

CARIBSAN Regional Conference

« Proceedings »

June 13 & 14, 2023, Martinique



The CARIBSAN project is co-financed by the European Union, through the INTERREG Caribbean program under the European Regional Development Fund, by the French Development Agency (Agence Française de Développement, AFD) and by the Water Offices (ODE) Martinique and Guadeloupe.

A word from the President



It gives me great pleasure to introduce the proceedings of the CARIBSAN regional conference, held on June 13 and 14, 2023 in Fort-de-France, Martinique. It brought together nearly 200 participants from 15 Caribbean countries and territories. You will find a summary of the discussions and presentations, as well as links to speeches and videos.

Lucien Saliber

President of the Assembly
of the Collectivité Territoriale
de Martinique, President
of the Water Office Martinique



Key messages



Wastewater treatment is a pre-requisite for the health of populations and for the protection of the environment in the Caribbean region.



The dynamics of the CARIBSAN project are positive, and deserves to be pursued in an ambitious second phase.



We need to take a fresh look at our collective and non-collective wastewater-treatment systems, in order to better respond to the realities of the Caribbean context.



Regional cooperation, in particular through territorial diplomacy, is essential to help the Caribbean islands adapt to climate change.



Nature can inspire the **right solutions** to the challenges of our time.



Treatment wetlands are adapted to the technical and economic challenges of sanitation in tropical island environments. Treatment wetlands make it possible to meet long-term challenges by simplifying maintenance requirements.



Exchanges of experience is essential to learn, in order to pool responses to shared challenges and pitfalls.



In the face of spontaneous urbanization and the increasing frequency of extreme events, sanitation needs to be rethought, with a focus on decentralized systems.



A multidisciplinary approach is desirable to meet the challenge of sanitation in the Caribbean, bringing together social, economic, urban planning, historical, geographical and technological visions.

Key figures



185

participants
including 98 women
and 87 men



2
days

12 countries
and 3 French overseas
territories in America



2 round
table dis-
cussions



16
representatives
of governments in the
partner countries



2
visits
at treatment
wetland plants

2



TV broadcasts



1 radio
broadcast
on the conference



16
News
articles



From left to right : Chantal Gaston, Shervon Placide, Magnus Williams and Amauri de la Peña Matos – CARIBSAN engineers and project managers for Saint Lucia, Dominica and Cuba respectively. - Photo credit : Lia Visyon



Site visit - Maupéou site, headquarters of the Communauté d'agglomération de l'Espace Sud in Rivière Salée - Photo credit: Lia Visyon



Field visit - Maupéou site, headquarters of the Communauté d'agglomération de l'Espace Sud in Rivière Salée // DOWASCO team - Photo credit: Lia Visyon



Site visit - Maupéou site, headquarters of the Communauté d'agglomération de l'Espace Sud in Rivière Salée // Lucien Saliber, President of the Assembly of the Collectivité Territoriale de Martinique and President of the Martinique Water Office, Marie-Jeanne Letord, CAESM Water and Sanitation Director, COTRAM Sanitation team - Photo credit: Lia Visyon

Agenda day 1

Tuesday, June 13, 2023

📍 Madiana Convention center,
Schoelcher, Martinique

8h30

Welcoming participants

9h00

Official speeches

Yolaine LARGEN, First Deputy Mayor of Schoelcher.
Éric TARDIEU, Secretary General of the International Network of Basin Organizations (INBO), Director General of the International Office for Water (OiEau).
Roland DUBERTRAND, Ambassador for Regional Cooperation in the Atlantic Area.
Louis Patrick HILL, Chairman of the Board of Directors of the Dominica Water and Sewerage Company (DOWASCO), representing Dominica.
Ricardo LIMIAS DIAZ, Director General of Infrastructure Development at the National Institute of Hydraulic Resources (INRH), representing Cuba.

Sylvie GUSTAVE-DIT DUFLO, President of the French Biodiversity Office, Vice-President of the Guadeloupe Region, President of the Water and Biodiversity Committee.

Pauline ANTOINE-PROSPERE, Secretary of State to the Minister of Education, Sustainable Development, Innovation, Science, and Vocational Training of Saint Lucia.

Lucien SALIBER, President of the Assembly of the Collectivité Territoriale de Martinique and President of the Water Office Martinique(ODE).

Bérangère COUILLARD, French Secretary of State to the Minister of Ecological Transition and Territorial Cohesion, responsible for ecology.

📺 VIDEO
CARIBSAN
project
presentation

10h05

Nature-based solutions
for tropical environments

🗣️ Questions
and Answers

Pascal MOLLE, Research Director, French National Institute of Agronomic Research & Environment (INRAE).

10h25

Round table « The challenges
of sanitation in the
Caribbean ».

Moderator: Ignatius Jean
Executive Director, CAWASA

📺 (introduction) **Jules DIDACUS**,
Director General of the Organization of Eastern Caribbean States (OECS).
Ricardo LIMIAS DIAZ, Director General of Infrastructure Development,

National Institute of Hydraulic Resources (INRH), Cuba

Louis Patrick HILL, Chairman Board of Directors of the Dominica Water and Sewerage Company (DOWASCO).

