

## **USDA Hurricane Mitch Recovery Program**

### **Special Objective 1—**

*Damaged Rural Watersheds Rehabilitated through Strengthened Local Capacity.*

## **SECTION II: DETAILED SpO 1 ACTIVITIES BY COUNTRY**

### **D. Country Program Description—El Salvador**

#### **Program Background and Objectives**

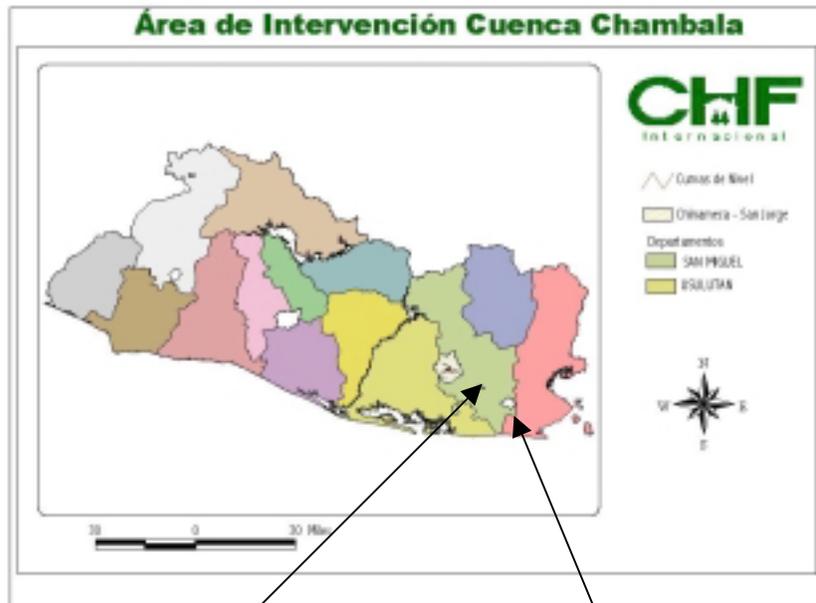
El Salvador is one of the most environmentally degraded countries in Central America. According to the World Resources Institute less than 2 percent of its original forest remains intact. A very high population density, relative to its neighbors, and a dependence on fuelwood as an energy source have resulted in a high degree of environmental vulnerability to Hurricanes.

After days of near constant rainfall during Hurricane Mitch, an emergency release of a water from a large hydroelectric dam produced major mudslides on denuded hillsides, and severely flooded the coastal regions of two rivers: the Rio Lempa and the Rio Grande de San Miguel. A typical scene of post-Mitch flood damage is shown in Figure 1 below. Houses were destroyed and fatalities occurred near this site.



**Figure 1. Typical flood damage in the Jucuaran Municipality, Usulután Department, El Salvador**

USAID/El Salvador focused its reconstruction efforts on the lower watershed areas (of the country taken as a whole) most directly affected by water damage (figure 2). Within this area USDA partnered with the Cooperative Housing Foundation (CHF) to undertake two projects aimed at rehabilitating damaged watersheds and mitigating against future disasters. In addition, USDA financed a number of very small-scale projects undertaken by Peace Corps Volunteers in El Salvador.



**El Jutal site**



**Chambala Site**

**Figure 2. USDA Project Sites in El Salvador with CHF**

Consistent with its programmatic focus in other countries, USDA identified rehabilitation of individual watersheds as the focal point of its reconstruction effort since it is the quality of watershed management which affects the ability of the land to regulate water runoff, conserve scarce soil and forest resources, protect rural infrastructure, and provide

for the myriad of products and environmental services required by an agricultural economy.

