

 	 
PROJECT:	SUSTAINABLE LAND MANAGEMENT IN THE COMMONWEALTH OF DOMINICA
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REPORT /OUTPUT TITLE	COULIBISTRIE WATERSHED RESTORATION ACTION PLAN
PROJECT COMPONENT/ACTIVITY:	<p>OUTPUT 2.1.4: DEGRADED WATERSHEDS IN AT LEAST 8 VILLAGES REHABILITATED WITH NATIVE VEGETATION BASED ON SITE SPECIFIC REHABILITATION PLANS DEVELOPED IN COLLABORATION WITH LOCAL COMMUNITIES</p> <p>OUTPUT 2.1.5: INCREASED PUBLIC UNDERSTANDING AND AWARENESS OF LD ISSUES AND ASSOCIATED SLM OPTIONS, AND INCREASED SUPPORT FOR LAND REGULATIONS</p>
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COULIBISTRIE WATERSHED RESTORATION ACTION PLAN

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LIST OF ACRONYMS

CW	Coulibistrie Watershed
CWAP	Coulibistrie Watershed Action Plan
CWMC	Coulibistrie Watershed Management Council
CWMP	Coulibistrie Watershed Management Plan
DBH	Diameter at Breast Height
DBOS	Dominica Bureau of Standards
DoA	Division of Agriculture
DOWASCO	Dominica Water and Sewerage Company
DSWMC	Dominica Solid Waste Management Corporation
FWPD	Forestry Wildlife and Parks Division
GoCD	Government of the Commonwealth of Dominica
GPS	Global Positioning System
LoA	Letter of Agreement
MOA	Ministry of Agriculture
MoU	Memorandum of Understanding
PISLM	Partnership Initiative for Sustainable Land Management
SALT	Sloping Agricultural Land Technology
SLM	Sustainable Land Management

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1 INTRODUCTION

The watershed management approach for Coulibistrie typifies a process that consolidates perspectives from a wide cross-section of stakeholders and partners to identify, discuss, prioritize, and implement, goals, objectives, and actions. These are aimed at preserving, protecting, and restoring key watershed processes and ecosystem services within the Coulibistrie Watershed (CW). The Coulibistrie Watershed Action Plan (CWAP) reflects this cooperative effort of planning and prioritizing a unified and directed approach to managing the watershed. It also represents a tool by which these goals can be achieved.

The CWAP outlines various issues that need to be tackled and priority areas in the watershed where this will occur. With the input of all major stakeholders, it was created to chart a course of action for state agencies, watershed community partners and other decision makers within or related to the watershed. The CWAP is a long-term strategy, but it sets specific targets and measures in three phases of implementation. However, the proposed activities under each phase were prioritized primarily based on current budget limitations. This could be scaled-up as budget provisions permit. Overall, the action plan is a concise and action-focused document. It is a culmination of elements of the watershed protection approach, formed through collaboration and consensus, reflecting the interests and concerns of different stakeholders within the La Plaine community. It is a flexible guide, in that the process may be modified to cater to the uniqueness of each microsite at the specific time of implementation.

2 PURPOSE OF THE CWAP

The CWAP creates an understanding of the watershed, identifies priority issues, and defines priority actions that are necessary to protect, improve, and restore watershed resources and processes. The CWAP is a derivative of the Coulibistrie Watershed Management Plan (CWMP) which provides an overview of the major watershed constraints and the approaches for remediation. This sets the stage for the implementation of key actions over a defined timeline. It is also designed to roll-out within multiple stages based on financial and other resource limitations.

The CWAP also acts as an information tool and directs actions within the watershed. By bringing together the knowledge, commitment, and resources of all the community partners, as well as state and developmental partners, the plan will ensure that all major issues in the watershed are adequately addressed through prioritized action strategies. The action plan is premised on local knowledge, scientific surveys with sound data analysis and integrates the main elements of the watershed approach: consultation, education, resource conservation and such like.

Finally, the CWAP and the process involved in its implementation improves communication and coordination among the various state, local government, and community organizations. It is also instrumental to further expanding public involvement in watershed management

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activities. Figure 1 provides a schematic of how the plan can be executed to achieve the desired results.