Zilta GEORGE-LESLIE, Managing Director of the the Saint Lucia Drinking Water and Sanitation Company (WASCO).

Lucien SALIBER, President of the Assembly of the Collectivité Territoriale de Martinique and President of the Water Office Martinique(ODE).

11h30

Experience sharing on
Treatment wetlands in
Martinique

🗣️ Discussion
with the
audience

Frédérick VOYER, Sanitation Director, Communauté d'Agglomération de l'Espace Sud de Martinique.

11h55

Morning closing remarks

📺 Video presentation of the
CARIBSAN project by INRH Cuba.

12h00

Lunch



14h00



Presentation of CARIBSAN results and way forward

Philippe SEGUIN, Project Manager, International Office for Water (OiEau)
Gaëlle HIELARD, CARIBSAN Project Manager, Water Office Martinique (ODE).

14h50



Presentation of pilot treatment wetlands sites by CARIBSAN partners

Amauri DE LA PEÑA MATOS, CARIBSAN project manager for Cuba-INRH.

Magnus WILLIAMS, CARIBSAN project engineer for Dominica - DOWASCO
Chantal GASTON & Shervon PLACIDE, CARIBSAN project engineers for Saint Lucia - WASCO.

15h50

Round table
« Caribbean cooperation to tackle climate change »

Moderator : Pascal SAFFACHE, University Professor and Director of the Master's degree "Territorial Diagnosis and Management of Island Spaces" at the University of the French West Indies.

(introduction) **Christopher CORBIN**, UNEP Coordinator for the Cartagena Convention.

Simone LEWIS, representing the

President of the Caribbean Water Association and Wastewater (CWWA) & Coordinator of the Global Water Partnership Caribbean (GWPC)

Sylvie GUSTAVE-DIT DUFLO, President, of the French Office for Biodiversity (OFB), Vice-President of Région Guadeloupe, President of the Regional Biodiversity Agency for the Guadeloupe Islands, President of the Guadeloupe Water and Biodiversity Committee.

Christelle OUTREMAN, Councilwoman of Regional Cooperation at the French Embassy in Saint Lucia.

Pauline ANTOINE-PROSPERE, Secretary of State to the Minister of Education, Sustainable Development, Innovation, Science, Technology and Training of Saint Lucia.

16h30

Discussion with the audience



16h45

Conference summary

Michéla ADIN, Director General of the Martinique Water Office

Stéphanie LARONDE, Director of Institutional and Technical Support and Cooperation at the International Office for Water (OiEau).

17h00

Closing words

Lucien SALIBER, President of the Assembly of the Collectivité Territoriale de Martinique and President of the Martinique Water Office.

19h00

Cocktail



Agenda day 2

Wednesday, June 14, 2023

Visits to treatment wetland plants
in Martinique

8h00



Departure of groups from the hotel
to field visits



9h00

Group 1:

Treatment wetlands Taupinière,
Le Diamant.

Group 2:

Treatment wetlands
Maupéou, Rivière-Salée.

12h30

Lunch



14h30

Group 1:

Treatment wetlands
Maupéou, Rivière-Salée.

Group 2:

Treatment wetlands Taupinière,
Le Diamant.

17h30



Site visit - Maupéou treatment wetlands, headquarters of the Communauté d'agglomération de l'Espace Sud in Rivière Salée - Photo credit: Lia Visyon

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Nature-based solutions
in a tropical context.

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and objectives for phase 2.

Presentation of pilot sites
by CARIBSAN partners.

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Round table: « Caribbean cooperation
to tackle climate change ».

Conclusions

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All presentations
are available
on our website.

Introduction

Nature-based solutions in a tropical context



Pascal MOLLE,
Research Director,
French National
Institute of
Agronomic
Research &
Environment
(INRAE).



Photo credit : Lia Visyon

In his introductory speech, Dr Molle outlined the scientific foundations of the CARIBSAN project's approach.

Nature based solutions for sanitation

Pascal Molle began by defining the concept of nature-based solutions, and their relevance to the challenges of climate change. In practice, they are capable of enhancing sustainability, strengthening resilience and promoting the circular economy. In the specific field of wastewater treatment, there are several families of processes that can be classified as **nature-based solutions**. These have been listed in the guide «Nature Based Solutions for Wastewater treatment» (IWA, 2021).

Treatment wetlands : technologies adapted to tropical conditions

Among these processes, treatment wetlands have shown advantages in terms of :

- **Reliability and robustness**, they are competitive compared to so-called « conventional » processes,
- **Adaptable sizing** in a wide range of contexts,
- **Reduction of operating cost**,
- **Co-benefits** and associated ecosystem services.

