

## **USDA Hurricane Mitch Recovery Program Special Objective 3**

*Hurricane-induced agricultural health risks will be reduced to levels consistent with existing WTO obligations and emerging food safety recommendations.*

### **SECTION II: DETAILED ACTIVITIES BY COUNTRY AND REGION**

Special Objective 3 (SpO 3) projects were designed to address Sanitation and Phytosanitation (SPS) issues that were common among the target countries within the region. Honduras and Nicaragua were primary participants and beneficiaries in the major part of the program.

Section II. A describes the Honduras and Nicaragua country programs in detail, disaggregating the data by specific country wherever possible and appropriate to the nature of the discussion.

Five of the 23 SpO 3 projects targeted multiple countries and are reported on here in Section II. B, Regional Program Description. The entire section is organized as follows:

#### **A. Country Program Description-- Honduras And Nicaragua**

##### **IR 3.1 Projects--*Enhance health practices for agriculture production and processing***

1. Farm Level Food Safety/HACCP for Livestock Products (Honduras and Nicaragua)
2. Best Management Practices for Shrimp Farming (Honduras and Nicaragua)
3. Establish Medfly-Free Zones (Honduras and Nicaragua)
4. Integrated Pest Management for Food Safety (Honduras and Nicaragua)
5. Extension Practices Improved for Dairy Food Safety (Honduras and Nicaragua)
6. Good Agricultural Practices for Food Safety (Honduras and Nicaragua)

##### **IR 3.2 Projects--*Strengthening of institutions essential for ensuring animal and plant health and food safety***

7. Training In Geographic Information Systems for Monitoring and Control of Livestock Pests (Honduras and Nicaragua)
8. Epidemiological Field Surveillance for Livestock Diseases (Honduras and Nicaragua)
9. Medfly-Free Zone Technical Advisory Committee for Policy Development and Implementation (Honduras and Nicaragua)
10. Strengthening Diagnostic Laboratories for Shrimp Disease Management (Honduras and Nicaragua)

11. Veterinary Education for Rural Women (Nicaragua)
12. Assessment of Feasibility and Benefit of Pink Bollworm Eradication on Corn Islands (Nicaragua)
13. Executive Leadership for Food Safety (Honduras)
14. Institutional Strengthening for Dairy Food Safety (Honduras)

**IR 3.3 Projects--*Rehabilitate physical infrastructure***

15. Rehabilitation of Veterinary Laboratories (Honduras And Nicaragua)
16. Design and Construction of Hydrothermic Mango Treatment Facility (Honduras)
17. Modernization of Cold Storage Shipping/Receiving Facility at Managua Airport (Nicaragua)
18. Construction of Vegetable Packing and Cold Storage Facility in Rivas (Nicaragua)

**B. Regional Program Description**

**IR 3.1 Projects--*Enhance health practices for agriculture production and processing***

1. Pest Risk for Admissibility of Non-Traditional Crops (Honduras, Nicaragua, Guatemala, El Salvador)

**IR 3.2 Projects--*Strengthening of institutions essential for ensuring animal and plant health and food safety***

2. Mitigation of Lethal Yellows Disease (LYD) in Coconuts (Honduras, Nicaragua, Guatemala, and El Salvador)
3. Food Safety System Infrastructure Modernization (Antigua/Barbuda, St. Kitts, Nevis)
4. Quarantine Systems Training for Policy Development and Implementation (Honduras, Guatemala, El Salvador and Nicaragua)
5. Waterborne Disease Causes and Control in Food Systems--Training for Policy Development and Implementation (Honduras, Nicaragua, El Salvador, Guatemala)

## **A. Country Program Description— Honduras And Nicaragua**

### ***IR3.1***

#### **Project 1 Farm Level Food Safety/Hazard Analysis Critical Control Points (HACCP) for Livestock Products (Honduras and Nicaragua)**

##### **Project Summary**

The HACCP Project addressed weaknesses in producer and processor sectors by focusing specifically on the knowledge and skills necessary for food safety. The food safety status of livestock products was weak under the best of circumstances, but particularly vulnerable in the face of natural disasters where water quality, public sanitation, and livestock health are deleteriously affected. The planned impacts were to increase producer awareness of connection between livestock health and food safety; provide advance training for institutional decision makers; and establish an HACCP-based export certification program.

##### **Key Accomplishments/Practical Impacts**

- Twenty Master of Science level training modules in post-graduate Food Processing and HACCP inspection were completed.
- Five high-value export products were successfully targeted (shrimp, beef, fish, cheese, and oriental vegetables) and an HACCP-based export certification program was implemented in Nicaragua.
- Producer-level food safety awareness was achieved.
- Project allowed Nicaragua to secure International Development Bank funds by meeting requirement that that Ministry of Agriculture (MAG-FOR) livestock and food safety inspectors have Master's level training.

##### **Practical Impacts**

- Better trained decision makers at government level.
- High-values export product markets in Europe were protected and expanded for Nicaragua thereby enhancing its national economic status.
- The IDB funding assistance to Nicaragua was a direct result of this project's impact on strengthening institutional capacity and human capital.



**Figure 1. Modernization of laboratory practices, Nicaragua MAG-FOR**

### **Additional Measures to Protect the Investment/Recurring Costs**

USDA recommends additional funding and expertise for HACCP training and standardization of HACCP livestock protocols in Central America.

## **Project 2 Best Management Practices for Shrimp Farming (Honduras and Nicaragua)**

### **Project Summary**

The shrimp farming sector of Central America is an important economic activity that offers employment and foreign exchange. Direct and indirect employment due to shrimp production is estimated at around 25,000 individuals. This places shrimp culture as the second most important introductory in the Gulf of Fonseca area after agriculture. (The Gulf of Fonseca area covers shrimp aquaculture producers in both Nicaragua and Honduras.) Given the key role of shrimp culture in coastal communities and enormous future potential, the damage inflicted by Hurricane Mitch was particularly grievous. Small and medium farmers--those who have the least access to technology, financing and good infrastructure--were the worst hit by the storm and faced the greatest challenges to recovery.