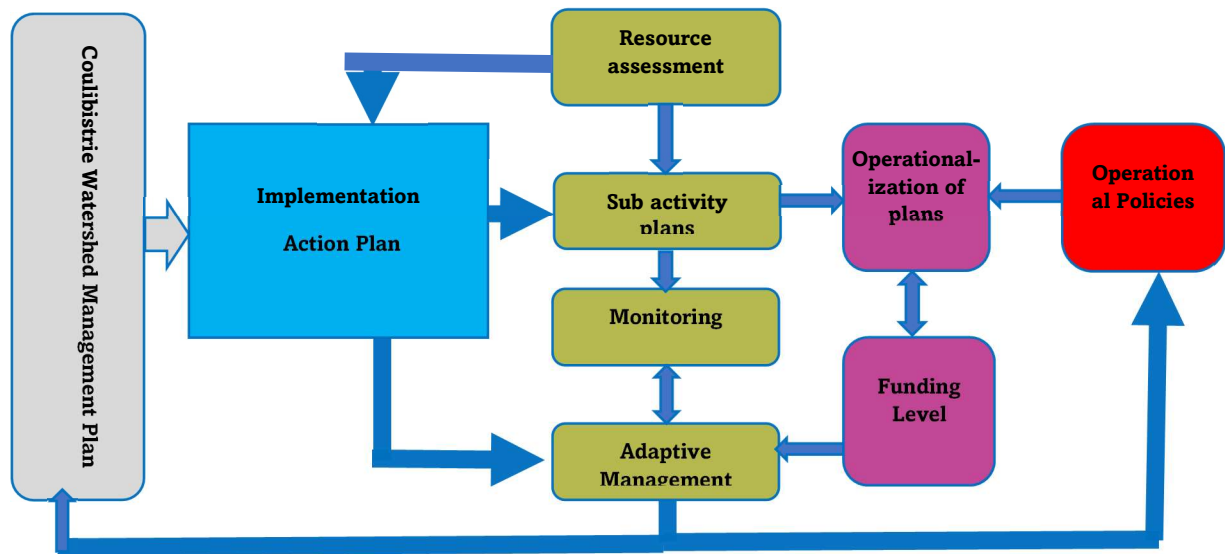


Figure 1 Schematic of the processes and key activities involved with the implementation of the CWMP

Summary of Key Issues

A combination of predisposing natural factors (particularly soil type, high rainfall, topography), and climate-related events are contributing to widespread land degradation and loss of valuable ecosystem services within the CW. A summary of the core issues include:

- Unstable slopes, prone to landslide
- High risk of flash floods and debris flows
- Unstable stream banks and denuded riparian areas
- Weak monitoring and enforcement
- Lack of awareness on sustainable watershed management
- Weak advocacy from groups/champions in the local community

3 GOALS AND OBJECTIVES OF THE CWAP

The broad goals are to develop:

- ✓ A strategy for restoring critical ecosystem functions and processes within the CW
- ✓ A tool for to address flood risk management for the community
- ✓ A road map to guide decision makers at the community and national levels on prioritizing key actions for restoring degraded watersheds
- ✓ A blueprint for effective watershed restoration that will support efforts to restore and sustainably manage watersheds in Dominica.

The specific objectives are to:

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- Guide tailored interventions including stabilizing stream banks, agroforestry and promoting natural regeneration within the watershed
- Design and implement a community-wide campaign to promote knowledge and awareness on Watershed Management
- Build local capacity for the establishment and functioning of the Coulibistrie Watershed Management Council
- Establish a community-based watershed monitoring program
- Increase the participation and support of key state agencies for the implementation of the CWAP

4 GENERAL APPROACH

- Prioritization and selection of activities included in the action plan are based on the core recommendations of the CWMP.
- Priority attention is given to promotion of natural regeneration of the upper and mid-sections of the watershed. The few remaining farmers should be supported to transition to an organic-based agroforestry production system
- Other priority areas of the plan include buffer restoration in riparian zones, revegetation of disturbed slopes from previous landslides.
- Improvements to overall water quality and volumes should be a particular focus since due to poor access post Hurricane Maria, water abstraction was relocated from the upper to the low-mid sections of the watershed.
- Facilitation of community mobilization and action to effectively address key watershed constraints for example, community-wide sensitization and education programs should be developed to promote an understanding of the role of residents in maintaining good watershed management practice.
- Secure commitment of stakeholders to specific actions and responsibilities