In tropical environments, Treatment wetlands present particular design and operating challenges. A sizing guide, the preparation of which was supported by the French Office for Biodiversity (OFB), is available in French, English and Spanish. It lists systems for treating domestic wastewater in tropical environments (*Lombard-Latune and Molle, 2017*).

The choice to be made will depend on the water to be treated, the treatment objectives and the context in which the plant is set up.

Nevertheless, Treatment wetlands face several challenges in tropical environments :

- **Land**, with relatively larger surface areas required,
- Lack of **standardized sizing rules** for these new solutions.

There are already many uses for Treatment wetlands in France and around the world :

- **Non-collective** sanitation,
- **Collective** sanitation of domestic wastewater. (In the hexa-gone region, Treatment wetlands have expanded rapidly since the early 2000s, and now account for 25% of collective wastewater treatment plants),
- **Industrial** wastewater, (as shown by the experiments carried out by the JM distillery in Martinique),

- **Sludge** treatment, (whether downstream of activated sludge plants, or more locally for septic tank),
- **Storm overflows** to protect sewage systems from heavy rainfall.

Seizing the opportunity of Treatment wetlands to rethink sanitation systems

More generally, Treatment wetlands can be used to initiate concrete reflection on how to adapt urban wastewater management - traditionally centralized around a system (connections, network and treatment) - to better modulate investment choices, adapt operation and maintenance, and gradually introduce a **decentralized vision**. This offers clear economic and technical advantages.



Field visit - Maupéou site, headquarters of the Communauté d'agglomération de l'Espace Sud in Rivière Salée // INRH team - Cuba
Photo credit: Lia Visyon

This is all the more true in contexts where urbanization has outstripped planning, as is the case on several Caribbean islands. This decentralized approach makes territories more resilient to extreme weather events, reducing the vulnerability of wastewater systems to heavy rainfall and helping to combat drought (by reducing urban heat islands and reusing wastewater). As part of a circular economy approach, this promotes co-benefits and associated ecosystem services, which will be studied in the second phase of the CARIBSAN project.

Discussions with the audience highlighted a number of complementary issues :

- **The valorization** (reuse) of mowed plants. Several possibilities were explored (reuse for their aesthetic character, for building insulation), also taking into account the role that this valorization can play in reinforcing the acceptance of these innovative treatment processes,

- **Plant species** used for treatment wetlands (*Heliconia psittacorum*, *Cyperus alternifolius*, *Canna indica*, etc.), which must be adapted to the ecosystem and climate, to the types of load to be treated and to treatment requirements, as well as to local risks (invasive plants, for example),
- **Raising users awareness.** In Martinique, there is a desire to develop showcases for research and the general public: facilities with platforms for visits (e.g. the Taupinière station), educational spots and teaching tools. Projects need to be co-constructed with the public, in particular with local residents (taken into account in the CARIBSAN 2 project).



What is a Treatment wetland?



Different types of treatment wetlands.



Round table 1

« The challenges of sanitation in the Caribbean. »



Introduction

Jules DIDACUS,
Director General
of the Organization
of Eastern Caribbean
States (OECS) on
video.



Moderator

Ignatius JEAN,
Executive Director
of CAWASA.

Introducing the first round table, the Director General of the Organization of Eastern Caribbean States (OECS), Dr Didacus, listed the multiple negative effects of **sanitation deficits**, endangering the health of populations, having socio-economic consequences on livelihoods, producing negative **environmental impacts** for inland waters and coastal zones, reducing biodiversity and limiting the expression of ecosystem services. In this context, climate change makes it all the more urgent to improve the quality of water, whose resources are dwindling, to devise ways of treating it, and to adapt or even develop the **reuse of wastewater** for purposes other than human consumption.

Against this backdrop, OECS welcomes and appreciates the CARIBSAN project. Its results will make it possible to better protect water resources, providing innovative, nature-based solutions with a high degree of sustainability.

In this context, the OECS welcomes the CARIBSAN project. It will help to better protect water resources, provide innovative, nature-based solutions with a **local expertise** mobilized, regional experience shared and the need to identify suitable tropical plant species.

Dr Didacus recalled that, according to article 24 of the Eastern Caribbean Economic Union Protocol (additional to the Treaty of Basse-Terre revised on June 18, 2010), each member state of the Protocol implements the St. George's Declaration of Principles on Environmental Sustainability in order to minimize environmental vulnerability, improve environmental management and protect the region's natural (including historical and cultural) resources to achieve optimal social and economic benefits for member states.



Participants

Zilta GEORGE-LESLIE,
General Manager,
Saint-Lucia Drinking
Water and Sanitation
Company (WASCO).



Ricardo LIMIAS DIAZ,
General Manager
of Infrastructure
Development at
of the National
Institute of Hydraulic
Resources (INRH),
Cuba



Louis Patrick HILL,
Chairman Board
of Directors of the
Dominica Water and
Sewerage Company
(DOWASCO).



Lucien SALIBER,
President of the
Assembly of the
Collectivité Territoriale
de Martinique
and President of
Martinique Water
Office.

