

28 novembre 2023

Evènement de Clôture
Closing Event
Evento de Cierre

Interreg
Caribbean
European Regional Development Fund



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CARIBSAN

Evènement de Clôture

Closing Event

Evento de Cierre

28 novembre 2023



INRAE



Interprétation/ Interpretation/ Interpretación

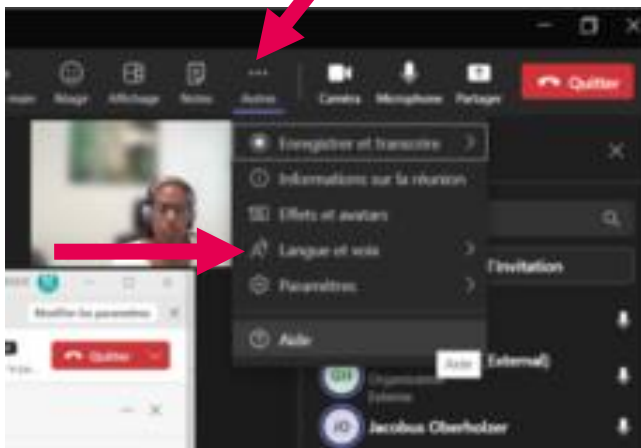
S'il-vous-plait/ Please/ Por favor

Announce yourself in the chat

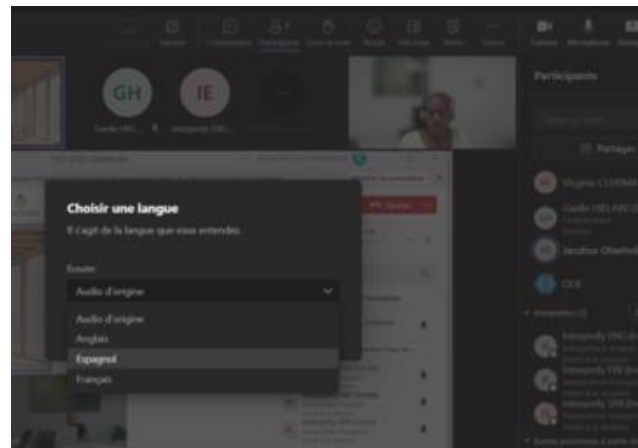
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 Micro OFF

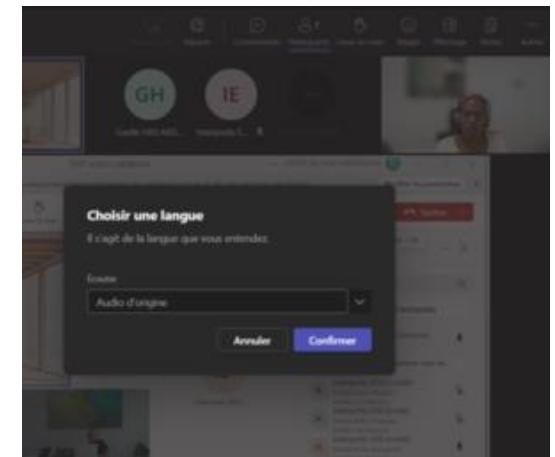
INTERPREFY



1. Click on « Language & voice »



2. Click on « Interpretation »
then select your language



3. Confirm

Programme / Agenda / Programa

9:00

Ouverture et discours officiels / Welcoming remarks and official speeches / Inauguración y discursos oficiales

9:40

Résultats du projet et présentation des sites pilotes / Project results and pilot sites / Resultados del proyecto y presentación de los sitios pilotos

Q/R Q/A P/R

11:25

Perspectives et conclusion / Outlook and conclusion / Perspectivas y conclusión

11:45

Photo de famille / Group picture / Fotografía de familia

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Discours officiels
Official speeches
Discursos oficiales

28 novembre 2023





Lucien SALIBER

President



Interreg

Caribbean

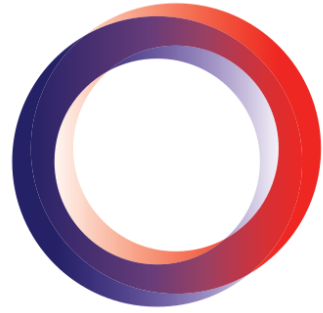
European Regional Development Fund



EUROPEAN UNION

Gilles BAJAZET

Director



AFD

AGENCE FRANÇAISE
DE DÉVELOPPEMENT

**Camille
GUIGONNET**

Project Officer

and

*Regional Communication
Manager*





**Isabelle
AMIREILLE-
JOMIE**

Deputy Vice-president



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Vidéo de présentation du projet CARIBSAN

Video presentation of the CARIBSAN project

Vídeo de presentación del proyecto CARIBSAN

28 novembre 2023



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Résultats du projet et présentation des sites pilotes

Project results and pilot sites

Resultados del proyecto y presentación de los sitios pilotos

28 novembre 2023



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Workpackage 2

Études préliminaires
Preliminary studies
Estudios preliminares



WP2 Etudes techniques

Site	Access to the site	Topographic study	Hydrogeologic study	Wastewater characterisation	Water consumption	Selection of treatment chain	Design
CU Pogolotti							
DM La Plaine	Land acquired						
DM Cotton Hill							
LC Black Bay	Accessibility works						