The Shrimp Farming Project focused primarily on the delivery of training to strengthen farmers' knowledge and skills necessary to enhance the physical and economic resilience of their enterprises through the use of Best Management Practices. The project plan also provided for strengthening the capacity of regional technical outreach organizations and training-of-trainers to leader farmers as a means of increasing the capacity of farmers to transfer know-how and experiences among each other

## **Key Accomplishments/Practical Impacts**

**Direct training activities for farmers**, including workshops, demonstrations, and farm site technical assistance.

- Direct farm-site training was provided in Nicaragua to 225 shrimp producers (51 women) in 13 separate one-day events.
- Direct farm-site training was provided in Honduras to shrimp producers 38 (5 women) in 10 separate one-day events.

**Training-of-trainers** courses for outreach personnel, educators, and farmer leaders focusing on Best Management Practices.

- In Nicaragua, 23 institutional representatives (3 women) were targeted as participants in the TOT program. There were 7 TOT courses, resulting in 525 person-days of training. Each TOT event covered a different technical topic.
- In Honduras, 25 institutional representatives (7 women) participated as trainees in the TOT program. There were 7 TOT courses, resulting in 567 person-days of training. Each TOT event covered a different technical topic.
- A series of field-based follow-up visits provided mentoring support to TOT participants in each country. In Nicaragua there were 4 follow-up visits representing 7 days of mentoring, and resulting in 104 trainee-days of support. In Honduras there were 5 follow-up visits representing 9 days of mentoring, and resulting in 196 trainee-days of support.

**Institutional Strengthening.** In Nicaragua, the main institutional collaborator and benefactor of institutional strengthening under this project was the University of Central America (UCA). In Honduras, the main institutional collaborator and benefactor of institutional strengthening was the Honduran Aquaculture Producers' Association (ANDAH).

- In Honduras, as a result of the strengthening achieved through this project, ANDAH provided training to shrimp producers in 6 communities, with a total of 92 participants (10 women).

- In Nicaragua, UCA assisted in organizing the Sixth Annual Meeting of the Shrimp Farming Cooperatives. This was an annual event prior to Hurricane Mitch but had not been held for two years as the farmers attempted to recover. With support from UCA, USDA, the project AQ-1 team, NOAA, the EU and USAID, resources were pooled to support this event with matching funds from the cooperatives. The event included a series of presentations, some of which were delivered by TOT participants using materials from the course. Approximately 280 people attended and 19 cooperatives were represented.
- The Sixth Annual Central American Aquaculture Symposium was held in August with ANDAH (Honduras) as the principal organizer. The USDA Training Assistant and the USDA Coordinator provided assistance in the form of organization and logistical support to the event.
- The USDA Hurricane Mitch project included a donation of approximately \$20,000 of extension and outreach equipment to local institutions to facilitate technology transfer and training activities.

**Formation of national level inter-institutional Consultative Groups** in Nicaragua and Honduras functioning as advisory boards and planning entities to improve national level management of the sector and provide stronger private-public partnerships. The Groups played an extremely important role in the project, providing technical guidance, institutional support and other assistance. A Consultative Group was formed in each country that included members of public, private and educational institutions.

- In Nicaragua, there were 10 member groups who met approximately 10 times.
- In Honduras, there were 12 member groups (membership was somewhat variable over time) who met at least 15 times.
- Additionally, in Honduras, the principal members of the Group developed and signed an inter-institutional agreement to share resources and collaborate on technical assistance to the small and medium producers. Under this agreement, members of the Honduran Consultative Group, Honduras Secretariat of Agriculture (SAG), INFOP, ANDAH, and El Zamorano Pan-American Agricultural School formed a technical team that assisted the USDA Training Assistance to 92 small and medium producers in six communities (see above).

The Consultative Groups, created by the Shrimp Farming Project, worked on a number of initiatives. A major effort was to educate and inform government members regarding the importance of the shrimp culture sector and the need of small and medium producers for technical and financial support. A key part of this assistance was to provide updated information and data on the sector. The Group organized and supported a survey of small and medium producers to collect the data needed for planning and legislative efforts.

**Development of Best Management Practices** appropriate to the environmental and economic realities of shrimp farmers in Nicaragua and Honduras, and **development and publication of a Best Management Practices reference manual and extension materials.**

- A series of extension materials, written for the layperson, were developed by members of the Consultative Groups, TOT training groups and the USDA Coordinators in both countries. The final drafts were reviewed in both countries and the final products published with oversight by UCA in Nicaragua. The language of publication was Spanish. Topics covered by these materials included:
  - Pond construction
  - Harvest and post-harvest handling of shrimp
  - Biosecurity in shrimp culture
  - Water quality in shrimp ponds
  - Best management practices (BMP) for shrimp culture
  - A calendar with BMP and environmental topics
- Shrimp producers who participated in the training and technical assistance activities of the project adopted new Best Management Practices. Examples of specific practices include: record keeping, sampling for health and feed adjustment, reducing water exchanges, using fewer antibiotics, lowering stocking rates, harvesting at night to improve product quality, employing biosecurity measures to avoid introduction and spread of diseases, drying ponds between crops, using lime as a disinfectant, use of a salinometer to monitor pond salinity levels, and using a pump instead of only tidal flows for water management.
- Several new ponds were constructed by shrimp producers, utilizing knowledge and skills transferred by the project including proper site selection, use of settling ponds at water inflow, purchase of pumps to improve management of water, reduced stocking rates, and use of balanced feeds to increase production.

**In Nicaragua**, an end-of-project producer survey showed an average of **8 new Best Management Practices** were adopted by each shrimp producer participating in the training and technical assistance activities of the project. **In Honduras**, the same producer survey indicated that each shrimp producer participant had adopted an average of **10 new Best Management Practices**.