The first round table of the conference, moderated by Mr. Jean, illustrated the challenges of sanitation in the Caribbean, with high-level representatives of the sector from several of the region's islands (Cuba, Dominica, Martinique and Saint Lucia). Speakers shared the issues specific to their territory. The following key ideas emerged from the various presentations :

Sanitation : a regional development challenge

For all the partners, achieving SDG 6 is both a priority and a real challenge. According to M. Saliber, the health, environmental and economic stakes are threefold. For Martinique, which is structurally lagging behind the rest of France in terms of access to sanitation, as for all the islands represented, improving sanitation access conditions in the Caribbean will provide co-benefits in terms of health, the environment and the economy.

To address these issues, the partners emphasized the relevance of a **regional approach** that should be :

- **Technical** : to identify and share the most appropriate solutions for the Caribbean context,
- **Human** : to train the various technical teams who design, operate and maintain wastewater infrastructure,
- **Financial** : to ensure that the necessary funds are available, both nationally and regionally, to meet the investment and operating costs,
- **Citizen** : to raise awareness of sanitation issues, and adapt technical solutions to the cultural and socio-economic context.

For each of these strategic areas of work, the CARIBSAN project generates a remarkable opportunity for dialogue, welcomed by all, which can be scaled up or replicated in the future depending on the results and lessons learned.

An integrated vision

As the speakers reminded us, the territories also share difficulties arising from the **Caribbean geography** :

- On the one hand, **residential areas are fragmented**, depending on the topography of each island. The more pronounced the topography, the greater the constraints on the installation of sanitation infrastructure.
- On the other hand, **uncontrolled urban development**, with the growth of spontaneous housing in areas where collective and non-collective sanitation is highly difficult to implement. As a result, the boundary between urban and rural areas is changing.

These findings call for an integrated vision in several respects : first and foremost, improved **urban planning**, and the integration of sanitation into a broader and renewed development approach. It implies the engagement of stakeholders in urban planning, construction, and notably architects. Responses need to be better adapted to each territory, including by innovating towards **non-centralized models**, which will redefine the artificial boundary between collective and non-collective sanitation. The questions from the audience focused

on the regulatory context in which local authorities and private individuals must operate their collective and non-collective wastewater treatment systems, on the performance in terms of pollution abatement depending on where the treated wastewater flows, technical support, financial resources, and conditions of access to land for private housing. A comparative law approach was also suggested by Mr. Lecante, President of Guyana's Water and Biodiversity Committee.

Wastewater and stormwater treatment also need to be better articulated, both in terms of the skills involved, and in terms of responses.

More frequent and intense extreme weather events highlight the **close interdependence between wastewater and stormwater management systems**, and generate significant operating constraints.



Photo credit : Lia Visyon



Finally, as Mr. Limias Diaz presented with the case of Cuba, an **integrated**, intersectoral and interdisciplinary approach **to public policy** is required. Cuba's National Institute of Hydraulic Resources (INRH) has adopted this integrated approach for CARIBSAN. Moreover, as Professor Cordova Lopez pointed out, it is desirable to bring scientific research closer to public decision-making, by basing investment choices on experiments adapted to the respective contexts. Mr. Nadeau, Member of Parliament for Martinique, stressed the political and not merely technical nature of the subject, which merits a global approach based on the fundamental human right to water and sanitation.

Get inspired by the environment to better protect it

As Mr. Hill points out, treatment wetlands offer us an opportunity to question the challenges we face and the solutions we propose to meet them. The neighbouring islands, though different, all have in common endangered exceptional ecosystems and a remarkable cultural wealth.

According to Mr Hill, we'll never know how the Caribbean would have

evolved if Christopher Columbus hadn't landed on its shores in 1492. Instead, we can only observe what they have become. Today, the islands are nothing more than the «ghosts» of what they once were. In this context, nature-based solutions are urgently needed to preserve and restore this common treasure and bring citizens closer to their environment.

Ms. George-Leslie spoke of the advantages of treatment wetlands in this context: promoting innovation in wastewater treatment, and finding concrete solutions with reduced operating constraints generate significant environmental co-benefits (**less energy expenditure, fewer chemical inputs**). This operational relevance, combined with the treatment performance of treatment wetlands, makes CARIBSAN a project to which Saint Lucia is very committed.

Feedback

Treatment wetlands in Martinique.



Frédéric VOYER,
Director for sanitation
at the Communauté
d'Agglomération
de l'Espace Sud de
Martinique (CAESM).



Photo credit : Lia Visyon

Mr. Voyer presented the experiences of treatment wetlands in a municipality in the South of Martinique.

The experience in the municipality of the South of Martinique

First of all, Mr. Voyer outlined the operational reasons why the municipality turned to the Treatment wetlands solutions. This experiment was born in response to the constraints generated by conventional methods, traditionally used in Martinique :

- Operating problems for activated sludge plants,
- Hypersensitivity to interfering clear water,
- Issues of maintenance of electromechanical equipment.

