

Cuban Agriculture and the Impacts of Tropical Storm Fay and Hurricanes Gustav and Ike¹

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Introduction

In little more than three weeks (August 18 through September 9, 2008) the island nation of Cuba was struck by three major tropical weather events: Tropical Storm Fay and Hurricanes Gustav and Ike (Map 1). Various Cuban sources have described the combined effects of these storms as the most materially devastating meteorological event in the history of Cuba. This report attempts to assess the damage to Cuban agriculture caused by these three storms.

Tropical Storm Fay

In the afternoon of August 16, 2008, Tropical Storm Fay approached southeastern Cuba with sustained wind speeds of 40 miles per hour (mph) after having caused extensive flooding in storm-ravaged Haiti. For the next 30 hours, the storm moved west-northwest parallel with Cuba's southern coast at about 15 mph, strengthening slightly until it had sustained wind speeds of 50 mph.

In the evening hours of August 17th, the tropical storm turned to the north and, in the early morning

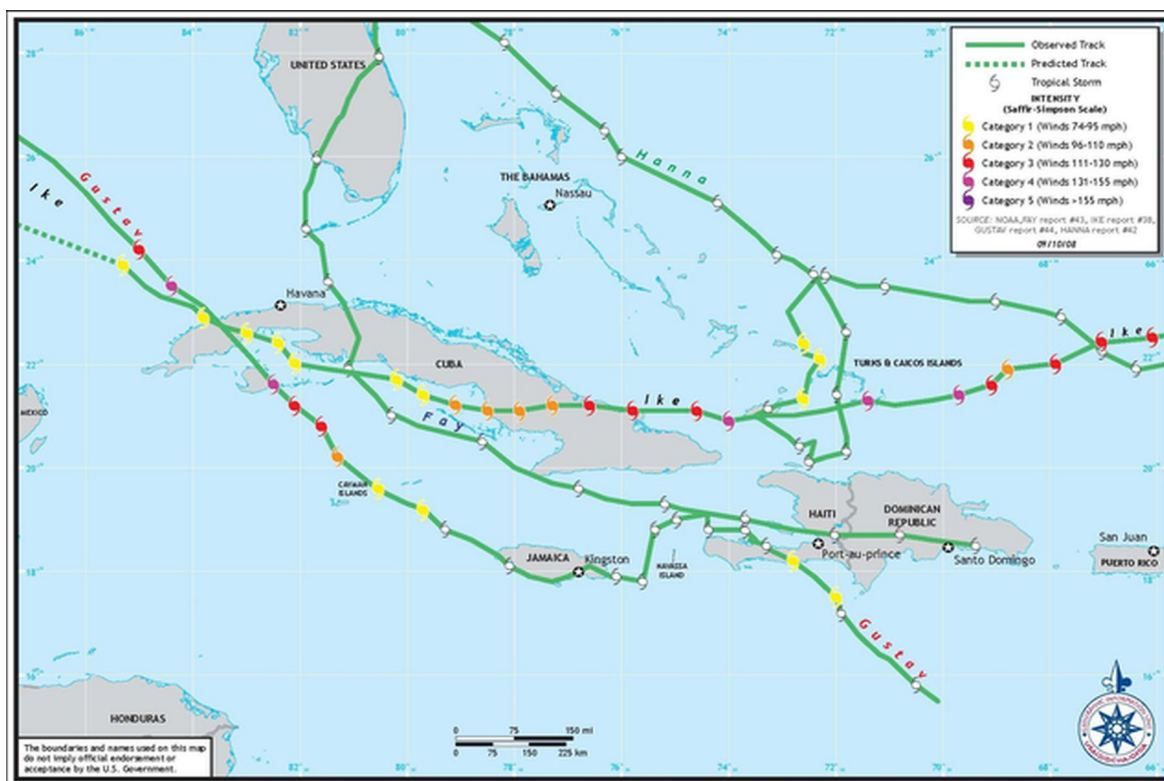
hours of August 18th, it moved across the southern shores of Cuba onto the sparsely populated Zapata Peninsula near the Bay of Pigs in Matanzas province with sustained winds remaining at 50 mph.