**Figure 2. In Nicaragua, TOT participants observe good construction practices for shrimp ponds.**

### Practical Impacts

- Industries of Nicaragua and Honduras, and institutions and organizational infrastructure are strengthened for the support of the shrimp production industry.
- Productivity has increased among the enterprises of those who received assistance through this project.
- Food safety status has been enhanced, resulting in a better quality product with greater marketing potential. Better food safety status of the shrimp product has benefited public health.
- Environmental quality in the shrimp production zones has been improved due to the diffusion of practices that are more environmentally friendly than those previously used.
- Nicaragua and Honduras are better able to endure future environmental shocks, and recover more quickly from such shocks, due to:
  - better organizational infrastructure
  - enhanced economic vitality of the enterprises so as to provide the fiscal engine necessary to drive recovery following disruption by natural disasters
  - new knowledge and skills necessary for protecting food safety status of shrimp products thus reducing potential for negative effects on public health following natural disasters

## **Additional Measures to Protect the Investment/Recurring Costs**

The final results of the Shrimp Aquaculture Project were:

- a well-trained corps of extension agents, educators and producers
- institutions with experience in providing technical assistance in a collaborative fashion
- producers who are trained and interested in learning more and applying new practices
- a body of excellent technical materials
- proven training curricula
- an outstanding training team
- extension strategies and plans accepted by multiple institutions

This is a recipe for a dynamic, strong and inter-institutional extension program that could provide sustained technical assistance to shrimp farmers, thus enhancing long-term adoption of Best Management Practices to continue the growth and improved efficiency of shrimp farming in Latin America.

The missing ingredients are financial resources and a facilitating, catalyzing lead institution. In order to sustain the implementation of Best Management Practices and to pursue new areas in need of attention, the current extension plans developed during the project should be followed. These plans focus on two key components:

- To enable extension agents to work with farmers through the provision of minimal resources and on-going training of the extension agents. This will address many of the technical and environmental challenges still facing the industry.
- To strengthen the public and private sector partnerships in order to make progress with financing, economic and policy issues.

Ideally, this work would be done on a regional basis since the issues and concerns are very similar for both countries. Since the Gulf of Fonseca is the natural resource base for the industry, a regional approach would be more effective and cost-efficient.

### Recurring Costs

Costs of continuation would be similar to those of this project. In order to finance and operate a collaborative extension program in each country, an annual budget of approximately \$30,000 would be needed for a total of \$60,000 to support the lead institution and its partners. This funding level would accommodate the full time salary of an extension agent/coordinator, materials, supplies, minor equipment, and some operational funds for other partners. If continued foreign technical assistance were

required, other funding would need to be added. Assuming that one or two specialists made regular trips (3-4 per year) for training and facilitation purposes, an additional amount of \$50-60,000 might be required, depending upon specific requirements of the specialists' time.

### **Project 3 Establish Medfly-Free Zones (Honduras and Nicaragua)**

#### **Project Summary**

The Mediterranean fruit fly (Medfly) [*Ceratitidis capitata*] is important to the Honduran and Nicaraguan economies, not only because of the losses to fruit production and increase in production costs due to the application of insecticides, but primarily because of the reduction of exports as a result of quarantines by countries that do not have the pest. Hurricane Mitch exacerbated this problem by redistributing the insect. The lack of an internationally accepted monitoring and surveillance systems in Honduras and Nicaragua jeopardized the export status of products from zones that had previously been considered free of Medfly because of the inability to meet verification requirements.

The Medfly attacks 253 types of fruit, nuts, and vegetables, of which the majority are tropical or subtropical in origin. The lack of a functional monitoring and surveillance system, as well as the lack of an internationally recognized quarantine system, affects the targeted countries in two ways:

- Producers are vulnerable to pest control expenses when there is no early warning system for Medfly buildup, and when there is insufficient information to inform decisions for establishment of new enterprises agricultural expansion is inhibited or placed at higher risk.
- Many countries will not accept imports from zones that cannot be certified as Medfly-free by internationally recognized protocols.

The planned expectations of this project were the implementation of an internationally accepted national monitoring and surveillance protocol for Medfly in Nicaragua and Honduras, and the establishment of internationally recognized Medfly-free zones in the two countries. The project work was done through a Cooperative Agreement with OIRSA, a regional multi-lateral government organization for Sanitation and Phytosanitation (SPS).

#### **Key Accomplishments/Practical Impacts**

- Decision makers within SAG (Honduras) and MAG-FOR (Nicaragua) understand the importance of implementing an internationally recognized monitoring and surveillance protocol.

- The monitoring and surveillance system has been put in place and is functional.
- Fundamental physical resources were purchased and donated by the USDA project
- Host country personnel are now trained and experienced in implementing the protocol.
- A large amount of quarantine data has been generated to fulfill international requirements for certification of Medfly-free zones in Honduras and Nicaragua.

### **Additional Measures to Protect the Investment/Recurring Costs**

The governments of Honduras and Nicaragua must continue implementation of the monitoring and surveillance protocol without lapse in order to meet and maintain international standards for recognition of the Medfly-free zones. The government of Honduras established the national infrastructure within the Secretariat of Agriculture necessary to proceed with the Medfly-free zone activities, and has committed \$500,000 for this purpose during 2002.

Additional years will require organizational infrastructure, qualified human resources, and funds of approximately \$500,000 per year.

### **Other Considerations**

- Advanced training of personnel who were capacitated under this project
- Basic training for a larger pool of personnel
- Technical assistance to government decision makers for writing, establishing, and implementing a monitoring and surveillance protocol that is nationally mandated
- Expansion of the Medfly-free zone perimeter (with proportionally more funding)

## **Project 4 Integrated Pest Management for Food Safety (Honduras and Nicaragua)**

### **Project Summary**

Hurricane Mitch exacerbated pest control problems for farmers by redistributing pests and upsetting agronomic ecosystems. The ability to recover from Hurricane Mitch, and other ecological disruptions in the future, depends on up to date pest management know-how. Additionally, farmer response to increased pest pressures is often an increase in the use of pesticides. Increased pesticide use can result in higher levels of pesticide residues, with serious implications for public health at a time when populations are already at greater risk from other problems following a natural disaster.

This project addressed incomplete levels of farmer knowledge and skills for pest management and minimization of pesticide residues. The project's purpose was to increase the use and diffusion of effective pest management practices that are compatible with the limited economic resources of small and medium scale farmers that make up the great majority of the agricultural enterprises in Honduras and Nicaragua (typically, 0.5 to 1.0 hectare enterprises).

