569,000	40	71	864	Well
Xenimajuyu	3,839,000	40	35	918	Well
Total	Q13,917,000	202	307	4,452	

Another area where public policy has not been responsive to the needs for irrigation is in electricity pricing. The greatest recurring cost of accessing underground water is the energy cost of pumping the water. Electrical pumps are normally considered more economical than gasoline or diesel pumps, but the electrical companies require that payments be made for connections twelve months a year, even though the well pumps may only be used for a few months. This makes the cost prohibitively high, and there is now a move to shift to diesel pumps for which off season costs are minimal.

A final issue that constrains increased use of irrigation is the lack of an adequate source of technical assistance in system maintenance and repair and appropriate production technologies to take advantage of water. Overhead sprinklers are commonly used in distributing irrigation water, although this technology is inefficient and wastes this valuable resource. The energy costs incurred in pumping water to the surface can only be justified if the water is then used in the most cost efficient manner, which requires investment in drip irrigation systems. The investment in irrigation can also only be justified for high value crops, and this may require intensive technical assistance in new crop technology.



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B. Response to Specific Questions

The scope of work for this analysis included a series of specific questions, which will be addressed in this section.

1. What is the status of irrigation (areas irrigated, crop concentrations)?

A study by IARNA/URL in 2009 indicates that irrigation for agriculture represents 40% of Guatemala's consumption of water, which is twice that of industry and six times that of human consumption. The following chart shows the area irrigated by crop (Table 10).

Table 10. Estimate of Area Irrigated by Principal Crops.

Crops	Hectares	%
Permanent Crops		
Bananas	22,400	7.18
Sugar Cane	168,490	54.00
Flowers and foliage	2,800	0.90
Limes	3,500	1.12
Mangos	3,500	1.12
Berries	350	0.11
African Palm	30,800	9.87
Papaya	980	0.31
Pineapple	2,100	0.67
Plantain	8,400	2.69
Pasture	14,000	4.49
Other permanent crops	2,170	0.70
Annual Crops		
Melons	5,530	1.77
Tomatoes	2,800	0.90
Onions	1,320	0.42
Other horticulture and annual crops	42,900	13.75
Totals	312,040	100.00

Source: SEGEPLAN 2006.

Seventy-one percent of the irrigated hectares in Guatemala are dedicated to sugar cane, bananas, and African palm, all of which are large scale plantation farms. In fact, almost all of the crops shown in the table above are primarily grown by wealthier farmers, with the small farmers among those producing the "Other horticulture and annual crops" category, which represents 14% of the total. However, even though small farmer use of water is relatively small in terms of the total number of irrigated hectares, in terms of value of production relative to alternative uses of the small farms, it is very significant. An analysis prepared by AGEXPORT in 2010 of a farmer who plants half of his or her land in corn, one quarter in French

beans, and one quarter in snow peas, earns six times as much as a farmer who plants the entire farm in corn.

2. What is the policy framework for improved access to water?

Unfortunately, the answer to this question has to be that there is no policy framework. There have been multiple attempts to draft and pass a water law. However, as a high ranking GOG official indicated to the author, by the time Guatemala began considering the adoption of such a law too many vested interests had been established and it has not been possible to obtain the mutual concessions needed for a coherent policy. The official indicated that it is not likely that such a law will be passed in the near future. The Ministry of Agriculture has not demonstrated capacity to prepare and adopt a consistent policy concerning public sector investment in irrigation. The absence of a coherent public sector policy framework has not impeded large scale private interests from investing in irrigation, nor the successful implementation of the USAID funded mini-riego projects twenty years ago. However, it appears that the current environment only encourages irrigation investments by large scale private producers and by donor programs.

Responsibility for policy guidance for potable water is split between the municipal governments, INFOM, Ministry of Health, MARN, and SEGEPLAN. The lack of a single focal point inhibits development of a coherent policy. Donor resources have enabled an increase in potable water coverage, although rural access is still very limited.

3. What is the institutional framework for improved access to water?

There is a lack of institutional clarity for both access to irrigation and access to potable water. As noted above, responsibility for potable water is divided among four national agencies and the 333 municipal governments. Primary responsibility clearly lies with the municipalities, and INFOM is a source of competent advice concerning system design and construction. But as noted above the many actors in this field inhibit creation of coherent policy that would favor increased public investment.

Unfortunately, the public sector institutional framework for irrigation is even weaker than it is for potable water. The Ministry of Agriculture's unit responsible for irrigation programs, PLAMAR, is understaffed and underfunded, and political influences have limited the quality of the staff. When it does implement irrigation projects, it limits its role to the engineering function of digging a well or capping a stream or spring and building the distribution network. It does not carry out the essential functions of organizing producers, training them in system management and maintenance, and assuring that they have access to appropriate production technologies to make appropriate use of the water.

Guatemala is beginning a reestablishment of an agricultural extension system via assignment of extension agents to municipal governments. With appropriate training these agents could conceivably provide some of the training to producers needed to facilitate effective operation of irrigation systems, but at this point the extension agents have such a broad range of responsibilities that it is not clear that they could focus sufficiently on this requirement.

4. What other donor activities fund improved access to water?

See description of other donor activities in section A.3 above.

5. What analyses identify potential water sources in target regions?

TCAP has funded preparation of highly detailed maps of underground water resources in Guatemala, which identify both the quantity and quality of this resource. These maps cover the entire country, so they are a ready resource once USAID identifies its target geographic regions. However, these maps do not, and cannot, indicate the depth of the underwater water resources, as this can only be determined by drilling exploratory wells. Some estimates of depth can be made by determining the depth of existing wells, but the private firms that drill wells consider this information proprietary and are not willing to make it public. Without knowing the depth of the aquifer it is not possible to calculate the economic feasibility of a specific groundwater project.

It is relatively easy to identify sources of water from natural springs and streams and rivers for a targeted geographic region. Such sources have been extensively exploited but it is likely that some opportunity exists for further development of gravity fed irrigation systems, or the use of small pumps to lift water from a river to the production area. Such water sources are commonly polluted, so investment in remedying this problem is an essential part of such projects.

Seventy percent of municipal water systems use surface water and thirty percent groundwater.

Ing. Rudy Cabrera, a consultant under the USAID/TCAP program, prepared an evaluation of the MAGA Unidad Especial de Ejecución de Desarrollo Integral de Cuencas Hidrográficas in 2008. The evaluation reviewed the operations, accomplishments, strengths and weaknesses of the operating unit and prepared a series of recommendations to further improve the units impact.

6. What irrigation technology models should USAID promote?

The evaluation that is being considered of the status of the mini-irrigation projects funded by USAID in the 1980s and 1990s will provide considerable information on the appropriate technologies to be supported and the economic impact of such investments. Clearly, gravitation based irrigation systems using surface water are much less expensive to build and operate, and are therefore much preferred. However, many experts interviewed indicated that the opportunities to access such resources have already been exploited in much of Guatemala. Assuming that this is correct, then groundwater represents the most available resource.

Accessing groundwater is costly, especially considering the uncertainty of the yield from any specific well. The small farmers that are USAID's target group cannot afford the investment in well drilling, even if it is loan financed. It is unlikely that USAID will have sufficient resources available to directly fund the drilling of irrigation wells, so use of this technology will depend on identifying a third source of funding, i.e. either the Government of Guatemala or another donor.

If funding is available for accessing groundwater, or if surface water sources can be tapped, the next technological requirement is to design efficient distribution and production utilization systems. Drip irrigation uses significantly less water than sprayer systems, and the less water used the lower the cost of supplying water to the producers, and the more producers who can be supplied from a given source. The choice of crops is also an important factor, as water needs vary by type of crop. Finally, much investment is needed in the "soft" technologies of organizing water users into cohesive groups that can be trained to maintain the water systems and govern water usage.

7. How could technology transfer needs be met?

This issue will be addressed more thoroughly in a subsequent document addressing the constraints to effective access to agricultural technology in Guatemala. Presently USAID probably has only two options to assure sustainable transfer of agricultural technology to prospective program participants (a non-sustainable option would be to directly fund provision of this assistance to target farmers by a contractor or private voluntary organization). One sustainable approach is to encourage private sector supply of such technology, either through input suppliers or produce marketing agents. These private sector sources of technology have a vested interest in encouraging proper application of production technologies that take advantage of irrigated water resources, as this will assure future commercial transactions. The second option is to support the expansion and professional competence of the nascent municipal extension agent system being developed by the Ministry of Agriculture.

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C. Future Programming Options

We believe that USAID has three potential programming options.

1. USAID is unlikely in the near term to have the level of resources that would be required to directly fund construction of irrigation projects. However, the IDB has indicated strong interest in this topic, and it is possible that the two institutions could team up to work with the GOG to achieve the necessary policy and legal reforms needed to make implementation of a joint irrigation program more feasible.

The U.S. Guidance on the Feed the Future initiative indicates that Phase I of U.S. assistance will be targeted at assisting countries to develop country-led plans. Foundational investments will be made that include "technical, financial and political support to the Focus Country to develop a CIP (Country Investment Plan) that includes:" (among others) "Prioritized policy changes and investments based on potential impact." The CIP is then to be reviewed by key stakeholders to see whether it is technically sound. As part of the review process to determine whether the Focus country is ready to receive larger core investments under the FTF program, "the Global Hunger and Food Security Coordinator will evaluate Guatemala's country commitment and capacity in the following areas:

- Adherence to basic principles of good governance and an overall policy environment conducive to achieving substantial results for the investments made;
- Progress made in a policy reform agenda linked to the CIP;
- Progress made in implementation capacity building plan linked to the CIP;
- Level of government budget allocation in national food security."

In effect, the U.S. Government is placing conditionality on its food security assistance requiring that the Focus Countries undertake and carryout policy reforms needed to create an effective food security environment. Given the importance of improved policies and Government of Guatemala implementation capacity for expanded access by small producers to irrigation, we suggest that the U.S. Government include elaboration and implementation of a Water Law among its policy conditionalities. Resources during the Phase I of the Feed the Future program could be targeted at providing the technical assistance needed to complete drafting the legislation, in consultation with all key stakeholders. Among the issues to be resolved would be the split between public and private funding of irrigation projects, annual budget commitments by the GOG, and institutional restructuring and strengthening of the Ministry of Agriculture's irrigation unit, PLAMAR. The lack of policy and institutional clarity concerning increased access to potable water could also be addressed. Finally, by adjudicating water rights and establishing a fee for environmental services, programs could be developed to improve watershed management and reduce the impact of disasters, and the rules governing new investments in dams to produce hydroelectricity and increased use of irrigation would be clarified.

Assuming that the GOG meets the policy reform targets, funds from Phase II Feed the Future programming could provide assistance with the further implementation of the reforms. In addition, IDB resources may be available to support the reform process. USAID has a history of successful policy conditionality negotiations with the Government of Guatemala, specifically macro economic reform measures related to Economic Support Fund assistance in the late 1980s and early 1990s.

2. The second option is similar to the first, but with lower expectations of the degree of policy reform that could be achieved. Development of a new Water Law has been stalled due to conflicts between the vested interests who believe that reform would be a zero sum game, with winners and losers. Assistance with the reform process might be able to reconcile these interests around a new legal and policy framework that would provide long-term, win-win benefits to all stakeholders. However, success in such negotiations cannot be assumed, given the fact that efforts to develop and pass a Water Law have not been successful ever since adoption of the 1986 Constitution, which called for such a law.

In terms of food security, the areas of greatest policy interest are an adequate, coherent and reliable policy that would guide public/private investments in new irrigation systems, and a coherent investment in improved and expanded potable water systems. The U.S. Government could negotiate policy targets as part of the country investment plan process that would specifically address these concerns, without attempting to support a broader reform affecting all legal and policy issues related to water.

3. The third option for future USAID programming would be simply to provide further technical assistance and financial support to the Asociación Guatemalateca de Exportadores in its efforts to promote expanded irrigation. The assistance could support elaboration of feasibility studies and systems designs for additional irrigation projects, and assist AGEXPORT in its efforts to obtain public/private funding for these investments.

VII. Analysis of Access to Agricultural Technology

A. Background

1. Objective of Analysis

Extreme poverty and chronic malnutrition are particularly pronounced in rural areas of Guatemala, and the primary economic activity in rural areas is agricultural production. Increased agricultural production depends to a great extent on productivity improving technologies. This paper will analyze the current status of the Guatemalan agricultural technology system and recommend possible program interventions that USAID could consider for improving the efficiency and effectiveness of this system.

The paper will begin with a brief background description of the importance of agricultural research and extension, the history of the activities in Guatemala, past USAID support for these issues, and other donor initiatives. The second section will focus specifically on the status of agricultural research in Guatemala, including both public sector and private sector approaches. The third section will discuss the status of public and private technology transfer systems. The final section will propose options for future USAID programming approaches.

2. Importance of Agricultural Technology

The World Bank has noted that the economic returns to investment in agricultural research have generally been exceptionally good, with rates of return of 175 – 900%. In a 2007 document, IICA noted that investment in agricultural research in Latin America in recent years has declined, and then commented: "Esta situación no deja de ser paradójica, especialmente al revisar numerosos estudios especializados que reflejan rentabilidades superiores a un 40% en promedio para inversiones en investigación agropecuaria en la región, así como crecimientos en productividad significativos..."[11] Analytical documents on the economic impact of agricultural extension tend to focus more on the most cost effective systems rather than trying to judge the actual economic returns from the effort.

In the modern global economy, access to a continual flow of new agricultural technology is perceived as a key to competitiveness. The anticipated advent of global climate change has further increased the perceived importance of access to improved agricultural technology, since changing growing conditions will create new stresses due to temperature change, change in rainfall, and change in natural pests. The new technologies developed during the green revolution in the 1960s and 1970s caused very dramatic increases in agricultural production to the extent that for the world to produce the same quantity of cereal in 2000 without the productivity improvements from the technology advances of the green revolution would have required the use of 1.76 billion hectares, compared to the actual 0.66 billion. The human and environmental conditions of the world today, if the green revolution had not occurred, would have been cataclysmic. Social and economic conditions in Guatemala will continue to deteriorate unless a system is established to increase access to modern farming technology.

On average developed countries invest 2% of the agricultural sector's gross domestic product in agricultural and forest research, with the following specific examples: United States 2.2%, Canada 4%, Japan 3% y Australia 4%.[12] The Guatemalan CONCYT reported in 2006 the following relation of investment in research (agriculture and non-agriculture) to GDP in Central America: Costa Rica: 1.7%, El Salvador: 0.4%, Panama: 0.8% and Guatemala: less than 0.3%.

The total value of the Gross Domestic Product of the Guatemalan agricultural sector in 2009 was estimated by the Central Bank at Q35.326 billion. The total budget for the Ministry of Agriculture was approximately Q625 million, of which Q250 was used to pay for free fertilizer for farmers. The budget for the agricultural research service, ICTA, was only Q13

11. IICA, Propuesta de Reestructura del Instituto de Ciencia y Tecnologías Agrícolas dentro del Sistema Nacional e Investigaciones Agrícolas, 2006, p. 64 en la Propuesta sin cambio del Marco Jurídico.
12. ALSTON, J.; Pardey, P. 1996. Making Science Pay. The Economics of Agricultural R&D Policy. Washington, The American Enterprise Institute. 373 p.

million, or 0.037% of agricultural gross domestic product. In reality, almost the entire ICTA budget went to pay salaries, with almost no funding available for the actual costs of research. In effect, public sector funded agricultural research and technology transfer do not exist in Guatemala.

3. Guatemalan Agricultural Technology Institutions and USAID Support

The Guatemalan Government first assumed a role in supporting the development and dissemination of agricultural technology in the 1950s, when the US Government Point Four program provided technical advisors from the U.S. Department of Agriculture. In the early 1960s, with support from the newly created USAID (under the Alliance for Progress program), Guatemala established the Instituto Agropecuario Nacional, which had both a Servicio de Investigación and a Servicio de Extensión. In the early 1970s, the Ministry of Agriculture was reorganized, with the creation of the Instituto de Ciencias y Tecnología Agrícola (ICTA), the Dirección General de Servicios Agrícolas (DIGESA) and the Dirección General de Servicios Pecuarios (DIGESEPE). ICTA was responsible for agricultural and livestock research and the other institutions for extension.

It is important to note that ICTA was established as an autonomous institute with a board of directors (with the Minister of Agriculture as President), and independent authority to earn fees for services and spend these resources in accordance with its own policies. It also had authority to establish its own personnel policies independent from those of the rest of the public sector. On the other hand, DIGESA and DIGESEPE were divisions within the structure of the Ministry of Agriculture, and had no independent financial or human resource policy capacity. The philosophy behind this dichotomy was that research requires scientists with greater technical preparation than does extension, so it was considered essential that the required human resources for research be given career stability and access to resources needed to undertake long-term research projects.

The creation of ICTA, DIGESA, and DIGESEPE (and other institutions responsible for grain marketing and agricultural credit) was supported by an agricultural sector loan from USAID. In addition to paying for technical assistance to improve the quality of the research, and equipment and vehicles and other costs incurred in establishing these new institutions, USAID resources financed scholarships to U.S. universities that trained a core of new leaders of agricultural technology research and extension in Guatemala.

USAID's intent at the time was to undertake a long-term commitment to improving the quality of agricultural research and extension in Guatemala. However, when the massive earthquake caused wide spread damage in 1976, U.S. assistance and GOG resources were redirected toward reconstruction activities. Shortly thereafter the Carter Administration cut off military assistance to the Government of Guatemala due to concerns about human rights abuses, and eventually US economic assistance was limited to private and non-governmental organizations. This policy was continued during the Reagan administration, with its preference for private sector led growth rather than support for public sector solutions.