### **Results Framework**

Special Objective 1 (SpO 1) was addressed through a combination of two intermediate results in El Salvador:

- Land and Water Resources Rehabilitated in Priority Watersheds (IR 1.2)
- Local Capacity to Mitigate Future Storm Effects Strengthened (IR 1.3)

This approach was consistent with the objectives of USAID/El Salvador's hurricane reconstruction program

### **Planned implementation activities**

USDA's undertook three distinct projects in El Salvador

- **El Jutal Project**-Reforestation and soil conservation activities on 45 hectares of land in the Jucuaran Municipality within the Usulután Department (CHF)
- **Chambala Project**-Reforestation and soil conservation activities on 60 hectares of land in the Chinameca Municipality within the San Miguel Department (CHF)
- **Peace Corps small grants project**-Establishment of a small grants fund for Peace Corps Volunteers and selected training activities (Peace Corps El Salvador)

### **Key Accomplishments of the Cooperative Housing Foundation (CHF)**

Work began with a field assessment by a three-person team from the Natural Resources Conservation Service (NRCS) which joined together with the environmental management unit within CHF to survey areas for possible intervention. Two geographic zones were identified for cooperative work with USDA.

The first was in the Jucuaran Municipality within Usulután Department (El Jutal project), part of the core area of hurricane damage. Work started first at this site (July 28, 2000), since USDA wished to evaluate first CHF's ability to undertake this sort of work. In early 2001, USDA entered into a second agreement with CHF in San Miguel Department, known as the Chambala Project. This particular site had been identified as an important area needing stabilization in order to reduce sediment build-up and flooding risks downstream in the towns of San Jorge, San Raphael del Oriente and El Transito. Summary results are presented below and on the following page.

## El Jutal

<b>Project Name</b>	<b>“Reforestation and establishment of soil conservation projects on 45 hectares of land located in the caseríos of El Colorado and El Encantado, El Jutal Cantón, Jucuarán Municipality, Usulután Department”</b>			
Start date	July 28, 2000			
Completion date	March 31, 2001			
Community	Caseríos, El Encantado and El Colorado, El Jutal Cantón			
Municipality	Jucuarán			
No. of beneficiaries	Direct 85 families; indirect 45 families			
Budget	<b>Participation Percentage</b>	<b>Colon</b>	<b>Dollars</b>	
	<b>COMMUNITY*</b>	¢ 467,743.06	\$ 53,425.82	60.77%
	<b>CENCITA*</b>	¢ 30,520.00	\$ 3,486.00	3.97%
	<b>CHF</b>	¢ 271,377.76	\$ 30,996.88	35.26%
	<b>TOTAL</b>	<b>¢ 769,640.82</b>	<b>\$ 87,908.7</b>	<b>100.00%</b>

**Table 1. El Jutal Project summary statistics**

\* In the El Jutal Project, CHS entered into sub-agreements with the Center of Integral Cooperation for Alternative Technologies (CENCITA) and with the current community association in an effort to share costs and strengthen the involvement of participants to reduce the environmental vulnerabilities in the selected areas.

## Chambala Project

Project Name	<b>“Reforestation and establishment of soil and water conservation projects on 60 hectares of land on the hillside of Chambala Canton, Chinameca Municipality, San Miguel Department”</b>			
Start date	March 1, 2001			
Completion date	December 1, 2001			
Community	Chambala and San Julián Cantons			
Municipality	Chinameca and San Jorge			
No. of beneficiaries	Direct: 140 Families, Indirect: 865 families from the cities of San Jorge, San Rafael, El Tránsito and the Hacienda Nueva Canton.			
Budget	<b>Participation</b>	<b>Colon</b>	<b>Dollars</b>	<b>Percentage</b>
	<b>Community</b>	¢ 210,742.7	\$ 24,071.12	32.6%
	<b>CHF</b>	¢ 435,999.0	\$ 49,800.00	67.4%
	<b>TOTAL</b>	¢ 646,741.7	\$ 73,871.12	100%

**Table 2. Chambala Project summary statistics**

The following goals were established for the development of the projects:

### **El Jutal:**

Implement environmental mitigation activities on 45 hectares in two (2) small watersheds for the protection of 46.62 hectares.

### **Chambala:**

Implement environmental mitigation activities on 60 hectares in one (1) small watershed. This project actually achieved the protection of 145.44 hectares in five (5) small watersheds.