The Ministries of Agriculture in Honduras and Nicaragua are not configured to provide technical outreach assistance to farmers. The project aspired to focus on strengthening farmer-to-farmer (FtF) linkages by building capacity among leader farmers for facilitating the process of FtF transfer of know-how. The project worked within the framework of farmer cooperatives to establish centers of knowledge and skill for pest control.

### **Key Accomplishments/Practical Impacts**

A number of farmers have expanded their knowledge about pest management, and have been able to implement improved practices. In Honduras, 8 days of formal workshops were delivered, with 324 participants (33 women). In Nicaragua, 8 days of formal workshops were delivered, with 241 participants (25 women). A group of melon producers in the Choluteca area of Honduras are using Integrated Pest Management (IPM) strategies to reduce pesticide costs and increase profits. In Nicaragua, producers are using improved IPM techniques resulting in reduced pesticide usage and the use of safer pesticides.

### **Additional Measures to Protect the Investment/Recurring Costs**

Additional field level mentoring would be highly beneficial to farmers as they seek to apply new knowledge and deal with emerging problems.

Workshops in outreach methodology and pest management techniques for leader farmers and producer associations would be beneficial. Local expertise exists to provide the needed technical assistance. Institutions such as the Pan-American Agriculture School (Zamorano) and the National Agriculture School of Honduras (La ENA), and the Association of Producers and Exporters of Non-Traditional Products (APENN) in Nicaragua have good human resources but need funding to mobilize the technical expertise in the form of workshops and field level assistance. A one-day workshop costs approximately \$1000 exclusive of food and transportation for participants. A half dozen field based workshops for vegetable producers in each country per year would have a high impact on pest management effectiveness, productivity, economic performance, and reduction of pesticide residues.

## **Other Activities to Consider to Mitigate Future Disasters**

The establishment of grower-owner, expert-supervised programs of field scouting and consultation would be highly beneficial. Such a program could be incubated in about 3 months, but will likely require about two years to become self-sustaining. Such a program may add up to 25% to existing grower costs, but should be offset by higher production. Care must be taken in such a case to avoid pushing the economy-of-scale to a level that would force low resource producers out of business.

Recurring costs for maintaining this new technology would be between \$10 and \$35 per producer. Costs will vary with pest intensity and the price of resistant varieties.

## **Project 5 Extension Practices Improved for Dairy Food Safety (Honduras and Nicaragua)**

### **Project Summary**

The production of cheese in Nicaragua and Honduras is typically done under inadequate food safety conditions that can put public health at significant risk during times of natural disaster that further weaken sanitation and disease status within these countries.

Furthermore, the ability to emerge quickly from future disasters will be enhanced if the industry is operating under good manufacturing practices and there will be a more robust economic base to fuel recovery if the industry can meet the food safety requirements of export markets. Throughout Honduras and Nicaragua, the production and sale of locally produced cheese represents an important source of household income families and local communities.

A large majority of cheese producers in Honduras and Nicaragua are operating their processing plants in conditions that often do not meet basic sanitary conditions to ensure the safety of their products for human consumption. Critical source-point contamination include untested liquid milk, use of non-pasteurized milk, poor filtration systems, unsanitary concrete processing tanks, use of wood utensils in stirring processes, poor employee sanitation, contamination from live-stock maintained close to processing facilities, and poor storage of finished product. The lack of national extension services in Honduras and Nicaragua inhibits dissemination of information and knowledge.

This project addressed food safety issues by enhancing knowledge, skills, and equipment among cheese producers and milk suppliers in the region of Olancho in Honduras and Boaco in Nicaragua. The project expected to:

- Catalyze changes in attitudes, skills, and production practices of small and medium scale cheese producers.
- Enhance the capability of food science technicians to be better able to provide training and technical assistance for small and medium scale cheese producers.
- Improve the capacity of producers in Honduras and Nicaragua to produce and package cheese under internationally recognized standards that allow for expanded entry into national and export markets.
- Enhance the extension capability of technical assistance providers in Honduras and Nicaragua.

The project collaborated with the Honduran Secretariat of Agriculture/Food Safety and Phytosanitation Division (SAG/SENASA), the National Agricultural School of Honduras (La ENA), the National Agriculture School of Nicaragua (UNA), the regional Network for Sustainable Development (RSD) for technical outreach, and various cheese production cooperatives. These institutions have the necessary capacity to go forward with the work of this project.

SAG/SENASA seems to be in a particularly strong position, having achieved Congressional legislation establishing authority for a food safety unit; structured and staffed a food safety regulatory office; developed and institutionalized a national dairy food safety protocol; and met U.S. Food and Drug Administration food safety requirements and thereby achieved admissibility of cheese into the U.S. market.

### **Key Accomplishments/Practical Impacts**

- Increased awareness among host country partners: La ENA, La UNA, RSD, and decision makers in the Ministries of Agriculture regarding technical, economic and political rules and regulations pertaining to production, transportation, and marketing of dairy products.
- Increase public awareness of the public health concerns relating to production and processing of milk products, and a better understanding of what the various government and private institutions are doing to address food safety and marketing issues.
- Improved sanitation procedures in dairy processing plants in Olancho (Honduras) and Boaco (Nicaragua), resulting in production of dairy products that are safer for human consumption.
- Four dairy processing plants in Olancho (Honduras) received FDA inspection, and are now positioned to begin exports to the U.S.
- The dairy analysis laboratories at La ENA and La UNA are fully equipped and now have the capacity to ensure product quality for producers and processors in Olancho and Boaco.
- Technical assistance brochures produced and distributed, creating a foundation of information and guidance for cheese producers.
- All technical assistance material produced by the project is accessible through the RSD website.

- Honduras:
  - Over 500 milk producers received field based technical assistance
  - Over 250 cheese facility employees received formal training plus facility-based mentoring after the training events.
- Nicaragua:
  - Over 500 milk producers received field based technical assistance
  - Over 200 cheese facility employees received formal training plus facility-based mentoring after the training events.
- Increased inter-institutional and bi-national (Honduras and Nicaragua) collaboration among non-governmental organizations (NGOs), governmental agencies, international aid organizations, dairy producers, and universities regarding technical, legal, and commercial aspects of dairy production and marketing.
- Cheese now being exported from Honduras to the U.S.A.



