



I. COVERSHEET FOR ENVIRONMENTAL MITIGATION PLAN & REPORT (UMBRELLA EMPR: **IRRIGATION AND SOIL CONSERVATION**)

USAID MISSION SO # and Title: _____

Title of IP Activity: _____

IP Name: _____

Funding Period: FY_____ - FY_____

Resource Levels (US\$): _____

Report Prepared by: Name: _____ Date: _____

Date of Previous EMPR: _____ (if any)

Status of Fulfilling Mitigation Measures and Monitoring:

_____ Initial EMPR describing mitigation plan is attached (Yes or No).

_____ Annual EMPR describing status of mitigation measures is established and attached (Yes or No).

_____ Certain mitigation conditions could not be satisfied and remedial action has been provided within the EMPR (Yes or No).

USAID Mission Clearance of EMPR:

Contracting Officer's Technical Representative: _____ **Date:** _____

Mission Environmental Officer: _____ **Date:** _____
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Regional Environmental Advisor: _____ **Date:** _____
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List of CHF Haiti projects covered in this UEMPR (Irrigation and Soil Conservation)

1. Background, Rationale and Outputs / Results Expected:

In Haiti, rain-fed agricultural systems are predominant, and existing irrigation infrastructure is largely outdated, poorly maintained, and no longer functional. Many irrigation canals have become clogged with river sediment and debris, thereby blocking water flows during most of the year and reducing agricultural productivity.

Haiti's hillsides are also extremely vulnerable to erosion due to severe deforestation for firewood and charcoal collection, as well as agricultural methods emphasizing slash and burn agriculture. In periods of heavy rain, bare hillsides lack the necessary vegetation to absorb water. Instead of retaining the water, topsoils are washed down the hillsides, leaving little fertile land left to cultivate.

CHF's USAID/KATA program is an \$81 million, 4-year program that is designed to:

- Enable access to economic opportunities that provide people with dignity, income, and the chance to contribute to the economic development of their country
- Enhance the government's ability to effectively respond to the needs of its constituents
- Provide improved access to capital, market linkages and investments for Haiti's micro, small and medium enterprises
- Increase access to social and productive infrastructure

Through irrigation and soil conservation projects, CHF hopes to achieve the following goals:

- 1) Reduce the possibility for community flooding, thereby improving agricultural productivity and safety for the communities downstream.
- 2) Contribute to the long-term reestablishment of healthy hillside soils to prevent mudslides and promote better watershed management
- 3) Bring irrigated water to new small scale farms, helping to increase agricultural production in areas in need of water for farms. The average size of farms served by these irrigation projects varies between 0.2 and 1 hectare.

2. Activity Description:

This EMPR covers all projects and activities directly related to the rehabilitation and extension of irrigation canals/systems, as well as any soil conservation projects and activities.

Certain activities are common throughout all different types of irrigation and soil conservation projects. The following are common activities throughout many of these projects:

1. Sourcing of construction materials
2. Construction and decommissioning
3. Maintenance of irrigation infrastructure and soil conservation live and dead barriers.

However, depending on the sub-type of infrastructure project, there may be different project activities.

Activities specific to rehabilitation and extension of irrigation canals/systems include:

- a) Planning and design for rehabilitation of a drainage canal
- b) Dredging existing canals, removing sediments and waste
- c) Reinforcement of irrigation canal walls
- d) Re-vegetation of irrigation canal banks
- e) Training on maintenance and proper use of irrigation canals
- f) Establishment of irrigation water-user agreements/associations

Activities specific to reforestation/re-vegetation of hillsides as a watershed management strategy:

- a) Site and species selection
- b) Planting of selected vegetation
- c) Training on proper maintenance and care for seedlings

Activities specific to structural soil conservation projects:

- a) Site selection and design of soil conservation structure
- b) Construction of dry walls, gully plugs, etc.
- c) Training on proper maintenance
- d) Establishment of local community maintenance group

3. Environmental Baseline:

Projects will be implemented in 5 departments of Haiti, Petit Goâve, Port-au-Prince, Saint Marc, Gonaïves and Cap Haïtien. Due to the increase of hurricane activity in recent years and the severe damages and loss of life that have resulted, the USAID/KATA program focuses much of its activity on watershed management and irrigation extension/rehabilitation, as well as soil conservation projects.