USAID reestablished support for the Ministry of Agriculture during the late 1980s, including the purchase of a fleet of vehicles to assist extension agents to reach farmers. USAID also supported a pilot project to explore possible creation of a private agricultural extension activity. However, in the 1990s USAID's budget levels dropped precipitously, and policy concern shifted away from agriculture toward environmental issues.

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In 1997, reportedly at the urging of the World Bank, the Government of Guatemala undertook a radical reorganization of the public agricultural sector, including the elimination of DIGESA and DIGESEPE, privatization of the public agricultural bank (BANDESA), privatization of most of the silos of the agricultural marketing institute, and a reduction in funding for ICTA. The intent at the time was that a fund would be established with the GOG resources that had previously been spent on the two extension services to be used in subsidizing on a declining basis the provision of agricultural technical assistance to farmer organizations by private service providers. The USAID AGIL project, which began in 2000, was designed in part to help structure this mechanism. However, the Ministries of Agriculture and Finance instead redirected the resources that had previously funded DIGESA and DIGESEPE toward other concerns (including a massive program to give fertilizer to small farmers), and the fund to finance private extension was never established. The end result is that for the past twelve years Guatemala has not had a public sector agricultural extension service and its agricultural research institute has become ineffectual. USAID provided some assistance to ICTA after Hurricane Mitch in order to make seed available to those affected, and USDA has provided some Food for Progress assistance in recent years to make seeds available to small producers. However, USAID has not provided institutional strengthening support to ICTA.

Finally, in the early 1990s, USAID provided $1 million to establish an agricultural research fund in AGEXPORT. This fund was used to co-fund competitive grants for agricultural research primarily focused on the expansion of non-traditional horticulture export crops. By requiring payment of at least one for one matching funds, AGEXPORT was able to capitalize its fund and keep the program going for eight years.

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4. Other Donor Programs

There has been sporadic support from other donors for ICTA in recent years, but no donor has undertaken a comprehensive program to support agricultural research and without a public sector extension service no donor support has been provided for that activity. The largest donor investment in agricultural technology in Guatemala was made by the Inter American Development Bank by funding AGROCYT, a competitive fund to finance agricultural research by public and private entities. This activity has ended and the experience is currently being evaluated, but there are indications that the guidelines for targeting of activities were too broad and that the overall impact of the effort was limited. IICA provided technical assistance in 2007 and 2008 to design an institutional restructuring of ICTA, but without increased public resources and an agreement with the ICTA employees union the restructuring could not be undertaken. USDA and Cooperación Española have offered support for specific activities but no donor has offered support for ICTA's critical need to address its human resources and infrastructure constraints. Five of ICTA's 13 experiment stations are currently operating, and the European Union is providing support to the station in Chimaltenango with training in grain seed and horticulture research. The Government of Japan's JICA agency is providing support with the dissemination of new technologies from the ICTA experiment station in Quetzaltenango. Finally, ICTA receives some technical support and new plant material from CATIE and the CGIAR international agricultural research centers.

5. Guatemala Policy concerning GMO Research

By law, crops using seeds that are produced using genetically modified processes can only be grown in Guatemala if they are for export. It is not legal to import commodities produced using genetically modified organisms into Guatemala for human consumption, although a number of consumer items imported from the United States include ingredients that were produced using GMO. GMO grain production is now occurring in Honduras, El Salvador and Mexico, and the head of ICTA believes that some produce has entered Guatemala illicitly. A draft law to change Guatemala's policies on GMO has been introduced to Congress and will soon be considered by the Agricultural Commission, but prospects for its passage are very slim, especially with a Presidential election season beginning.

B. Status and Prospects for Agricultural Research

1. Public sector research

a. Current Status of ICTA

Although at one time ICTA was seen as a model for agricultural research institutions in developing countries, it has obviously fallen below this standard. According to the current Director of ICTA the reasons for this decline are lack of political support over time and mismanagement of the institution in the past. ICTA's situation is not unique, since the trend in the 15 public agricultural research institutions in Latin America has been to reduce budgets and researchers. However, ICTA's situation is the worst in the region, as the ratio in Guatemala of the public sector agricultural research budget to agricultural GDP is the lowest in all of Latin America.

The number of researchers in ICTA has declined from 166 in 1991 to 67 now, and there are only 10 researchers for corn and 5 for frijoles, the two staple crops of the Guatemalan diet. In 2009, ICTA only received Q8.5 million from the GOG and had to draw down on the capital reserves for its seeds program just to meet its payroll. If it does not receive a new injection of financing from the GOG in the near future it will be forced to close. The ICTA Director estimates that the institution needs a minimum of Q25 million to operate, and Q60 million to be an effective research organization. To provide research for all the crops it is mandated to support would require Q100 million.

As an autonomous institute, ICTA's Board of Directors is its governing body. The members of the Board are the Ministers of Agriculture, Economy, Finance, and SEGEPLAN, plus members representing the private sector, San Carlos University, and one representing the private universities. The law establishing ICTA indicates that Board members will receive a "dieta" for attending Board meetings of Q50, which equaled $50 when ICTA was created. It is now worth about $6, and all of the Board members regularly send substitutes to the meetings. ICTA lacks policy leadership.

ICTA's decline has affected all aspects of the organization. Although it still is able to keep five of its 13 research stations open, this is in part due to financial support from donors. Ninety percent of ICTA's budget goes to salaries, and most of the rest pays for operation of its installations. The salaries of ICTA employees are at the same level they were 15 years ago, and are lower than those of other employees with equivalent education and experience in MAGA. The research staff is aging as new staff is not being hired, and as a result the staff lacks interjection of recently trained researchers with up to date skills. There have been a number of proposals to reduce the number of employees in order to free up resources to actually fund research activities, but the institution lacks the funds that would be needed to cover severance pay. Many of the researchers could earn more money, and contribute more to Guatemala's development, if they were to work elsewhere, but they feel they cannot afford to quit and forgo their right to severance pay. The employees are also represented by a labor union, which has proven inflexible in seeking solutions, despite the reality that salaries are substandard. At a meeting sponsored by USAID/TCAP to explore the status of public agricultural research and extension, the ICTA researchers vociferously argued that the solution has to be more money, not less staff.

ICTA's physical plant and equipment are severely deteriorated. Its central office and research station in Bárcenas no longer has a water supply (water is pumped to fields from a nearby stream for irrigation, but not to its offices). The institution has been cannibalizing spare parts to keep a few tractors running in order to keep growing the genetic material in its seed bank. Many of its buildings are old and require considerable maintenance. ICTA uses one of its remaining tractors to run a pump to bring water to the fields, as the engine on the pump doesn't work.

ICTA has few effective links to other segments of the Ministry of Agriculture. ICTA recently promoted the creation of the Sistema Nacional de Investigación de Tecnología Agrícola (SNITA) to coordinate research agendas between public, private and academic research organizations, but the fact that the Guatemalan universities no longer require theses for Ingeniero Agrónomo degrees has greatly reduced research within the academic institutions.

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b. Future Prospects for ICTA

The Minister of Agriculture (who took office in March, the fourth Minister in the first two and a half years of the Colom administration) has told the Director of ICTA that additional resources will be provided by August to keep the institution functioning through 2010 and that a budget of Q50 million will be requested for 2011. Given the financial problems of the Government of Guatemala even prior to significant damage to major infrastructure from Tropical Storm Agatha and more recent storms, and given the government's inability to get the Guatemalan Congress to approve a budget for 2010 and anticipated problems for 2011, it seems questionable that the Minister will be able to fully meet his promise.

IICA provided intensive support to design a restructured and more dynamic ICTA in 2007/8, but there was no political commitment or funding to implement the plan. ICTA has very significant structural weaknesses, including very weak human resources, obsolete and nonfunctioning equipment, and dilapidated physical plant. If a decision is reached to create a strong public sector agricultural institution in Guatemala, the best course of action might be to formally close ICTA and pay severance pay to all of its employees, and then create a new institution that could selectively hire those old and new researchers worth the opportunity, at salary levels that would motivate performance.[13] Some of its research stations have been invaded by farmers and others overtaken by urban sprawl, and it would probably be necessary to dispose of many of the stations in order to reduce the size of the system to one that could be maintained. The mandate for the new institutions would also need to be reduced to cover just basic grain and frijol crops, in collaboration with private seed and other input producers. Close linkages to the international agricultural research institutions would also be necessary.

However, any attempt to create a revitalized public agricultural research institution would require strong and sustained political support within Guatemala. Given Guatemala's many other problems, such support has not materialized up to now.

Development of appropriate technologies for basic food crops is a public good that logically should be the responsibility of a public institution funded by the government's budget. The only other alternative is to use public funds to contract private research on basic food crops, and avoid the problems of a public institution. However, the failure of the Guatemala Government to meet its commitment to provide funds for private provision of agricultural extension services does not bode well for the Government taking on a commitment to contract for long-term agricultural research. Discussion of future options concerning public sector agricultural research will be included in section D below, but they do not look encouraging.

2. *Private agricultural research*

a. ARF

The Agricultural Research Fund (ARF) was established in the late 1980s under the USAID Highlands Agricultural Development (HADS) project. USAID provided a grant of $2 million to AGEXPORT to set up a competitive grant fund for agricultural research. The program focused on the research needs of the non-traditional horticulture export industry, and was demand driven as it required that all research projects be at least 50% co-funded by the private sector. If a follow on research project was undertaken the private sector contribution was increased to 60%, and to 70% for a third project. Not more than 20% of the funds provided for any research project could be used for administrative expenses.

Since the program focused on short-cycle horticulture crops, no ARF funded research project could extend beyond 18 months. A total of 20 projects were carried out. Once a firm or group of producers identified a specific agronomic problem with an export horticulture crop, a consultant would be contracted to analyze the problem and develop a research protocol and proposed budget. This would be reviewed by the ARF Consultative Council, and if they did not have technical knowledge of the topic a second consultant would be contracted to analyze the validity of the research protocol. Once approved, a monitoring committee was set up consisting of the ARF Director and the interested private sector firm or individuals. This firm would monitor the research progress and encourage a thorough and prompt compliance with the contracted research agenda. Many researchers commented that they had never been so thoroughly supervised.

The ARF program lasted far beyond the end of the USAID project, due to the accumulation of matching contributions from the private sector. However, after eight years the total funds were depleted and the program came to an end. This was a pilot effort to see if the model would work, so there was no attempt to institutionalize a permanent source of support. If there is an attempt to resurrect ARF, it will be necessary to address its long term sustainability.

13. Closure of an autonomous public institute in Guatemala requires 67% of votes in Congress, so it might be easier if a new institution is created and simply lay off all staff with severance pay and transfer out all assets, but leave the institutional shell.

This research model is particularly suited to the short-term research needs of existing horticulture exporters. However, the model has several short comings as a potential tool for meeting other agricultural research needs. Even for the horticulture sector, this model does not lend itself to the research of potential new crops for Guatemala, as a single investor might be unwilling to assume 50% of this expense, and the research could easily require more than 18 months. Secondly, the model would not work well for basic grain crops, because research on new varieties and other issues can often take many years, and it would be difficult to find a source of co-funding for an activity that is in essence a public good. The co-funding element is critical to this model, as it assures that the issue is directly relevant to actual farmers (therefore demand driven), and it spreads the impact of a limited amount of resources. However, the third problem is the issue that led to the demise of ARF. Donors are willing to fund a pilot activity without a vision of long-term sustainability, but are unwilling to take on a commitment to continually fund an ongoing activity. Unless a source of permanent annual, non-donor funding can be identified, the model is not sustainable. The only options would be to:

1. Obtain a legally binding commitment from private producer or agribusiness organizations to provide X amount of funds for Y number of years to provide the seed capital for the matching grants,
2. Establish an endowment that would generate sufficient resources above the inflation rate to provide the ARF with resources that would match co-funding of research projects, or
3. Somehow obtain a binding commitment for annual contributions from the public sector.

b. CENGICAÑA

The Centro Guatemalteco de Investigación y Capacitación de la Caña de Azúcar (CENGICAÑA) is totally funded by the Guatemalan sugarcane industry. It is a useful model of agricultural research that is institutionalized based on private sector support. Creation of the Center was facilitated by the fact that the sugarcane industry is highly concentrated. A small number of very large sugar processing plants could reach a consensus to establish the Center much more easily that a large number of unaffiliated processors or producers. Because the Center is controlled by a small group of relatively wealthy individuals and firms, it is able to adopt a long-term vision and long-term research initiatives that would not have been possible under ARF (described above). For example, one of the CENGICAÑA research projects is the investigation of a new sugarcane variety identified in Asia. To complete the research agenda will take 12 years. The Center is also concerned about climate change and the potential impact on the watersheds that supply irrigation to cane fields. The Center manages 16 meteorological stations within the sugar growing area to record temperature and rainfall and other indicators, in order to keep the industry informed of current conditions and also to monitor long term trends.

CENGICAÑA receives $0.04 for every bag of sugar exported, and each sugar mill contributes 4% of its profits into a fund which the mill uses to directly fund CENGICAÑA research activities of particular interest to it. Activities funded with the general funds are available to all producers and processors, whereas those funded by specific processing plants are proprietary. CENGICAÑA is an excellent model of how a single industry can mobilize to fund long-term agricultural research in the absence of a public sector commitment to this requirement.

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c. Future Prospects

USAID/TCAP sponsored a symposium on private led and funded agricultural research on July 15, 2010 in Guatemala City. The event generated far more interest than anticipated, with the active participation of over 70 persons, 50 of whom were leading Guatemalan agricultural producers and business people. Presentations were made at the symposium by the former head of ARF, Ricardo Santa Cruz, and by the Director General of CENGICAÑA, Mario Melgar. In addition, presentations were made by the Director General of the Fundación Hondureña de Investigación Agrícola (FHIA), Adolfo Martinez, and by the Director Executivo of the Centro de Innovación de la Floricultura Colombiana (CENIFLORES), Jorge Iván Restrepo.

ARF and CENGICAÑA were described above. CENIFLORES is part of a network of organizations that provide investigation services for the various subsectors of agriculture in Colombia, as well as the public sector Instituto Colombiano Agropecuario. Each of these institutions is extremely well funded and staffed, and CENIFLORES has sufficient political clout to obtain public sector financing when needed. It was fascinating to learn about this structure, but it had little applicability for the conditions of Guatemala.

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FHIA, on the other hand, is a very applicable model as it is addressing the same concerns that affect Guatemalan commercial agriculture. It was established in 1984 when United Brands decided to close its banana/plantain research program and laboratory in La Lima, Honduras. USAID worked closely with the Minister of Agriculture to design and create a private foundation to take over management of the facility and provide research and laboratory services to support private sector-led agricultural diversification. USAID approved a ten year, $20 million project to support the Foundation, and ten years later facilitated creation of a $16 million endowment from local currency generated through ESF macroeconomic support to Honduras.

The Foundation has 88 members who elect eight of the nine members of the Board of Directors (the Minister of Agriculture is a permanent member of the Board but the rest come from the private sector). There are four categories of members, and one category (socios aportantes) consists of individuals and firms who provided the US equivalent of $50,000 to the Foundation. The endowment fund has grown to $18 million, and interest from this fund currently covers 35% of the FHIA budget. The rest of the budget is covered by fees charged for services, including for management of donor funded projects. The services include laboratory analyses (soils, pesticide residues, identifying pests, etc.), nurseries, sale of produce, and training and publications. FHIA has four experimental/demonstration stations in different parts of Honduras, one of which it is a Government of Honduras facility that it is managing under a donor funded contract.

FHIA's five priority areas of activity are agroforestry on fragile slopes, horticulture production in the valleys and highlands, sanitary/phytosanitary management, forest plantations, and fruit production. Its annual budget is currently $4.4 million.

The presentation of these four models was followed by a panel of leading Guatemalan agribusiness leaders who described the importance for Guatemala and for their own companies to have access to a reliable source of quality agricultural technology. They also commented on the applicability of the various models described by the four presenters. Following the comments by the panel members, there was an extended period of public discussion, with a nearly unanimous call for the establishment of a non-governmental agricultural technology entity, with varying ideas as to whether it be a foundation or a fund similar to ARF. One of the speakers commented that Guatemala in the past had a virtual monopoly on the supply of

snow peas to the U.S. and European markets in the off season. However, Peru has invested in technological advances that now threaten the central role of the Guatemalan industry. Other examples were given of cases where Guatemala was not taking advantage of potential agricultural exports due to the lack of applied research.

At the end of the symposium the group endorsed a proposal by one of the panel members that a strategy be developed for the creation of a private led research entity, including definition of its mandate, structure, cost, and sources of funding. Four principles were identified that should govern the effort:

1. Improve productivity;
2. Increase competitiveness;
3. Create value added for the products; and
4. Be sustainable in environmental, sanitary, and financial perspectives.

There was a clear understanding that the creation of such an institution or fund would require financial support from the private sector, although there were also frequent references to the need for support from international donors.

The symposium achieved all that was expected of it, in terms of generating interest and ideas for a new initiative to achieve a stable source of technology for the commercial agricultural sector. Now a specific proposal needs to be developed, including identification of possible sources of financial support. Only at that point will it be possible to determine whether this initiative is viable.