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Workpackage 2

Méthode multi-critère

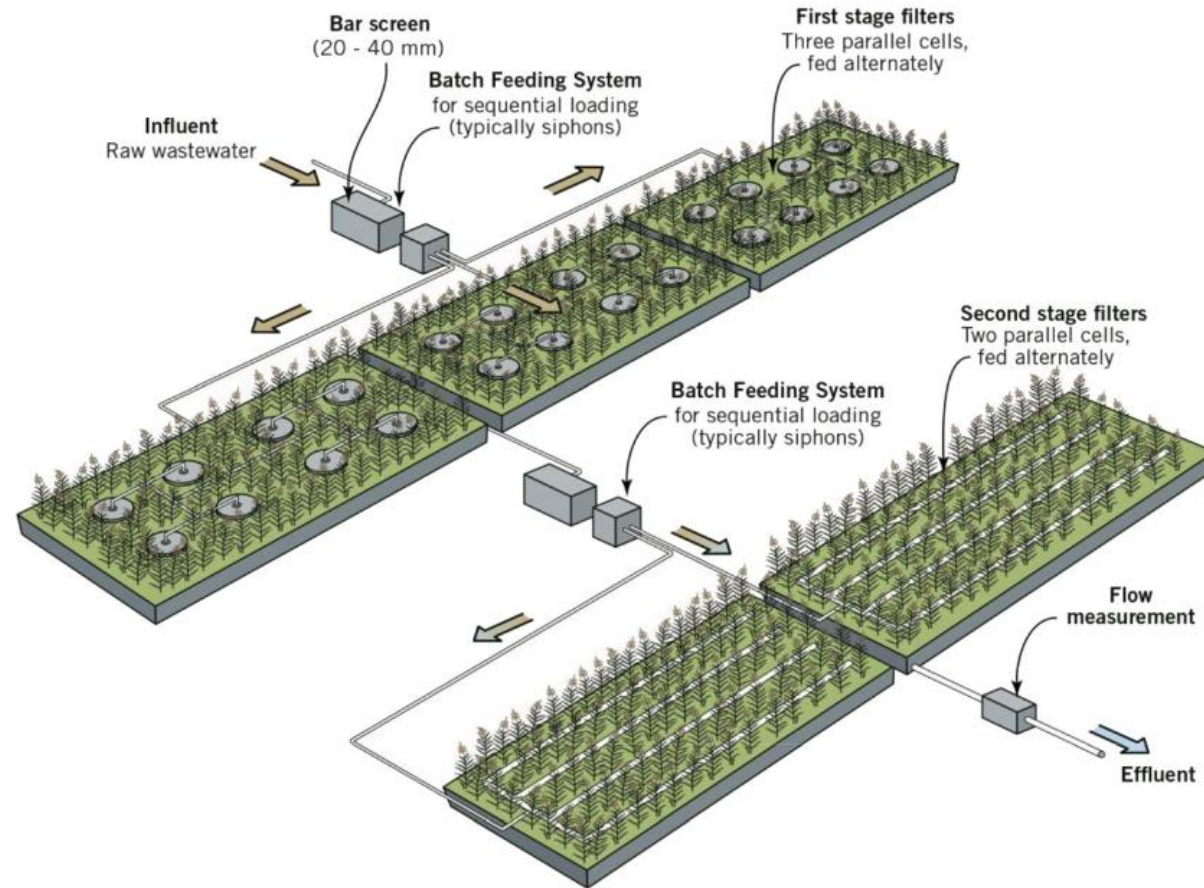
Multi-criteria method

Método multicriterio



Designing a treatment chain – Diseñar una cadena de tratamiento

Example - Ejemplo

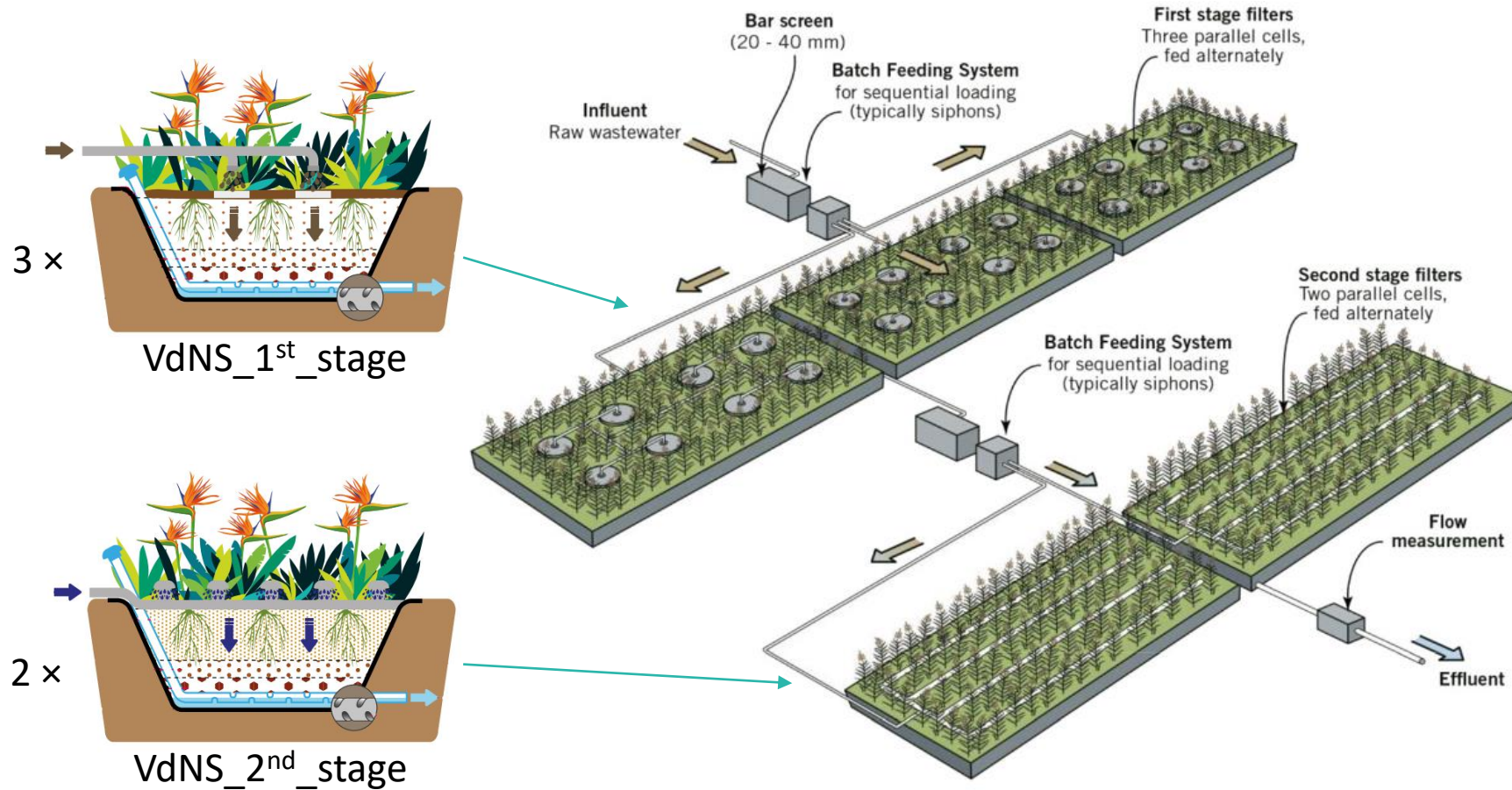