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5 IDENTIFICATION OF KEY STAKEHOLDERS AND THEIR RESPONSIBILITIES

Thematic area(s)	Key Stakeholders	Main Responsibility
Revegetation	DOWASCO	Primary custodians of water catchments with responsibilities for maintaining their natural functions
	FWPD	Identify, design & implement appropriate watershed restoration measures including community education, plant propagation, monitoring & enforcement of applicable legislation
	MoA	Promote SLM uptake, support farmers to implement SLM best practice
SLM practice	Nursery owners,	Propagate required plant species
	Farmers/Landowners	Support & promote restoration activities & best practice
	Village Council & other Community-based groups	Support & promote restoration activities & best practice
	Development agencies	Provide technical and financial resources to support restoration
	MoA	Promote SLM uptake, support farmers to implement SLM best practice
	Farmers/landowners	
	Farmers	Knowledge exchange, participate in training sessions
	Community residents	See above re Community-based Groups
	CWMC	Coordinate implementation of the WS management plan
	Technical experts & related technical cooperation agencies	Technical backstopping, research, capacity building
	Educational institutions	Capacity building, preparation of knowledge products
	DOWASCO	Raise awareness and provide requisite training on streamflow measurement, sampling and analysis;
	DBOS	Sampling and water quality analyses
	Volunteers	Sampling and data collection on various watershed parameters
	Data entry support	Design and maintain system for data management
	FWPD	Monitoring, oversight & enforcement

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Thematic area(s)	Key Stakeholders	Main Responsibility
	DSWMC	Support community-based waste management programs
	Env Health Dept	Support community-based waste management programs
	Legal/law enforcement	Enforce applicable laws and regulations
Knowledge promotion	Media houses	facilitate knowledge transfer & awareness programs on sustainable WS management
	Audio/visual service providers	
	Campaigners, community activists	
	Min. of Education	
	Communications specialists	

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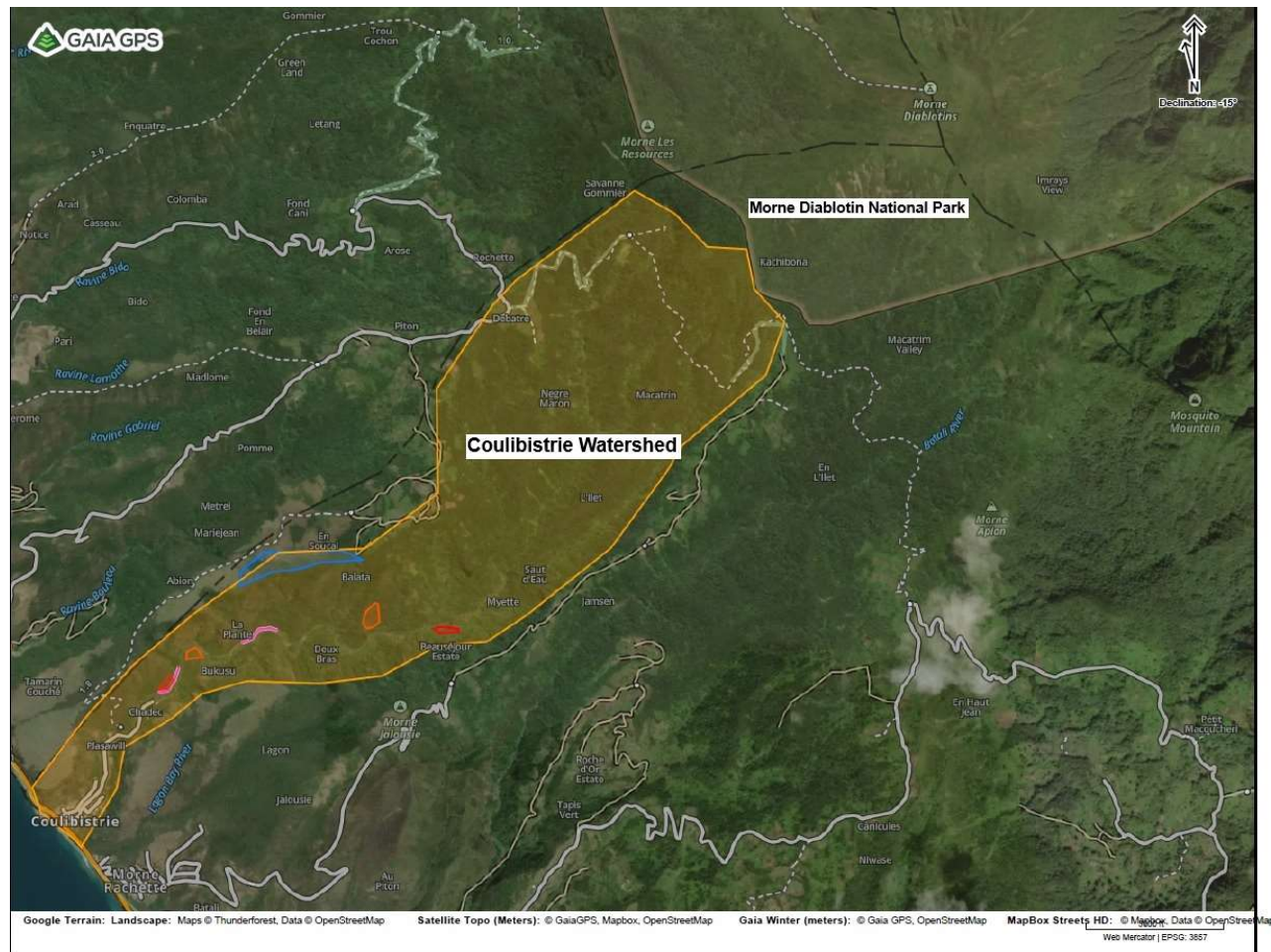