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C. Technology Transfer

1. Public Sector

a. ProRural

When the Colom government came to office, it immediately began plans to establish an extension service. The initial home for this service was the Programa de Desarrollo Rural (ProRural), a new organization under the President's office focusing on integral development of Guatemala's poorest 125 municipalities. In 2009 this program reportedly employed 230 extension agents and 880 local promotores working under the direction of 16 supervisors in 955 communities. The program was implemented in Totonicapán, Sololá, San Marcos, Quiche, Huehuetenango, Alta and Baja Verapaz, Santa Rosa, Jalapa, Jutiapa, El Progreso, and Zacapa. The promotores were selected by the local communities and the producer groups.

One of the problems the program encountered is that the Guatemalan universities' agricultural curricula no longer include training in extension, since the elimination of the MAGA extension service was perceived as doing away with this specialty. It is not clear to the author why the agronomy graduates wouldn't benefit from training in how to interact with and provide training to campesinos, since those that go to work for private firms would need these skills. ProRural began discussions with INTECAP to provide a certificate program in agricultural extension in order to train its staff. They also began preparing videos to provide training to farmers in soil preparation, seed selection, and other themes.

However, ProRural's budget for the extension program for 2010 was not approved. The head of the extension program and the head of ProMAIZ (which also lost its funding this year) indicated that they are still not certain what happened. The author had understood that the ProRural extension program was transferred to MAGA (see below), but the head of the program indicated that the MAGA extension program was to be a parallel initiative focusing on different geographic locations (although in fact the MAGA program is focusing on the same departments, creating duplication and confusion).

b. MAGA

MAGA established its new extension service on April 25, so in effect it is a work in progress. At a meeting sponsored by USAID/TCAP to discuss the public sector research and extension programs, as well as review the results of the symposium on private sector led research, the head of the MAGA extension program, Pedro Rosado, provided a detailed description of the new program. They have thus far established 37 agencies in Zacapa, Chiquimula, El Progresso, Baja Verapaz, and Quiché, with 123 extension agents (39 agricultural, 37 home economics, and 35 4H advisors). They plan on establishing 48 more agencies by the end of 2010, with 175 more extension agents. The plan is to have 10 local promotores per extension agent. MAGA plans on having agencies in 275 municipalities in 2011.

The author (and others) had originally understood that the extension agents would work for the municipal governments, after being jointly selected by the municipality and MAGA (similar to the Técnicos Forestales that work directly for the municipal mayors, under the supervision of the Instituto Nacional de Bosques (INAB)). However, the description provided at the TCAP meeting was that MAGA will have Departmental Coordinators of Agricultural Extension, and the extension agencies will work directly for these coordinators. It was unclear during the presentation how the promotores are selected but it did not appear that the communities served would have the lead role in this process. Most of the new extension agents are aged 18 to 24, and at this point there is no training program for them or for the promotores.

The promotores will receive a salary of Q1560 per month, and the extension agents an amount somewhat higher. The promotores salary is relatively high due to the need to comply with the legal minimum wage for rural areas. The annual budget just for the number of promotores hired in 2010 will be about Q17,000,000, and with the salaries of the extension agents, supervisors, and associated costs the total could easily reach $4 million. The expansion of the program to 275 municipalities in 2011 would more than triple this cost.

In a separate meeting at the TCAP office in June, the director of the effort to establish a new extension service indicated that the new extension program would receive Q32 million of bond sale resources which will pay for personnel and some of the operating costs. The General Manager of ICTA informed us that Q8 million of that institution's Q23 million budget for 2010 was being transferred to the extension service. So it appears that the new program's budget is closer to $5 million this year. Clearly the GOG is giving greater priority to extension than to research.

The leader of the new MAGA extension program has requested technical assistance from TCAP in the preparation of an agricultural extension strategy.

c. Future Prospects

The Government of Guatemala is clearly placing very high priority on agricultural extension, despite the unfortunate confusion between the roles of ProRural and MAGA. The USAID/TCAP meeting to discuss public sector agricultural research and extension was attended by Christopher Dowswell, who worked as the chief assistant to Nobel Prize winning agricultural researcher Dr. Norman Borlaug at CIMMYT for 31 years. Mr. Dowswell had an opportunity to discuss with Pedro Rosado his plans for agricultural extension in greater depth during a break in the TCAP sponsored event. Based on

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those discussions, Dowswell believes that the model being used for the extension service promotores is more similar to what one would expect of promotores sociales than for promotores agrícolas. The new program has no linkages with sources of agricultural technologies, either ICTA or private input suppliers. In addition, the program has not established any measures to be used in assessing impact. The role of the extensionista de hogar and the extensionistas de jovenes is even less clear.

More important, the program does not provide a role for farmers or municipalities to shape the agenda for the extension service, which Dowswell considers a critical aspect based on his knowledge of such systems worldwide. As an example, Pedro Rosado gave a detailed description of plans to have farmers build terraces, with walls constructed with rocks collected in clearing the farm. Dowswell doubted that farmers would take on this arduous task unless someone paid them to do so, and this is not contemplated.

It appears that the extension service is being implemented quickly in order to establish greater GOG presence in rural communities. However, without an intensive training program, links to sources of technology, and real community support and leadership, it is unlikely that the program will have an impact on agricultural production. The Ministry's plan to rapidly ramp up the extension service, rather than starting it in a limited number of locations on a pilot basis, is probably not an advisable approach. We will discuss Pedro Rosado's request for technical assistance in developing a strategy for agricultural extension in section IV.

2. Private Sector

a. Input Suppliers and Agro processors/exporters

The transfer of new agricultural technologies to small scale horticulture and coffee producers in Guatemala has traditionally been done by the processors and exporters who buy their production, as it is in the interest of these firms to assure that the product they receive meets quality and sanitary/phytosanitary standards. This is especially the case where new crops are being introduced with which the small farmers have no prior experience. Some technical advice has also been provided in the past by input suppliers, especially seed and pesticide salesmen. AGEXPORT seeks to strengthen these relationships through its Encadenamientos Rurales program. While the role of purchasers and suppliers is an essential component of technology transfer for high value crops, it has not proven an effective mechanism for improving the use of productive technology for small scale basic grain producers. The primary constraint to increased production faced by these producers is poor plant nutrition, requiring improved soil conservation and management and micro-dosing of fertilizers. Commercial input suppliers cannot earn a financial return from providing this type of advice.

b. Non Governmental Organizations

A number of NGOs and PVOs in Guatemala have implemented effective technology transfer programs that have increased production, however these are often limited to specific locations. The Fundación AGIL has managed an effective program, in collaboration with Mercy Corps and Wal-Mart, in assisting small scale farmers to produce non traditional horticulture crops that meet world sanitary/phytosanitary standards. In addition, USAID's various food aid partners have carried out very effective extension programs for some time to introduce farmers to modern production methods. However, each of these organizations is only able to have an impact on a limited geographic area. For example, one of the food aid partners carries out a very comprehensive extension program that results in significant increases in small farmer production and incomes, but the activity is only implemented in 6 of Guatemala's 333 municipalities. In addition, each of these examples is totally dependent on continued donor funding, and therefore is not a sustainable option for continuing transfer of agricultural technologies.

c. Future Prospects

Private provision of technology transfer support for small farmers is an effective means to facilitate small farmer access to technology and hence to increase their production and incomes, especially for specialty coffee and horticulture producers. However, it is not a substitute for a public sector agricultural extension service to reach the hundreds of thousands of small scale basic grains producers, if this is the objective.

D. Possible Program Approaches

1. Public Sector Research and Extension Options

At this time there does not appear to be an opportunity for USAID to invest in improved generation of agricultural technology via public sector agricultural institutions in Guatemala, and an invest in public sector technology transfer, if any, should be conditioned upon the adoption of a viable strategic plan. The GOG agricultural research service, ICTA, has such enormous structural problems that various attempts to reform it have failed. It is underfunded and there is no political will within the GOG to effectively reform it. Its staff cannot be fired and cannot be renovated. And its physical plant and equipment need to be replaced. To create an autonomous public sector institution in Guatemala requires a two thirds majority vote in the Congress, and the same percentage is required to dissolve one. Therefore, eliminating this institution probably is not feasible. A parallel public sector institution could be established and the worthwhile staff rehired by it and the useful assets transferred to it, and ICTA could be left as an empty shell.

However, in the current political environment no one appears interested in taking on this challenge, and it could be extremely difficult to muster the political coalition to obtain approval for such a change. There are better private sector options (to be discussed below) for providing agricultural research services to the dynamic non-traditional horticulture industry, and the coffee and sugarcane producers have access to the level of research they require through their own organizations. It is reported that basic grain yields of small scale farmers in Guatemala are mainly constrained by lack of plant nutrients, and this issue must be addressed by educating the farmers about improved plant management techniques via an effective extension program, and does not require additional research. Therefore, USAID support for revamping public sector agricultural research in Guatemala should not be a priority for achieving its Feed the Future objectives.

The Government of Guatemala is committed to creating a new public sector agricultural extension service, although the constant changes in Ministers of Agriculture over the past two and a half years has slowed down this effort. An extension service was first created in ProRural, and then it was abandoned this year to establish a similar organization in MAGA. The MAGA program is being quickly expanded to a large number of municipalities, without adequate attention to training of agricultural extension agents and promotores, assuring that local leaders set the extension agenda, establishing a system to measure the effectiveness of the effort, and linking the new extension agents with sources of technology.

The leader of the MAGA agricultural extension service has requested that the USAID TCAP program provide an expert advisor to assist with development of an agricultural extension strategy. Clearly, development of such a strategy should have preceded the establishment of the service, not afterwards. The author also understands that USAID Washington is considering award of a cooperative agreement or contract to a consortium of US land grant universities, under which they will do assessments of the agricultural extension services of all 20 countries selected for participation in Food for Progress. Given the fact that the current MAGA extension program is already launched, any effort to provide assistance with this strategy will be difficult. On the other hand the Mission may want to go on record with a description of how such a program should be run, so that this document can be shared with other donors and with the next GOG. An effective mechanism to transfer improved technology to the vast number of poor agricultural producers would certainly facilitate achievement of the Feed the Future objectives, but it is unclear if the Guatemalan Government is willing or able to undertake such an effort in a serious manner. At least its present initiatives are not encouraging.

2. Private Sector Research and Extension Options

USAID should continue to assist with the dissemination of appropriate agricultural technologies that focus on basic grain production through NGOs and PVOs. USAID could explore with these organizations options to expand the number of clients served, and to reduce per beneficiary cost of disseminating technology in order to expand impact. The author realizes that this approach does not meet the Feed the Future criteria of supporting permanent solutions to the issues that constrain food security, but it is the only option available until a more coherent GOG institutional approach becomes available.

The symposium that USAID/TCAP sponsored on private sector funded and led agricultural research generated a surprising amount of enthusiasm among leading private sector agricultural producers and agribusinesses (primarily in the horticulture subsector, but also involving others). There were about fifty such individuals, and support for developing a plan for creation of such an institution was strongly expressed. Two consultants are currently developing a proposal for establishment of such an institution. It will be ready shortly, and the same participants in the original symposium will be invited to review and comment on the strategy. The objective at that time will be to have the participants nominate a committee of private agricultural and agribusiness leaders to begin the steps necessary to create the institution.

There are of course a number of difficult issues that will need to be addressed before the feasibility of this initiative can be fully assessed. The chief of these is the source of financial support. The successful FHIA was created with the donation by United Brands of a functioning laboratory complex, with a ten year USAID grant to cover operating costs, and eventually with the grant of an endowment. In Guatemala no similar laboratory complex exists, USAID and other donors can only commit funds to activities for a limited time period, and sources of endowment resources are difficult to find. However, Guatemala has an advantage that Honduras did not have when FHIA was established, in that it has a large, vibrant non-traditional agricultural export industry.

The proposal that is being developed will contemplate two or three options, corresponding to different levels of financial support, and the process to create the institution will have to be adjusted depending on the support that can be enlisted. Options could range from creation of a sustainable ARF, creation of a financial mechanism that would contract FHIA to establish a horticulture research station in Guatemala, or the creation of a sister private agricultural research foundation in Guatemala.

There is a clear and present need for a reliable source of agricultural technology to support the existing non-traditional agricultural export industry in Guatemala, and to pave the way for its continued expansion. Guatemala's horticulture sector serves a wide variety of clients, including those in the U.S. and Europe, Central America (especially El Salvador), and the domestic market. The acquisition by Wal-Mart of most of the major supermarkets in Central America creates a more unified source of demand in the Central American region, and within Guatemala. But this market is increasing its quality requirements, and this means that producers must have access to improved technologies.

The strong felt need among the Guatemalan private agricultural/agribusiness sector for the creation of a credible, non-governmental source of technological information for the non-traditional agricultural export market represents an important opportunity. FHIA has demonstrated the feasibility of this model, and a center of excellence in Guatemala that assures continued modernization of the Guatemalan horticulture sector could have a profound impact on Guatemala's development. USAID should provide such support as it can to see if a feasible option can be identified. And if such an institution can be established, support during its nascent years would be strongly justified in pursuit of increased rural incomes in Guatemala.

No similar strategy to create a permanent, private sector-led agricultural extension service is currently available in Guatemala. The technology that would be developed, if a private agricultural research institution could be created, would be directly distributed by the agribusinesses that would be members of the institution or by those that purchase its services. For the immediate future, non-governmental organizations could also be expected to disseminate the technological information.

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VIII. Analysis of Access to Rural Finance Issues

A. Background

Extreme poverty and chronic malnutrition are particularly pronounced in rural areas of Guatemala, and the primary economic activity in these regions is agricultural production. Increased agricultural production depends to a great extent on use of productivity improving technologies, and these technologies require inputs (seeds, fertilizer, pesticides) whose cost exceeds the resources of most small producers. In addition, if farmers shift to higher value crops, then longer term investments are usually required, e.g. planting of tree crops, irrigation systems, processing facilities, collection centers, packing houses, cold storage, etc. This paper will analyze the current status of the Guatemalan financial system and the effective supply and demand for agricultural credit and other financial services and recommend possible program interventions that USAID could consider for improving the efficiency and effectiveness of this system. The paper will focus on access to financing by Guatemala's small scale commercial farmers, primarily specialty coffee and horticulture producers. Large farmers have access to financing, and improving the incomes of the large number of subsistence basic grain producers mainly requires dissemination of farming techniques that require little capital financing.

Much of the information presented in this document has been drawn from two reports prepared by consultants under the USAID/TCAP program. Mr. James Fox prepared an analysis of the status of the Guatemalan banking system in July 2010, and Dr. Michael Schwartz prepared a report titled "Financial Services: Availability and Access for Guatemalan Small Coffee and Horticultural Producers."

This paper will begin with a brief background description of the current status of the Guatemalan banking system and other financial institutions, the available statistics on lending to the agricultural sector, and a description of other donor activities related to this theme. The next section will analyze the effective demand for rural financial services, followed by a section discussing the constraints on effective supply of these services in rural areas. The final section will propose options for future USAID programming approaches.

B. Guatemala's Financial System

1. Status of the Banking System

The Guatemalan banking system has made considerable progress and has been able to weather the recent worldwide financial market crisis with few problems. The Bank of Guatemala has sustained sound economic policies and the Superintendent of Banks has taken appropriate steps to assure the integrity of the banking system. The total credit to the private sector by the formal banking system represents about 28% of GDP, up from 13% nineteen years ago (although still only about half the ratio prevalent in Honduras and Costa Rica). The banking system as a whole currently has the highest rate of profitability compared to any other sector of the economy.

There has been considerable consolidation of financial institutions in Guatemala in recent years, as the number of banks declined from 26 in 2006 to 18 today. In part this consolidation has resulted from implementation of new international norms affecting levels of bank capitalization (Basil I). It is likely that the consolidation of the system will continue as there are significant economies of scale in banking, and there are a number of very small banks that will have difficulty competing with the larger banks. At the same time that the number of banks has been reduced, there has been a rapid creation of new agency offices. There are 2,500 bank agencies in Guatemala now, which is double the level in 2006. As many of these new agencies are outside the cities, this greatly facilitates access to financial services in these zones. Until 2007 all banks in Guatemala were owned by Guatemalans, but now a third of the 18 Banks are foreign owned.

The following table shows the trend in credit outstanding for the banking system. The three largest banks control two-thirds of the market (Table 11).

Table 11. Guatemalan Banking System-Banks by Credit Outstanding, 2006-2010 (millions of Quetzales).

Bank	2006	2007	2008	2009	2010 (March)	Market Share, 2010	Cumulative Market Share
Industrial	11,954	16,444	18,904	18,935	18,617	25%	25%
Desarrollo Rural	7,745	13,258	14,975	15,992	15,997	21%	46%
G&T Continental	7,614	12,292	13,374	13,485	13,140	18%	64%
Agromercantil	3,480	5,723	5,538	6,448	6,390	9%	73%
Reformador	2,763	4,768	4,936	4,545	4,298	6%	78%
Citibank	533	177	5,381	4,331	4,026	5%	84%
De Los Trabajadores	1,865	2,239	2,948	3,715	3,793	5%	89%
De América Central	1,943	2,437	2,744	2,862	2,788	4%	93%
Internacional	1,742	1,921	2,122	2,327	2,156	3%	96%
Crédito Hipotecario	727	679	732	739	782	1%	97%
Proamérica	0	0	0	696	681	1%	98%
Inmobiliario	666	595	546	550	562	1%	98%
De Crédito	247	245	291	362	375	1%	99%
Azteca	0	248	467	386	360	0%	99%
De Antigua	468	427	388	364	359	0%	100%
Americano	166	184	192	177	170	0%	100%
Vivibanco	30	20	20	16	14	0%	100%
Other Banks	9,572	7,326	1,276	0	0	0%	100%
Total	51,515	68,983	74,834	75,930	74,508		

Source: Superintendencia de Bancos, Guatemala, Informe del Sistema Financiero, March 31, 2010 and previous, from James Fox, Report on the Guatemalan Banking System, July 2010.