Schematic of the classical French VF design. Image courtesy of Epur Nature.

Esquema del diseño clásico francés de la FV. Imagen cortesía de Epur Nature.

Designing a treatment chain – Diseñar una cadena de tratamiento

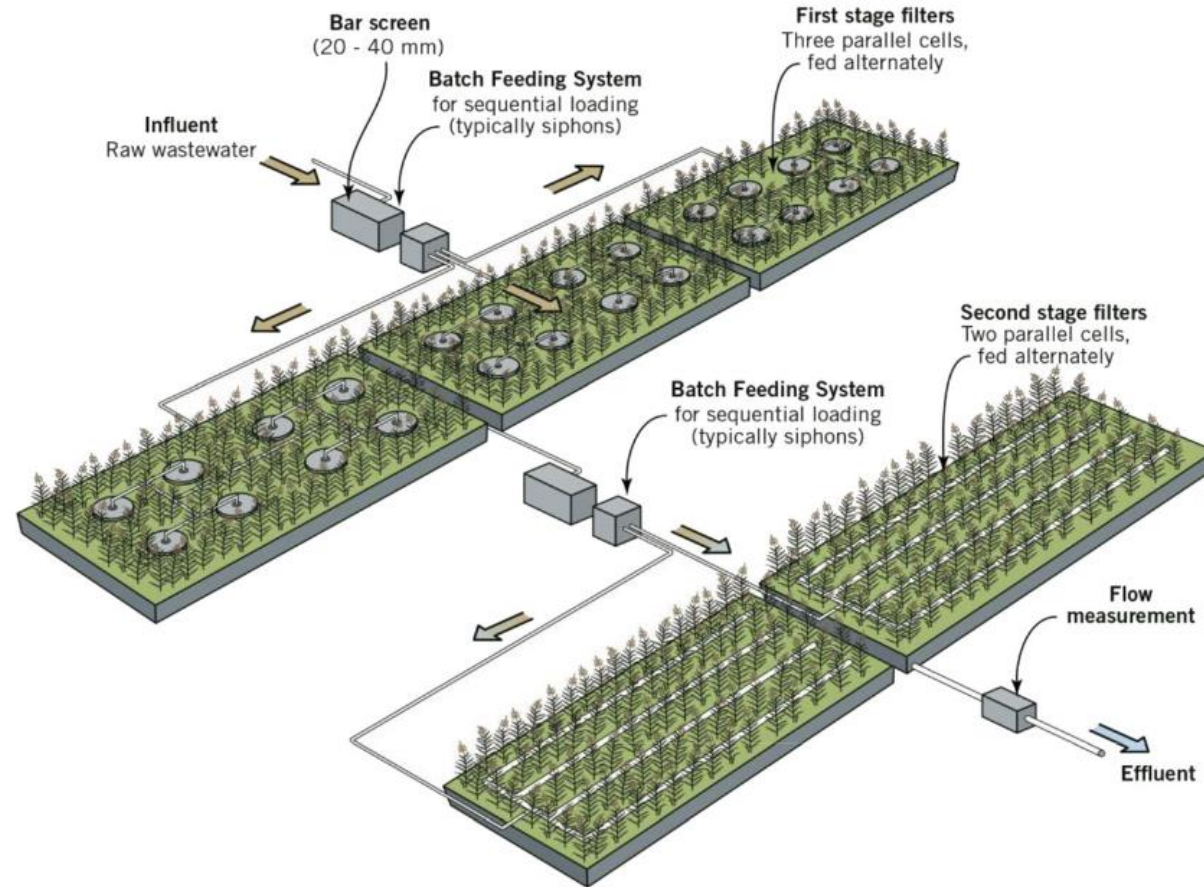
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Designing a treatment chain – Diseñar una cadena de tratamiento