Figure 2 Overlap of the CW and the Morne Diablotin National Park

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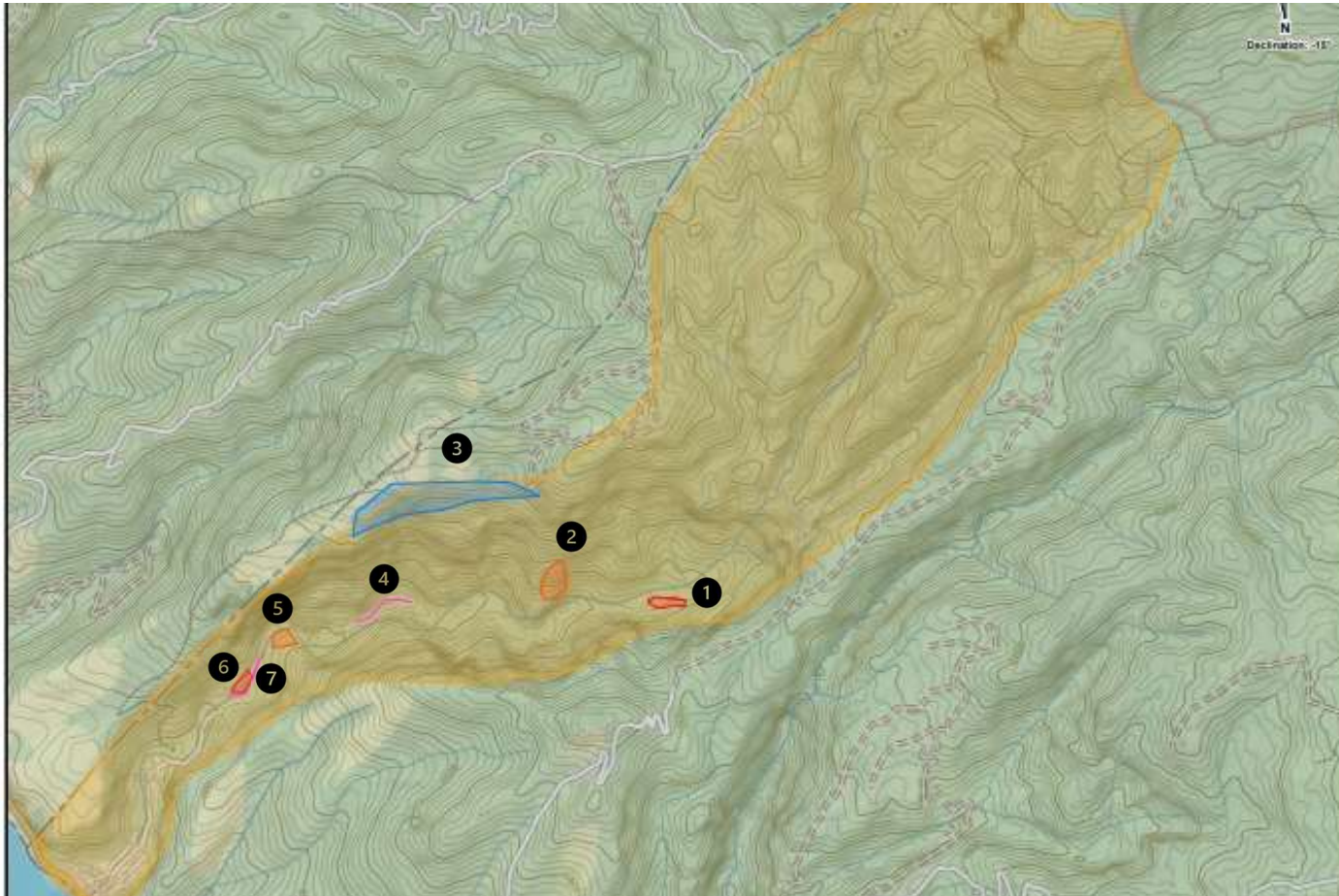