As the storm made its turn to the north, its forward speed slowed to about 10 mph. The slower movement allowed rainfall totals to accumulate significantly in some areas. The Cuban government reported storm rainfall totals as high as 18 inches in localized areas, causing some rivers and creeks to overflow and flood roads, highways, and low-lying fields. Wind gusts from the storm were reported as high as 66 mph in Cuba.

Rainfall and winds from the storm caused damage to housing and infrastructure, mostly in terms of roof damage. Some damage to agriculture, including Cuba's major citrus-producing area, Jagüey Grande in west-central Cuba, was reported from flooding and uprooted trees; however, the storm's effect appears to have been limited in scope and generally restricted to the central portions of the island.

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Map 1. Paths of Tropical Storm Fay, and Hurricanes Hanna, Gustav, and Ike, 2008. Source: [http://www.reliefweb.int/rw/fullMaps_Am.nsf/luFullMap/426128ESF5C8D1D4C12574BF00339754/\\$File/usaid_TC_Caribbean090808.pdf?OpenElement](http://www.reliefweb.int/rw/fullMaps_Am.nsf/luFullMap/426128ESF5C8D1D4C12574BF00339754/$File/usaid_TC_Caribbean090808.pdf?OpenElement)

The storm moved off of Cuba's northern coast to the east of the capital city of Havana near the town of Cárdenas later in the morning of August 18th (on a path that allowed Tropical Storm Fay to make landfall in Florida a record four times). Because the heaviest rainfall and winds were on the eastern side of the storm, the Cuban capital of Havana was largely unaffected by the worst of the storm.

Hurricane Gustav

Hurricane Gustav struck the western portions of Cuba on August 30, 2008 as a Category 4 hurricane with sustained wind speeds of 145 mph. It was one of the strongest hurricanes ever to hit the island, and reported winds gusts of 212 mph were the highest ever recorded in Cuba.

Hurricane Gustav initially struck Haiti on August 26th with sustained winds of 75 mph, making it a Category 1 hurricane (Category 1 hurricanes have winds between 74 and 95 mph). As soon as it made landfall in Haiti, the hurricane weakened to a tropical storm and maintained this strength as it moved off the

coast of Haiti and proceeded in a southwesterly direction toward Jamaica. Tropical Storm Gustav moved over Jamaica on August 28th and 29th, and then increased in intensity very rapidly after moving off the Jamaican coast, growing from a tropical storm to a Category 4 hurricane in only a little over 24 hours as it moved toward the west-northwest and approached southwestern Cuba (Category 4 hurricanes have wind speeds between 131 and 155 mph, with associated coastal storm surges generally 13 to 18 feet above normal). Cuban authorities evacuated over 400,000 people from coastal and low-lying areas in western Cuba in anticipation of the wind, rain, and storm surge that Hurricane Gustav was expected to bring.

Hurricane Gustav initially struck Cuba's Isle of Youth (Isle de la Juventud), population of about 87,000, where it caused heavy flooding and extensive wind damage. Reports from Cuba indicate that as much as 80% of the housing on the Isle of Youth was damaged or destroyed by the storm. Cuba's civil defense chief for the isle indicated that nearly all of

its roads were washed out and the electrical grid on the Isle of Youth was almost completely destroyed.

Agricultural production on the Isle of Youth is largely for the local market, with significant citrus acreage. The Cuban government reported that the heavy winds, rain, and flooding from Hurricane Gustav destroyed the entire citrus crop and the processing facilities on the Isle of Youth. In addition, 80% of the poultry production on the Isle of Youth was damaged or destroyed.

Hurricane Gustav then moved rapidly across the Gulf of Batabano to strike the Cuban mainland, south of the town of Los Palacios in Pinar del Río province on the western end of Cuba. The storm crossed the narrow width of Pinar del Río province in a matter of a few hours, moving offshore near the town of La Esperanza. The damage that this strong hurricane left, however, was very substantial.

The Cuban government reported that over 120,000 homes in Pinar del Río were damaged or destroyed by Hurricane Gustav, representing over 45% of the province's total housing stock. Reports from the town of Los Palacios indicate that 10,000 of its 13,000 homes were damaged by the hurricane, with 6,000 being completely destroyed. The nearby town of San Cristóbal reported that 11,000 homes were damaged by the storm.