Impact of the context - Impacto del contexto

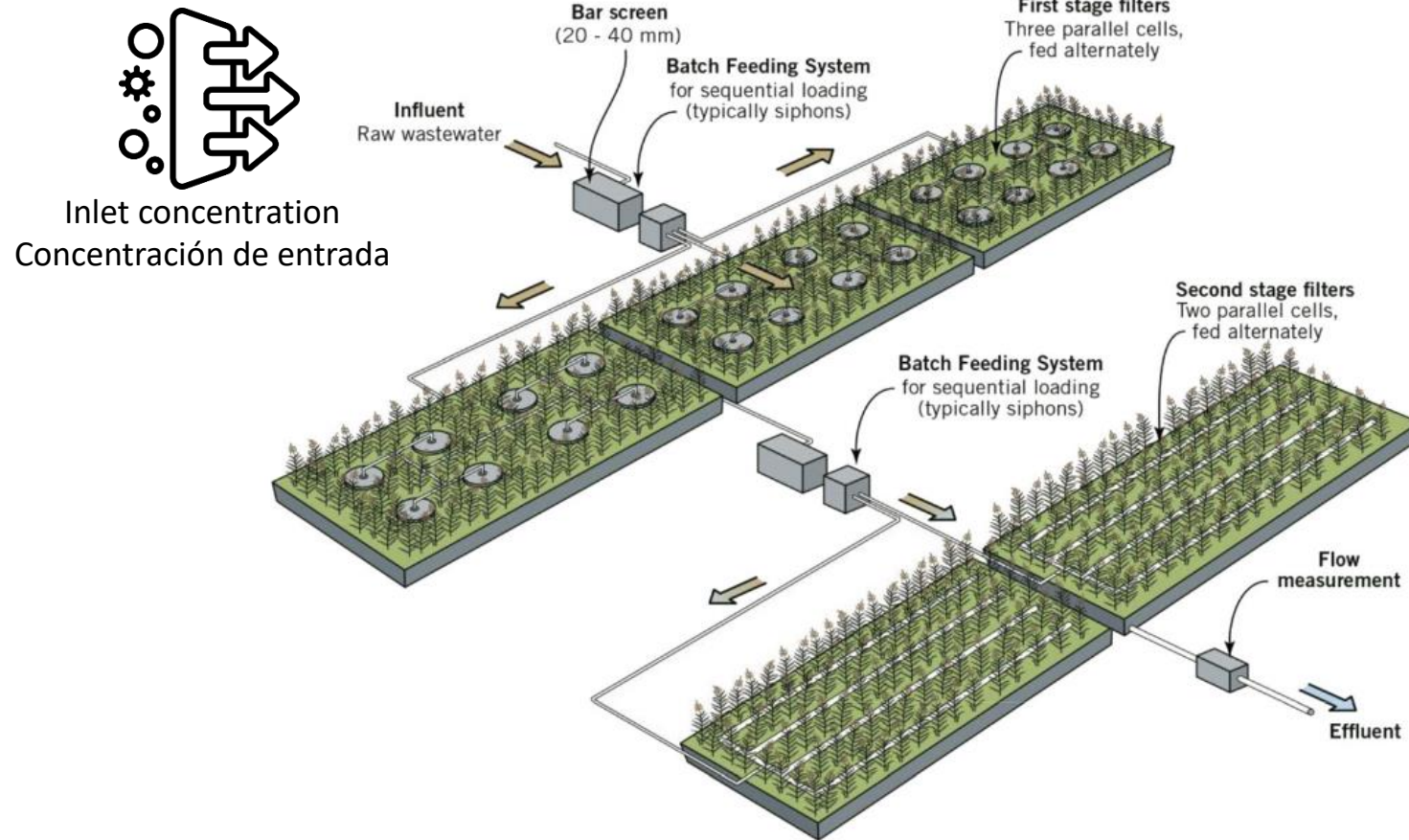


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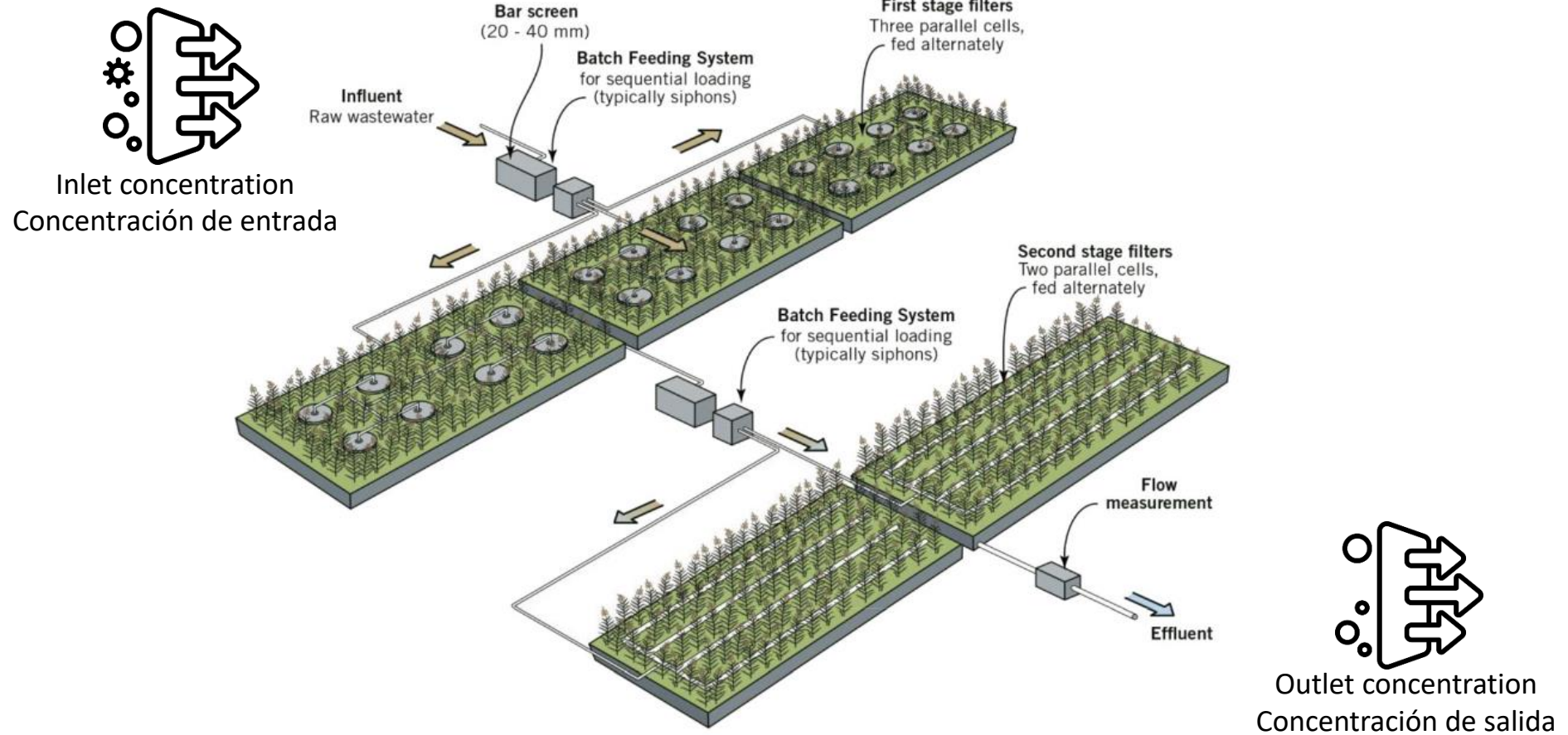