The Guatemalan Superintendent of Banks calculated that for the first quarter of 2010, Guatemalan banks had available liquidity ("disponiblidades") of 22.8 billion Quetzales (close to $3 billion dollars), or about 16.3% of their assets. It is likely that these assets consist mainly of short-term government paper or other very liquid instruments. Guatemalan Government bonds earn only 4.5%, so there is a strong incentive to find borrowers capable of paying higher rates.

Over 93% of the private banking system loans are given for consumption, commerce, and industry activities. As will be shown later, agriculture receives just over 5% of the total loans, or about $500 million from the private banks.

The primary factors limiting further expansion of the banking system in Guatemala according to a leading banker are the level of crime and violence in the country, the economic problems facing the real economy, and the mixed signals being given by the Government of Guatemala concerning economic policy. The crime and violence not only increase the cost of doing business for the banking system itself, but also increase the risks and lower the competitiveness of Guatemalan firms, thus decreasing the effective demand for loans. The Guatemalan economy is currently constrained by stagnant global economic conditions since trade is a primary engine of growth. The frequent changes of Ministers of Economy and Agriculture, and the recent change of the Minister of Finance, have caused considerable uncertainty concerning the economic policy environment. The result of these factors is the liquidity statistic cited above. Some argue that this liquidity results from the fact that it is too easy for bankers to just park the resources in government bonds, and not do the hard work of finding good borrowers. However, government bonds only pay 4.5% interest, so even though they are low risk they are not very profitable. The banker mentioned above also argued that the profitability of the banking system is due primarily to the fees they are able to charge for a wide range of financial services, rather than profits on loan activity. The one highly profitable type loans is for consumer credit (via

credit cards), but the banker is worried that banks have gone overboard in this area due to the high returns and the system is exposed to losses if the economy falters.

2. GOG Trust Funds

The Government of Guatemala frequently uses trust funds to finance development activities, either with resources provided by international donors, or with its own resources. The activities funded through this mechanism are quite varied, and in some cases the trust funds are merely a disbursing tool to expedite program implementation, for example the Fondo Vial, administered by the private Banco Industrial, which is a disbursement/payment mechanism for road maintenance contracts.

The size and complexity of the GOG Trusts Funds has grown to a level that makes them an important factor in financial markets. The Ministry of Finance currently tracks 75 trust funds that have been established by the Government of Guatemala, and information can be found at the following site: http://www.minfin.gob.gt/fideicomisos/parte4.html. The current liquidity in these trust funds (i.e. resources that are readily available, not counting funds that are in longer term deposits) under central GOG programs is Q3.875 billion, and under decentralized institutions (primarily municipalities) the sum is about Q1 billion. The total liquidity is therefore about $610 million.

In Annex J we present a selected list of the trust funds that have been established that provide funding for rural, primarily agricultural, activities. The total contracted amount when these trust funds were established was about $384 million (many trust fund contracts provided that additional amounts could be added to the contracted amount). The currently available amount in the trust funds is $91.5 million. These trust funds are mainly managed by Banrural, although a few of them are managed by other banks. The banks earn fees for administering the resources, and can also use the liquidity provided by these resources to provide financing to other activities until the resources are used for the intended purposes. Not surprisingly, the execution rate of trust fund activities is often slow as the banks sometimes can benefit most by not disbursing the funds.

Each of the trust funds includes clear definitions of the types of activities that can be financed, the types of borrowers who can qualify, the terms that are to be applied to the financing (length of loans, interest rates), etc. Financial sector experts have long argued that this type of targeted financing is counterproductive to the development of effective private sector financial markets as it creates distortions, and can crowd out the development of private sector mechanisms that in the long term could direct greater resources toward the favored activity than can be made available through public sector targeted financing. However, since these funds already exist, USAID should take them into account in preparing its Feed the Future strategy, as these resources (and those of other inactive trust funds) could potentially be redirected to meet financing needs to address food security issues.

3. Other Financial Institutions

There are several important non-bank financial institutions in Guatemala. The largest of these is the Federación Nacional de Cooperativas de Ahorro y Credito (FENACOAC). It has 27 cooperatives as members, and these coops have 166 service centers throughout Guatemala. The system has a total of 850,000 members, and manages consolidated deposits totaling $500 million, with $475 million of loans outstanding. Most of the saving and loan cooperative financing goes for commerce, housing, and other urban or semi-urban activities, but approximately 10% is reportedly provided for agriculture. There have been recent examples of producer associations and agricultural cooperatives entering into alliances with specific savings and loan cooperatives that facilitate lending for agricultural production and marketing, and providing small agricultural producers with access to safe savings account options and remittance flow management.

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A second type of non-bank institution that is important in Guatemalan financial markets is finance companies (financieras). Thirteen percent of the portfolio of these institutions is composed of loans for agricultural activities, more than double the percentage of the sector's share of bank loans. However, the total size of this portfolio is relatively small, and only about 3% of total financing to the agricultural sector comes from this source. Most of the finance companies are actually owned by Guatemalan banks.

Off-shore lending sources provide 17% of the total financing of the Guatemalan agricultural sector, and the sector receives 6.5% of all off shore lending, which is higher than the share of financing the sector receives from Guatemalan banks. However, off shore financing tends to be restricted to major exporting firms. Two off shore lenders of interest are the US Root Capital and the Dutch Oikocredit. They provide resources to small producers through their organizations (cooperatives or associations). Oikocredit's loan range is $100,000 to $7 million, and Root Capital's is $25,000 to $1 million.

A fourth category of significant non-bank financial institutions is micro-finance institutions (MFIs). As of 2008 there were 23 such organizations that provided $144 million in loans to 262,705 borrowers. The micro finance movement has traditionally focused on financing of small scale commerce activities, and to some extent assistance with family emergencies. The interest rates charged by the MFIs are normally higher than the returns on investment available for most agricultural activities, and their financing is normally for very short periods, which also makes this an inappropriate source of funds for agriculture. However, some IFIs (Génesis Empresarial) have provided short-term financing for coffee marketing costs, and to allow farmer associations working under contracts with the World Food Program to pay producers without waiting a month for grain cleaning and delivery to be completed in order to receive the WFP payments. A new micro finance law is expected to be adopted in 2010 that will allow MFIs to receive deposits and borrow resources from other sources, which could lead to a rapid expansion of the MFI system.

Of the total financing to the agricultural sector, 80% is provided by Guatemalan commercial banks. Also, half of all loans received by the agricultural sector are denominated in dollars, indicating a strong bias in financing toward export activities.

4. Value Chain Credit

An additional source of credit for agricultural production activities is private financing made by agricultural input suppliers, agro-processors, and exporters. It is in the commercial interest of these firms to increase the quality of production of agricultural commodities, either as a way to sell more inputs (fertilizer, seeds, and pesticides) in future years, or to expand the level of processing and exporting activity. The source of funds used to provide this financing may be the internal working capital of the agribusiness firms, or could be bank loans negotiated by the firms for the purpose of providing the onward financing. In other cases, private firms may simply provide guarantees for private bank loans to producers, and then pay off these loans directly to the bank from sale of the produce, before paying the producer.

While this is an important, and in some situations the only source of financing for small producers, there is evidence that it is an extremely costly source of funds. Interest rates reportedly are typically around 4 to 5% a month. The prices of agricultural inputs provided on credit are up to 50% higher than for inputs purchased with cash. And an agricultural processor or exporter who receives produce for which it provided advance funding will often discount the prices for the produce received. The producers would prefer that financing be provided through normal financial institutions, rather than incur these costs. And it is likely that the agribusinesses would also prefer that financing be provided by specialized financial institutions so they could concentrate on their core business.

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A recent study prepared for the FAO identified significant issues with this type of financing: "*Faced with the insufficient outreach of financial intermediaries, farmers along agricultural value chains find in interlinked credit transactions with buyers, processors or input suppliers an incomplete substitute for financial intermediation. These arrangements, sometimes called supplier finance or value chain finance, rest on the advantages that different actors have in lending to other actors along the same value chain. These advantages overcome information gaps, because of the familiarity and trust between actors. There are important drawbacks of such arrangements, however, including the limited range of services offered (typically only short-term credit), the constraints of the lending entity (without access to funds from outside the value chain, most of these actors will have a difficult time in expanding their credit portfolios), the high probability for the credit relationship to disappear when market dynamics change (since such transactions are often tied to specific crops), and the greater potential for exploitative lending.*" [14]

5. Rural Finance Activities by Other Donors

Very limited donor resources are targeted at financial market development, and even less for expansion of rural financing. The World Bank recently completed a $5 million technical assistance project for financial services. The IDB has provided limited funding to the Bank Superintendent for risk supervision, and a new IDB MIF project will assist with expansion of micro financing. The IDB has also provided trade finance lines of credit for $150 million to two private banks over the past two years, some of which probably has helped finance the export of agricultural products.

There have been additional other donor financing for agricultural production activities that are components of broader projects. For example, one of the Trust Funds listed in Annex J, Proyecto de Desarrollo Rural de la Sierra de los Cuchumatanes, was established to provide financing to producer organizations as part of a broader IFAD and Government of Holland integrated development program for that region. No donor is currently addressing the issues of financial market reform or systemic issues limiting access to rural financing.

C. Bank Lending for Agriculture

The following table shows the percent of private sector loans by economic sector by year. Private bank loans to the agricultural sector have averaged just over 5% of total bank loans over the past five years, despite the fact that agriculture makes up over 13% of GDP. Lending to agriculture was over 6% of total loans in 2006, prior to the closure of Banco de Café. Other sectors that received less credit in relation to their contribution to GDP were manufacturing and transport/storage. The sectors that receive the largest amount of bank loans, in relation to their percentage contribution to GDP are commerce, construction, and financial services (Table 12).

Table 12. Percentages of Credit by Sector, 2006-2010.

Sector	2006	2007	2008	2009	2010 March
Agriculture	6.1%	5.3%	5.3%	5.2%	5.2%
Consumption	24%	26%	26%	26%	26%
Transfers	4%	2%	2%	3%	3%
Mining	0%	0%	0%	0%	0%
Manufactoring	11%	11%	11%	11%	11%
Electricity, gas and water	3%	3%	3%	3%	3%
Construction	12%	15%	15%	15%	15%
Commerce	21%	20%	20%	19%	19%
Transport, storage	1%	1%	1%	1%	1%
Financial services	10%	12%	12%	12%	12%
Community services	4%	3%	3%	3%	3%
Other	3%	1%	1%	1%	1%
Total	100%	100%	100%	100%	100%

Source: James Fox, Report on the Guatemalan Banking System, July 2010.

14. Claudio Gonzalez-Vega, et. al., "Value Chains and Financial Intermediation: Some Theory and a Case Study about Creditworthiness, Supermarkets and Small Producers in Central America", FAO, Rome, 2007.

The sector distribution of financing in this table may not be totally accurate, as banks sometimes intentionally misreport the sector to which loans are made since the Central Bank requires different percentages of loan loss reserves for loans to different sectors. As Jim Fox, who supplied this table, commented: "Might a manufacturing firm use credit to expand its sales of agricultural inputs? Might loans for commerce be used to promote agricultural production? In both cases, the answer is likely to be yes."[15] However, despite this caveat, the table probably gives a realistic portrayal of the sector distribution of private sector loans.

The following table shows a comparison of sector share of GDP in 2009 and its share of private sector bank loans. This table is somewhat confusing, in that it excludes loans for some activities, particularly consumption which is the leading use of loans, and it excludes other sectors of the economy, such as government services and housing. For this reason, in this table agriculture is shown to have a 21% share of this subsample of GDP, whereas its share of overall GDP is 13.5%. However, the table gives a good idea of which sectors of the economy attract the greatest loan financing, and which sectors are underrepresented (Table 13).

Table 13. Bank Lending and GDP Shares, 2009.

Sector	Share of GDP, 2009	Share of Bank Credit	Credit Share/GDP Share
Agriculture	21%	8%	38%
Mining	1%	0%	27%
Manufactoring	28%	16%	58%
Electricity, gas and water	4%	5%	123%
Construction	5%	23%	445%
Commerce	18%	29%	162%
Transport, storage	17%	2%	9%
Financial services	7%	18%	259%
Total	100%	100%	

Source: James Fox, Report on the Guatemalan Banking System, July 2010.

This table shows that construction, commerce, and financial services all receive a larger portion of the total portfolio of private bank loans in Guatemala than would be expected given their overall role in the economy, whereas agriculture, manufacturing, and transport/storage receive less.

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15. Fox, James *Report on the Guatemalan Banking System*, August 2010.

The agricultural sector in Guatemala is dynamic and a major driver of the country's growth. It generates 50% of the nation's employment and 60% of Guatemalan exports. The percent of bank loans for agricultural activities that are in arrears was 2.3% in March 2010, compared with 2.6% of total bank loans. So, why does the Guatemalan financial system under finance this sector? Why does it instead over emphasize increasingly risky consumer finance, and place its excess liquidity in GOG bonds? The answers to these questions, based on an analysis prepared by Dr. Michael Schwartz, are that there is too little effective demand from the agricultural sector, and the banking system has not learned how to provide effective supply of financing.[16] These two themes will be discussed in the following two sections of this report. The following quotation emphasizes the importance of these themes:

"[Financial] services are demanded to improve the management of liquidity, deal with risk and cope with adverse shocks in less costly manners, implement improvements in technology and productivity, and accumulate assets more efficiently. Increased access to sustainable financial intermediaries able to supply a broad range of financial services at competitive prices and [under] terms and conditions adapted to the demands of small and medium producers, augments the welfare of the rural population. In most developing countries, however, formidable obstacles keep the rural outreach of financial intermediaries quite limited. These obstacles arise from demand and supply shortcomings and are greater when the clients are poor, the transactions are small, risk cannot be easily mitigated, information is scarce, and mechanisms for contract enforcement are unavailable.

The rural ***demand*** *for financial services is constrained by high transaction costs, a limited ability to signal creditworthiness to potential lenders at reasonable costs, and low repayment capacity due to lack of market opportunities.* ***Supply*** *is similarly restricted due to lack of reliable information about potential borrowers, the difficulties of contract enforcement, and covariant risk facing potential lenders in rural areas. Costs and risks increase with distance, in all of its dimensions -geographic, social, ethnic, cultural, linguistic, occupational, and the like- and with isolation. Usual shortcomings include the narrow range of financial services offered. Few services are offered, in ways that do not adequately address the requirements of the portfolios of activities found among participants in value chains."*[17]

D. Inadequate Effective Demand for Agricultural Financing

Almost every analysis of the constraints to increased agricultural production by small farmers in developing countries cites inadequate access to credit. Any strategy that can turn a subsistence small farmer into a commercial producer requires adoption of productivity enhancing technologies, and in most cases diversification of production into higher value crops. This process requires use of agricultural inputs (seeds, fertilizer, and pesticides) that cost more than the average small farmer can afford. The problem is even more complicated if the transition requires medium term investments, like installation of irrigation, planting tree crops that require several years to enter production, protective infrastructure like plastic sheet tunnels to keep out pests, and collection and packing centers. It seems obvious that there is a strong, unmet demand for agricultural credit.

However, from the financial market's perspective, there is a great difference between felt need for credit and effective demand. Effective demand represents those credit applicants who have the qualifications to warrant approval of a credit application (assuming for the moment that the banking system applies economically efficient loan approval criteria; this is not always the case and will be addressed in the following section on effective supply of credit). The following are the principal factors that undermine the creditworthiness of agricultural producers.

1. Scale and Dispersion

It is widely recognized that a principal issue in providing credit to small farmers is the transaction cost, i.e. the cost incurred by the lender in meeting with the borrower, receiving and processing a loan application, disbursing funds, and monitoring compliance with the loan. These problems are accentuated when, as is the case in Guatemala, the borrowers are dispersed geographically. The problems become critical when the small size of the loan is considered, since the transaction costs then become very large as a percentage of the total loan. In providing credit to small farmers, lenders must deal with:

1. relatively low capital demand per production unit,
2. lack of real property guarantees,
3. widely dispersed demand for technology, inputs and information, which increases their costs, and,
4. marketing logistics for decentralized production.

16. Schwartz, Michael, Financial Services: Availability and Access for Guatemalan Small Coffee and Horticultural Producers, August 2010.
17. Claudio Gonzalez-Vega, *et al Ibid.*

The interest rate or fees required to cover these transaction costs, plus the cost of capital and an allowance for risk, becomes very high. The only remedy to this issue is to group farmers into larger units, via an association or cooperative, or by making the loan through an intermediary such as an input supplier or product exporter.

2. Lack of Collateral

The Guatemalan banking system has a conservative culture, and it is interesting that foreign banks that have become involved in this market have adopted the same culture. Loan approval depends principally upon the value of the real estate collateral offered, and less on the appraisal of the project's cash flow and profitability. The only real estate property that is usually accepted as collateral is urban property, in part because small holders often have unclear title to their land, and even if it is a good title, bankers do not want the political and financial cost of foreclosing such property.

One Guatemalan cooperative overcame this constraint by having all members assign possession of the titles to their land to the cooperative, and this (combined with a lien on the cooperative's real assets) enabled the cooperative to obtain bank financing at reasonable rates. It is unlikely that many small farmers would submit to such a process, due to the unwillingness to risk title to their land, especially if the risk is communal and not personal.