Figure 3 Spatial distribution of proposed restoration interventions in the CW

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Table 1 Description of proposed restorative interventions in the Coulibistrie Watershed

Watershed Section	Map Ref. No.	Targeted Sites	Description	Area (ac)	Recommended species	Plant Estimate
						(Count)
Upper	1	AgF-Up	Agroforestry Demo-Plot	2	Forest and various tree crops: citrus, avocado, cinnamon, cocoa	300
Mid	2	EnR_Mid	Enrichment planting	3	Red cedar, Coubawi, Mapou, L'epine, pwa dou, savonette	450
Mid-Upper	3	Inv. Sp. Mgmt*	Restoration of upper slopes dominated by lemon grass	20	Native dry forest species including Campeche, Savonette, fat pok), Mango, Guava	1500
Mid	4	Buf-Mid	Riparian buffer restoration	3	Mango, Sand box tree, Ficus, Bamboo	150
Lo	5	EnR-Lo	Enrichment planting	1.5	Red cedar, Coubawi, Mapou, L'epine, pwa dou, savonette	225
Lo	6	AgF-Lo	Agroforestry Demo-Plot	1	Commercial forest and various tree crops spp. (citrus, avocado, mango, cocoa)	150
Lo	7	Buf-Lo	Riparian buffer restoration	3	Mango, Sand box tree, Ficus, Bamboo, Kennip, Tamarind	150
Total				33.5		2,925

***Invasive lemon grass management/restoration**

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Table 2 Total proposed area per restoration intervention and summary cost for implementation

Restoration Intervention	Specific area of intervention		Total Area Impacted (Acres)
	Acreage	Budget US\$	
Enrichment plantings (EnR)	4.5	\$4041.00	100
Agroforestry (AgF)	3	\$26,071.00	25
Riparian Buffer (BuF)	6	\$ 10,620.00	30
Invasive sp. management	20	\$17,960.00	110
Development of Capacity building programs	-	\$ 4,000.00	-
Watershed monitoring program	-		-
Community Engagement & Knowledge Promotion Plan/Process	-	\$ 6,000.00	-
Total	33.5	\$68,692.00	265

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6 KEY ACTIVITIES TO BE UNDERTAKEN

Enrichment of degraded sites: Enrichment planting with selected tree species aims to restore critical ecosystem functions and watershed hydrology. Two sites within the watershed were identified for enrichment planting given limited access and very rugged terrain. The priority sites identified for restoration are shown in Figure 3.

Sub-activities	Responsible party	Collaborating partners	Indicators of accomplishment
Prepare TOR for an out-planting coordinator	EcoApp Inc.	PISLM	Draft TOR
Identify and recruit an out-planting coordinator	EcoApp Inc.	FWRPD	Signed contract
Conduct site reconnaissance	Coordinator	EcoApp Inc/FWRPD	Site visit report
Develop site-specific enrichment plans	EcoApp Inc	FWRPD/DOWASCO	Draft plans
Source and procure planting material	Coordinator	FWRPD/Private Nurseries	Signed agreements with nursery(ies)
Conduct out planting activity	Coordinator	FWRPD/NEP/Comm unity groups	Photographic and written reports
Prepare progress reports on planting activities	Coordinator	EcoApp Inc.	Weekly reports

Development of Capacity building programs: Empowerment of the community is an essential prerequisite for effective watershed management. Based on community consultations and the findings of the CW study several critical knowledge gaps emerged. These will be addressed by the development and execution of 3 training sessions