**Figure 3. In Honduras, sanitary cheese making, using technology delivered by project.**

### **Additional Measures to Protect the Investment/Recurring Costs**

Continued training and mentoring will help cheese producers build the knowledge and skills they require for successful technical transition. Efforts need to be made to expand the accomplishments of this project to additional cheese processing facilities. To ensure achievement of goals in Nicaragua, the national government should establish a national dairy food safety protocol, and a national regulatory unit to help cheese producers meet international standards.

Government level inspection and regulatory activities could require approximately \$100,000/year to maintain current significantly important but modest level of activity in Honduras. Cheese processing plants will require approximately \$10,000 per year to make and maintain necessary improvements. La ENA and La UNA will require approximately \$15,000/year each to maintain current level of technical assistance and laboratory analysis infrastructure.

## **Other Activities to Consider to Mitigate Future Disasters**

Continued training in Best Manufacturing Practices for dairy food safety should be given a high priority. Field-level and processing plant-based technical assistance and mentoring is an important element for implementation of improved dairy food safety practices.

Production and distribution of a second generation of technical assistance bulletins appropriate for the needs and constraints faced by the industry would be of significant value in advancing dairy food safety practices. La ENA, La UNA, and RSD have the human resources for this task, but lack funding.

Indications are that a dairy extension radio program for “Best Management Practices” would be well received and an effective way of getting succinct technical food safety messages to dairy and cheese producers as well as the general public.

## **Project 6 Good Agricultural Practices for Food Safety (Honduras and Nicaragua)**

### **Project Summary**

Hurricane Mitch exacerbated product sanitation problems for farmers by degrading water sources, destroying sanitation and hygiene facilities for humans, increasing the rate of diarrheal disease, and exacerbating the scarcity of appropriate containers for packing fruits and vegetables. The ability to recover from Hurricane Mitch, and other ecological disruptions in the future, depends on up-to-date food safety know-how for the production of fruits and vegetables. The loss of export markets due to failure to meet international standards has implications for the economic well being of the agriculture sector as well as the public health status of the domestic population.

This food safety project addressed incomplete levels of farmer and packer knowledge and skills for compliance with international standards for food safety. The focus was on small and medium scale producers, who represent the great majority of the farming population in Honduras and Nicaragua. Small to medium producers are those that farm 0.5 to 1.0 hectares of vegetables. The project addressed a general absence of good sanitation practices in the field, and of sanitary conditions in packing sheds. Products are

commonly irrigated with water from contaminated sources, and are harvested by workers who have no access to toilet facilities in the field. Packing sheds often operate with lack of hand washing facilities and sanitizing stations for knives and other implements. Washing of produce at the shed is often done without proper monitoring of the application time and sanitizer concentration needed to ensure anti-microbial efficacy. Post-washing handling of produce is typically done without gloves and without regard for hygienic practices. These less than adequate practices can and do lead to outbreaks of food borne illness.

The purpose of the project, under IR 3.1, was to increase the use of food safety practices in the production and processing of fruits and vegetables. This was to be done by increasing knowledge and skills through training and field-level mentoring and technical assistance to producers and packers.

### **Key Accomplishments/Practical Impacts**

Fourteen days of training were provided during the life of the project in Honduras, reaching a total of 133 participants (42 women), including 94 producers. In Nicaragua, a total of 12 days of training were provided, reaching a total of 149 participants (17 women), including 98 producers. Among the participants was ministry of agriculture personnel in both countries; however, the Ministries do not have outreach functions. Industry representatives and NGO personnel were among the participants of the training programs; these hold potential for dissemination to their facility workers of the information communicated in the training events. The greatest potential for diffusion of the technology in a way that will result in behavioral change is farmer-to-farmer.



**Figure 4. Fruta del Sol Cooperative in Honduras using improved vegetable packing procedures.**

## **Additional Measures to Protect the Investment/Recurring Costs**

Field-based technical assistance is needed to help producers translate their new knowledge into practices. A continuing series of producer workshops throughout the coming year would help protect the accomplishments of the project, as well as add new farmers to the cadre of those using improved practices. Farmer-to-farmer diffusion would be reinforced by including extension methodology and communication skills in a training program for leader farmers.

The farm and packer-level costs of maintaining the new food safety practices are in the range of less than \$100/year per hectare, to approximately \$1000/year for a typical cooperative packing facility.

Funds for training and technical outreach delivered through La ENA, La UNA, and producer cooperatives would be beneficial.

## **Other Activities to Consider to Mitigate Future Disasters**

National food safety protocols should be developed and institutionalized. Also needed are regulatory infrastructure and human resources for technical assistance to producers and packers for compliance.

*IR 3.2*

## **Project 7 Training in Geographic Information Systems (GIS) for Monitoring and Control of Livestock Pests (Honduras and Nicaragua)**

### **Project Summary**

Compliance with WTO obligations for the monitoring and control of livestock diseases requires an information system that meets international standards. Recovery of the livestock industry from pest outbreaks following natural disasters and the protection of international pest status certifications depends on being able to track and document changes in livestock disease status over large geographic areas.

The existing systems for tracking livestock disease status and projecting trends following new pest occurrences are inadequate. Outbreaks of economically important pests could not be recognized and mitigated reliably under the pre-Mitch systems.

The planned expectations of the project were to upgrade monitoring and surveillance systems with modern GIS equipment and software; train personnel in the use of the new systems; and establish a protocol for field-level monitoring and data collection. As a result, the ability to recognize pest outbreaks at an early stage and launch corrective eradication or quarantine actions would be possible.

### **Key Accomplishments/Practical Impacts**

In Honduras, two SENASA offices were equipped with GIS hardware and software and five personnel were trained on GIS. In Nicaragua, two MAG-FOR offices were equipped with GIS hardware and software and seven personnel were trained on GIS. SENASA and MAG-FOR are well positioned to carry on with the GIS for livestock pest surveillance.