Table 3 on the following page specifies key accomplishments at each site.

<b>ACTIVITIES</b>	<b>EL JUTAL</b>	<b>CHAMBALA</b>	<b>TOTAL</b>
<b>1. Construction of irrigation ditches reflected here in lineal meters</b>	110	42,070	42,180
<b>2. Rehabilitation of irrigation ditches reflected here in lineal meters</b>		5,106	5,106
<b>3. Establishment of plant barriers in lineal meters</b>	8,537	58,096.5	66,633.5
<b>4. Construction of individual land terraces</b>	294	725	1,019
<b>5. Construction of filtration tanks in cubic meters</b>	N/A	6,875.40	6,875.40
<b>6. Construction of filtration ditches in number of units</b>	N/A	16,425	16,425
<b>7. Construction of rock barriers in lineal meters.</b>	18,256	0	18,256
<b>8. Reforestation in hectares</b>	11.21	32.84	44.05
<b>9. Protection of natural slopes in lineal meters</b>	N/A	7,760	7,760
<b>10. Small watershed protection</b>	2	5	7
<b>11. Hectares protected</b>	46.62	145.44	192..06
<b>12. Number of trained individuals</b>	70	323	393

**Table 3. Key accomplishments at CHF sites**

## Activity Descriptions

### 1. Construction of irrigation ditches on slopes

These projects were primarily constructed in Chambala, where topographic conditions are more favorable. A total of 65.02 hectares were protected in Chambala and a total of 0.13 hectares were protected in El Jutal. With a total of 42,180 lineal meters of irrigation ditches, the filtration of more than 1 million cubic meters of water per annum has been achieved (figure 3)



**Figure 3. Contour infiltration ditches to reduce run-off and increase water infiltration**

### 2. Rehabilitation of irrigation ditches on slopes

This particular project was implemented in Chambala with an objective to dig up those irrigation ditches that were damaged by the earthquakes and newly construct them with the assistance of the local agricultural producers and farmers. A total of 5,106 lineal meters of irrigation ditches were rehabilitated using this method.

### 3. Establishment of plant barriers

These barriers were established primarily to protect ditches (figure 4) and were constructed only on land where the slope is not appropriate for other types of land works. They are also used to protect hillsides that have been subject to rockslides and landslides. Presented here as follows is a list of projects undertaken and their measurements in lineal meters.

Type of Barrier	Chambala Lineal Meters	El Jutal Lineal Meters	Total Lineal Meters
Lemon grass	38,033	5,105	43,138
Vetiver grass	2,651	3,432	5783
King Grass	9,350		9350
Izote	1,252.5		1,252.5
Banana	1,470		1,470
Bamboo	2,590		2,590
Cocoa	2,750		2,750
<b>Total</b>	<b>58,096.5</b>	<b>8,537</b>	<b>66,633.5</b>

**Table 4. Plant barriers species used and accomplishments**



**Figure 4. Establishment of live plant barriers on steep slopes**

#### **4. Construction of individual terraces**

These terraces were constructed in an effort to increase the filtration of water in areas where fruit trees were planted on steep slopes, thereby protecting 0.74 hectares in El Jutal and 6.10 hectares in Chambala.

#### **5. Construction of filtration tanks**

These tanks were constructed at the Chambala site to protect against the flow of water along access roads or critical points of water accumulation. Their production was highly appropriate and of great impact on the filtration of water. A total of 484 water tanks were constructed in different dimensions for a total of 6,875.4 cubic meters.

#### **6. Construction of filtration ditches**

Small filtration ditches were constructed in areas of coffee cultivation primarily represented by small producers. The project worked to protect 42.48 hectares.

#### **7. Establishment of rock barriers**

These barriers were mainly constructed in El Jutal, on land where the quantity of loose rock was adequate for the construction of this type of project (figure 5). A total of 29.21 hectares were protected by the barriers.