A policy change a few years ago that many felt would open up the market for rural lending was adoption by the Government of Guatemala of a law for movable assets (Ley de Garantías Mobiliarias). This law created a registry where all liens on movable assets, such as tractors, irrigation pumps, vehicles, cattle, etc., could be registered. In theory, this should have facilitated extension of credit to individuals for purchase of movable assets, or as an acceptable guarantee for loans for other purposes. However, despite the fact that about $750 million of movable assets have been registered, the commercial banking system continues to prefer mortgages on real estate as a guarantee.

Donors and the Government of Guatemala have attempted to address this issue by establishing guarantee funds. USAID's Development Credit Agreements provided a 50% guarantee on private bank funds lent for specific purposes. However, although private banks in Guatemala sought access to this program, and several agreements were signed, the program has stimulated very little new loan activity. The Government of Guatemala created the Dacredito/Guate inverte program with the Quetzal equivalent of $18,750,000 that provides up to 80% coverage for bad debts. In 2009 about 850 loans were made under this program through one of the two private banks accessing the guarantees, G&T Continental (the other participating bank was Agromercantil). G&T considers the program as a transition mechanism to provide services to new customers until they prove their acceptability as normal clients. However, it is too early to see what sort of loan guarantees the bank will require of the new customers once they graduate from the GOG coverage.

3. Risk of the loan

The search for acceptable collateral as a guarantee in providing loan financing is not unreasonable, given the risks involved in agriculture, especially risks associated with farmers who undertake a transition from subsistence to commercial farming. In a recent study by the World Bank of snow pea growers associated with the Cuatro Pinos cooperative in Guatemala over a twenty year period, the authors identified six factors that increased the risk of this business[18]:

1. extreme price fluctuations;
2. increased competition from other growers and other exporting countries;
3. stagnant production efficiency;
4. organizational management problems (within *Cuatro Pinos*);
5. quality compliance;
6. low risk bearing capacity.

While participation in this new commercial activity increased returns to family labor, over the twenty year period there were periods of profit and loss that create a level of risk that discourages provision of financing by Guatemalan private banks. Improved use of technology would mitigate many of these risks, and the dilemma for the banks is how to distinguish those prospective clients that will use such technology appropriately and those that will not.

18. Carletto, C, *et.al.*; Non-Traditional Crops, Traditional Constraints; World Bank Policy Research Paper 5142, 2009.

4. Lack of Credible Information

An additional factor that limits the effective demand of prospective agricultural clients for loans from the Guatemalan banks is the difficulty the banks have in obtaining credible information about the producers or their organizations. In part this is a problem of the banks, as will be discussed below in the section addressing issues with effective supply of credit, because only a few Guatemalan banks employ staff knowledgeable about agriculture. However, even for banks that do have appropriate staff, it is difficult to obtain a credible appraisal of the financial status of farmers and farm organizations, and of the prospects for their endeavors. Futures markets do not exist for the non-traditional export products grown by Guatemala's horticulture producers, and although futures markets do exist for coffee, they are often irrelevant for the specialty coffees produced by Guatemala's small farmers. Many farmer organizations, and basically all small producers, do not produce statements of income and expense and in fact often do not record the data from which such statements could be prepared.

While an experienced bank official knowledgeable about the agricultural sector could construct a reliable projection of farm income based on an assessment of the farmer's technological capacity and the trends for the products to be produced, there are not many such experts working for Guatemalan banks. In their absence, lack of this information impedes the ability of the farmers to qualify for financing.

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5. Small Farmer Organization Management and Financial Strength

The only effective way to decrease transaction costs incurred in providing financing to large numbers of small farmers is to group them together in associations, cooperatives, or other such organizations. However, the credibility of this approach depends on the management capacity of the farmer organizations. In addition, if an organization is to serve as the intermediary for financing, its own financial strength becomes an issue. The Cuatro Pinos cooperative is currently seen as a leading institution in the expansion of non-traditional agricultural exports in Guatemala. However, in the early 1990s the farmer directors of this successful cooperative dismissed their manager and assumed direct control of the organization. Over the next several years, the cooperative's significant financial reserves were depleted and its produce failed to meet the quality standards for import into the United States. At the point that the organization was close to failing, the prior manager was reemployed and the cooperative returned to profit. Of course, all small businesses are subject to reversals. As financial intermediaries, banks must be agile at assessing the management capacity of their prospective clients. However, there is a significant difference between assessing the status and prospects of a single entrepreneur compared to those of a farmer organization whose future leadership is ultimately in the hands of poorly educated farmers. In the short term, active donor technical assistance can provide the bank with confidence in the viability of the organization, but such assistance is time limited, and after it ends only a successful track record, stable management, and credible financial records can earn the organization access to financing.

E. Effective Supply of Financial Services

In the previous section a series of structural problems were discussed that limit the ability of small farmers to qualify for bank loans. However, not all farmers are poor risks, and on the supply side of financial services the main structural weakness is that most of the banks do not understand agriculture or the rural economy in general. As quoted earlier, the developing country financial market expert Claudio Gonzalez-Vega stated: "*Costs and risks increase with distance, in all of its dimensions -geographic, social, ethnic, cultural, linguistic, occupational, and the like- and with isolation.*" Guatemalan banks are all based in Guatemala City and like many professional Guatemalans most of the bankers tend to have had little exposure in their lives to rural living except perhaps for occasional visits to large coffee or sugar plantations.

As pointed out by Mike Schwartz in the paper cited earlier, "… *within the group of commercial small producers (and their organizations) there are important differences in capacity, reliability and competitiveness. By not making this differentiation and continuing to view the small farmer universe as monolithic, the "good" commercial farmer and his respective value chain are adversely affected. When seeking financial services, "good" producers are very often viewed through the same lens as "bad" producers (inefficient, unreliable, etc.); in part, because the means for differentiating among these producers are difficult or costly. Ideally, the creditworthiness of a small producer or organization and his request for services should be evaluated on the basis of:*

1. *the economic viability of the activity in question,*
2. *the capacity of the small producer (and/or his organization),*
3. *the availability of efficient mechanisms to deliver financial and technical services that maximize coverage, while minimizing costs and risk."*

Jim Fox in his paper, also cited earlier, comments that "it seems likely that the primary explanation (for bankers' perceptions of agriculture as a risky sector) is simply that most banks lack the experience and expertise to operate in the sector. Success, as evidenced by Banrural, involves technical staff with substantial numbers of *ingenieros agrónomos*, and others with understanding of the rhythms and issues that confront the agricultural producer and processor. Only Banrural and G&T-Continental seem to have committed themselves to develop and train the necessary professional staff."

The inability of most banks to cull from the mass of farmers those who represent good risks is a structural weakness and affects the effective supply of credit. To be effective in providing financial services to the rural sector, and particularly agriculture, requires a different set of financial instruments and processes than those to which the banks are accustomed. For a loan officer who is required to meet a quota for a certain volume of loan operations, it is easier to focus on urban consumer loans than to reach out to commercial farmers.

However, some of the larger banks in Guatemala have begun to adopt structural changes that will facilitate increased rural lending. The number of bank agencies in Guatemala more than doubled between 2006 and 2008, and many of the current 2,500 agencies are located in rural areas. Also, G&T Continental and Banco Industrial have adopted a system of agents without agencies, where local businessmen and women in small towns, for example the local pharmacist or hardware store owner, are authorized in the Bank's name to receive small deposits, make small loans, process credit card applications, manage remittances, etc., and receive a fee based on a small percentage of the transaction. This model was first introduced by FENACOAC and up until now the rural lending provided by these agents has tended to be for micro enterprises involved in commerce. However, it is an important innovation that will increase the banks' understanding of the rural economy.

In 2006, G&T Continental established a Microcredit Lending Program that has expanded to 8 regions, six of which are rural. Microcredit here is a misnomer, based on the common definition used internationally, as loans are made for up to $10,000 for operations and $20,000 for investments. The program to date has provided loans averaging $3,800 to more than 20,000 rural clients, with simpler documentation requirements that the norm for commercial loans.

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The increased attention being given to rural areas by the three largest Guatemala banks, Banco Industrial, Banrural, and G&T Continental, which collectively have two-thirds of the Guatemala banking system's loan portfolio, is highly encouraging. And where these leaders go other banks are likely to follow. However, for there to be an effective supply of credit to rural areas financial services designed for urban lending will need to be modified. The following are the principal issues:

1. **Credit timing and coverage**: Loans to agricultural producers tend to cover input costs but not hired labor. In the case of small farmer production of coffee, 67% of annual costs are labor, with two thirds of this expense for harvest. Mike Schwartz analyzed tomato production and marketing as a case study for the horticulture sector and found that while labor costs represented a smaller proportion of total costs than for coffee (37%) they still came to $2,200 per manzana, which is a large sum for small producers. Why labor should not be considered a valid working capital expense in a loan application is not clear. Most bank loans also exclude financing for technical assistance to the farmers, which is highly counterproductive as access to modern technology is the most important factor in lowering risk. Finally, the timing of loans can be a critical issue. In the case of coffee, loans normally come due at the time of harvest, which forces producers to sell much of their coffee at the time that prices are lowest.

2. **Interest rates**: Interest rates on short term capital financing range from 10.5% to 24%. Schwartz calculated that rates over about 14% erode the competitiveness of small commercial farmers, under current economic conditions. The inability of banks to distinguish between "good" small commercial farmers and those who are more risky, and to factor this into interest rate calculations, penalizes the sector as a whole. Access to more information on the borrowers would allow calculation of appropriate rates based on cost of capital, realistic risk assessment, and transaction costs. A 14% interest rate represents 9.5% more than the bank can earn depositing the resources in government bonds, and if the arrearage rate on agricultural loans is only 2.3%, it would appear that this is a healthy margin.

3. **Limited use of garantías mobiliarias**: As noted earlier, although Guatemalan law has changed to allow use of movable assets and guarantees for loans through the creation of a registry of such assets, the banking system has yet to make extensive use of these guarantees. Such

guarantees are particularly important for rural lending and especially for agriculture. Again, if bankers have access to more information on rural borrowers, and have staff that understands this sector, then they may be more willing to deviate from their normal preference for urban property mortgages as guarantees.

4. **Medium term lending**: Many of the most important investments for modernizing commercial agriculture require medium term investments. Many small producers would make much more money, and at lower risk, if they shift from annual crops to tree crops (mangos, avocados, citrus, cacao, improved coffee varieties, and even commercial forestry). Specialty coffee and horticulture producers have other investment requirements that cannot easily be paid for from a single harvest, such as irrigation distribution systems, and collection, packing, and processing facilities. However, all of these investments require access to loans with medium term payback requirements, and at interest rates that would avoid spiraling costs.

F. Possible Program Approaches

As noted above, the recent expansion of the Guatemalan banking system into rural areas is highly encouraging. The system is relatively healthy and competitive, and a few of the banks are investing in the human resources needed to become effective in rural lending. Eventually, this system should be able to continue to adapt in ways that will allow agricultural lending to become more prominent in bank portfolios.

As the banking system evolves, the structural weaknesses affecting borrowers must also be addressed. The analysis prepared by Mike Schwartz emphasized that improving the effective demand for credit requires increased scale of operations and appropriate use of appropriate technology. Provision of financial services and productivity enhancing technical assistance must to be more closely integrated. The analysis prepared by this author, as part of the series of Feed the Future analyses for USAID, of the constraints on access to agricultural technology in Guatemala painted a dismal picture, and a possible new initiative described there to create a private sector led and funded institution to serve the technology needs of commercial farmers is an important potential step to address this need. Only with sustained access to appropriate technology can commercial farmers lower their risks to the point that they can consistently attract financing.

There may be ways that USAID and other donors could help commercial farmers qualify for and have access to appropriate financial services. The following are options that could be considered.

1. **Human resource development**: There are several areas where more highly trained and experienced human resources are needed to expand access to rural finance. As banks hire increasing numbers of ingenieros agrónomos to serve the agricultural sector, they are likely to find that these individuals have inadequate training in certain key areas. With the abandonment by the GOG of the public agricultural extension function in 1997, the Guatemalan university system dropped courses in extension from the agronomy degree programs. Therefore, recent graduates have received no training in how to communicate with farmers. The university system needs to reestablish these courses and assistance could be provided in how to structure them so that they are applicable to agronomists working as bankers and in various other roles. Short courses could be offered to improve the skills of agronomists who already have their degrees to help them to increase their skills. In addition, increased attention to training in agricultural economics would help prepare human resources for the banking industry.

   Short-term training and observational tours for bankers to learn from banking practices successfully used in other developing countries to expand lending to rural borrowers could help accelerate the change process in Guatemala. Possible countries that could offer useful models include Colombia, Peru, and Chile.

   A third area where increased human resource development would be beneficial, in this case addressing the need for effective demand for credit, is in agricultural cooperative and farmer association management. These organizations need to be significantly strengthened in order to qualify for sustained access to financing. The experience of the Cuatro Pinos cooperative in succeeding, failing, and recovering all hinged on having competent management. Currently such training is available mainly through on the job training supported by selected donors and PVOs. AGEXPORT could offer such a course through its Escuela de Comercio Exterior. However, for Guatemala to be sustainably competitive in the global market, managers will need to become even more capable, and the Guatemalan university system

should consider developing specialization programs in farmer organization management as an option within their business schools.

2. **Credit rating service**: USAID assisted the development of a credit rating service for the micro finance industry under the AGIL project during 2000 to 2004. A similar service capacity for providing private banks with independent information on the credit worthiness of agricultural borrowers and/or their organizations would help banks begin to distinguish between good and poor risks. There are a number of entities that gather information in Guatemala that is used by banks in assessing credit worthiness, but few farmers are listed. Several banks indicated to Mike Schwartz during interviews that this service would be useful.

3. **Integrating banks into the value chain**: A number of donors, most notably USAID, have invested in the development of agricultural value chains in recent years. By more closely linking input suppliers, producers, transporters, buyers, processors, and exporters, small farmer integration into commercial agriculture has been improved. Banks need to become effective formal participants in these value chains. Farmers or farmer associations who have been selected as participants in a value chain have already been recognized by the industry as capable producers, and as members of the value chain they have access to technology and markets that are critical to mitigating risks. Banks therefore should have considerable incentive to provide the financing needed to make the production possible, perhaps initially with guarantees provided by the buyers, processors, or exporters. This financing would in some cases substitute for credit provided by input suppliers or buyers, which have been shown to have exorbitant costs.

4. **Encourage FENACOAC to provide more financing to agriculture**: As noted earlier, the Guatemalan Federation of Savings and Loan Cooperatives, FENACOAC, has nearly a million members in its 27 affiliated cooperatives, and a combined loan portfolio of $475 million, 10% of which is for agricultural activities. There have been isolated efforts to associate specific savings and loan cooperatives with agricultural producer organizations, so that financing to producers is provided by the savings and loan cooperatives, and the producer association repays the loan when it markets the producer's crop. FENACOAC's system of cooperatives tends to have excess liquidity and the institution has expressed interest in assistance in developing the techniques and procedures that would allow greater lending to the agricultural sector.

5. **Farmer organization strengthening**: Mention was made above of the need to further invest in development of managers of farmer organizations. A broader effort might also be justified as these organizations serve an important role in increasing the scale of production activities and marketing capacity. The benefits of transaction cost reduction for a bank to provide services to a single farmer organization rather than to a large number of individual producers are clear. However, this is only true if the organization itself is credit worthy. The experience in Guatemala tends to indicate that cooperative organizations that are affiliated to a federation (such as FEDECOCAGUA and FENACOAC) tend to be the most sustainable, as the federation can exercise quality control over the cooperative's management. Donors, including USAID, have worked successfully in recent years with farmer associations, which have less formal structures than cooperatives and lack a federated structure. Long-term sustainability of these organizations probably will require some sort of second tier structure.

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6. **Guarantee funds and risk capital funds**: There have been good and bad experience with guarantee funds, but the good examples provide a basis for possible expansion. There is almost no source of risk capital financing in Guatemala, since even the Latin American Agribusiness Development Corporation, which specializes in this service, has minimal operations. The GOG has approximately $500 million of liquidity in various trust funds, much of which appears to be stagnant. It would be worth exploring potential use of some of these resources to expand the guarantee funding mechanism and possibly to create new sources of risk capital financing.