During the hurricane seasons of both 2004 and 2008, the flooding and mudslides in Gonaïves provide examples of the types of indirect problems that result from hillside deforestation and poor watershed management. According to earthobservatory.nasa.gov, “in September 2004, more than 2,500 people died when Tropical Storm Jeanne unleashed torrential rain on northeastern Haiti...The disaster was repeated in September 2008, when a string of storms—Gustav, Hanna, and Ike—drenched Haiti. Though the resulting floods were as extensive as in 2004, the death toll was not as great. As of September 15, 423 people had been reported dead, 50 were missing, and more than 100,000 were in shelters, said the United States Agency for International Development (USAID).”

The mudslides and flooding in Gonaïves serve as a grim warning to the possibilities of what could be in the nation’s capital, Port-Au-Prince, as both cities are located in large watersheds. Such floods and mudslides can contribute to a slew of other health, social and environmental problems ranging from road blockage, to drinking water contamination and disease spread.

In USAID’s 2007 report “Environmental Vulnerability in Haiti,” Glenn Smucker and team point out that many of the environmental problems in Haiti can be attributed to, “acute poverty, rapid population growth and unplanned urbanization”(Smucker, iii). These factors have created a

much higher and concentrated demand for firewood and charcoal among other natural resources and services in and around urban centers.

Not only does the indoor burning of charcoal worldwide account for the death of nearly 800,000 children and 500,000 women annually (WHO, 2006), but it is a main factor driving the deforestation of hill and mountainsides in Haiti. According to Richard Haggerty's country study on Haiti from 1989, in 1925, Haiti had 60% of its original forest covering the country. Since then, the population has cut down all but an estimated 2% of its original forest cover, and in the process has destroyed fertile farmland soils, contributing to desertification. Most important is the hillside deforestation, which has caused a slew of flooding and mudslide problems for cities and other communities located in watershed and flood plain areas.

The average annual rainfall is 140 to 200 centimeters, but it is unevenly distributed. Heavier rainfall occurs in the southern peninsula and in the northern plains and mountains. Rainfall decreases from east to west across the northern peninsula. The eastern central region receives a moderate amount of precipitation, while the western coast from the northern peninsula to Port-au-Prince, the capital, is relatively dry. Some regions have two rainy seasons, lasting from April to June and from August to October, whereas other regions experience rainfall from May to November. Annual variations of precipitation can cause droughts, widespread crop failures, and famine.

Temperatures are almost always high in the lowland areas, ranging from 15° C to 25° C in the winter and from 25° C to 35° C during the summer. Haiti is located on the leeward side of Hispaniola, which means that the influence of humid trade winds is not as great as in The Dominican Republic. The more humid districts are found on the northern and eastern slopes of the mountains.

Only 54% of the population in Haiti has broad definition access to potable water, while only 30% have access to sanitation coverage, according to a WHO/UNICEF report in 2006.

According to CIA world fact book, about 66% of all Haitians work in the agricultural sector, which consists mainly of subsistence farming on a small scale. Mangoes and coffee are the country's most important exports; however, agriculture only makes up 30% of the country's GDP.

In order to alleviate the pressures put upon the Haitian population due to the level of environmental degradation in the country, as well as promote long-term sustainable development as to allow for reforestation and environmental recuperation, development agencies must, "be part of an integrated approach, directly linking natural resource management with other pertinent sectors such as early warning, urban planning, reproductive health, and job creation programs" (Smucker, v).

4. Evaluation of Environmental Impact Potential of Activities (Table 2):

Soil quality degradation:

The increase in water available for irrigation promoted by the project may cause soil salinization, nutrient depletion, and water logging of soils without proper irrigation and soil management.

Increase in land conflicts:

With an increase in irrigable land, land tenure, gender inequality and other issues could create land conflicts.

Invasive species:

Species used for reforestation and revegetation of hillsides should be carefully selected to avoid planting invasives.