As further indication of the extent of the damage in Pinar del Río province, an official from Cuba's Electrical Union reported that the entire electrical grid in the province was affected (150 high-tension electrical towers collapsed from the storm winds) and that the entire system will have to be reconstructed. Preliminary estimates indicate that over 500 schools in Pinar del Río and Havana provinces sustained damage from Hurricane Gustav.

News reports have indicated that Hurricane Gustav destroyed 55,700 hectares of crops in western Cuba and the Isle of Youth, including 13,070 hectares of root vegetables, 2,931 hectares of grains, and 543 hectares of fruits. In addition, 877 organic vegetable gardens and 392 other intensive farming sites were affected by the hurricane. Reports indicate that 25,900 tons of agricultural crops were destroyed and 1,200 tons of agricultural crops were damaged by the

hurricane. Another 4,355 tons of stored food were damaged or destroyed by the storm. Hurricane Gustav also reportedly damaged 180,000 hectares of reforested lands.

Pinar del Río is the premier tobacco-producing province in Cuba. Initial reports from Cuban government officials indicated that over 1,800 tons of stored tobacco leaves (about 7% of Cuba's 2007 total production) had been damaged by the hurricane. However, later reports indicated that only 800 tons of the stored tobacco leaves were totally destroyed. The Cuban government also reported that 3,414 tobacco curing barns and storage facilities had been destroyed and 1,590 had been damaged by the hurricane. Tobacco plants growing in the fields sustained heavy damage from hurricane wind and rain. While this does not affect food supplies in Cuba, it will constrain Cuba's cigar exports in the near term, which will reduce Cuba's foreign currency earnings at a time when these funds will be critically important for purchasing and importing food stocks and construction supplies to assist in hurricane recovery.

Citrus groves and processing facilities in Pinar del Río and Havana provinces suffered extensive damage from Hurricane Gustav as well. With the majority of the fruit in the region either fully mature or nearing maturity, the Category 4 hurricane winds knocked most of the fruit from the trees and, in many cases, damaged the trees themselves, even uprooting some trees.

Reports indicate that the rice processing complex at Los Palacios, which supplies the entire Pinar del Río province, suffered extensive damage from the storm. Over 25% of their rice stock was lost when a roof blew off of one of the storage silos.

Sugar and rice generally can withstand more wind and rain than vegetable and row crops, but heavy flooding can destroy these crops. It is expected that the sugar and rice plantings along the path of Hurricane Gustav experienced notable losses.

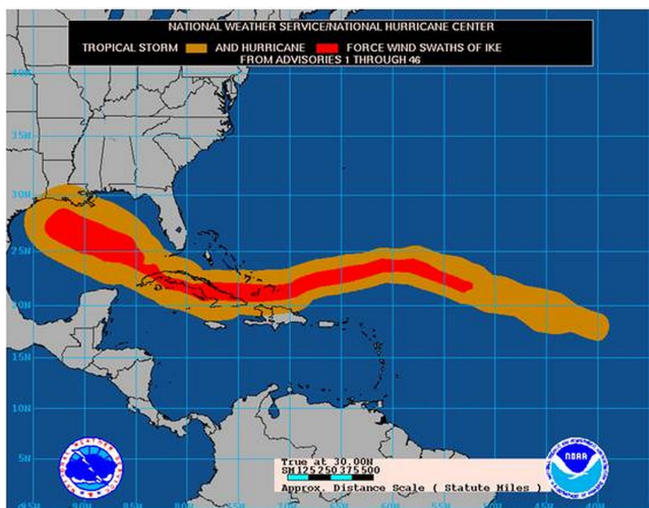
Coffee is produced in the Rosario mountain range in western Cuba. Cuba's state-run radio reported that the coffee harvest had been moving into its peak season when Hurricane Gustav struck and

that damage to the region's coffee crop from the storm was very significant.

Reports indicate that 100% of the poultry industry was seriously damaged in the eight municipalities in Pinar del Río province that were the most directly affected by the storm.

Hurricane Ike

Cuba is a long, relatively narrow island, stretching over 770 miles from its western to eastern tips, and measuring 120 miles wide at its widest point and only 18 miles wide at its narrowest point. Hurricanes typically strike the island moving with a northern vector such that they generally move across the narrow width of the island. Hurricane Ike was a remarkable storm in that it moved from east to west along the entire length of Cuba, bringing hurricane-force winds to about two-thirds of the island, and tropical storm winds and torrential rains to the entire Cuban archipelago (Map 2).