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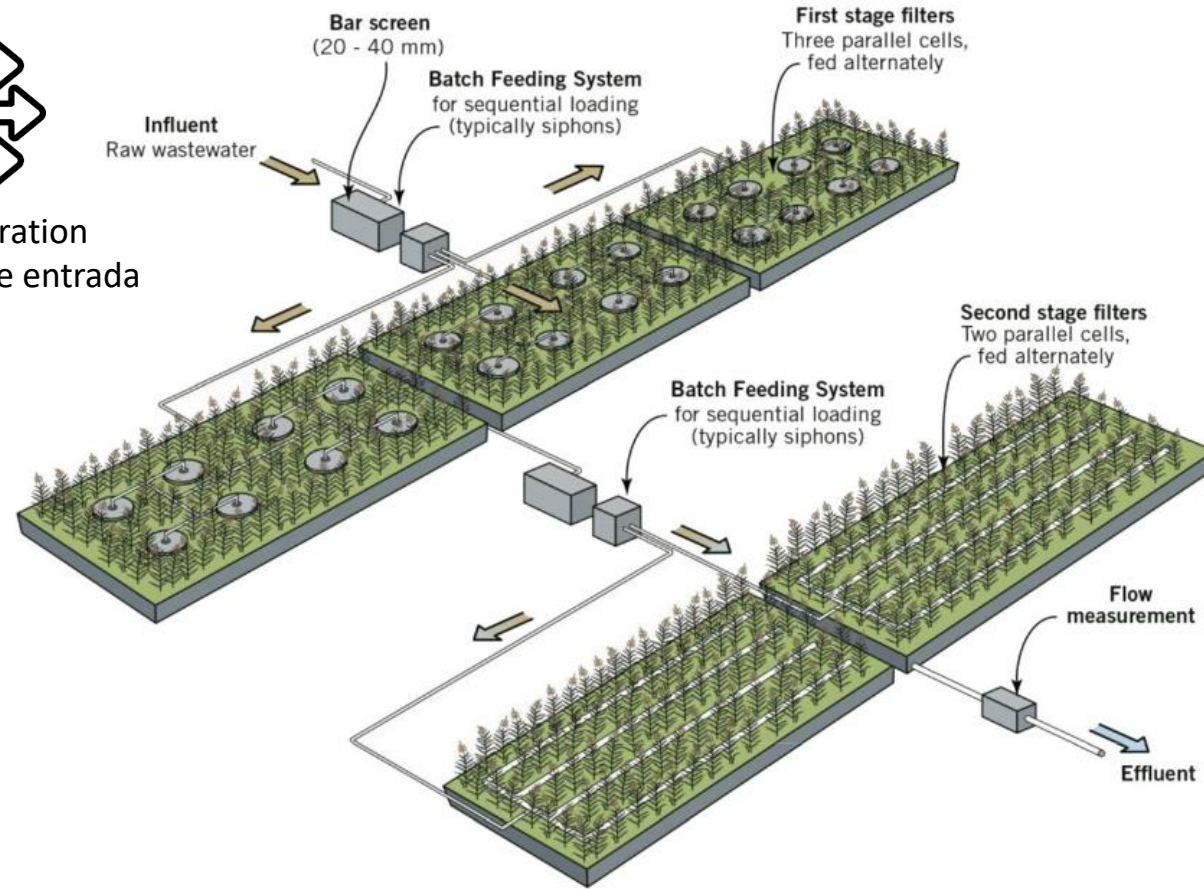
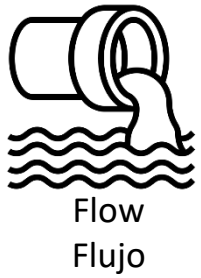
Impact of the context - Impacto del contexto