**Figure 5. Rock barriers constructed in El Jutal project site**

## 8. Reforestation

The species used for reforestation were primarily locally available trees and consisted of the following: *Nim* (*Azadirachta indica*), Cedar (*Cederla odorata*), *Leucaena* (*Leucaena leucocephala*), Olive ( *Simarouba glauca*) *Carreto* (*Pithecollobium saman*) *Pepeto* (*Inga spuria*); fruit trees: Mango (*Mangifera indica*), Avocado (*Persea americana*), Lemon (*Citrus limon*), Orange (*Citrus sinensis*), Cashew (*Anacardia occidentale*), and *Paterno*. The reforestation was undertaken on private home lots as live barriers for the protection of natural slopes and small forests. The following table details the quantity of trees planted:

Tree type	Quantity per project		Total
	Chambala	El Jutal	
Fruit trees	4,500	1,350	5,850
Forest trees	35,985	5,500	41,485
<b>Total</b>	<b>40,485</b>	<b>6,850</b>	<b>47,335</b>

**Table 5. Number of tree seedlings planted by project site**

## 9. Protection of natural slopes

This project was implemented for the most part in Chambala, owing to the existence of a highly erosive soil prone to the formation of slopes. This phenomenon was accentuated even more by the passage of Hurricane Mitch and recently with the earthquakes of early 2001. The protection of these natural slopes consisted of the construction of dikes with strips of native forest including banana, bamboo and *Izote* (*Yucca elephantipes*) planted in a transversal pattern along the inclination, spacing the trees according to the degree of the slope and alternating between species. With this activity, the formation and deepening of the ditches is avoided. A total of 7,760 lineal meters of dikes was constructed.

## 10. Small watersheds protected

The small watersheds protected in the Chambala project empty into the watershed of the San Jorge Ravine which feeds into the Rio Grand watershed in San Miguel. The watersheds of El Jutal empty into El Jocotal Lagoon feeding into the same watershed.

Project	Name-small watershed
Chambala	<ol style="list-style-type: none"> <li>1. La Florida</li> <li>2. Buenos Aires</li> <li>3. Mar y Cielo</li> <li>4. Joya Grande</li> <li>5. El Güirito</li> </ol>
El Jutal	<ol style="list-style-type: none"> <li>1. El Encantado</li> <li>2. El Colorado</li> </ol>

**Table 6. Small watersheds targeted in projects**

## 11. Hectares protected

The protection of the small watersheds required the establishment of water and soil conservation projects such as: the construction of ditches and trenches, the production of plant barriers with various species, filtration tanks, rock barriers, individual terraces, and soil erosion ditches. The reforestation project included live barriers and the planting of trees on private lots. The trees consist of fruits and forest species native to the region and were planted directly using seeds and seedlings with the following results:

Project	Soil conservation projects in hectares	Reforestation In hectares	Total hectares
Chambala	112.06	35.41	144.47
El Jutal	35.41	11.21	46.62
<b>Total</b>	<b>147.47</b>	<b>46.62</b>	<b>194.09</b>

**Table 7. Summary of hectares protected by project site and activity**

## 12. Persons trained

During the implementation of the project, trainings were given to the direct beneficiaries, students and technicians from 20 institutions that operate in the area. Training included such topics as soil erosion, construction and use of an “A” frame, and construction of physical conservation structures. This resulted in the following achievements:

Project	Beneficiaries			Students			NGOs			Total
	M	W	<b>T</b>	M	W	<b>T</b>	M	W	<b>T</b>	
Chambala	133	78	<b>211</b>	35	35	<b>70</b>	39	3	<b>42</b>	323
El Jutal	25	23	<b>48</b>				20	2	<b>22</b>	70
<b>Total</b>	<b>158</b>	<b>101</b>	<b>259</b>	<b>35</b>	<b>35</b>	<b>70</b>	<b>59</b>	<b>5</b>	<b>64</b>	<b>393</b>

### Symbology:

**M** men, **W** women

**Table 8. Summary of person trained by the project**

## **New technologies introduced**

A number of the technologies that were utilized by CHF are well-known conservation practices that rely on hand labor and locally available materials. These technologies may not be “new” in El Salvador, but were often new to the communities targeted by this project and thus can be considered an effective example of technology transfer.