Map 2. Tropical storm and hurricane wind history of Hurricane Ike (graphic dated September 12, 2008).

Source:

http://www.nhc.noaa.gov/refresh/graphics_at4+shtml/151304.shtml?swath#contents

Hurricane Ike first came ashore in Cuba during the early hours of the morning of September 8, 2008 in eastern Cuba at Punta Lucrecia near the city of Banes in Holguín province. As it approached Cuba, the hurricane had reached Category 4 strength. However, just before making landfall in Cuba, it weakened to a Category 3 hurricane (wind speeds between 111 and 130 mph) with torrential rains.

Hurricane Ike struck with a particularly strong storm surge, causing heavy flooding in coastal areas along the north shore of eastern Cuba. The hurricane reportedly brought 20-foot waves to eastern Cuba. Cuba's state-run television videos show waves crashing ashore and splashing over the top of a five-story apartment building located near the shore in the city of Baracoa in eastern Cuba, close to the area where the hurricane made landfall.

Once it made landfall, Hurricane Ike decreased to Category 2 intensity (winds between 96 and 110 mph). It continued in a westerly direction and moved off the southern coast of Cuba around noon on September 8th near Punta Macurijes, southwest of the city of Camagüey in Camagüey province. The storm continued in a west-northwesterly direction paralleling the south-central coastline of Cuba just offshore. Even though the eye of the storm passed offshore, this path allowed the northeastern quadrant of the storm, which contained the strongest winds and the heaviest rains, to travel squarely over the island of Cuba, bringing hurricane-force winds and torrential rain to all of central Cuba.

Mid-day on the following day, September 9th, Hurricane Ike crossed back onshore in western Cuba as a Category 1 hurricane at Punta La Capitana near the town of San Cristobal in Pinar del Río province. This was close to the area where Hurricane Gustav had struck Cuba only nine days earlier. Approximately six hours later, the storm once again moved offshore at very nearly the same spot where Hurricane Gustav had moved offshore. It should be noted that Hurricane Ike was a very large storm. Three days later, on September 12th, as the hurricane was preparing to strike the U.S. coast, satellite images clearly showed the outer bands of clouds and rain from Hurricane Ike still covering the western half of Cuba.

Cuba has one of the world's most active and effective emergency preparedness systems. As a result Cuba is able to mobilize large evacuations when hurricanes threaten. The Cuban press reported that about 2.7 million people were evacuated in preparation for Hurricane Ike, representing nearly 25% of the total Cuban population. Because of its hurricane preparations and mass evacuations, injuries

and deaths from hurricanes are usually very low in Cuba. However, despite these preparations, the Cuban press reported seven fatalities from Hurricane Ike (no deaths were reported from either Tropical Storm Fay or Hurricane Gustav).

Comprehensive official details on damages in Cuba from hurricanes and tropical storms are typically difficult to obtain, and this was the case once again with Hurricane Ike. This is not surprising given the extensive destruction of electrical and communications systems across the island. Plus, presumably, Cuban government officials at all levels and the Cuban people in general are more interested in recovery efforts than in tallying losses. Reports on damages from the international press vary. But beyond the specific numbers and conflicting reports, the damages wrought by Hurricane Ike, coupled with Hurricane Gustav and Tropical Storm Fay, have been catastrophic for Cuba as reported by Cuban newspaper *Granma* (<http://www.granma.cu>).

Hurricane Gustav was estimated to have damaged or destroyed over 120,000 homes in the narrow swath it cut across western Cuba. Reports estimate that an additional 324,000 homes were damaged or destroyed across the island by Hurricane Ike. Over 63,000 of these homes were reported as being totally destroyed. The Cuban government acknowledges that, because of these damages to homes, over 200,000 people are homeless and will have to remain in shelters for an extended period until their destroyed homes can be replaced. Hundreds of thousands of others will be forced to wait for the completion of costly repairs to their homes.

While the heavy winds and rains from Hurricane Gustav brought concentrated damages to the western portions of Cuba, Hurricane Ike's path ensured extensive damage from winds and flooding across the entire island. As much as 19 inches of rain were reported in some areas of Cuba from Hurricane Ike and over 15 inches of rain were reported as having fallen in Laz Terrazas in Pinar del Río province in a 24-hour period. Reports of 10 to 12 inches of rain were common in many areas of Cuba. In addition to the flooding of rivers and creeks and accumulations in low-lying areas caused by such heavy rains, 87 of Cuba's dams and water reservoirs were reported to

have overflowed, causing additional flooding in areas downstream of these structures.