1. Environmental Mitigation Actions (Tables 2 & 3) (this section is part of the annual EMR, but not the initial):

CHF will implement the following strategies to mitigate the potential impacts described above:

- Train irrigation users on best practices to adequately manage soil quality and minimize wasted water;
- Determine current and future water demands and evaluate capacity of potential sources during dry and rainy seasons and extreme conditions;
- Establish and build capacity of local water management committees on irrigation management, conflict resolution, and infrastructure maintenance;
- Utilize native and non-invasive species in any reforestation and revegetation activities;
- Ensure sound technical design of soil conservation structures based on hydrology and topography of watershed;
- Carry out Environmental Assessments for any irrigation and soil conservation projects that are large in scale or that are to be located in sensitive areas.
- Monitor irrigation and soil conservation projects during construction and after completion, and make adjustments to the mitigation plan when unforeseen impacts arise or when mitigation measures are insufficient to reduce impacts.

Tables 2 and 3 provide additional detail on the mitigation measures and monitoring strategy to be implemented by CHF Haiti.

III-A. Environmental Screening Form (Table 1):

*A screening form will be filled out for each individual project that falls under this UEMPR

III-B. Identification of Mitigation Plan (Table 2)

Activity/Impact/Mitigation Table (USAID/KATA) - Irrigation and Soil Conservation			
Project Type	Activity	Description of Impact	Prescribed mitigation measures
A. General Construction Activities for Soil Conservation/Irrigation Rehabilitation projects	i. Site selection for irrigation or soil conservation project	1. Poor site selection can instigate community conflicts over water use	a. Restrict irrigation development to communities where land ownership and use rights have been clearly established
	ii. Sourcing of construction materials	2. Soil erosion and sedimentation	a. Use available local materials first, but only if they provide long lasting, suitable materials.
			b. Limit extraction of rock from riverbed, and prohibit extraction of material from riverbanks and slopes
			c. Backfill borrow pits when no longer needed, to prevent accumulation of standing water, use for waste disposal, etc.
	iii. Construction and decommissioning of soil conservation and irrigation projects	3. Erosion and/or sedimentation due to construction activities	a. Designate a material storage zone that does not cause an obstruction to traffic and access to homes
			b. Minimize use of heavy machinery
			c. Limit earth moving to dry seasons
		4. Construction site potentially poses a human health and safety hazard to workers and local residents	a. Provide potable water, adequate protective gear, appropriate sanitary and solid waste disposal facilities for the use of construction workers

	iv. Maintenance and operation of irrigation canal work/soil conservation projects	5. Erosion and sedimentation of canals/ditches and furrows due to improper construction or lack of maintenance and or extreme flow events	a. Implement proper irrigation design and catchment conservation activities. Provide training for farmers on irrigation and canal maintenance and management (structure stabilization and use of vegetative cover).
		6. Soil degradation due to poorly managed irrigation activities (nutrient depletion, water logging, soil salinization, etc.) and poor placement of canals and selection of irrigable area.	a. Employ proper water management practices (apply irrigation water at correct time and at correct rate, ensure good drainage) and proper crop rotation in irrigated fields.
		7. Land use conflict resulting from land tenure issues, water rights, supply vs. demand over time (lack of irrigable land), increased incomes among only a portion of the local population, participants	a. Develop MOUs with the water group committees and irrigation committees ensuring gender equality, to reduce impacts on environmentally sensitive areas, to address land tenure issues and reduce conflicts
			b. Ensure establishment of irrigation control system through installation of shutoff valves, watering schedules or a fee system through MOUs with committees
		8. Degradation of gabions, dry walls or masonry work	a. Establish responsible parties within community to maintain soil conservation structures
B. Reforestation/ re-vegetation of hillsides as a watershed management strategy	i. Site and species selection	9. Invasive species damages local ecosystems and endangers survival or local flora and fauna	a. Ensure that non-invasive and native species approved by Ministry of Agriculture are selected for reforestation.
	iii. Maintenance of seedlings	10. Seedlings fail to thrive	a. Build fencing, either plastic or metal around seedlings to prevent animals from grazing over the seedlings
			b. Apply compost to improve organic matter content, texture of the soil, and the soil's ability to infiltrate rainfall
			c. Establish a local community group responsible for providing adequate care for seedlings and vegetation

C. Structural soil conservation - Land Terraces	i. Site selection and design of land terraces	11. Engineering of land terraces may increase rainfall runoff and erosive impacts	a. Ensure that parameters like land's site, slope, soil depth and soil type are taken into account, and encourage revegetation of degraded and marginal areas to reduce runoff
			b. Create side hill ditches or similar diversion structures, in order to divert runoff
			c. Re-vegetate terraces with appropriate species of soil-holding vegetative cover (fruit-bearing trees, native bush species or vetiver, elephant grass) to stabilize soil after terrace construction is complete

III-C. Environmental Monitoring and Evaluation Tracking Table (Table 3).