A more “high-tech” technology transfer was a technical assistance and training consultancy undertaken by NRCS specialist Mike Squires who instructed staff at CHF’s Usulután office in how to set up and use a geographic information system (GIS) for their project sites.

## **Key Accomplishments of Peace Corps El Salvador**

A second component of the project was to expand the scope and impact of the USDA’s project by making accessible to Peace Corps Volunteers and their associated communities small amounts of money and targeted technical assistance as needed. Technical assistance was provided through CHF to Peace Corps Volunteers (PCVs) in practices that will help to mitigate and prevent the effects of natural disasters, especially heavy rains and hurricanes that frequently occur in El Salvador.

Three different activities were carried out:

- Environmental Education and Watershed Protection in-service training (32 participants)
- Workshop on sustainable farming techniques by Roland Bunch (64 participants)
- Financial support for PCVs and their local communities to carry out Hurricane Mitch rehabilitation activities in watershed protection, reforestation, and soil and water conservation, and other related areas.

The last item was essentially a small grants fund that could be accessed by PCVs to finance environmental mitigation projects. The maximum amount of a grant was \$250. A total of 30 PCVs received money under what proved to be a very successful and cost effective component of the project. A list of the projects funded follows below in table 9. Figure 6 shows a PCV and his counterpart at their nursery project.



## Peace Corps Projects undertaken with USDA hurricane funding

PCV Name	Project Title	Location	Amount
Jessica Lynch	Protejamos la quebrada El Pasito	Sn Fco. Lempa, Chal.	246.39
:Michael Hoffman	Mil metros de barreras muertas	Cacaopera, Mor.	250.00
:China Kreiker	Reforestacion con frutales	San Sebastian, La Paz	250.00
:Sherri Mangum	Reforestacion con frutales	Los Henriquez, Cus.	204.86
:Katie Sell	Capacitacion Cons. Suelos	San Isidro, Mor	250.00
:Andy Dvoracek	Material vegetativo barreras vivas	Sn.Julian, Chambala	250.00
:Susan Turpening	Vivero especies nativas	El Porvenir, SA	246.29
:Patrick Kitzmiller	Conservacion suelos	Joateca, Morazan	200.86
:Jennifer Kerekes	Equipo control de incendios	Parque Deininger,LL	250.00
:Layla Aerne	Equipo control de incendios	Cerro Verde, SA	248.43
Robyn Thiel	Reforestacion	SnPedro Masahuat,LP	250.00
:Michael Osland	Acequias y barreras vivas	Las Trancas, Us.	250.00
:Rolf Hains	Equipo control de incendios	La Montañona, Ch	250.00
:Jennifer Morgan	Vivero especies nativas	Torola, Morazan	91.74
:Will Jordison	Maderables x Cons.Suelos y Refor.	Sesori, SM	250.00
:Becky Smith	Proteccion microcuencia	Las Cañas, Jocoro,Mo	247.00
:Heather Jacobs	Club ecologico y huertos caseros	San Miguel Tepezontes	248.34
:Salmon Lutz	Diversificacion de Fincas	Tamasha,Fco.Menendez	249.60
:Amanda Wheeler	barreras vivas	Buena Vista, Ilopango	250.00
:Camille McCarthy	Equipo control de incendios	Los Farallones, Son.	249.04
:Karen Leavitt	Reforestación	Chalchuapa. SA	246.51
:Emma Eyre	Mitigation of Env.Degradation	Ignacio Ellacuría, Chalaten.	250.00
:Jason & Kollette Stith	Proyecto de Flores y Cons. De Sue.	Los Planes, Chalaten.	250.00
:Korie Drommund	Vivero especies nativas	San Simon, Morazan	250.00
:Paul Menard	Arboles frutales	Cihuanango, Sonsonate	250.00
:Jeff Valentine	Proyecto Cultural	Suchitoto, Cuscatlan	250.00