Cuban government reports indicate that 4,000 tons of foodstuffs were lost or damaged by Hurricane Ike in eastern Cuba. In the city of Villa Clara alone, 180 neighborhood food distribution centers and storage facilities lost portions or all of their roofs.

The Cuban government reports that its entire sugar crop and industry suffered extensive damage from Hurricane Ike. Official government reports indicate that 156,600 hectares of sugarcane were flattened by the heavy hurricane winds (the term for this damage is "lodging") and 518,879 hectares of sugarcane were flooded. Harvesting for the new season will not begin for several months and, while the lodged sugarcane is salvageable, crop yields will suffer from the damage and harvesting will be more difficult. Flooding also is a serious problem as it can harm yields unless the water is drained quickly, but no information is available regarding how quickly the flooded fields can be drained. Reports also indicated that 3,895 hectares of newly planted sugarcane was lost, with rains and flooding being so significant that in some areas the sugarcane was actually washed out of the ground. Cuban Sugar Ministry officials have indicated that nearly 50% of this year's sugar crop may be lost due to the hurricanes.

Damage was heavy to the sugar industry infrastructure as well. Cuban government officials reported that 115 sugar mills and factories were damaged by the hurricane, as well as 150 industry railway facilities. In addition, 132 warehouses reportedly were damaged, soaking at least 40,000 metric tons of stored sugar. The Sugar Ministry also indicated that 430 miles of sugar plantation roads had been washed out by the storm along with 14 railway and highway bridges linking the plantations with sugar mills.

All of this came at a time when Cuba's sugar industry was experiencing some measure of recovery as part of a restructuring effort. In the late 1980s, Cuba had been the world's largest sugar exporter and the third largest sugar producer in the world (behind Brazil and India), producing upwards of 8 million metric tons of sugar per year. However, in the 1990s, Cuba's sugar industry became so precipitous that, by

2000, Cuban sugar production had fallen to around 1 million metric tons, which caused Cuba to import sugar to meet domestic requirements. Restructuring efforts began in 2002, and reports indicate that the 2007/2008 harvest reached 1.5 million metric tons, eliminating the need to import sugar. It was estimated that sugar output for the 2008/2009 season would increase about 25% over the 2007/2008 volume. However, the hurricane damage precludes continued growth in output for the upcoming harvest and may even result in crop reductions in subsequent seasons.

Inundation of rice paddies is expected to detrimentally impact Cuba's rice production at a time when the government has been attempting to boost rice output to reduce the need to import large volumes of rice.

There have been specific references in the press to extensive losses of banana and plantain trees in many parts of Cuba from the heavy storm winds. Reports indicated the loss of 200,000 banana and plantain trees in Guantánamo province, and 150,000 trees in Laguna Blanca in Granma province, along with 80% of the banana and plantain acreage in Villa Clara province and 70% of Villa Clara's other crops. (Map 3 shows Cuba's provinces.) A separate report indicated the loss of 32,305 hectares of banana/plantain in the eastern provinces, along with 10,000 hectares of other crops, including papaya, yucca, vegetables, beans, maize, and boniato.



Map 3. Provinces of Cuba. Source: <http://www.webhavana.com/CubaMaps/>

Hurricane Ike impacted all three of Cuba's important coffee-producing regions – the Sierra Maestra Mountains in eastern Cuba, the central Escambray Mountains, and the Rosario Mountains in western Cuba. The peak of Cuba's coffee harvest takes place from September to December, so losses of coffee production throughout the island are

reportedly significant for this year's harvest. Even in the least impacted areas, an estimated 10% of the coffee crop is reported destroyed by storm wind damage. A similar proportion will need to be harvested very soon or it will be lost. Reports indicate that Cuba's central coffee production area may have lost almost 50% of its crop. The coffee crop is reportedly a complete loss in a number of important coffee-producing municipalities in Granma, Guantánamo, and Holguín provinces in eastern Cuba.