Faced with these challenges, the municipality has turned its attention to treatment wetlands, which have been very popular in France since the 2000, But which required adaptation to the specificities to the island environment.

The municipality was won over by the appeal of the treatment wetlands' greater **robustness**, the prospect of **lighter** operation and **maintenance work**, and greater flexibility in the face of the arrival of parasitic clear water.

Thanks to the ATTENTIVE project, an experiment was carried out on two pilot sites: the Taupinière wastewater treatment plant in Le Diamant, with a capacity of 1,200 population equivalent (p.e.), and the Mansarde Rancée wastewater treatment plant in Le François, with a capacity of 1,360 p.e. The sizing took into account the recommendations of the French Biodiversity Office (OFB) guide mentioned in the introduction by M. Molle (*Lombard-Latune and Molle, 2017*).

Feedback

Mr. Voyer listed the **lessons learned** on the design and operation of treatment wetland plants :

- Highly efficient purification yields,
- Slightly lower investment cost (between €900 and €1000/EH),
- Low operating costs, stating in response to a question from the floor that operating costs would be at least halved compared to a conventional station,
- Need for 3 to 4m² of land per inhabitant in mainland France (*compared with 0,8m² per inhabitant in the tropics, editor's note*),
- Similar construction times,
- Raw materials available locally,
- Sector development for
- production of suitable aggregates.

He also identified the advantages from a societal point of view, describing treatment wetlands as a good vector of communication for the public and decision-makers. Treatment wetlands also have the advantage of being adapted to the **local** context and **materials**, and of being able to stimulate social integration (mowing and plant exploitation).

Treatment wetlands could be mobilized for non-collective sanitation, stormwater or mixed water treatment, sludge or septic tank management.



Crédit photo : Lia Visyon

In response to a question from the floor on the level of contamination abatement made possible by treatment wetlands, Mr. Voyer pointed out that the abatement levels observed for the main parameters at the plant outlet are higher than the minimum levels stipulated in the French legislation. Further reinforcement of these levels would require tertiary treatments that would not necessarily be relevant to the needs of the receiving environment, and would be potentially costly.

Finally, a third project is currently being studied in the municipality of Le François, which will take into account the pilot experiments carried out at the two pilot stations. This new project will be part of a wider urban planning framework. The reuse of treated wastewater is under study.



Read all presentations.



The experience of treatment wetlands in Martinique.

CARIBSAN

Results of phase 1 and objectives for phase 2.



Philippe SEGUIN,
Project Manager,
International Office
for Water (OiEau).



Gaëlle HIELARD,
CARIBSAN Project
Manager Martinique
Water Office (ODE).

Ms Hiélard and Mr Seguin,
made a joint presentation of
progress and prospects.

Concrete results and milestones from Phase 1

Phase 1, starting in 2021, has a budget of €2.4 million, with support from the European Union's (EU) Interreg Caribbean Cooperation Program, the Agence Française de Développement (AFD) and the Martinique and Guadeloupe Water Office. The partnership between INRH (Cuba), DOWASCO (Dominica), WASCO (St. Lucia), and the Martinique and Guadeloupe Water Offices enabled to share knowledge between peers. With CAWASA's regional vision and INRAE's technical and research support, the project brought together a wide range of skills, particularly well-suited to the project's ambitions.

42 experts were mobilized to implement the activities, including many women engineers and managers.

Phase 1 identified

3 pilot sites for treatment wetlands, the implementation of preliminary studies (topographical, hydrogeological, wastewater characterization, pre-project studies, costing) and a multi-criteria analysis to identify the process best suited to the local needs. The first phase provided an opportunity to build stakeholders capacities beyond the partner countries, to share technical resources and to support the purchase of equipment required for the work of partners (e.g. sampling, measurements, laboratory, IT).

In addition, visits, experience-sharing activities and training courses have helped to strengthen mutual understanding and highlight the potential of treatment wetlands in tropical island environments. The participation and interest shown by twelve Caribbean countries in the June 2023 Conference is a fine testimony to this.

Shared ambitions for Phase 2

On this basis, phase 2 (2024-2026), with an initial budget of €8.5 million, will aim to set up pilot sites in 3 countries (construction of treatment wetland plants). These will be set up in very different contexts (see below) and will meet the

specific needs of each region. Phase 2 will offer more targeted training for operation and maintenance teams, and more general planning with an **asset management** approach to reinforce the sustainability of investments. The project will facilitate the development of a tool (developed by INRAE) to define wastewater management scenarios using a geographic information system. Thanks to the concrete examples provided by the pilot sites, this phase will enable

experience to be shared as we learn together how to implement the treatment wetlands.

Phase 2 will be resolutely in line with a collaborative Caribbean **research** approach, exchanging plant selection in partnership with Cuba's National Botanical Garden, and setting up a pilot project at a university in Havana. From a legal and administrative point of view, the project will propose also a normative study (discharge thresholds, dialogue between countries). Methodologically, the partners will give priority to **participation**, with the organization of local workshops, landscape integration, administrative follow-up of projects with the competent authorities in each country, detailed design, construction, monitoring of performance, and monitoring of impacts on receiving environments.