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Designing a treatment chain – Diseñar una cadena de tratamiento

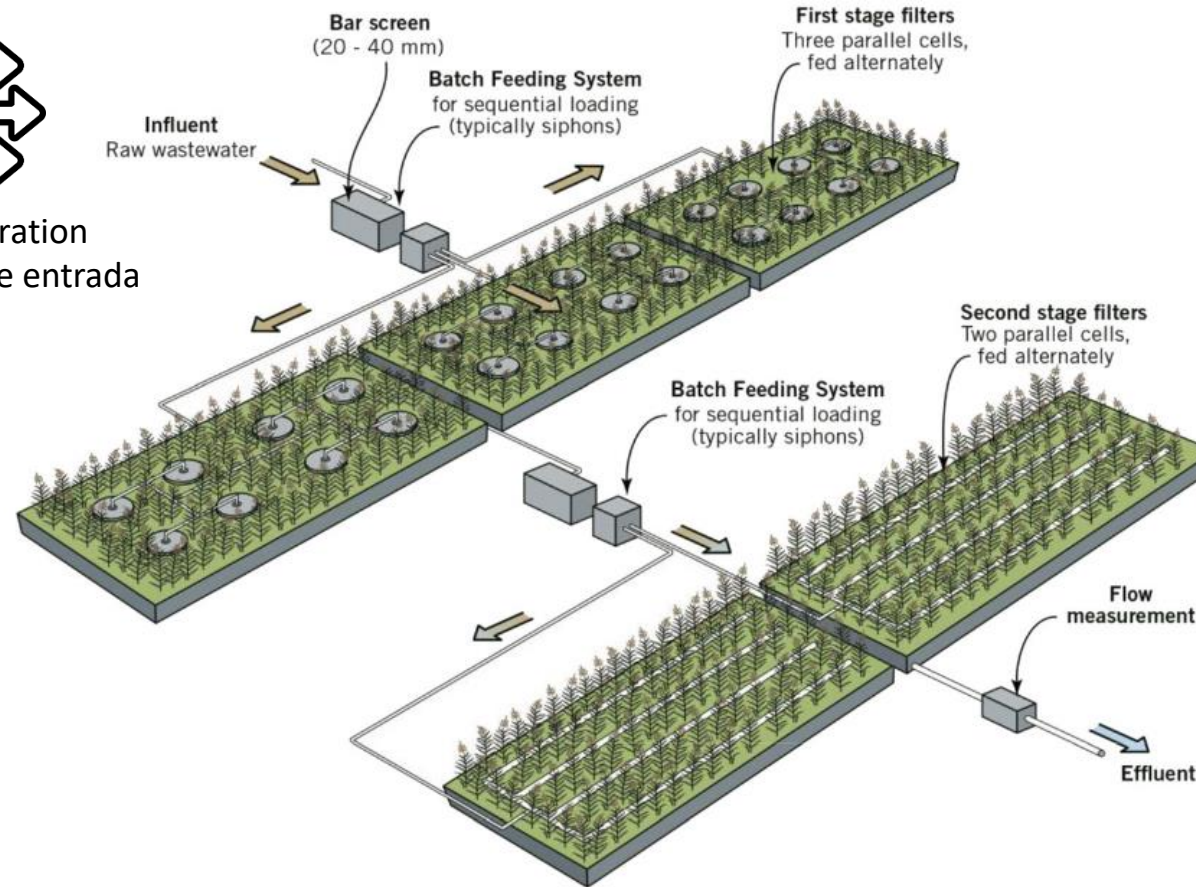
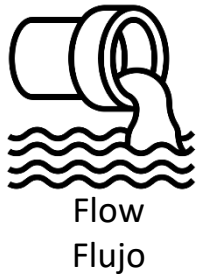
Impact of the context - Impacto del contexto



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Designing a treatment chain – Diseñar una cadena de tratamiento