The ability to recognize pest outbreaks at an early stage and launch corrective eradication or quarantine actions is now possible to a greater extent than previously feasible.

### **Additional Measures to Protect the Investment/Recurring Costs**

Periodic upgrades of the GIS and strengthening of the infrastructure for sharing of information across political boundaries within the region would be appropriate. Funding amounts to support this work would be approximately \$5000/year per country.

## **Project 8 Epidemiological Field Surveillance for Livestock Diseases (Honduras and Nicaragua)**

### **Project Summary**

The ability to recover from present and future natural disasters that exacerbate the spread of livestock disease depends on the ability to make field diagnosis, implement scientifically based sampling, and collect specimens for laboratory analysis. In the case of both Honduras and Nicaragua, the field surveillance infrastructure was too weak to adequately address principal livestock disease threats.

## **Key Accomplishments/Practical Impacts**

### *For Nicaragua:*

- Substantial increase in number of livestock producers reporting disease and assisting with lab sample collections.
- Substantial increase in Nicaraguan live beef exports to Mexico.
- Capacity to document bat paralytic rabies plague in livestock (resulted in National Geographic television documentary).
- Cattle producers introduced through training to production cost economic modeling.
- Classical swine fever vaccination & buffer zone maintained in spite of OIRSA dropping support.
- Cattle grub fly (*Dermatobia hominis*) or *torsalo* studied to prevent this major plague from occurring or emerging.
- Major poultry disease (avian influenza) prevented from ingress from Guatemala and El Salvador.
- Bio-security in the poultry industry greatly improved.
- Livestock evaluation equipment purchased, installed, and personnel trained in its use.

### *For Honduras:*

- Substantial increase in number of livestock producers reporting disease and assisting with lab sample collections.
- Cattle producers introduced through training to production cost economic modeling.
- Reinforced partnership with USDA/APHIS Central American field surveillance for livestock diseases.
- Livestock evaluation equipment purchased, installed, and personnel trained in its use.

### Practical Impact

The MAG-FOR Animal Health institution (Nicaragua) was strengthened sufficiently to enable them to become a member of the International Organization of Epizootics (OIE), the international standard-setting body on animal health headquartered in Paris. Both MAG-FOR and SENASA are off to a good start, well positioned to build on achievements.

## **Additional Measures to Protect the Investment/Recurring Costs**

The host institutions need USDA/APHIS mentoring and technical assistance for continued strengthening of field surveillance. Projected costs are:

Nicaragua-- \$100,000 annually to maintain critical number of veterinary field inspectors.  
Honduras-- \$100,000 annually to maintain critical number of veterinary field inspectors.

## **Project 9 Medfly-Free Zone Technical Advisory Committee (TAC) for Policy Development and Implementation (Honduras and Nicaragua)**

### **Project Summary**

Complementing the project for “establishing Medfly-free zones” (see pages 10-11) this project established a Technical Advisory Committee (TAC) of world experts, including those from the Central America region, on Medfly quarantine systems. The function of the TAC is to support the implementation of the Medfly-free zone project and provide a base of expertise to advise regional governments on Medfly quarantine protocols following the end of the USDA Hurricane Mitch Recovery Program. TAC members include experts from USDA/APHIS, UN/FAO, the International Atomic Energy Agency, the Inter-American Institute for Cooperation in Agriculture (IICA), and the Regional Organization for Agricultural Health (OIRSA).

### **Key Accomplishments/Practical Impacts**

There is a base of expertise familiar with the work of the Medfly-free zone project, and capable of providing the highest quality of technical support for strategy formulation, decision-making, and project planning. This base of expertise places the region in an excellent position to establish internationally recognized Medfly-free zones. Medfly-free areas reduce the cost of production for fruits and vegetables, and open export markets by meeting international phytosanitation standards.

### **Additional Measures to Protect the Investment/Recurring Costs**

The government of Honduras, IICA, and OIRSA are in positions to move forward with the Medfly-free zone work. However, effort is needed to coordinate the efforts of these players. The government of Nicaragua sees the Medfly-free zone objectives as having merit, but has expressed uncertainty about whether continuation of this work will fit in its national goals for the immediate future. Failure to continue the work done under the Hurricane Mitch Recovery Program will result in a loss of quarantine integrity and reversal of the progress made during the past two years.

The TAC should convene to assess the Medfly-free zone activities within the region, and provide local governments the benefit of expert consultation for proceeding with the work.

Approximately \$10,000 would be needed to convene the TAC for a 7-day review of the Medfly-free zone activities.

## **Project 10 Strengthening Diagnostic Laboratories for Shrimp Disease Management (Honduras and Nicaragua)**

### **Project Summary**

A strong technical capacity of national diagnostic laboratories is vital to being able to obtain a useful situation assessment of the disease situation following Hurricane Mitch in order to inform decision making for recovery actions. An effective network of diagnostic labs is essential for mitigation of future disasters, as well as providing support to the industry during normal times. In Honduras and Nicaragua, national laboratories were operating with inadequate field surveillance methodology, out-dated equipment, and a lack of technical expertise.

The planned expectations of this project were to develop a regional capacity for accurate and timely diagnosis of shrimp pathogens by national aquatic animal services, facilitate OIRSA's intent for the harmonization of diagnostic methods, and provide orientation on reporting of OIE notifiable pathogens.

### **Key Accomplishments/Practical Impacts**

Equipment has been upgraded. Laboratory personnel now have enhanced skills in diagnosis and a greater understanding of the causes and control of shrimp diseases.

The SENASA unit within the Honduran Secretariat of Agriculture is well positioned to take full advantage of the accomplishments of the project, and to sustain the institutional strengthening that has occurred. The Nicaraguan Ministry of Agriculture and Forestry has made remarkable progress under the USDA Hurricane Mitch Recovery Program. Full implementation of the new potential of MAG-FOR for shrimp disease surveillance and diagnosis will depend on establishing this activity as a high priority within its budget and program activities.