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Area that could be irrigated

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Selected Government of Guatemala Trust Funds for Rural Development

Annex A

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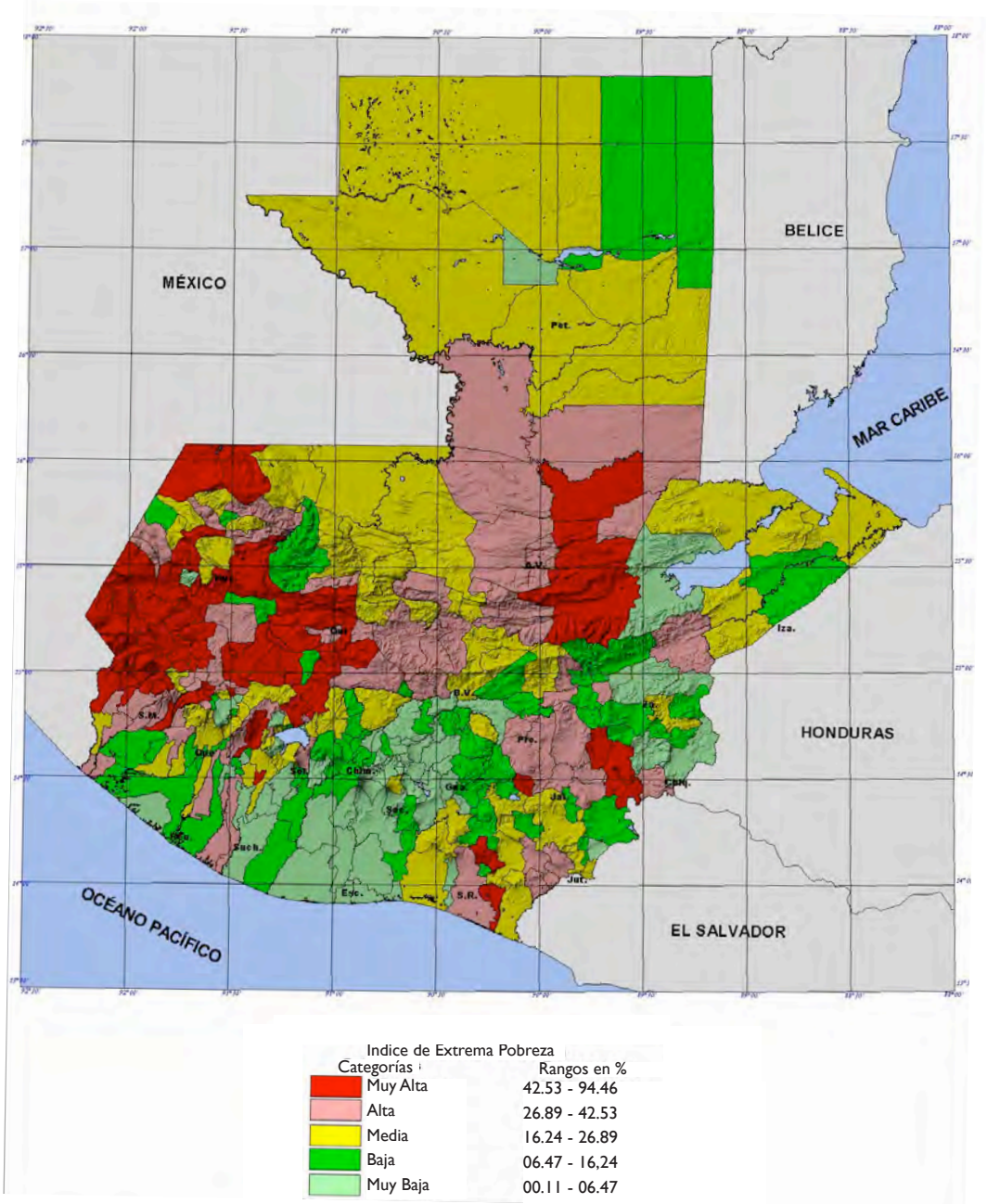
Annex B

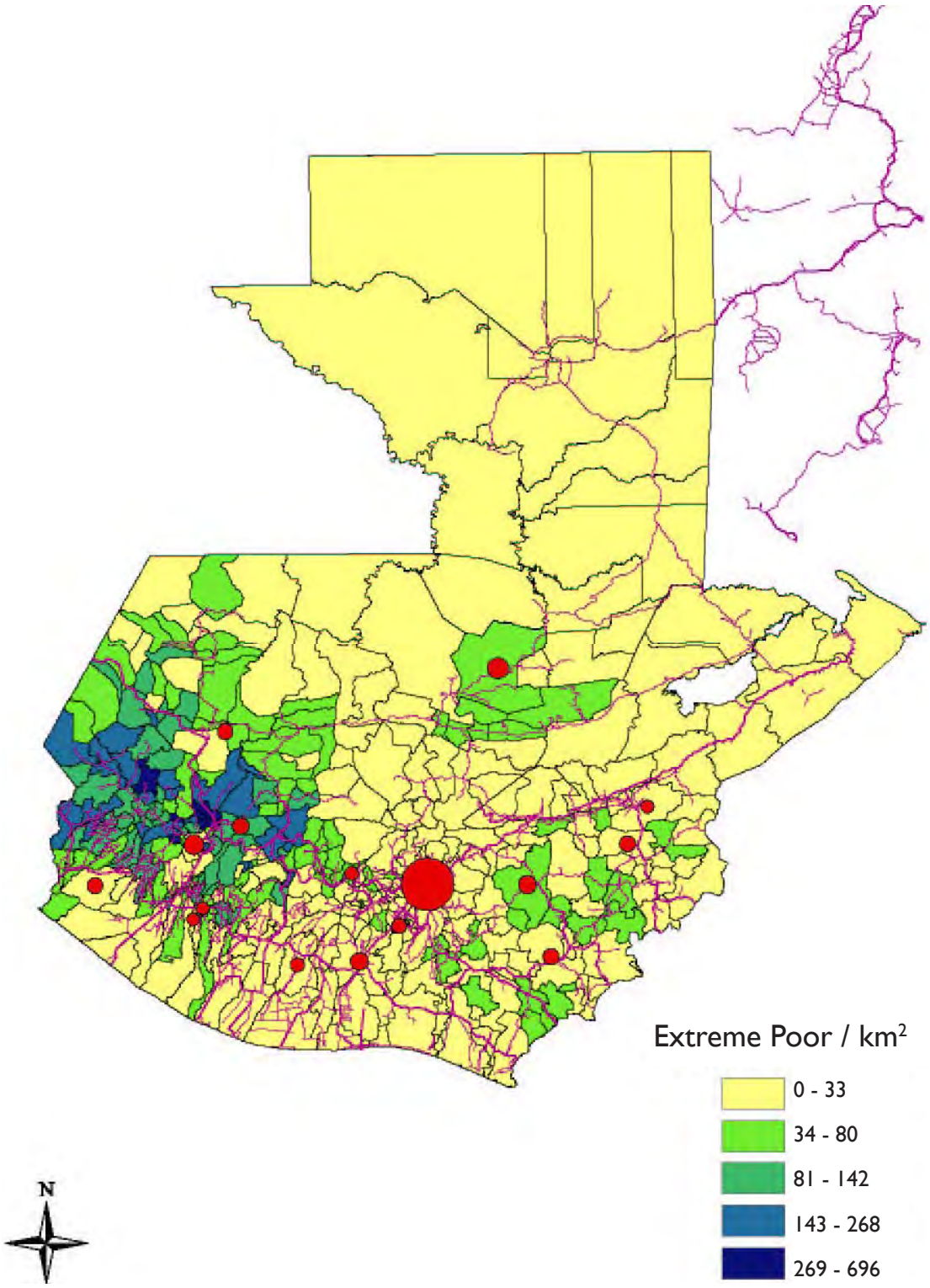
List of Maps

B-1. Extreme Poverty Guatemala 2002



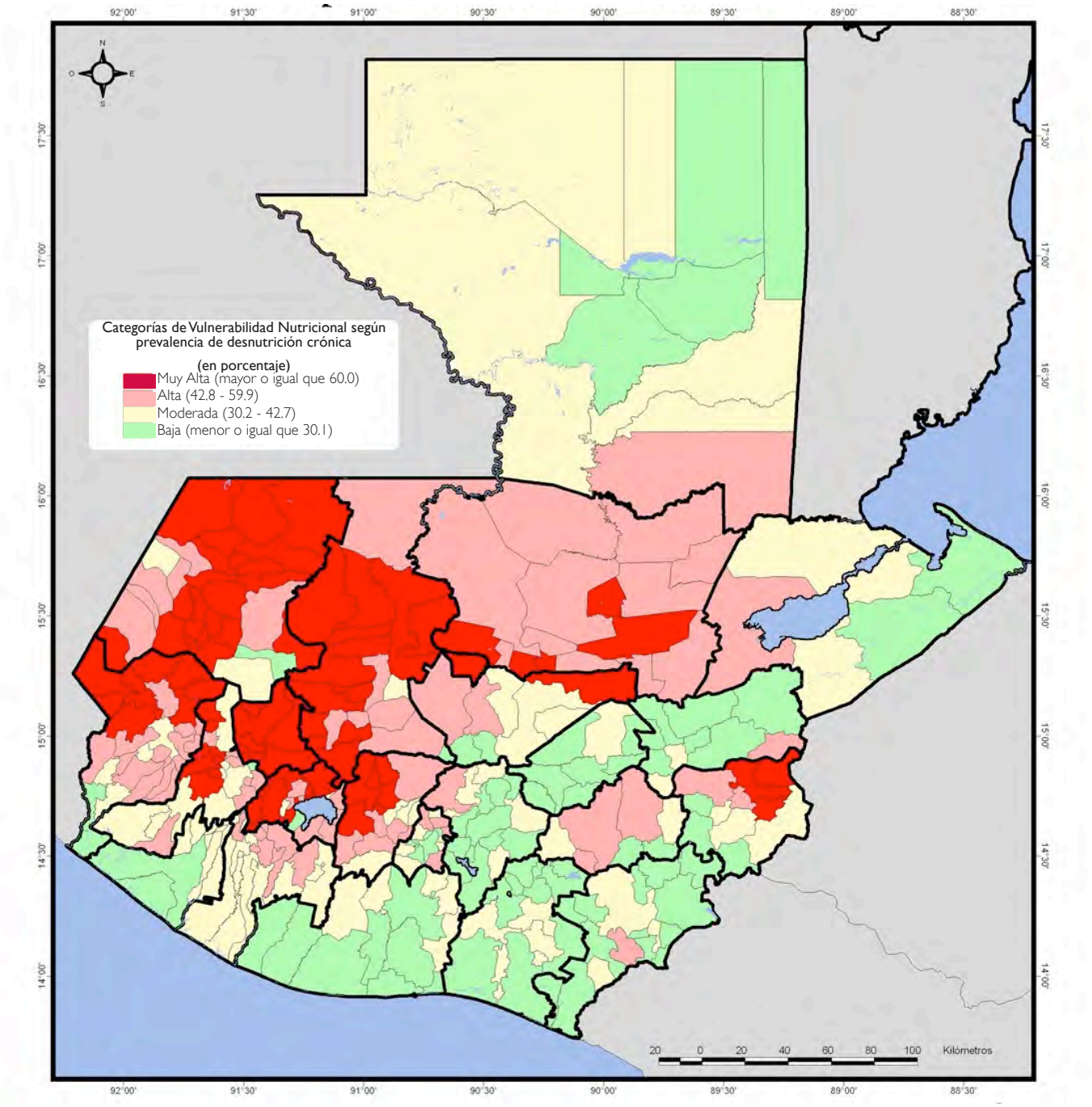
Source: MAGA.

B-2. Poverty Densities, Guatemala.



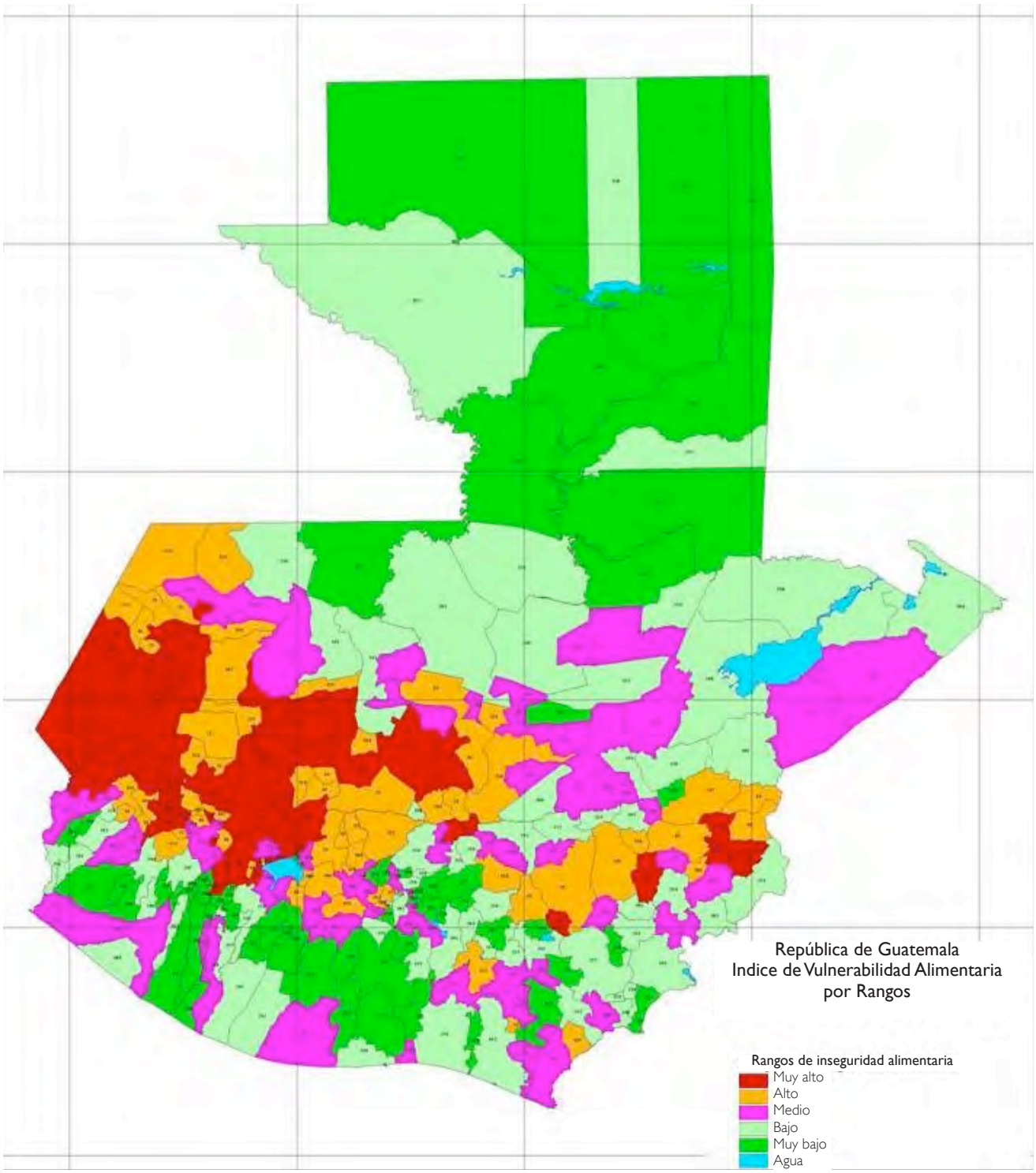
Source: Drivers of Growth team using data from MAGA-SIG and the Population Census, 2002.

B-3. Chronic Malnutrition by Municipality, Guatemala 2008.



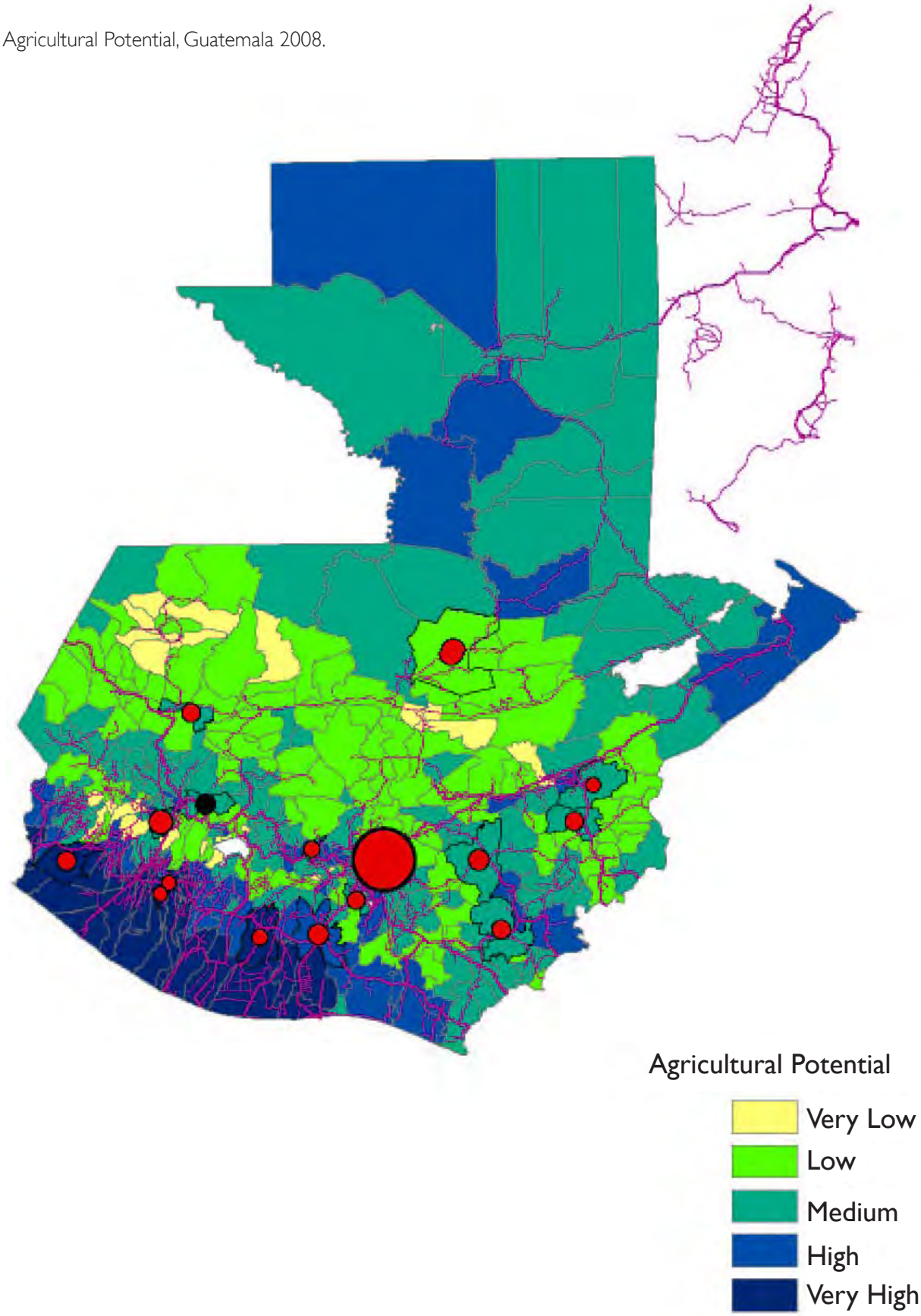
Source: Tercer Censo de Talla, Ministerio de Educación y Secretaría de Seguridad Alimentaria y Nutricional (SESAN).