Sub-activities	Responsible party	Collaborating partners	Indicators of accomplishment
Assess & prioritize capacity development needs	EcoApp Inc	Community groups, DoA, FWRPD	Needs assessment report
Develop training packages		DOWASCO, DBOS, FWRPD, DoA,	Report on approved trainings
Identify resource personnel to execute trainings		Environmental Health. DSWMC	Shortlist of personnel
Execute planned trainings			Training report
Report on training activities			Progress report

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Development of watershed monitoring program: Watershed monitoring is required to assess the effectiveness of any implemented corrective actions. A systematic program yields many benefits but relies strongly on effective coordination, required technical and financial support. This will be achieved through the establishment of the CWMC and a highly effective watershed monitoring program that will generate the required data needed for decision making.			
Sub-activities	Responsible party	Collaborating partners	Indicators of accomplishment
Initiate meeting to determine scope based on priorities and available human and financial resources	EcoApp Inc.	Community groups, DOWASCO, FWPD,	Meeting report
Establish watershed monitoring team (s)	EcoApp Inc. to coordinate		Approved TOR/Team(s) formally organized
Develop MoU/LoA for engagement of key partnering agencies	EcoApp Inc.	DOWASCO, FWPD, DoA, DBOS,	Draft MoU/LoA
Prepare relevant progress reports			Progress reports
Develop a Community Engagement & Knowledge Promotion Plan/Process: Community support is crucial to the successful implementation of the CWMP. In that regard a community mobilization drive will be undertaken to garner support and secure stakeholder participation in the various activities. Importantly, changes in perceptions and attitudes of residents about land use and waste disposal will be prioritized.			
Sub-activities	Responsible party	Collaborating partners	Indicators of accomplishment
Obtain community /stakeholder feedback & approval	EcoApp Inc./	Community groups, other key stakeholders	Meeting report
Develop TOR for a communications strategist			Draft TOR
Develop draft content -Community-wide awareness campaign: -Radio programs 2 -townhall meeting -School's poster competition - Radio jingle -Promotional videos	Communication strategist		Approved community engagement/knowledge promotion plan
Finalize & validate plan	EcoApp Inc.	Community Groups, Key stakeholder representatives	Finalized plan

All activities indicated above are subject to the availability of funds and the guidance of PISLM and other key partners.

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7 BUDGET

Activity	Unit Cost (US\$)	Quantity	Total Expense (US\$)
Enrichment planting of degraded sites			
Prepare TOR for an out-planting coordinator	-	1	-
Identify and recruit an out-planting coordinator	-	1	-
Conduct site reconnaissance	\$200.00	2	\$400.00
Develop site-specific enrichment plans	-	1	-
Establishment of enrichment sites per acre*	\$1,770.00	4.5	\$7,965.00
Restoration of riparian buffer*	\$898.00	6	\$5,388.00
Agroforestry plots	\$8,687.00	3	\$26,061.00
Invasive sp. Management	\$898.00	20	\$17,960.00
Prepare progress reports on planting activities	-	-	-
Sub-total			\$57,774.00
Development of Capacity building programs			
Assess & prioritize capacity development needs	-	1	-
Develop training packages (Watershed monitoring, SLM, organic production systems)	-	3	-
Identify resource personnel to execute trainings	-	1	-
Execute and report on planned trainings	\$1,500.00	3	\$4,500.00
Sub-total			\$4,500.00
Development of watershed monitoring program			
Determine scope of monitoring program	-	1	-
Facilitate establish watershed monitoring team	-	1	-
Develop draft MoU/LoA for engagement of key partnering agencies	-	5	-
Prepare relevant progress reports	-	1	-
Sub-total			-

* See appendices for a detailed breakdown of these costs

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Develop a Community Engagement & Knowledge Promotion Plan/Process

Obtain community /stakeholder feedback & approval	-	1	-
Develop TOR for a communications strategist	-	1	-
Communications strategist	\$300.00	6	\$1,800.00
Townhall meeting	\$300.00	1	\$300.00
Sub-total			\$2,100.00
Total			\$64,374.00

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8 REQUIRED SUSTAINABILITY ACTIONS FOR SUCCESSFUL RESTORATION

To guarantee project success, sustainability considerations must be integrated into the various project activities. This will ensure that adequate capacity is developed for the efficient and timely delivery of the required outputs at every phase of the project. Table 3 provides a summary of the required capacities, how they can be provided and the expected outcomes to be derived. This can also serve as a guide to gauge the progress and success of restoration efforts within the watershed.