The Cuban government reported sending students and agricultural workers to the coffee plantations in the mountains to clear and repair roads, remove trees that fell on coffee plants, collect and process coffee beans scattered on the ground, and harvest the remaining crop. Progress has been slow because access to the coffee plantations is difficult, and the work camps for the harvesting crews and the processing facilities and dryers were heavily damaged by Hurricane Ike. Because a large proportion of Cuba's coffee is exported on the premium market, crop losses will decrease Cuba's hard currency revenues from coffee exports.

Cuba's citrus crops begin to ripen in August, and it is expected that most of the ripe citrus fruit throughout the island was knocked off the trees, and many of the trees were damaged or destroyed by the heavy winds. Cuba's acting Minister of Agriculture reported that Hurricane Ike destroyed over 135,000 tons of fruit. Reports indicate that efforts were underway to salvage at least 50,000 tons of felled grapefruit for processing or animal feed.

Beyond the loss of fruit in the current season, tree damage detrimentally impacts future production as well. There is also the problem of citrus greening (the bacterial disease Huanglongbing, or HLB, which is fatal to trees and for which there is no known cure) in Cuba which suggests that the long-term prospect for the citrus industry is limited even in the absence of the hurricanes. The hurricane winds undoubtedly helped to further spread this disease more broadly in Cuba.

Cuba's citrus juice processing facilities in Jagüey Grande in western Matanzas province probably sustained damage from Hurricane Ike. The

Cuban government reported that its large fruit processing facility in Ciego de Avila was severely damaged by the storm. All of this will detrimentally impact domestic fresh citrus fruit and juice supplies and Cuba's fresh citrus and citrus juice concentrate export markets which will reduce hard currency earnings from citrus.

Extensive damage to over 200 greenhouse structures for agricultural production throughout the island has been reported which is not surprising given the strong winds that struck all areas of Cuba.

There have been no reports available on losses of cattle, but ranchers in Las Tunas and Camagüey provinces reportedly moved their livestock from prime grazing areas to higher ground in anticipation of extensive flooding. There have been reports of valuable (scarce) stocks of meat being lost from no refrigeration due to power outages.

Heavy winds are reported to have caused extensive damage to poultry houses throughout the island. Over one-half million head of poultry were lost to the storm. Poultry feed supplies have been seriously disrupted by the storms which will complicate the recovery of the industry. Losses of birds for meat and eggs will detrimentally impact the supply of these important sources of protein for the Cuban population.

Concluding Observations

This report documents the impacts of Tropical Storm Fay and Hurricanes Gustav and Ike on Cuban agriculture. The sum total of the damages caused by these storms to the Cuban economy, infrastructure, and agriculture is nothing short of catastrophic. This report does not include the impact of Hurricane Hanna which caused flooding from storm surges in the coastal areas of eastern Cuba. One AP article reported that Hurricane Gustav crippled Cuba's agricultural industry, food production, and infrastructure (Weissert, *Associated Press* 2008). Weissert's observation was made based only on the devastating damage from Hurricane Gustav in western Cuba before the more widespread destruction inflicted on the entire island by Hurricane Ike.

The United Nations Office for the Coordination of Humanitarian Affairs initially estimated that damage from the storms could run as high as three to four billion dollars, but more recent estimates coming from Cuban authorities indicate that the cost of the damages may exceed five billion dollars.

The Director of Cuban National Institute of State Reserves said on Cuban television that Cuba's resources are not adequate to deal with the extensive damage caused by Hurricanes Ike and Gustav. Cuba is receiving a steady stream of offers for emergency aid from a wide range of nations, including Argentina, Bolivia, Brazil, Cayman Islands, China, Colombia, Ecuador, Guatemala, Mexico, Peru, Russia, Spain, St. Lucia, Uruguay, Venezuela, and Vietnam. This aid takes the form of emergency supplies, food, construction materials, and tents for those who have lost their homes, as well as financial commitments. Even the small Southeast Asian nation of Timor-Leste (East Timor) has committed \$500,000 to Cuba's hurricane recovery.

As of the publication date of this report, the Cuban government has rejected a series of aid offers from the United States (Robles, September 22, 2008, and September 13, 2008).

The World Food Program and a host of other United Nations agencies and offices are responding to Cuba's hurricane recovery, committing over \$3.5 million in relief aid for food assistance, construction supplies and tools, healthcare supplies and hospital equipment, and agricultural economic recovery (United Nations Office for the Coordination of Humanitarian Affairs).

