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## **Riverbank Stabilization – a Collaborative Effort in the Fond D'or Watershed, St. Lucia**

### **Introduction**

Rivers in the lower Fond D'Or Watershed are severely degraded. Along many stretches, the river bank (riparian zone) has been used for intensive farming practices and livestock grazing. Agricultural cultivation is dominated by intensive banana production and many of the active banana plantations along the rivers are being managed without any form of appropriate soil conservation measures. As a result, many sections of rivers in this watershed have collapsed and high levels of sediment from poorly designed and maintained drains are transported in overland flow contributing to increased soil erosion and channel sedimentation.

Rivers frequently need to be desilted, particularly in areas of the lower watershed where flooding of adjacent settlements and the road network occurs. In addition ripar-

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### ***Feature Article:***

## **Mitigation of Impacts of Industrial Wastes on the Lower Haina River Basin and its Coast, Dominican Republic**

### **Introduction**

The Lower Haina River Basin is one of the Dominican Republic's main industrial conglomerations, with over one hundred medium to large sized industries. The region is highly contaminated by these industries as well as the solid and liquid wastes generated by the communities. Most industries lack an environmental component among their objectives. Final disposal of industrial waste is mostly carried out by third parties without environmental authorization and difficulties in the management of toxic and hazardous waste are further exacerbated by poor capacity and infrastructure.

The Dominican Republic's GEF-IWCAM Demonstration Project aims to obtain tangible results in the reduction of pollutants in this hydrographic basin. The principal intervention is in the industrial sector with the implementation of clean production programmes to reduce contamination by developing recycling and reutilisation mechanisms.

The main expected results are a reduction in the pol-



***Industries on the Lower Haina River***

*(Continued on page 2)*



[www.unep.org/wed/2010](http://www.unep.org/wed/2010)

## World Environment Day 2010 Message:

*"The destruction of the natural world costs the global economy some \$2 to \$5 trillion every year but economists barely notice the loss. This is a fundamental and profound market failure at the heart of our global economic system. Nations must work together to place a value on biodiversity, just as we need to place a global price on carbon emissions. Only when we fully value nature will we properly protect it. We rely on the natural world for our food, for clean water, for protection from floods and storms and to provide us with a habitable climate. If we lose nature, we lose ourselves."*

**- Mohamed Nasheed, President of the Republic of Maldives -**

## BACKGROUND ON THE GEF-IWCAM PROJECT:

The Global Environment Facility-funded Integrating Watershed and Coastal Areas Management in Caribbean Small Island Developing States (GEF-IWCAM) Project was approved by the Global Environment Facility (GEF) in May 2004. Implementing agencies are the United Nations Environment Programme (UNEP) and the United Nations Development Programme (UNDP). Executing agencies are the Secretariat of the Cartagena Convention (UNEP-CAR/RCU), the Caribbean Environmental Health Institute (CEHI) and the UN Office for Project Services (UNOPS). The thirteen participating SIDS are: Antigua and Barbuda, The Bahamas, Barbados, Cuba, Grenada, Dominica, Dominican Republic, Haiti, Jamaica, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, and Trinidad and Tobago. The length of the Project is 5 years and commenced in the second quarter of 2005. The Project Coordinating Unit is located at the CEHI, as agreed by the Implementing and Executing Agencies and the participating countries.

(Continued from page 1)



*Solid waste disposal is a challenge—Children play alongside garbage*

—lution emitted by the industrial sector, improvements to water quality within the basin, and the creation of a sustainable management programme for the hydrographic basin.

Full project implementation began in June 2008 and is due to end in September 2010.