Table 3 Key sustainability actions and how they can be achieved for successful watershed restoration

Pre-Project	How this will be accomplished	Expected Outcome
Secure the commitment and participation of key stakeholders	Hold consultations, Signed MoU/LoA	Key stakeholders maintain a high level of interest and meaningful participation during and post-project. The profile of watershed management elevated at the national level
Actively Support Community Knowledge and awareness	Consultations with farmers, community leaders individually and through focus groups. PISLM national radio outreach programmes. Ongoing advocacy of FWPD and the DoA	Greater acceptance of environmental stewardship responsibility at individual and community levels
Map available technical resources/skill sets of the community	Engagement of residents and community leaders	Key resource persons informed and committed to support project initiatives & decision-making
During-project		
Develop local capacity	Several training opportunities and access to watershed monitoring tools	An effective and functional watershed monitoring unit established; Community involvement in watershed management is enhanced
Establish Watershed Management Council	Work with key stakeholders to establish the CWMC, Develop ToR for CWMC, support capacity development activities targeted at prospective councilors, Central Government agrees to roll out	The CWMC becomes sufficiently empowered and capacitated to undertake watershed management responsibilities.

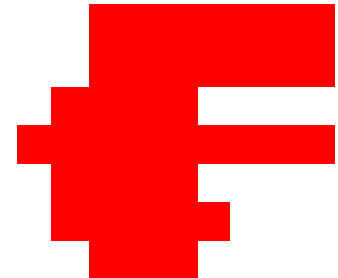
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	the national land use policy and action plan using the CW as a pilot.	The CWMC becomes a model for the implementation of national watershed management programs
Increase access to grant funding and technical support opportunities	Train community stakeholders on grant proposal preparation; Compile a database of potential funders and technical resources	Greater pool of financial and technical resources are available to support watershed management activities. At least of 80% of the operational budget of the CWMC is derived from grant assistance.
Post-Project		
Maintain plants established under the various project interventions	Provide requisite, training, guidance, inputs, tools and equipment for the maintenance of established plants; develop a field monitoring program	Well-maintained restoration sites that have the desired impact and appeal
Promote and support sustainable livelihood initiatives	Develop an ecotourism strategy for the area that will seek to create employment as tour operators, tour guides, watershed stewards, and such like	Increased employment opportunity and greater awareness and understanding of the wider community about the importance of its natural resources
Build capacity to effectively communicate results	Provide training on data collection, management, analysis, reporting and communication and presentation skills	Periodic reports on watershed status and outcomes of management activities are presented and disseminated within and outside the community

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9 IMPLEMENTATION SCHEDULE

#	Activities	M1				M2				M3							
		W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
		1	2	3	4	1	2	3	4	5	6	7	8				
1.0	Summary activities to be completed as part of the Coulibistrie Watershed Action Plan																
1.1	Complete enrichment planting of targeted degraded sites																
1.2	Establish agroforestry plots																
1.3	Establishment of riparian buffers																
1.4	Establish invasive species management area																
1.5	Develop and implement capacity building programs																
1.6	Develop and implement a watershed monitoring program																
1.7	Develop and implement a community engagement & knowledge program																



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10 APPENDICES

A. Bill of Quantities

Schedule of Prices (per acre) for Enrichment Planting of Forest					
Bill No. 1	Establishment Inputs and equipment				
Item No.	Description	Unit	Quantity	Unit Rate US\$	Amount US\$
1.1	Tree diameter measuring tape DBH	-	2	\$ 80.00	\$ 160.00
1.2	clinometer/compass	-	1	\$ 350.00	\$ 350.00
1.3	Write in the rain Record books	-	3	\$ 50.00	\$ 150.00
1.4	GPS handheld and protective case (etrex 22x)		1	\$ 300.00	\$ 300.00
1.5	Collection, site preparation and planting of wildings	days	5	\$ 100.00	\$ 500.00
1.6	Husbandry/maintenance	days	2	\$ 80.00	\$ 160.00
	To Summary				1,620.00
Bill No. 2	Management, supervision and monitoring				
Item No.	Description	Unit	Quantity	Unit Rate US\$	Amount US\$
5.1	Management, supervision and monitoring	days/yr	1	150	\$ 150.00
	To Summary				150.00
	TOTAL COST				1,770.00