B-4. Vulnerability to Food Insecurity, Guatemala 2008.



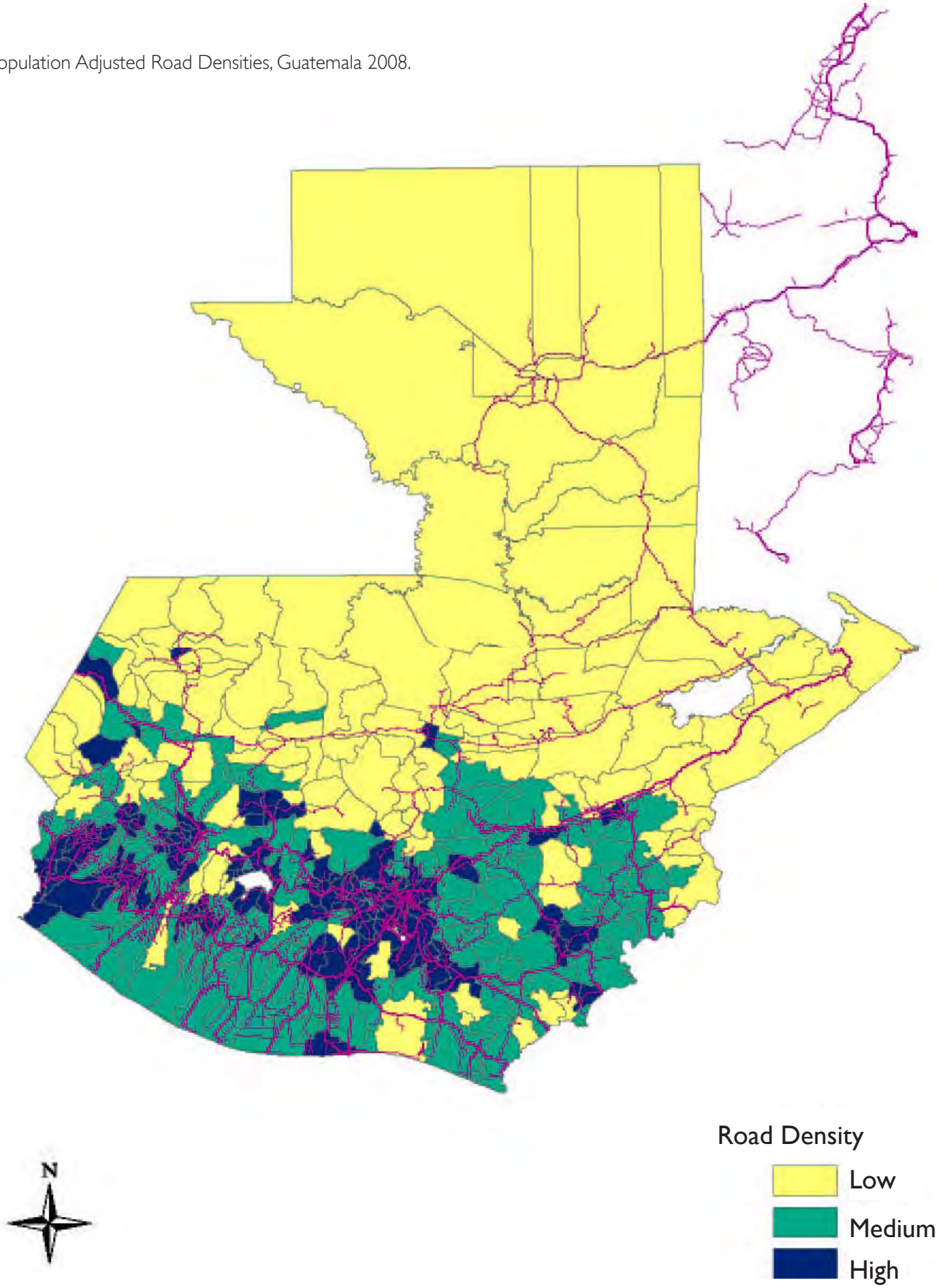
Source: SEGEPLAN (Secretaría de Planificación y Programación de la Presidencia). 2008. Vulnerabilidad municipal y la calidad de vida de sus habitantes. Guatemala.

B-5. Agricultural Potential, Guatemala 2008.



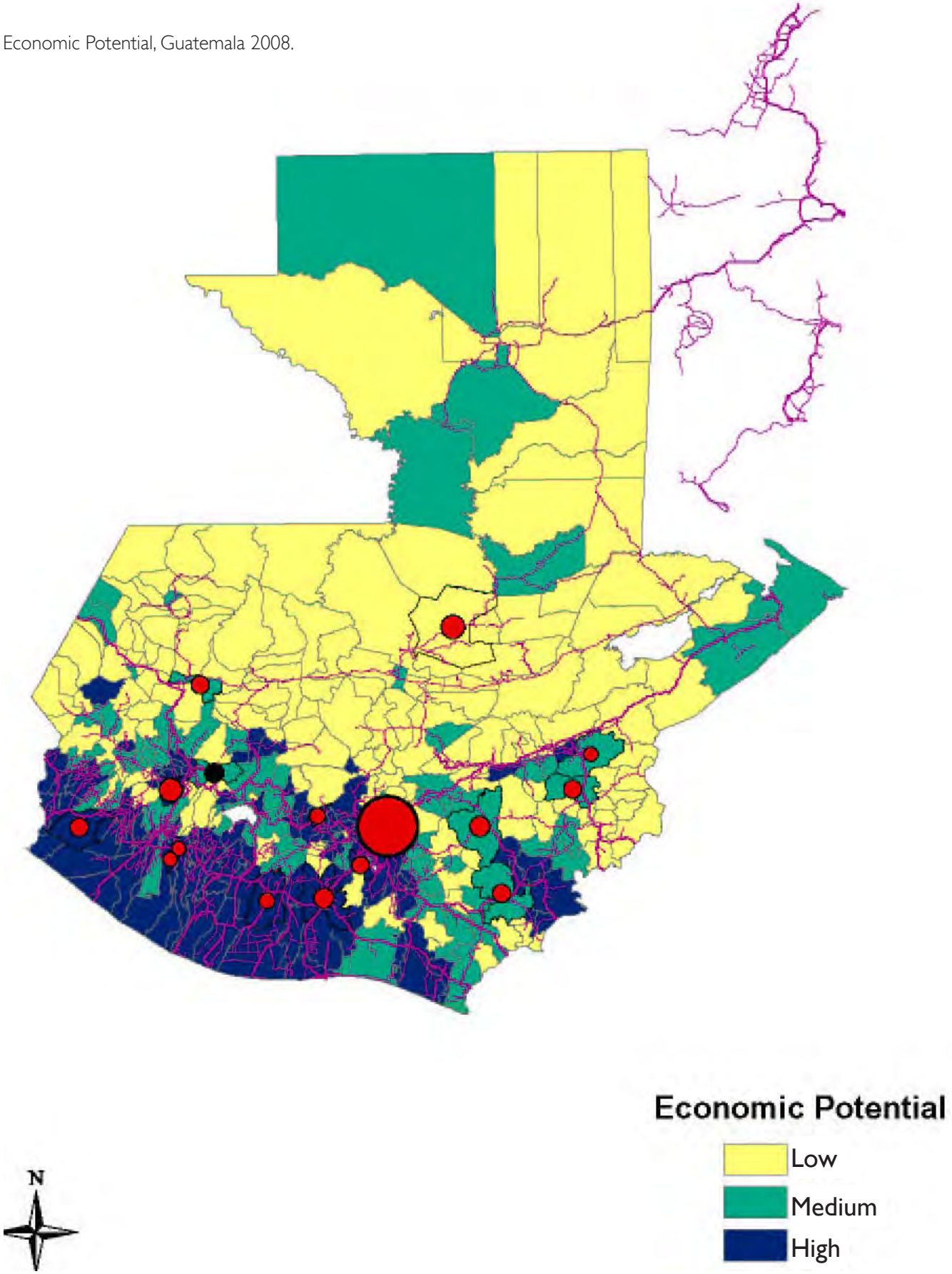
Source: Drivers of Growth team and MAGA-SIG.

B-6. Population Adjusted Road Densities, Guatemala 2008.



Source: MAGA-SIG.

B-7. Economic Potential, Guatemala 2008.



Source: Drivers of Growth Team.

Annex C

Table 1. Annual net income source by household income quartiles for rural cropping-households in Guatemala in 2000.

Quartile of total household income Number of observations	First 611		Second 611		Third 611		Fourth 610		Overall Sample 2443
1. On-farm income 1.1 Crop income	16 (9%)	a	195 (27%)	b	326 (22%)	c	379 (10%)	c	229 (15%)
Share of households within the subsample (SHS)	100%		100%		100%		100%		100%
1.2 Livestock income	37 (22%)	a	87 (12%)	b	99 (7%)	b	104 (3%)	b	82 (6%)
SHS	70%		74%		75%		76%		74%
2. Off-farm income 2.1 Agricultural wage employment	53 (31%)	a	222 (31%)	b	399 (27%)	c	556 (15%)	d	307 (21%)
SHS	27%		50%		56%		54%		47%
2.2 Skilled RNFE (self + wage) income	4 (2%)	a	17 (2%)	a	33 (2%)	a	296 (8%)	b	88 (6%)
SHS	2%		4%		6%		14%		7%
2.3 Unskilled RNFE (self + wage) income	39 (23%)	a	139 (20%)	a	508 (35%)	b	1840 (51%)	c	631 (42%)
SHS	24%		40%		58%		81%		51%
3. Not earned income 3.1 Remittances	9 (5%)	a	23 (3%)	a	50 (3%)	a	333 (9%)	b	104 (7%)
SHS	6%		7%		9%		19%		10%
3.2 Other private transfers	6 (4%)	a	12 (2%)	a	10 (1%)	a	51 (1%)	b	20 (1%)
SHS	7%		9%		9%		10%		9%
3.3 Social assistance	4 (2%)	a	6 (1%)	a,b	10 (1%)	b	9 (0%)	b	7 (0%)
SHS	4%		6%		7%		8%		6%
3.4 Pensions	1 (1%)	a	11 (2%)	a	17 (1%)	a	47 (1%)	b	19 (1%)
SHS	0%		3%		3%		4%		3%
4. Total household income	169 (100%)	a	712 (100%)	b	1452 (100%)	c	3613 (100%)	d	1486 (100%)
5. Total income per capita	79		326		608		1493		627

a, b, c, d, show the differences among quartiles using Tukey-Kramer test at 10% significance level.

Source: Hernandez, Ricardo, Reardon, Thomas, Guan, Zhegfei, Rural Non Farm Employment and Agricultural Modernization and Diversification in Guatemala. Unpublished paper presented to the Agricultural and Applied Economics Association 2010 Joint Meeting, p. 39.

Annex D

Table 2. Value of Agricultural Production by Department, Guatemala.

Value of Agricultural Production by Department (Quetzales Millions)												
Department	Bananas	Coffee	Sugar Cane	Cardamom	Fruits	Basic Grains	Vegetables	Rubber	Other Annuals	Other Permanent	Other Semiperm.	Total
Alta Verapaz	43	97	0	234	110	230	44	8	428	3	45	1,244
Baja Verapaz	2	19	0	8	27	85	92	0	73	0	6	312
Chimaltenango	10	230	0	0	66	120	211	13	62	0	6	719
Chiquimula	3	77	0	0	17	114	34	0	15	0	9	270
El Progreso	3	25	1	3	48	35	24	0	16	0	17	171
Escuintla	1,026	118	1,580	5	78	88	19	27	60	67	108	3,176
Guatemala	8	141	7	0	80	77	94	0	39	0	34	482
Huehuetenango	20	170	1	27	159	139	163	1	21	0	5	706
Izabal	532	5	0	14	32	97	15	23	221	11	168	1,117
Jalapa	3	77	0	0	31	65	41	0	3	0	2	222
Jutiapa	5	42	0	0	66	240	148	0	68	0	11	580
Petén	13	1	0	0	52	577	24	0	30	2	27	726
Quetzaltenango	97	173	0	0	196	113	203	131	16	0	32	962
Quiche	4	15	1	49	157	178	64	0	8	0	6	481
Retalhuleu	40	65	29	0	430	95	7	79	75	4	61	884
Sacatepéquez	0	79	0	0	41	22	67	0	32	0	21	263
San Marcos	137	395	0	1	404	126	120	94	22	43	251	1,592
Santa Rosa	10	372	30	0	184	119	16	0	37	0	14	783
Sololá	118	60	0	0	60	36	37	19	38	0	4	371
Suchitepéquez	128	236	149	3	286	77	8	327	106	4	84	1,407
Totonicapán	6	7	0	0	45	53	18	0	3	0	0	133
Zacapa	57	218	0	1	47	49	24	0	421	0	9	826
Total general	2,265	2,624	1,801	346	2,614	2,733	1,474	721	1,794	133	920	17,425
AV,Q,H,SM	204	677	2	310	830	672	391	103	479	46	307	4,023
Chim,H,Q,So,T	158	481	2	76	488	526	493	32	131	0	22	2,410
Jalapa/ Chiquimula	6	155	0	0	48	179	75	0	18	0	11	492
R,Es, Such	1,195	420	1,758	9	794	260	34	432	241	74	253	5,467

Source: Agricultural production from agricultural census 2002. Prices as of 2004/5.

Annex E

Table 3. Comparative Yield Data for Basic Grains in Central America (Tons/Hectare).

Rice	2004	2005	2006	2007	2008	Average	Guatemala Position
Costa Rica	4.0	4.0	3.1	3.2	4.1	3.7	
El Salvador	6.7	7.3	7.3	7.5	3.2	6.4	
Guatemala	2.9	2.9	2.8	2.7	3.3	2.9	4th
Honduras	5.5	4.7	3.0	4.0	2.6	4.0	
Nicaragua	2.3	2.5	3.7	3.7	2.0	2.8	
Panama	2.2	2.6	2.6	2.8	3.0	2.6	
Average	3.9	4.0	3.8	4.0	3.0	3.7	
Beans	**2004**	**2005**	**2006**	**2007**	**2008**	**Average**	
Costa Rica	4.0	4.0	3.1	3.2	4.1	3.7	
El Salvador	1.0	0.8	1.0	1.1	0.9	1.0	
Guatemala	0.9	0.9	0.6	0.7	0.7	0.8	3rd
Honduras	0.7	0.6	0.7	0.7	0.6	0.7	
Nicaragua	0.8	0.7	0.8	0.8	0.3	0.7	
Panama	0.3	0.4	0.3	0.3	0.3	0.3	
Average	1.3	1.2	1.1	1.1	1.2	1.2	
Corn	**2004**	**2005**	**2006**	**2007**	**2008**	**Average**	
Costa Rica	2.0	2.1	3.5	2.2	1.9	2.3	
El Salvador	2.8	3.0	3.1	3.2	2.0	2.8	
Guatemala	2.2	2.4	1.5	1.7	1.6	1.9	4th
Honduras	5.5	4.7	3.8	4.0	2.6	4.1	
Nicaragua	1.5	1.4	1.5	1.6	1.2	1.4	
Panama	1.3	1.2	1.5	1.5	0.9	1.3	
Average	2.6	2.5	2.5	2.4	1.7	2.3	
Sorghum	**2004**	**2005**	**2006**	**2007**	**2008**	**Average**	
Costa Rica	0.0	0.0	0.0	0.0	0.0	0.0	
El Salvador	1.6	1.6	1.8	1.9	1.6	1.7	
Guatemala	1.5	1.5	1.2	1.2	1.1	1.3	Tied for last
Honduras	1.2	1.4	1.0	1.1	1.6	1.3	
Nicaragua	3.4	3.3	1.9	2.1	3.0	2.7	
Panama	3.4	3.2	3.2	3.2	1.1	2.8	
Average	1.9	1.8	1.5	1.6	1.4	1.6	
Wheat	**2004**	**2005**	**2006**	**2007**	**2008**	**Average**	
Costa Rica	0.0	0.0	0.0	0.0	0.0	0.0	
El Salvador	0.0	0.0	0.0	0.0	0.0	0.0	
Guatemala	2.0	2.1	2.0	2.0	0.6	1.7	First among two
Honduras	1.0	1.0	0.5	0.5	-	0.8	
Nicaragua	0.0	0.0	0.0	0.0	0.0	0.0	
Panama	0.0	0.0	0.0	0.0	0.0	0.0	
Average (Gua & Hon)	1.5	1.6	1.2	1.2	0.6	1.2	

Source: From a draft analysis prepared by Carmelo Gallardo and Jaime Carrera.