Photo credit: Lia Visyon



Site visit - Maupéou site, headquarters of the Communauté d'agglomération de l'Espace Sud in Rivière Salée // Arnaud René Corail, Vice-Chairman of the Communauté d'Agglomération de l'Espace Sud de la Martinique (CAESM) and Chairman of the CAESM Water and Sanitation Commission, Lucien Saliber, President of the Assembly of the Collectivité Territoriale de Martinique and President of the Martinique Water Office - Photo credit : Lia Visyon

A long-term vision

The audience asked the speakers about the possibility of scaling up, with more pilot sites, within partner countries on the one hand, and with new countries on the other.

Martinique Water Office and the International Office for Water have stressed the importance of pilot sites for the project, to demonstrate the relevance of the technology in the Caribbean context, and to disseminate the results to project owners and financiers in the region, with a view to **replication** and geographical diver-

sification. Thematically, the project is also an opportunity to mobilize Nature-based Solutions.

The speakers agreed to hold another conference at the end of the second phase of the project, to be held in one of the partner countries. CARIBSAN is a long-term project.



Read all presentations.



CARIBSAN : first results after one year.

Presentation of pilot treatment wetlands sites

By CARIBSAN's partners in Cuba, Dominica and Saint Lucia.



Participants
Amauri DE LA PEÑA MATOS, CARIBSAN Project Manager for Cuba-INRH.



Magnus WILLIAMS, CARIBSAN Project Engineer for Dominica - DOWASCO.



Shervon PLACIDE & Chantal GASTON, CARIBSAN Project Engineers for Saint Lucia - WASCO.

Three countries for a common project

Mrs Gaston and Mr Placide (Sainte-Lucie), M. De la Peña Matos (Cuba) and Mr. Williams (Dominica) presented the expectations of their respective institutions, illustrating their countries' overall sanitation strategy and the role of the CARIBSAN within this framework. They also described the specific context of each pilot site for implementing treatment wetlands. They detailed the specific topographical features and constraints of the sites, the preliminary studies carried out to characterize the wastewater, and the training and communication activities carried out

during the first phase of CARIBSAN. Once these studies have been completed, construction can begin in each country, as planned in phase 2.

Treatment wetland pilot site in Dominica

In Dominica, a country of around 71,000 inhabitants (2011 census) covering 750 km², sanitation is a strategic issue for the island's health and environment. DOWASCO is the public company in charge of water and sanitation services.

CARIBSAN partner countries



Some 23,000 drinking water users are registered, for a geographical coverage of 100%. On the other hand, there are only 3,300 sanitation users on the island, mainly located in urban areas (Roseau, Jimmit, Canefield). 20% of the country is connected to a centralized/collective system, with the remaining 80% using individual/non-collective systems (septic tanks, etc.).

Treatment wetlands offer an interesting opportunity for DOWASCO. Two pilot sites are possible in Dminica:

- **La Plaine** (south-east), whose construction will be financed by CARIBSAN 2,
- **Cotton Hill** (North-West), partially supported by the Global Water Partnership - Caribbean.

A local consultant has been hired to carry out the preliminary studies (geotechnical, soil, hydrogeological). Topography is available thanks to a LIDAR survey. CARIBSAN supported

the organization of sampling and monitoring campaigns to characterize effluents. Samples were analyzed by DOWASCO in Dominica and Martinique for advanced parameters. The results are available for La Plaine, and have yet to be finalized for Cotton Hill. In addition, the CARIBSAN project has requested a list of laboratory equipment and knowledge resources, in order to strengthen analysis and testing capacities.

Among the operational challenges encountered, DOWASCO reports delays due to land issues in the case of the La Plaine site, where land acquisition was completed recently (May 2023). This problem was not encountered at the Cotton Hill site, where the land belongs to the government.

More generally, Mr Williams was keen to emphasize the enthusiasm of DOWASCO's teams for the CARIBSAN projet. Its relevance and organization correspond to Dominica's expecta-

tions. The project's communication also supports the promotion of innovative technologies for improving sanitation in Dominica.

Country	Partner	Sites	Population benefiting
Dominica	DOWASCO	La Plaine	132 apartments
		Cotton Hill (co-funded by GWP-C)	300 inhabitants

Treatment wetland pilot site in Saint Lucia

Representing WASCO, Saint Lucia's public company responsible for water and sanitation services, Mme Gaston and M. Placide began their presentation with a description of the island's sanitation methods. As in Dominica, the vast majority (90%) of households rely on non-collective systems in Saint Lucia. Only 7% of the population in urban areas have access to a public sewage system. For this country of 620 km² and almost 180,000 inhabitants, domestic and industrial wastewater is therefore only partially treated, and discharged into inland or coastal environments. Bathing waters are contaminated, affecting the health of the population and the environment.