6			
2			
7	Jason Gordon	Reforestacion y Cons. De suelos	San Pedro Nco. La Paz 243.77
2			
8	Derek Kenssinger	Arboles frutales	El Socorro , La Union 250.00
2			
9	Michael Laeshner	Promoción de arboles frutales	San Pedro Nco. La Paz 300.00
3			
10	Tim Boyer	Promoción de arboles frutales	San Pedro Nco. La Paz 446.01
		<b>TOTAL</b>	<b>7468.84</b>

**Table 9. List of Peace Corps projects in El Salvador financed by USDA**



**Figure 6. Peace Corps Volunteer Will Jordinson and his Counterpart Modesto Martinez (World Vision) at the small nursery produced as part of a small grants project financed by USDA.**

## **Host Counterpart Organizations**

USDA's approach in El Salvador was to maximize the utility of its modest budget by augmenting the work of on-the-ground organizations having an established field presence and direct links to communities. This took place by direct funding of field activities and by providing technical assistance from specialists from the Natural Resources Conservation Service (NRCS).

This ensured that a significant share of USDA's Hurricane resources went to actual rehabilitation work in the field. By working with established organizations and their existing field staff, USDA technical assistance money did not have to be spent setting up offices, buying vehicles, and hiring staff.

USDA's chief partner was the Cooperative Housing Foundation, which was already active in El Salvador and had received significant funding from USAID/El Salvador to undertake various reconstruction activities. CHF in turn established an agreement with a local Salvadoran NGO called the Center of Integral Cooperation for Alternative Technologies (CENCITA) to assist with the work in the El Jutal project.

Peace Corps El Salvador played an important role in complementing the work of CHF. At the Chambala site there was a PCV assigned to work with the community implementing the CHF funded project. USDA had originally sought to provide funding directly to Peace Corps El Salvador, but this effort was not allowed by the administrative offices of Peace Corps headquarters in Washington. CHF kindly offered to step in and be the conduit to issue small grants to PCVs for their projects.

USDA's choice of a mix of organizations with a long-term presence in El Salvador will maximize the likelihood that this work and new similar activities will be carried on. We expect that Peace Corps, CHF and CENCITA will continue to provide technical assistance and training in El Salvador for a long time to come.

## **Practical Impact of El Salvador Program Activities**

Environmental vulnerability was reduced for the residents in the entire region of project implementation and in particular the inhabitants of the low region of the watershed of the San Jorge Ravine.

Sustainable conditions were created for agricultural production in soils that are not generally appropriate for cultivation.

Erosion caused by free flowing rainwater was reduced thereby creating more fertile soil conditions.

Local NGOs were strengthened through a greater focus on the protection of small watersheds and as a basic unit for the development of activities of environmental mitigation.

The level of consciousness was raised on behalf of area residents regarding the importance of risk mitigation for their communities.

The generation of income through incentives increased the productivity and fomented greater stability among the residents.

The trees and plants will provide continued benefits for years to come.

The community members became the stakeholders and the owners of the project.

Local organizations and institutions were strengthened.

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

Most of USDA's resources resulted in the placement of actual physical and biological soil conservation structures on steep agricultural hillsides in or near vulnerable communities. This represented for these communities a significant investment in their land base.

The biggest constraint to farmer adoption of improved soil conservation practices is the high cost of the initial investment (in time and materials). Since this has been subsidized by USDA there shouldn't be a particular need for additional funding at these sites to insure that the investments already made are maintained.

It should be remembered, however, that the target communities in El Salvador have very low incomes and that rural El Salvadoran farmers live close to the subsistence level. Thus the target communities certainly need and would benefit from continued overall development assistance in all the primary sectors (health, education, agriculture, etc.).

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

Although the area of watershed treated was significant, there still remain many additional areas of vulnerability on steep slopes that could be treated if resources were available. The Chambala area is due west of a large volcano and the area has many mountainous slopes that could be stabilized.

**Budget for the El Salvador HMRP:            US\$ 206,733**