### **Additional Measures to Protect the Investment/Recurring Costs**

An advanced studies program in aquatic pathology within the national universities of Honduras and Nicaragua would provide the in-flow of human resources and technical support to sustain the accomplishments of this project, and address related needs that remain. Strengthening the academic programs of national universities in Nicaragua and

Honduras is highly preferable to addressing the problem of training by sending students to other countries, such as the USA, to study.

About \$10,000/year per country is required for laboratory supplies and a small amount of on-site supplemental training. Additional funding of about \$10,000/year per country to enable small scale shrimp producers to pay for the lab services would be essential in order for producers to take full advantage of the strengthened national capacity to provide them with useful shrimp aquaculture information for disease management.

## **Project 11 Veterinary Education for Rural Women (Nicaragua)**

### **Project Summary**

Recovery from the effects of Hurricane Mitch on livestock health, and ability to address livestock health issues on a continuing basis within Nicaragua depends on a sufficient cadre of veterinary professionals. Domestic economy and export earnings are at stake. This project was implemented to address the lack of academically trained veterinary professionals, especially women.

### **Key Accomplishments/Practical Impacts**

- Fifteen rural women were selected for full veterinary education scholarships.
- Faculty computer lab with Internet access was established.
- Critical veterinary reference library textbooks were purchased.
- Professional office was established for the newly-formed National Association of Veterinary Medical Professionals.
- UNAN-Leon (the national veterinary school) linked with Zaragoza, Spain and Texas A&M Veterinary Schools, and with USDA/APHIS Center for Epidemiology and Animal Health in Ft. Collins, CO.

#### Practical Impacts

Gender equity in veterinary profession is being addressed through the initiatives of this project. The institution of veterinary education is stronger and there is a cadre of veterinary professionals in the educational pipeline. UNAN-Leon is in good position to proceed with the scholarship program and strengthening of its academic program.

### **Additional Measures to Protect the Investment/Recurring Costs**

Current scholarship students will need textbooks and sustenance until they complete their studies.

Nicaragua could benefit from continued technical assistance for institutional strengthening of its veterinary education system. \$20,000 would fund further training for veterinary faculty and extend scholarships to additional women.

## **Project 12 Assessment of Feasibility and Benefit of Pink Bollworm Eradication on Corn Islands (Nicaragua)**

### **Project Summary**

Hurricane Mitch changed the distribution of agricultural pests. The ability to recover from the effects of the hurricane, and to develop priorities and policies for the future depends upon having accurate epidemiological information. The Pink Bollworm (PBW) exists on the Corn Islands of Nicaragua on wild cotton. The expansion of cotton production on the mainland depends on assuring that the PBW does not spread from the Corn Islands. The current level of knowledge about PBW status on the Corn Islands is insufficient to assess the risk to mainland cotton industry and to formulate an appropriate response strategy.

### **Key Accomplishments/Practical Impacts**

USDA accomplished the three objectives of the project: the assessment of PBW status on Corn Islands, a determination of level of risk to mainland cotton industry, and an assessment of feasibility for PBW quarantine and eradication. The knowledge now exists to make an informed decision about the PBW situation on the Corn Islands.

### **Additional Measures to Protect the Investment/Recurring Costs**

Utilization of the results of the assessments performed under this project will depend on cognizance and priorities within the Nicaraguan MAG-FOR. USDA recommends follow-up to the assessment, including possible implementation of the quarantine and eradication recommendations.

Approximately \$190,000 would be needed to implement the eradication program. The recommendations focus on the use of Sterile Insect Technique (SIT) with aircraft release, and scientific monitoring through the use of pheromone traps.

## **Other Activities to Consider to Mitigate Future Disasters**

The phytosanitation quarantine program in Nicaragua for all economically important insect pests should be strengthened in accordance with internationally recognized standards. This effort would cost approximately \$50,000/year for monitoring, following eradication.

## **Project 13 Executive Leadership Training for Food Safety (Honduras)**

### **Project Summary**

To strengthen expertise in Food Safety policy development and program implementation among mid to upper level leaders within the Honduras SAG, IICA has launched a comprehensive program of Food Safety Leadership Training. The IICA program provides a series of training events over a period of two years that address leadership, technical understanding, and multi-national collaboration.

Two upper level individuals (one woman, one man) within the SAG Food Safety and Phytosanitation Division (SENASA) will complete the program and contribute their new skills and knowledge to advance food safety policy development and program implementation.

### **Key Accomplishments/Practical Impacts**

The Honduran SAG/SENASA will have human resources with greatly enhanced expertise in food safety policy development and program implementation. In the future, Honduras will be a strong leader within the region for international collaboration on food safety. Eventually, there will be a regional network of decision makers at mid- and upper-levels of national governments to develop a partnership across national boundaries for addressing food safety issues that are priorities for all countries in the region.

### **Additional Measures to Protect the Investment/Recurring Costs**

The program participants need to be maintained in positions where their expertise can be utilized to advance food safety policy development and program implementation. While there are no recurring costs associated with the IICA program, funding is needed for travel to enable participants to engage in networking activities and program building within the region.

Approximately \$4000/year would enable both individuals to leverage their knowledge, skills, and leadership through meetings with counterparts in other Central American countries, and participate in related seminars.

### **Other Activities to Consider to Mitigate Future Disasters**

Convening of policy development seminars among regional government representatives.

## **Project 14 Institutional Strengthening for Dairy Food Safety (Honduras)**

### **Project Summary**

Concern about the impact of dairy food safety on public health was a high priority issue following Hurricane Mitch. The ability of the dairy food industry to recover from the degradations of Hurricane Mitch, and to mitigate the effects of similar natural disasters in the future, depends on establishing modern protocols and strengthening the infrastructure for producer education and enforcement.

### **Key Accomplishments/Practical Impacts**

Progress was made toward a national dairy food safety protocol that meets international standards. The capacity of enforcement personnel was strengthened through training. In the Olancho region, several model cheese processing facilities were established to serve as tests of the new protocol and enforcement infrastructure.

SENASA of the Secretariat of Agriculture is now well positioned to capitalize on the high level of progress that they have achieved.