Faced with these constraints, WASCO sees treatment wetlands with great interest for their treatment efficiency, operating and maintenance costs, and their benefits in terms of public

well-being (reduced odors, aesthetic appeal).

The Black Bay Vieux-Fort site, located in the south of the island, currently has a wastewater collection system. The septic tank method of wastewater treatment is inefficient, generating contaminated effluent and a nuisance for residents. The Saint Lucia partners are proposing to bypass this system, while taking advantage of the collection network, to install a new treatment wetland plant.

In preparation for this investment, a topographical, hydrogeological and geotechnical study was carried out by a local consultant. WASCO has characterized the effluent since 2020. Phase 2 will see the finalization of the plant's design, followed by its construction on the Black Bay site, while capacity-building and communication activities continue.

Country	Partner	Sites	Population benefiting
Saint Lucia	WASCO	Black Bay	600 inhabitants

Treatment wetland pilot site in Cuba

Accompanied by an illustrative video and graphic model of the future treatment wetland plant in **Pogolotti** (Greater Havana), Mr. de la Peña (see link to his presentation below) detailed the various stages of treatment planned for the pilot site.

Thanks to water sampling and analysis, the preliminary studies have helped Cuban partners to characterize the effluents and are already guiding their technological choices. If the administrative and financial conditions are met, INRH plans to rapidly build the pilot plant, using identified technical solutions.

For phase 2, the Cuban partners are also planning a shared research project between the Havana Botanical Garden and the National Botanical Conservatory of Martinique.

The Cuban approach is based on a scientific approach. It also includes a major training and knowledge dissemination component, taking advantage of the project's working sessions and Cuba's considerable scientific expertise. The CARIBSAN team in Cuba brings together experienced researchers and young engineers in a complementary vision. The clear objective is to test the technique on the Pogolotti pilot site, and then replicate the model in other areas of the country.

Country	Partner	Sites	Population benefiting
Cuba	INRH	Pogolotti	2 000 inhabitants







CARIBSAN training in Martinique.





Wastewater characterization in Dominica.





Read all presentations.

Round Table 2

« Caribbean cooperation to tackle climate change. »



Moderator

Pascal SAFFACHE,
Professor at the
University of the
French West Indies.



Christopher CORBIN, UNEP Coordinator for the Cartagena Convention.

The second round table was introduced and moderated by Mr. Saffache, Professor of Geography at the University of the French West Indies.

His presentation set the framework for the dialogue by recalling the expected effects of climate change in the region.

The region is already experimenting climate change with the addition of two factors:

the slow but constant rise in sea level, and the one-time increase in the frequency and intensity of extreme events. These two dangers make the Caribbean islands particularly vulnerable. The warning signs are shared throughout the region, and the common denominator is coastal erosion.

According to Mr. Saffache, this observation raises important questions: about investment choices for development and the prospects for migration in the Caribbean.



Participants

Simone LEWIS, representing the President of the Caribbean Water Association and Wastewater (CWWA) and Coordinator of the Global Water Partnership Caribbean (GWPC).



Sylvie GUSTAVE-DIT DUFLLOT, President of the French Biodiversity Office (OFB), Vice-President of the Région Guadeloupe, President of the Regional Agency for Biodiversity in the Guadeloupe islands, President of the Water and Biodiversity Committee of Guadeloupe.



Participants

Christelle OUTREMAN,
Councillor
for regional
cooperation at the
French Embassy
to Saint Lucia.



Christopher CORBIN,
UNEP Coordinator
for the Cartagena
Convention (video).



**Pauline ANTOINE
PROSPERE**, Secretary
of State to the
Minister of Education,
Sustainable
Development,
Innovation, Science,
Technology and
Training of Saint Lucia.

The following common ideas emerged from a high-level dialogue :

The regional approach is essential.

With only 1% of emissions, the Caribbean islands are not responsible for climate change. They are, however, the first victims, and the urgency is clear. As Ms Gustave-Dit Duflot said : « **We don't have any B islands** ». This existential questioning calls for a joint effort in two directions. On the one hand a common and increased presence in international arenas (climate negotiations, financing mechanisms). On the other hand, action within the region, between countries that share common challenges, to strengthen solidarity and build cooperative projects.

Water resources are at the heart of the effects of climate change, as pointed out by Mr. Corbin. Apart from rising sea levels and the recurrence of droughts or floods, demand for water is changing for all uses (domestic,

agricultural, industrial), while **availability is changing in time and space**. Adapting to climate change therefore means thinking in terms of integrated water resource management (IWRM), with a concrete, progressive approach involving governance, integrated planning, capacity-building, and knowledge and information sharing. This is the purpose of the Global Water Partnership-Caribbean toolbox presented by Ms Lewis of GWP-Caribbean.

The effects of climate change are making current challenges more acute. Climate change highlights deficits in access to essential services and structural development issues. In the specific case of the water and sanitation sector, the notion of «no-regrets» measures quickly becomes apparent. For example, investing in non-intensive technologies for sanitation that deliver results, or reducing leakage in drinking water networks, will always bring socio-economic and ecosystem



Photo credit : Lia Visyon

benefits, and these benefits will be all the more relevant when it comes to building resilience and coping with the expected effects of climate change on water resources.