### Project Partners

- Ministry of Environment and Natural Resources
- Haina Association of Industries and Businesses
- Herrera Association of Industrial Businesses
- Lower Haina Municipal Government (City Hall)
- Dominican Institute for Hydraulic Resources
- Autonomous University of Santo Domingo (UASD)
- Ministry of Education
- Coordinator of Haina Neighborhood Councils
- San Cristobal Province Directorate of the Ministry of Environment and Natural Resources

### Project Activities and Achievements

#### **Establishment of a management infrastructure and strategy for the Haina River Basin**

The Project Steering Committee, which includes the various partners, will be converted into the Haina Management and Development Council when the project ends. Monitoring capacity is being developed within the watershed, with training being provided to the Municipal Environmental Management Units of the Municipal Governments (UGAM) located in the project area.

**Legislative and policy review to provide incentives for reductions in discharges and emissions, and to establish responsibility for monitoring and compliance**

(Continued on page 3)



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- Design and application of a survey to 110 of the 126 industries in Haina, enabling a comprehensive analysis of the solid and liquid waste practices and atmospheric emissions in the area.
- Establishment of 20 sampling points to gather baseline surface water quality data in the Lower Haina River watershed and adjacent coast.
- An inventory of indicator species and / or species that are pollution-resistant at these sites.
- Based upon the findings of the industrial survey and river and coast sampling, proposals to revise some environmental regulations in the Surface Water Quality and Discharge Control and in the Ground Water regulations were made. The first of these is currently being revised.
- Development of a map of industrial discharge for the Lower Haina River Watershed (useful information for the Ministry of Environment, which previously only had recorded information from the 31 industries granted environmental permissions).

#### **Identification and implementation of mechanisms to reduce point-source pollutants**

Cleaner Production Mechanisms have been identified and will be implemented in ten industries at a pilot level. It is projected that the remaining 116 industries will also have these mechanisms implemented gradually (short, medium, and long term).

#### **Clean-up and Public/Private Sector Awareness**

Development of a clean-up strategy for the watershed, to be implemented by the Municipality, and monitored and supervised by the Haina Management and Development



*Haina Association of Industries and Businesses meets*

*Haina is their home*



Committee. This is supported by a communication strategy aimed at various sectors: industrial, academic, community (neighborhood councils), and transport. Groups were formed to support the environmental protection and conservation work, e.g. the Volunteer Nature Guardians (made up of students from the four middle schools of Haina) and the Environmental Defense Clubs (made up of primary school students from 2 schools in Haina).

#### **Summary of the Demonstration Project's Impacts**

- Attitude change amongst industries related to management of industrial discharge
- Improved communication between the industrial sector and the Ministry of Environment
- Improved integration between different parts of the Ministry of Environment and other governmental institutions in the execution of the project
- In the medium term, considerable improvement in the air quality and management of solid waste
- Students were motivated to form the volunteer Nature Guardians and Environmental Defense Clubs; Neighborhood Councils identified more with environmental issues
- Community involvement in work related to clean-up of the watershed increased
- Creation of synergies with other activities within the Ministry of Environment and Natural Resources, such as: the construction of barriers to prevent dumping of solid waste and informal dumps in zones near the river and estuary; on-site stabilization of contaminated soil contaminated lead from an old smelting plant and battery recycling center, and; restoration of the wetlands in the lower Nigua, and, declaration of that site as a protected area.

(Continued from page 1)



*Meeting to discuss the river bank stabilization initiative*

ian zones and riparian vegetation are being lost. These play an important part in maintaining water quality because they act as buffers, filtering out some of the agricultural chemicals before they enter the water courses.

#### River Bank Assessment

An assessment of vegetation along the main rivers within the Fond D'Or watershed was conducted in January 2009. The survey assessed the condition of the river, land tenure, farming practices and the total area required for planting along farms near the river bank. Aerial photography was used to enable assessment of long stretches of the river channel more easily and GIS maps were prepared showing various land uses.