### **Additional Measures to Protect the Investment/Recurring Costs**

USDA recommends three activities to protect the investments already made under this project: continued refinement of dairy food safety protocol, expansion of the inspection and enforcement infrastructure, and training for new dairy food safety inspection personnel. Approximately \$100,000/year is needed to support these measures, including funding for 3 inspector positions.

Without additional expansion of enforcement capacity, approximately \$30,000/year is needed to carry out field inspections using existing infrastructure.

## **Other Activities to Consider to Mitigate Future Disasters**

Dairy food safety protocols need to be harmonized across all countries within the Central America region.

### ***IR 3.3***

## **Project 15 Rehabilitation of Veterinary Laboratories (Nicaragua and Honduras)**

### **Project Summary**

Following Hurricane Mitch, damage to veterinary laboratory capacity and general pre-Mitch capability to fully address sanitation and phytosanitation needs were barriers to quick recovery. Both countries were in dire need of equipment modernization, facility repairs, and upgrading of technical skills of laboratory personnel.

### **Key Accomplishments/Practical Impacts**

Key accomplishments included equipment upgrades, facility renovation, replenishment of supplies, and technical training for laboratory personnel. The Ministries of Agriculture in Honduras and Nicaragua are in good positions to capitalize on the advances made under this project.

### **Additional Measures to Protect the Investment/Recurring Costs**

Maintenance of equipment and facilities, and continued upgrading of technical training, must be priority items in national budget and programming.

Approximately \$30,000/year per country is needed to maintain stock of lab reagents and facility maintenance.

## **Other Activities to Consider to Mitigate Future Disasters**

USDA/APHIS oversight for lab management, mentoring, and periodic checks on lab testing protocols.

## **Project 16 Design and Construction of Hydrothermic Mango Treatment Facility (Honduras)**

### **Project Summary**

Mango is a major export crop in Honduras; however, the inability to meet the phytosanitation requirements of USDA/APHIS to eliminate Medfly has prevented the Honduran mango industry access to the U.S. market. This inability to reach the U.S. market has macro repercussions: the economic vitality of the agriculture sector provides the fiscal resources that buffer the effects of natural disasters like Hurricane Mitch, and provides the fuel for recovery.

The planned expectations of this project were to develop the Honduran mango growers' technical capacity and the industry's physical infrastructure to meet USDA/APHIS phytosanitation requirements.

### **Key Accomplishments/Practical Impacts**

Honduran mango producers now have access to a 25,000 square foot state-of-the-art hydrothermic mango treatment facility.

A number of growers received technical assistance through USAID/FINTRAC to develop their ability to induce early flowering and target a U.S. market niche.

### **Additional Measures to Protect the Investment/Recurring Costs**

Successful operation of the hydrothermic facility depends on capable management, collaboration among growers to produce quality products at the right time, and development of advantageous export market linkages. Approximately \$100,000 is required to support these follow-on activities and enhance project success.

### **Other Activities to Consider to Mitigate Future Disasters**

Mango growers need assistance for compliance with Medfly trapping protocol and synchronization of mango flowering. The costs of trapping and synchronization of flowering should be covered by the growers themselves.

## **Project 17 Modernization of Cold Storage Shipping/Receiving Facility at Managua Airport (Nicaragua)**

### **Project Summary**

A cold storage shipping/receiving facility in compliance with WTO obligations is a key to an agricultural industry that has sufficient economic resilience to recover as quickly as possible following natural disasters like Hurricane Mitch. Breaches of food safety are easily exacerbated through inadequate cold storage facilities.

In Nicaragua, imports and exports were constrained by out-dated equipment and a facility of inadequate capacity. The inappropriate commingling of products increased food safety risks.

### **Key Accomplishments/Practical Impacts**

The project implemented several major improvements in the cold storage shipping/receiving facility. These included expansion of cooler capacity, an increase in the number of cooler chambers to permit separation of food types according to international protocols, renovation of the conveyor system for handling cargo pallets, installation of an automated platform scales, and a cold tunnel linking accesses to cooler chambers. The facility renovations have resulted in an increased capacity for import and export, enhancement of food safety status, and compliance with international standards.

The airport facility is operated by the Nicaraguan Association of Producers and Exporters of Non-Traditional Products (APENN). APENN is positioned well to maintain and operate the facility to meet its full potential for enhancing export/import transactions.

### **Additional Measures to Protect the Investment/Recurring Costs**

Approximately \$5,000/year is needed for facility maintenance. No additional measures are anticipated for the near future.



**Figure 5. Cold storage shipping/receiving facility at the Managua International Airport operated by the Nicaraguan Association of Producers and Exporters of Non-Traditional Products (APENN)**

## **Project 18 Construction of Vegetable Packing and Cold Storage Facility in Rivas (Nicaragua)**

### **Project Summary**

The difficulties in transportation and communication in the aftermath of Hurricane Mitch pointed out the need for having fruit and vegetable packing facilities and cold storage capacity in proximity to the production areas. In the case of Nicaragua, no fruit and vegetable packing and cold storage facilities existed in the southern tier of the country.

The business enterprises of the producers and packers in this area suffered from disruption of the normal packing and storage operations that were located a long distance from the production sites, and difficult access to them following Hurricane Mitch.

This project was designed to ensure producers' access to packing and cold storage facilities that were physically and economically conducive to getting their products to market.

## **Key Accomplishments/Practical Impacts**

The fruit and vegetable producers in the southern tier of the country have access to packing and cold storage facilities that are economically and physically suitable for their situations. The new facility has 384 square meters of construction under roof; 170 cubic meters of cold storage space; a packing system with electric conveyor, sorting, and washing equipment; and capacity to pack 90,000 pounds of vegetables in a 10-hour day. The principal products are tomatoes, green peppers, plantains, ginger squash, mangos, melons, and passion fruit.

## **Additional Measures to Protect the Investment/Recurring Costs**

Approximately \$2,000/year is needed for facility maintenance. No additional protective measures are anticipated for the near future.

## **Other Activities to Consider to Mitigate Future Disasters**

Technical assistance to small scale farmers for producing input of the appropriate type and quality such that the benefits of the facility are expanded to more rural families.