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Bill No. 2	Establishment Inputs				
Item No.	Description	Unit	Quantity	Unit Rate US\$	Amount US\$
2.1	High value forest and crop trees	Plants	150	\$ 8.00	\$ 1,200.00
2.2	compost/organic fertilizer	18 Kg bags	2	\$ 26.00	\$ 52.00
2.4	Orange flagging tape	12 pk	1	\$75 00	\$ 75.00
2.6	Jab planter	Sum	1	\$ 200.00	\$ 200.00
2.7	Planting trees and cover crops	days	3	\$ 85.00	\$ 255.00
2.8	Husbandry/maintenance	days	2	\$ 80.00	\$ 160.00
	To Summary				\$ 1,942.00
Bill No. 3	Management, supervision and monitoring				
Item No.	Description	Unit	Quantity	Unit Rate US\$	Amount US\$
31	Management, supervision and monitoring	days/yr	5	150	\$ 750.00
	To Summary				\$ 750.00
	TOTAL COST				7,732.00
<u>Schedule of Prices (per acre) for Land Restoration with Agroforestry</u>					
Bill No. 1. Installation of farm drains and vetiver strips					
Item No.	Description	Unit	Quantity	Unit Rate US\$	Amount US\$
1.2	Establish storm drains 160 ft long (with a trapezoid dimension (32 in x 24 in x 24 in) and placement and shaping of spoils along the downslope section of storm drain	cu ft	720	3	\$ 2,160.00
1.3	Contour drains 320 ft long 24 in x 12 in x 12 in)	cu ft	480	3	\$ 1,440.00
	Sourcing vetiver plants	plant	960	1	\$ 960.00
1.4	Planting of vetiver strips on upper side of drains	ft	480	2	\$ 960.00
	To Summary				\$ 5,520.00
Bill No.2	Field establishment and maintenance				
Item No.	Description	Unit	Quantity	Unit Rate US\$	Amount US\$

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2.1	High value forest and crop trees	Plants	150	\$ 8.00	\$ 1,200.00
2.2	compost/organic fertilizer	18 Kg bags	2	\$ 26.00	\$ 52.00
2.3	Signage	Signs	5	\$ 150.00	\$ 750.00
2.4	Planting trees and cover crops	days	3	\$ 85.00	\$ 255.00
2.5	Husbandry/maintenance	days	2	\$ 80.00	\$ 160.00
	To Summary				\$ 2,417.00
Bill No.3	Management, supervision and monitoring				
Item No.	Description	Unit	Quantity	Unit Rate US\$	Amount US\$
3.1	Management, supervision and monitoring	days/yr	5	150	\$ 750.00
	To Summary				\$ 750.00
	TOTAL COST				8,687.00

<u>Schedule of Prices (per acre) for Restoration Riparian Buffer</u>					
Bill No. 1	Establishment Inputs				
Item No.	Description	Unit	Quantity	Unit Rate US\$	Amount US\$
1.1	Sourcing of forest and crop trees	plant	50	\$ 8.00	\$400.00
1.2	Clearing forest tacks and planting wildings	days	4	\$ 83.00	\$332.00
1.3	Husbandry/maintenance	days	2	\$ 83.00	\$166.00
	To Summary				898.00
	TOTAL COST				898.00

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B. Description of the major restoration interventions in the Coulibistrie Watershed

Restoration Intervention	Description
Enrichment plantings (EnR)	Two plots identified for enrichment planting are old scarps that are accessible. Mostly native species will be used. Inaccessible areas will be allowed to restore naturally.
Agroforestry (AgF)	Two sites, located in the mid- and upper-watershed sections, respectively. The upper region site is an existing farm that will be supported to transition into an organic production system. Restoration is targeted at supporting the expansion of tree crops, ground cover establishment and installation of soil conservation measures e.g. Storm and contour drains, slope stabilization measures, vetiver strips, and intercropping
Riparian Buffer (BuF)	Depending on access and extent, buffer restoration will focus on a 50 m width on either side of the targeted sections of the Coulibistrie River. A linear distance of 516 m and a total area of 3 acres is targeted for riparian zone restoration. A combination of selected native and other trees and shrubs will be integrated in the two buffer sections.