The riverbank assessment and site observations conducted during the exercise revealed relatively high levels of susceptibility to bank degradation of the selected rivers, primarily to bio-physical and environmental factors. Most of the natural vegetation has been removed in favour of other types of land use and what remains is further threatened by intensive banana cultivation and cattle grazing. The Fond D'Or, Dernière Rivière and Grande Ravine Rivers were found to be the most degraded and vulnerable of the four rivers selected and to require immediate remedial action to prevent further levels of degradation.

A 6 metre wide vegetated buffer strip was recommended along each side of the river channel from the Fond D'Or Bay, upstream to the upper reaches of the watershed as a front line measure of defence. The assessment recommended that, as a matter of priority, measures be taken to mitigate the destruction of the natural vegetation within the riparian buffer. In addition to vegetated buffer zones along the entire length of the river, appropriate control systems to stabilize and settle out contaminants from farms and households were needed. The vegetated buffer could be established from natural vegetation, tree crops or commercially important timber species. Traditionally, land owners tend to favour tree crops, and given the prevailing agro-ecologic conditions in the area, mango, citrus breadfruit and cocoa were deemed to be suitable species.

Most of the farmers interviewed during the exercise agreed that most of the river banks are degraded and accepted partial responsibility for the current status of the river buffer zone. However, while most were prepared to participate in the rehabilitation program, they stressed a preference for tree crops due to their perception that timber trees provide excessive shade which ultimately affects banana crop production levels.

It was estimated that a total distance of 19,862 metres of riverbank was degraded and would require rehabilitation by re-vegetation of the banks. The study went so far as to estimate the length of river segment to be planted on each property.

#### A Collaborative Approach to Replanting Riverbanks

Riverbank rehabilitation programs undertaken in the area before have had varying levels of success. It was therefore decided that a more **"collaborative approach"** to rehabilitation of the river banks would be used.

The new banana certification programme under the Fair Trade label requires that all farmers establish a buffer zone along the river where they have established banana farms. The GEF-IWCAM St. Lucia Demonstration Project therefore collaborated with the National Fair Trade's Mabouya Valley office (given its mandate under the farmer certification programme), the Forestry Department of the Ministry of Agriculture, Forestry and Fisheries, MAFF, (given its mandate under the Forest Soil and Water Conservation Ordinance), the Agricultural Extension Department of MAFF, and the Project for Peace, a Non-Governmental Organization, to address the problem. Farmers and private land owners, schools and other partner organizations were also included amongst stakeholders consulted.

Following the assessment, a meeting was held with Fair Trade, the Forestry Division of the Ministry of Agriculture, Forestry and Fisheries, and the Project for Peace, to discuss a number of initiatives. It was agreed that the project should focus upon one affected area, the Grande Ravine tributary. This would, in effect, be a demonstration of good practice for river bank stabilization which could be replicated throughout the Fond D'or Watershed. Among things discussed were:

- Funding to acquire the tree crops recommended for planting;
- An educational programme;
- The number of plants each farmer would receive and when they could be made available; and
- The responsibility for monitoring of planting and maintenance.

(Continued on page 5)



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*Planting trees*

nance of the tree crops by Fair Trade.

Meetings were subsequently held with the banana farmers from the Grande Ravine settlement and farmers from other settlements in the watershed. They were briefed on the water quality problems and the need to have them as partners if the programme was to be successful. The Project for Peace supported the initiative by purchasing the planting material from the Ministry of Agriculture at a subsidized cost, and, in addition to providing some technical support, GEF-IWCAM contributed towards the cost of two signs. The Forestry Department provided forest tree seedlings.

Additional support and sponsorship was provided by a private sector company, First National Bank, which both contributed funds to, and participated in, the tree planting exercise. They also hired a company to videotape the event which was later aired on national television.

#### Public Awareness and Sensitization

In an effort to stimulate interest and participation, a sensitization and awareness programme was conducted before the planting programme began by the Ministry of Agriculture's Information Unit along with the Government Information Service (GIS).