Environmental Monitoring and Evaluation Report (USAID/KATA) - Irrigation and Soil Conservation									
Impact No.	Description of Mitigation Measure	Responsible Party	Monitoring Methods			Results			Recommended Adjustments
			Indicators	Methods	Frequency	Dates Monitored	Problems Encountered	Mitigation Effectiveness	
1	a. Restrict irrigation development to communities where land ownership and use rights have been clearly established		Y/N existence of land ownership/use memorandum from the community	Field Survey	Once pre-project implementation				

2	a. Use available local materials first, but only if they provide long lasting, suitable materials.								
	b. Limit extraction of rock from riverbed, and prohibit extraction of material from riverbanks and slopes								
	c. Backfill borrow pits when no longer needed, to prevent accumulation of standing water, use for waste disposal, etc.		Y/N signs of erosion around construction and/or borrow pit sites	Field Visit Report	Weekly during construction and every 3 months for 1 year after construction				
3	a. Designate a material storage zone that does not cause an obstruction to traffic and access to homes								
	b. Minimize use of heavy machinery								
	c. Limit earth moving to dry seasons								
4	a. Provide potable water, adequate protective gear, appropriate sanitary and solid waste disposal		Y/N reported accidents or complaints from workers	Survey of workers/construction supervisors	Weekly during construction				

	facilities for the use of construction workers								
5	a. Implement proper irrigation design and catchment conservation activities. Provide training for farmers on irrigation and canal maintenance and management (structure stabilization and use of vegetative cover).		Y/N irrigation users adopting 3 or more best practices	Field Survey	Semi-annually				
6	a. Employ proper water management practices (apply irrigation water at correct time and at correct rate, ensure good drainage) and proper crop rotation in irrigated fields.								

7	a. Develop MOUs with the water group committees and irrigation committees ensuring gender equality, to reduce impacts on environmentally sensitive areas, to address land tenure issues and reduce conflicts		Y/N existence of a functioning water group committee performing duties as expected	Water user survey	Annually				
	b. Ensure establishment of irrigation control system through installation of shutoff valves, watering schedules, or a fee system through MOUs with committees		Y/N Water conflicts reported or resolved within last 6 months	Water user survey	Semi-annually				
8	a. Establish responsible parties within community to maintain soil conservation structures		Y/N Structure is deteriorating	Visual inspection	Annually				
9	a. Ensure that non-invasive and native species approved by Ministry of Agriculture are selected for reforestation.		Number of seedlings surviving out of the number of seedlings planted	Field survey	Annually				

10	a. Build fencing, either plastic or metal around seedlings to prevent animals from grazing over the seedlings								
	b. Apply compost to improve organic matter content, texture of the soil, and the soil's ability to infiltrate rainfall								
	c. Establish a local community group responsible for providing adequate care for seedlings and vegetation								
11	a. Ensure that parameters such as slope, soil depth and soil type are taken into account, and encourage revegetation of degraded and marginal areas to reduce runoff		Y/N Area is visibly less eroded/more vegetated than before project	Before and after photo	Once one year post-project				
	b. Create side hill ditches or similar diversion structures, in order to divert runoff								

c. Re-vegetate terraces with appropriate species of soil-holding vegetative cover (fruit-bearing trees, native bush species or vetiver, elephant grass) to stabilize soil after terrace construction is complete								
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References for UEMPR tables:

Bickel Stephen E. (lead author with 6 others). "Environmental Guidelines for Development Activities in Latin America and the Caribbean." USAID Latin America Bureau Publication, July 2006.

Office of Sustainable Development, USAID Bureau for Africa. "Environmental Guidelines for Small-Scale Activities in Africa: Environmentally Sound Design for Planning and Implementing Development Activities. January 2007.