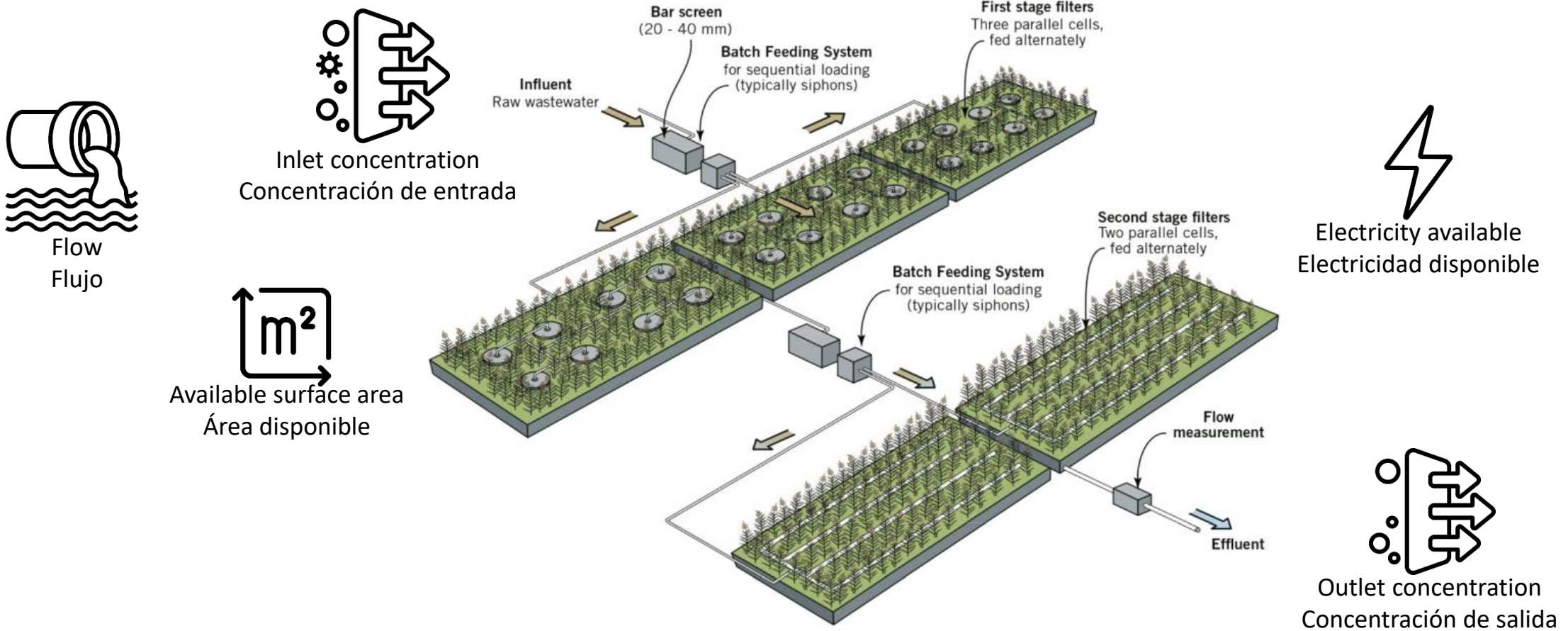
Impact of the context - Impacto del contexto



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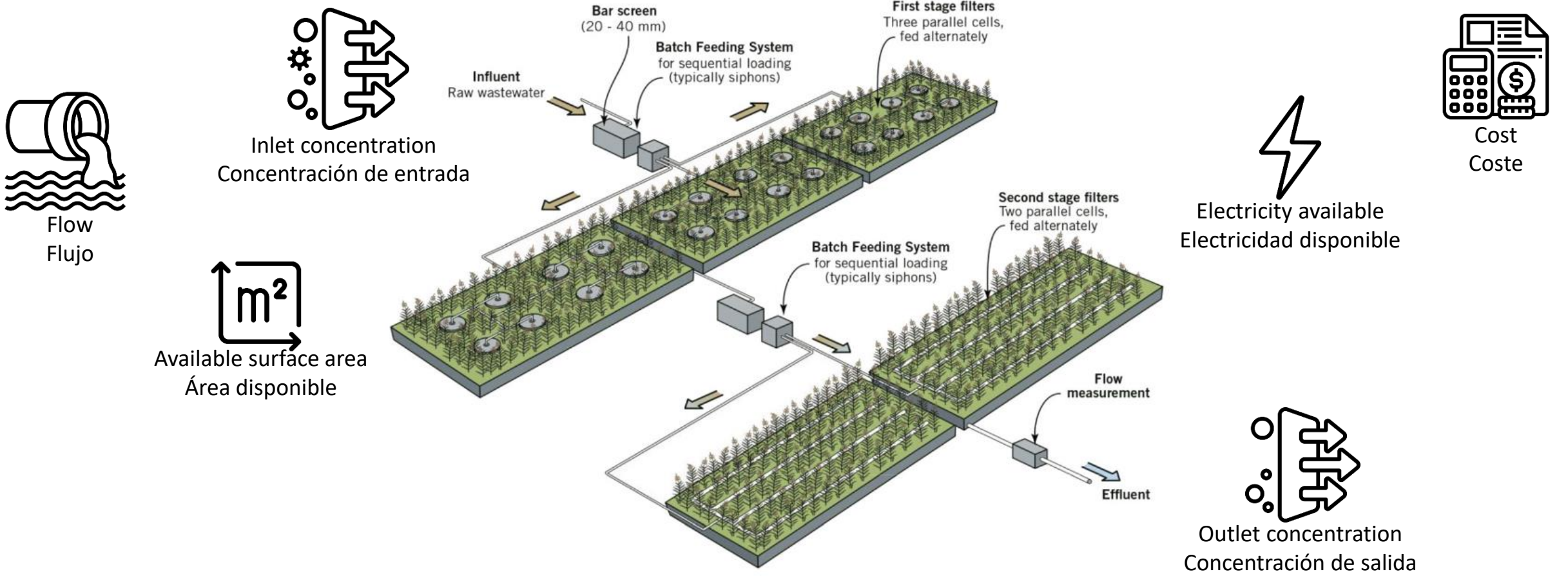