The planting exercises took place from September to October 2009. Given prevailing land management practices adopted by farmers along the riverbanks, it was necessary to stake all trees immediately after planting. This, it was hoped, would help to prevent damage to trees when herbicide is being applied to crops; a serious concern as past experiences showed that when trees planted along riverbanks were not staked, the risk of damage due to herbicide contamination was extremely high.

In an effort to ensure timely and successful execution of the exercise, full participation by farmers and land owners was encouraged. Farmers whose holdings were not adjacent to the

riverbanks were encouraged to work with farmers whose land was. In areas which were abandoned or where land owners were not interested in participating in the program, schools within the valley were invited to participate as part of an effort to provide students with hands-on experience.

#### Present Status

The 2009 – 2010 dry season began early and was severe, taking its toll on forested areas, agricultural areas and resulting in river water levels which are below average, even for the dry season. The efforts to establish a small governmental group to continue monitoring planted areas, were not successful. Farmers faced serious challenges irrigating their crops, providing drinking water for their cattle and other livestock and keeping newly-planted trees watered. The status of the new trees and replanted areas is still to be assessed.

#### Lessons Learned

- There is a need for public education and awareness programmes about the importance of the riparian zone, its important function and protective measures.
- Significant collaboration amongst stakeholders resulted in an ambitious programme of replanting which was supported by both the public and private sector. The experience demonstrates however that the setting up of a monitoring and evaluation programme, as well as the provision of ongoing technical advice to farmers, particularly with regard to river bank stabilization measures, is essential for sustainability.
- Participating farmers, in particular, need to be educated about the value of maintaining a healthy riparian zone if they are to be fully committed to protecting and stabilizing the river bank, particularly in the long-term.
- Compromise in the selection of tree species for planting was necessary to ensure the participation of farmers.



*Participants in the planting exercise*

## Ridge-to-Reef (R2R) Workshop

The IWCAM Regional Project Coordinator (RPC) participated in an Experts meeting for a new Ridge-to-Reef (R2R) Initiative being developed by IUCN, convened from May 19-21, 2010 in Punta Leona, Costa Rica. This meeting was organized by IUCN and included representatives from the IUCN offices in various regions of the world, as well as partners and collaborating agencies. The RPC was invited to bring an IWCAM and Caribbean perspective to the deliberations.

Experts heard a history of the initiative and discussed the objectives of the meeting, followed by presentations on the work of a Consultant, Mr. Noel Jacobs, in the form of a White Paper: *Ridge to Reef Water Management Practices to Support Ecosystem Services and Improve Riparian and Coastal Livelihoods*. Technical presentations were made, based on the White Paper but the majority of the meeting involved plenary and work group discussions on the proposed programme, defining aspects of the programme and identifying a Vision, Goal, Global Objective and Specific Objectives, as well as desired Results. This new R2R initiative is expected to build on the experience of GEF-IWCAM in the Caribbean.



Meeting participants in Punta Leona



The Head Table, ISTAC 5

## 5<sup>th</sup> LBS Interim Scientific, Technical Advisory Committee (ISTAC)

The RPC participated in the LBS ISTAC and IMO Regional Workshop on the London Protocol and MARPOL Convention which took place in Panama City, 24 – 28 May 2010. He presented on the work of the project and was given responsibilities for crafting Recommendations, based on the discussions at the ISTAC. Of great significance was the number of participating countries who indicated their intent to sign the LBS Protocol. In the case of Antigua/Barbuda, a document was expected to have been presented to the Parliament during the week of the ISTAC meeting.

In addition, networking opportunities were utilized. These included meeting with the French delegation to discuss opportunities for collaboration on IWRM and support for LBS Protocol ratification. These discussions led to the agreement on collaboration in a planned event on Bio-indicators later in 2010.

## GEF-IWCAM Exhibits at Fifth Biennial Caribbean Environmental Forum and Exhibition, CEF-5, 21—25 June 2010, Montego bay, Jamaica

Our exhibit focuses upon all nine GEF-IWCAM Demonstration Projects.