Young people bring hope.

In the particular demographic context of the Caribbean, climate change is sharpening intergenerational differences. But they also open up a central field of dialogue: it is today's young people who will know the consequences of our actions tomorrow. Ms. Antoine-Prospere recommended a bottom-up approach, taking into account the particularities of each island, and giving a privileged voice to young people, so that they can play a greater part in public decisions, to better engage them and become actors in the development of their territories.

Ecosystems can provide answers to those who know how to observe them. The CARIBSAN Conference have highlighted that nature-based solutions can be mobilized to meet major development challenges. Nature can be a source of learning to identify and replicate effective solutions. Ms Gustave- Dit Duflot argued in favor

of ecosystem services as a means of adaptation. Biodiversity in the Caribbean hotspot is a unique asset for the region. We need to know more about it and mobilize it more effectively to meet the challenges of our time. Mangroves, for example, help to cope with rising sea levels (adaptation), while also acting as important blue carbon sinks (mitigation). Projects and funding opportunities exist in this area. Ms Outreman cited the various mechanisms supported by France in the region (FICOL, FASEP, FEXTE, FCR) and in particular the new mangrove restoration program in collaboration with the Organization of Eastern Caribbean States (OECS), financed by France (EUR 3 million) in 2023 via the French Development Agency (Agence Française de Développement, AFD).

Conclusions



Summary

Michéla ADIN,
Director General
of the Water Office
Martinique (ODE).



Stéphanie LARONDE,
Director of institutional
and technical support
- cooperation at the
International Office for
Water (OiEau).

Ms Adin and Ms Laronde summarized the discussions using four key words.

INSPIRATION

The participants showed that they share a common source of inspiration when it comes to treatment wetlands: Nature. Nature offers concrete answers to the challenges facing our Caribbean societies. This Conference was a wonderful example of this. It's vital to continue being inspired.

AMBITION

This Conference sets a clear course: to implement a solution inspired by nature in a rigorous way, adapted to the context of each country, according to the priorities of local partners, in an appropriate and sustainable way. This means moving from the study stage to the construction stage. These constructions will enable us to draw lessons specific to each case. It also means continuing to exchange ideas to develop the skills of technical teams, and to adapt to different legislative frameworks. An important point raised during the day was the adaptability of these solutions for private or non-collective facilities. The long-term ambition is also to extend this technical expertise to Caribbean countries that are not currently direct partners in the project.



Photo credit : Lia Visyon



Photo credit : Lia Visyon

INNOVATION

The conference focused on a solution to the shared challenge of sanitation on islands and tropical environment. Phase 1 of the CARIBSAN project, based on extensive prior research, clearly demonstrated that treatment wetlands deliver convincing results. With real economic, environmental, social and technical advantages, they are alternative solutions to conventional wastewater treatment.

COOPERATION

In view of the problems identified jointly, Martinique's experience with treatment wetlands was an obvious choice, with strong potential for cooperation. Each country has its own specific ecosystems and needs. It's an exceptional opportunity to set up pilot sites in these territories at the same time. Cooperation allows us to considerably enrich the results of the experiment, to share our mistakes as well as our successes, and to put Caribbean solidarity into practice.



Closign remarks

Lucien SALIBER,
President of the
Assembly of the
Collectivité Territoriale
de Martinique and
President of Water
Office Martinique.

The CARIBSAN adventure has a bright future ahead.



Photo credit : Lia Visyon

Official speeches

First Deputy Mayor
of Schœlcher,
Yolaine LARGEN

Secretary General of the International Network of Basin Organizations (INBO), General Director of the International Office for Water (OiEau)
Éric TARDIEU

Ambassador
for Regional Cooperation
in the Atlantic area,
Roland DUBERTRAND (Visio)

Chairman Board of Directors,
of the Dominica Water
and Sewerage Company
(DOWASCO),
Louis Patrick HILL

Managing Director,
Infrastructure Development,
National Institute of Hydraulic
Resources (INRH), Cuba
Ricardo LIMIAS DIAZ

President of the French
Biodiversity Office, Vice-Pre-
sident of the Guadeloupe
Region, President of the Water
and Biodiversity Committee
Sylvie GUSTAVE-DIT DUFLO

Secretary of State
to the Minister of Education,
Sustainable Development,
Innovation, Science,
Technology and Training
of Saint Lucia
Pauline ANTOINE PROSPERE

President of the Assembly
of the Collectivité Territoriale
de Martinique and President
of Water Office Martinique
Lucien SALIBER

French Secretary of State
to the Minister of Ecological
Transition and Territorial
Cohesion, responsible
for Ecology.
Bérangère COUILLARD

Animation : Eddy Marajo

Full speeches and presentations
are available on our website.



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« Proceedings »

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more about
the conference.