The speed with which Cuban agriculture is able to recover from the damages wrought by these storms will vary by commodity sector. The Cuban government has introduced a program to promote planting and recovery of short-cycle crops for human and animal consumption to help improve food availabilities as quickly as possible.

In recent years, Cuba has increasingly relied on urban gardens and *organoponicos* to provide fruits and vegetables to its largely urban population. Their presence in urban areas minimizes the need for transporting goods to make distribution more rapid

and economically efficient. These agricultural production units may play an important role in supplying food, particularly perishable vegetables and fruits, to urban populations following the storms.

The implementation of recently announced policies that make under-utilized land available to individual or cooperative farmers and shifting agricultural planning and decision-making authority from central to local levels could help accelerate the recovery of agriculture in Cuba. However, the availability of agricultural inputs in Cuba has been a consistent problem ever since the collapse of the Soviet Union in the early 1990s. After the hurricanes, Cuba's acting Agriculture Minister acknowledged the limited availability of seeds and organic fertilizers for the recovery process. Without adequate resources and inputs, all of Cuba's agricultural recovery programs will face challenges.

The extensive destruction of Cuban crops and stored food supplies suggests that there will be an increased need for Cuba to import food in the short to medium term. Given the damage to food storage and refrigeration systems, and the difficulties facing Cuba in restoring vastly damaged electrical grids, most food imports will need to consist of less perishable commodities. Given its geographic proximity to Cuba and the economies available in shipping smaller orders over relatively short distances, the United States would be a logical source of supply for much of Cuba's short-term food requirements. Even before the hurricanes, the Cuban government acknowledged challenges in its finances and hard currency supplies. It asked some of its creditors to restructure its debt due to the spike in fuel and food prices and the decrease in nickel prices (nickel is Cuba's largest export product by value). The tremendous challenges from hurricane recovery will place an additional strain on the Cuban financial system. Earnings from agricultural exports will be down in the short term and tourist revenues may decrease due to damaged hotels and facilities in some areas of the island. For these reasons, Cuba may concentrate on food purchases from countries or companies that will provide them with credit.

During his nearly 50 years as the leader of Cuba, Fidel Castro was a constant and commanding

presence on Cuban TV and in the press. In times of national crisis, his leadership style was even more evident, as he frequently would visit the most heavily impacted areas of the country to talk with the local Cuban citizens, all the while exhorting the Cuban people to persevere for the good of the revolution. Cuba's current leader, Raul Castro, has a very different and more low-key leadership style, and the contrast has been particularly evident during the hurricane disasters of the last month, as his public presence has been limited. How the Cuban people will respond to Raul's leadership approach remains to be seen. So, too, there is uncertainty regarding the people's response to the challenges of rebuilding Cuba's infrastructure with very limited resources along with the anticipated food crisis that the Cuban government acknowledges will take at least six months to resolve.

While expectations for improved living conditions under the Raul Castro administration have been high, the combination of severe shortages and prolonged economic stagnation may promote widespread cynicism. The effectiveness of Cuba's command-and-control system to implement large-scale evacuations during a natural disaster was demonstrated with these storms. Managing massive nationwide relief and reconstruction efforts while facing financial constraints will be a great challenge for Cuba's government. However, if government actions are perceived to be effective, the crisis could potentially increase the credibility of the administration.

Since the revolution in 1959, the Cuban people have come to expect the government to provide some level of basic food supplies at inexpensive (subsidized) prices. It should be noted that the last major civil unrest in Cuba occurred in 1994, with the Rafter's Crisis, which was due in part to critical food shortages. National security considerations related to these events reportedly enabled Raul Castro, then head of the military and national security, to successfully promote the important agricultural policy change allowing the opening of Cuba's Agricultural Markets – a significant market-oriented reform for Cuba. (Cuba's Agricultural Markets, *Mercados Agropecuarios*, allow farmers to sell, at free market prices, any surplus agricultural

production beyond that which they are obligated to sell to the state food collection agency *Acopio*. For additional detail on these markets see “Structural Change in Cuban Agriculture in the 1990s” [Messina 2001].) Might more new and significant changes in Cuban agricultural policy be on the horizon?

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