Visit us to learn about the work of the projects, their achievements and how Participating Countries and the Region are benefitting from their activities.

We will also be introducing you to our Community Based Resource Assessment (CBRA) Tool which will be launched later this year!

For information on CEF-5 see:

<http://www.cef.org.lc>





## GEF-IWCAM St. Lucia Demonstration Project Closes... And the *Trust for the Management of Rivers* takes over!



On 30 May 2010, the GEF-IWCAM St. Lucia Demonstration Project held its Closing Ceremony and officially launched the Non-Governmental Organization, the Trust for the Management of Rivers (TMR).

The lively ceremony was a tribute to participants in the Project as well as a symbolic handing over of responsibility from the Fond D'Or Watershed Management Committee (WMC), which was the core of the participatory watershed management mechanism during project implementation, to the newly created TMR.

Due to concern by WMC members that beneficial activities begun during the project would not be sustainable, a series of consultations took place in 2009 to explore the best type of organizational structure for a group dedicated to continuing an integrated approach to the management of the watershed after project completion.

The TMR already has a mission statement and objectives, rules and regulations, and a Transitional Plan of Action. Its mission is:

*to achieve recreational water standards in the river through the promotion of improved land use practices throughout the watershed.*

Its functions are:

- To provide leadership for river water management, research, education, etc.
- To promote, establish and enhance partnerships
- To develop coordinated river water quality efforts based on GOs and NGOs Programmes.



*The Head Table*



*The audience*



*Closing Ceremony tribute dance*



*The GEF-IWCAM RPC passes the torch to the President of the TMR, Trevalyn Clovis*





## Global Oceans Conference 2010

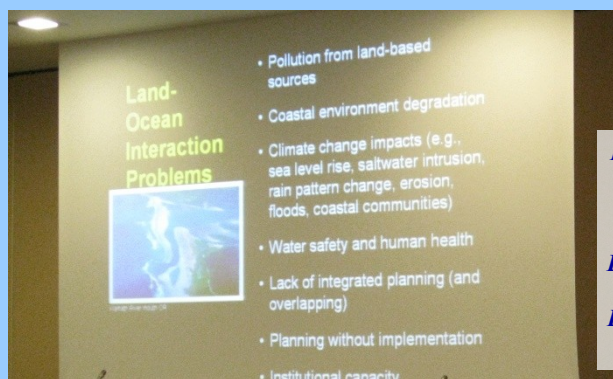
The GEF-IWCAM Project was represented at the Fifth Global Conference on Oceans, Coasts and Islands (GOC 5), at UNESCO in Paris, 3—7 May 2010, by the CNIS, Donna Spencer. Her presentation on Critical Success Factors for Sustainable IWCAM in Caribbean SIDS, was made during Session 42 of the GOC5.

This session was co-convened with the US NOAA International Program Office and UNEP—GPA and focused upon Strengthening Implementation of Integrated Watershed and Coastal Management.

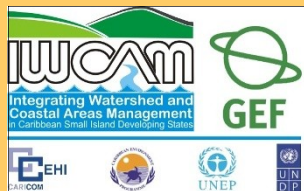
The Project was also represented by LaVerne Walker who presented on the Establishment of a Participatory Watershed Management Model in the St. Lucia Demonstration Project.



*Ambassador Dessima Williams, Grenada, Chair, Alliance of Small Island States (AOSIS), chairs Plenary Panel 6: SIDS and Mauritius Strategy Implementation in the Context of Climate Change Vulnerabilities, 7 May 2010*



*LaVerne Walker makes her presentation in Session 42 while Drs. Gonzalo Cid (l) and Clement Lewsey of NOAA listen*



**Participating Country Focal Points, Demonstration Projects and others are invited to submit articles. Please contact Donna Spencer at [dspencer@cehi.org.lc](mailto:dspencer@cehi.org.lc)**

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