Annex F

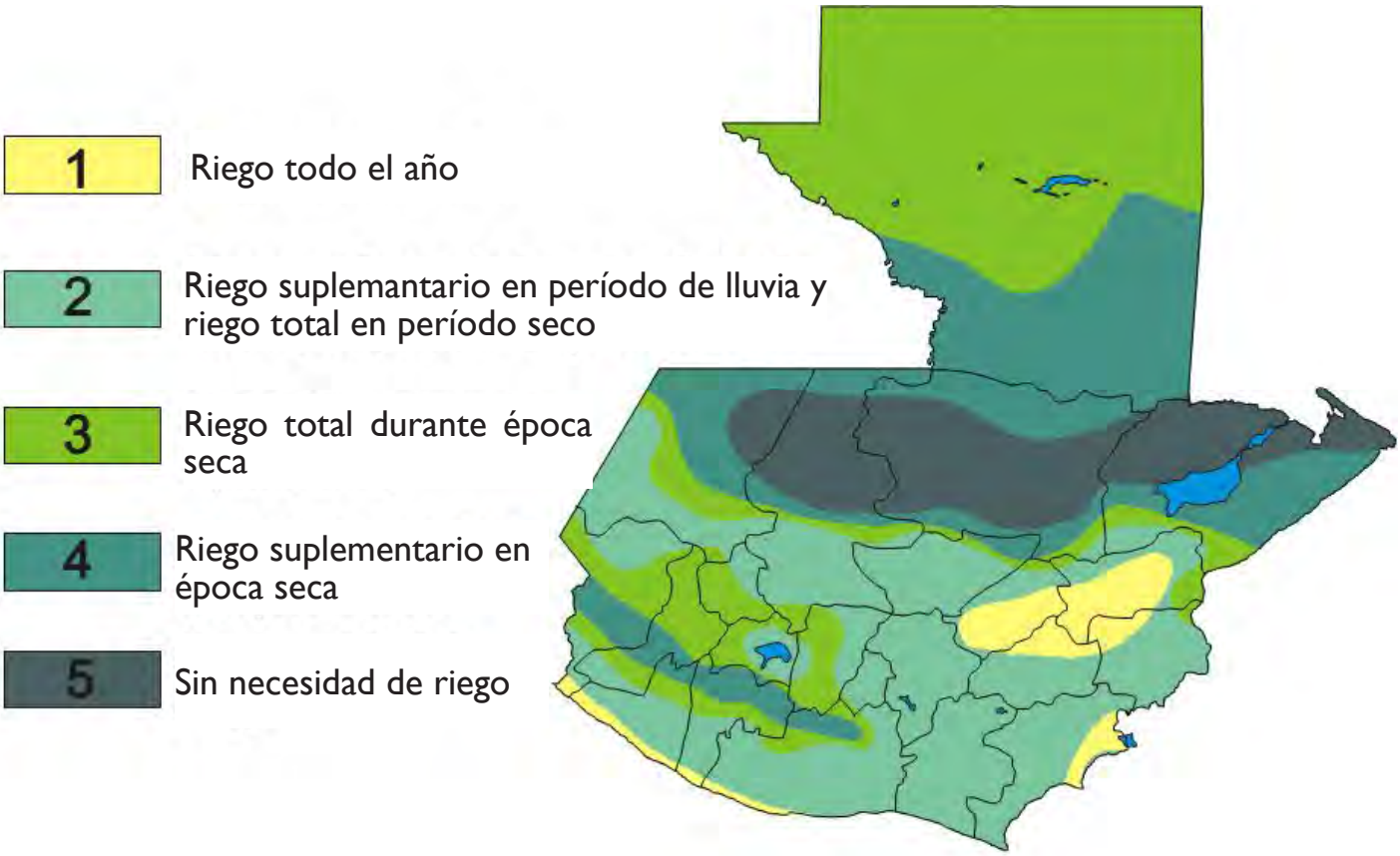
Table 4. DR-CAFTA GAP Analysis, Guatemala's SPS Capacity 2010.

Food Safety System	Guatemala Completed	Possible Points
Meat	39%	100%
Dairy	72%	100%
Fresh Vegetables	43%	100%
Pesticides	65%	100%
Overall Score	55%	100%
Laboratories		
Food Micobiology	60%	100%
Residues	61%	100%
Animal Health Labs	47%	100%
Plant Health Labs	60%	100%
Plant Health System		
Level of Harmonization	7%	10%
Traceability	4%	10%
Official Inspection Laws	9%	20%
Inspection System	7%	20%
Functional Laboratories	13%	20%
All Export products inspected	7%	10%
No containers detained	6%	10%
Overall Score	53%	100%
Animal Health System		
Veterinary Infrastructure-Personnel	10%	15%
Authority, Laws, Regulations	9%	10%
Laboratories	10%	15%
Adequate Budget	7%	15%
Adequate Surveillance System	8%	10%
Veterinary Accreditation System	3%	5%
Import/Export Regulations	4%	5%
Animal ID System	6%	10%
Adequate record system	7%	10%
Indemnity Program	3%	5%
Overall Score	67%	100%

Note: The data shown above for food safety, laboratories, and plant health are from a report submitted to USDA/FAS by the Government of Guatemala in response to a survey request by USTR. The GOG failed to complete the survey concerning the animal health system. The data shown above for this system are initial estimates prepared by USDA/FAS in 2009 of the status they expected for Guatemala as of 2010.

Annex G

Figure 1. Geographic Zones based on Rain Deficit (1 - 5), Guatemala.



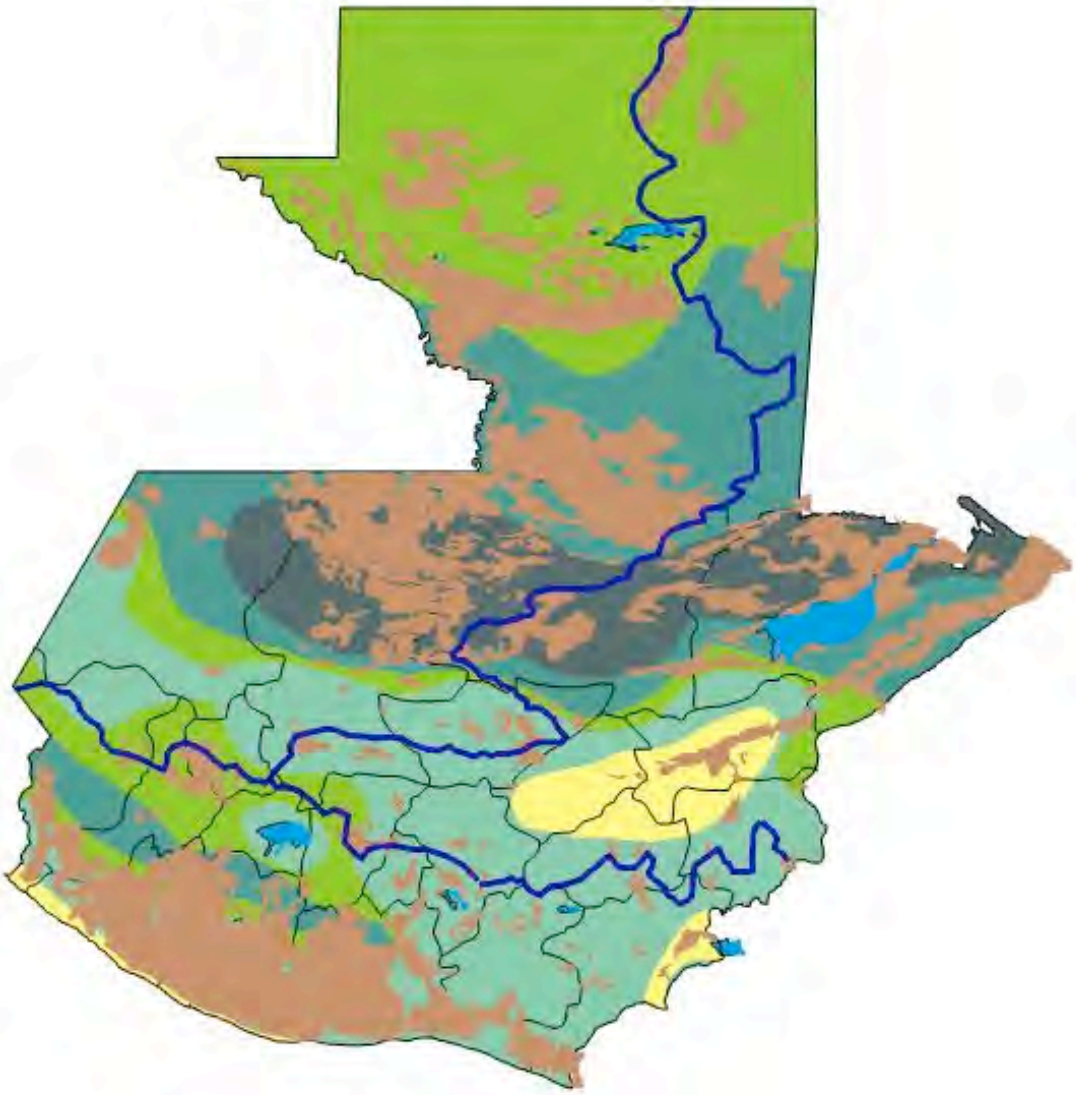
Source: PLAMAR, 2010.

Annex H

Figure 2. Area that could be irrigated, Guatemala.

Área con vocación agrícola 2,632,000 hectáreas.

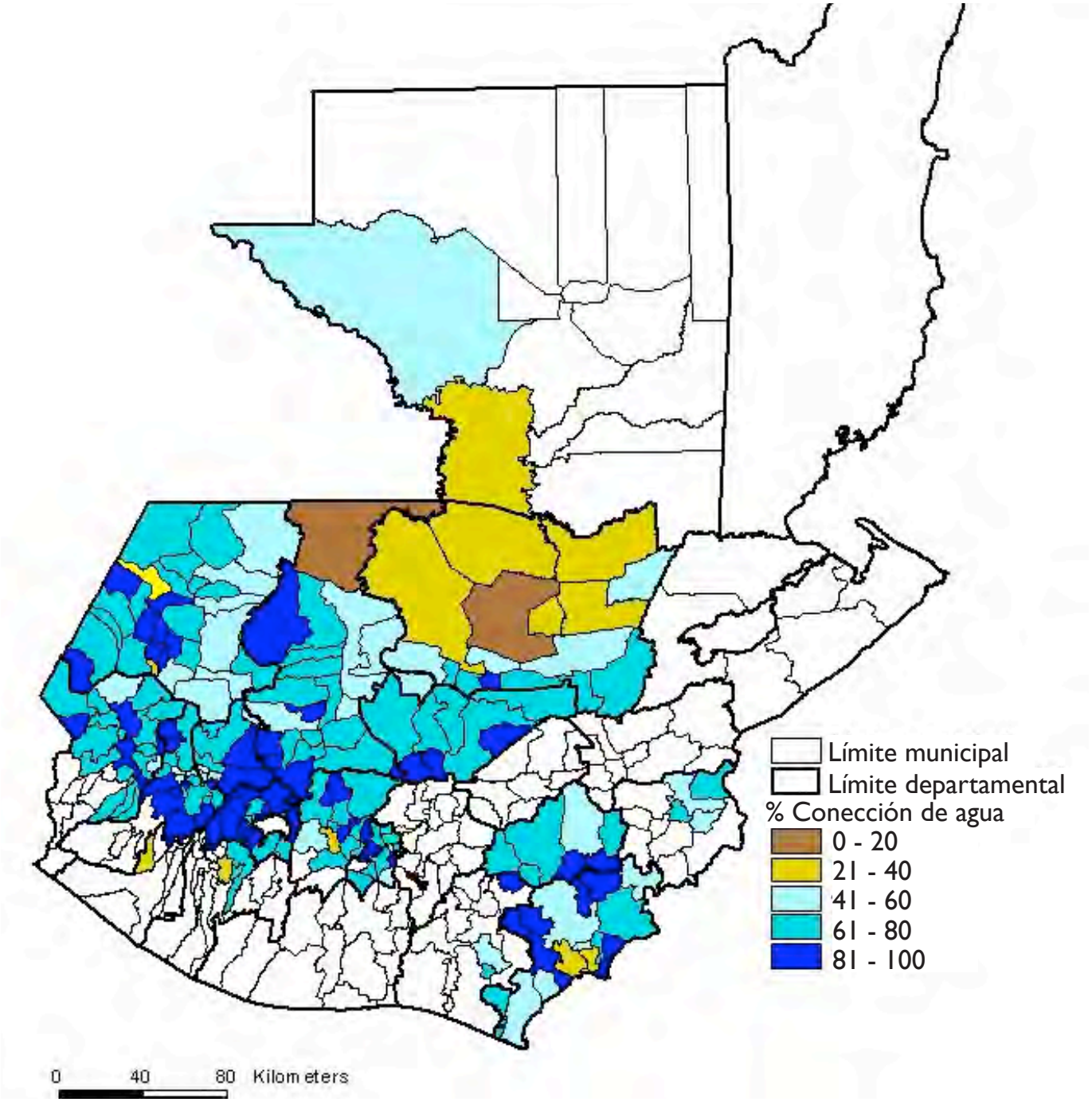
Área suceptible de riego 1,296,000 hectáreas.



Source: PLAMAR, 2010.

Annex 1

Figure 3. Percent of Households with Access to Potable Water, Guatemala.



Source: IARNA, 2009.

Annex J

Table 5. Selected Government of Guatemala Trust Funds for Rural Development, July 2010.

MinFinance Registry Number	Fideicomiso Title	Responsible Institution	Purpose	Contracted Amount	Dollar Equivalent
6	Mejoramiento del Pequeño Caficultor	BANGUAT	Asistencia crediticia para pequeños productores de café.	$7,750,000	$2,018,675
7	Administración de Carteras	BANRURAL	Recuperación de cartera agrícola.	$1,781,370	$220,700
8	Fideicomiso Apoyo Financiero para los Productores del Sector Cafetalero Guatemalteco	BANRURAL	Diversificación de cultivos, agroindustrialización, comercialización y reestructuración de la deuda: para reactivar, modernizar y diversificar la caficultura	$100,000,000	$26,104,250
9	Crédito de Desarrollo Agropecuario -CREDESA-	BANRURAL	Asistencia financiera para la actividad productiva agrícola, pecuaria, miniriego, comercialización, artesanía y microempresa para pequeños y medianos productores.	$3,701,272	$1,071,175
10	Crédito para el Desarrollo Productivo DICOR II -CREDEPRODI-	BANRURAL	Asistencia financiera para la actividad productiva a pequeños y medianos productores.	$1,250,000	$1,075,150
11	Proyecto de Desarrollo Rural Sostenible en Zonas de Fragilidad Ecológica en la Región del Trifinio, Area de Guatemala -PRODERT-	BANRURAL	Asistencia crediticia a pequeños productores agropecuarios.	$4,394,875	$2,237,250
13	Programa de Desarrollo Integral en Areas con Potencial de Riego y Drenaje	BANRURAL	Asistencia crediticia y técnica para proyectos de riego y drenaje en el Territorio Nacional.	$40,000,000	$19,728,588
14	Crédito Rural	BANRURAL	Asistencia financiera a pequeños y medianos productores rurales e intermediarios financieros.	$25,019,764	$2,987,113
15	Fondo Nacional para la Reactivación y Modernización de la Actividad Agropecuario -FONAGRO-	BANRURAL	Asistencia financiera reembolsable y no reembolsable para la reactivación y modernización de la actividad Agropecuaria.	$62,500,000	$4,978,100

MinFinance Registry Number	Fideicomiso Title	Responsible Institution	Purpose	Contracted Amount	Dollar Equivalent
16	Proyecto de Desarrollo Rural de la Sierra Cuchumatanes	BANRURAL	Asistencia crediticia a pequeños productores del Departamento de Huehuetenango.	$1,734,000	$809,850
17	Proyecto de Desarrollo Rural para Pequeños Productores de los Departamentos de Zacapa y Chiquimula	BANRURAL	Asistencia crediticia a pequeños productores de Zacapa y Chiquimula.	$2,831,000	$1,460,738
18	Fideicomiso Proyectos Productivos de la Población Desarraigada	BANRURAL	Proporcionar asistencia crediticia para proyectos productivos para las poblaciones desarraigadas.	$700,000	$480,688
19	Crédito Programa de Desarrollo Rural en el Departamento de Totonicapán -CREDITOTO- ALA 94/81	BANRURAL	Proporción para asistencia crediticia a los usuarios en el Depto. de Totonicapán, quienes serán medianos, pequeños microempresarios que, de forma individual u organizada, desarrollan actividades agropecuarias, agroindustriales, industriales, de artesanía, comercio o servicios.	$1,115,362	$2,417,975
23	Fondo Nacional de Desarrollo, FONADES	C. H. N.	Ejecución de programas y proyectos que mejoren el nivel de vida y las condiciones económicas y sociales de la población del país más vulnerable a la pobreza y extrema pobreza del país.	$112,500,000	$12,204,375
37	Fideicomiso para el Desarrollo Rural Guate Invierte	G&T CONTINENTAL	1. Preinversión para la formulación y establecimiento de proyectos productivos, 2. Fondo de garantía hasta el 80% del financiamiento que se otorgue a los beneficiarios, 3. Asistencia técnica, 4. Seguro agropecuario hasta el 70% del financiamiento que se otorgue a los beneficiarios.	$18,750,000	$13,672,238
			Totals	$384,027,643	$91,466,863

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