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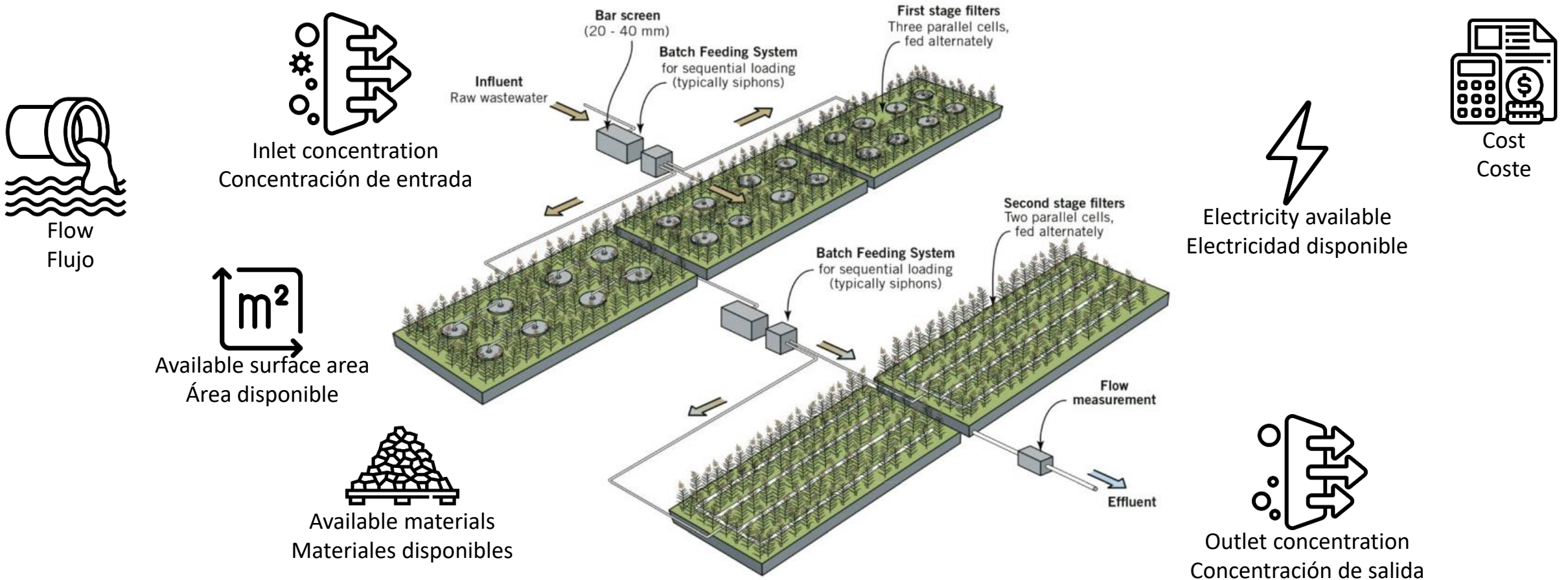
Impact of the context - Impacto del contexto



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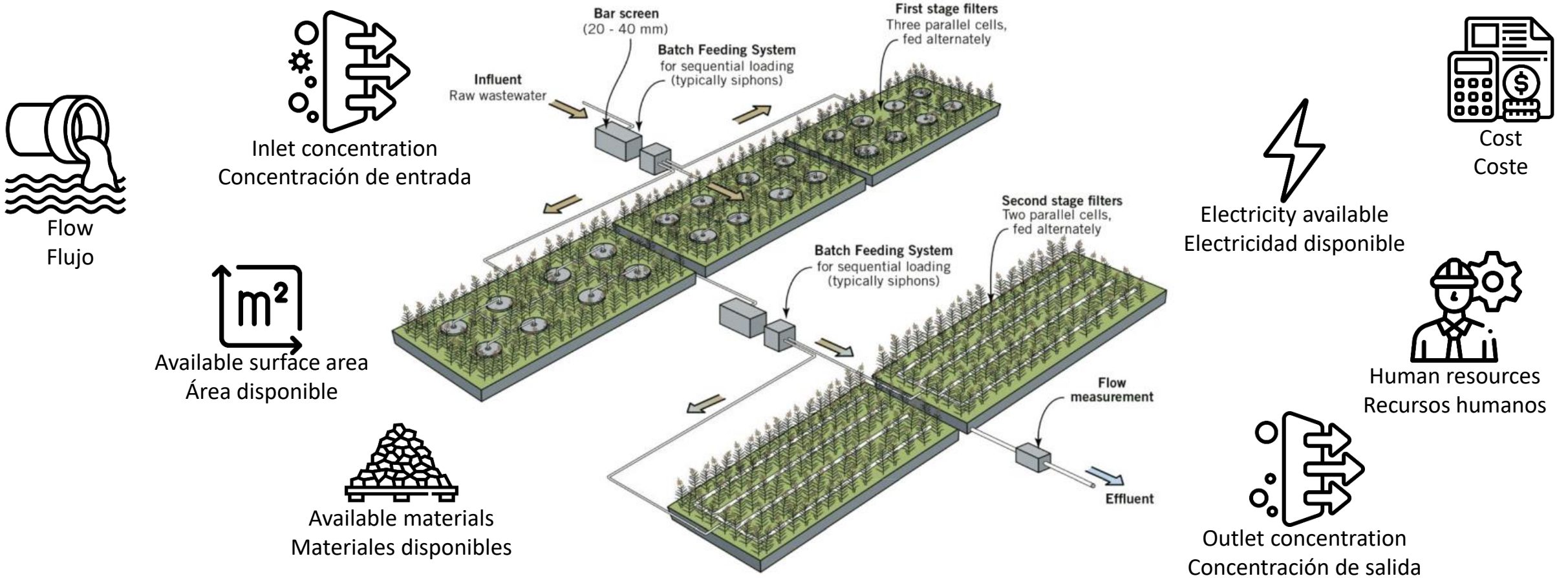


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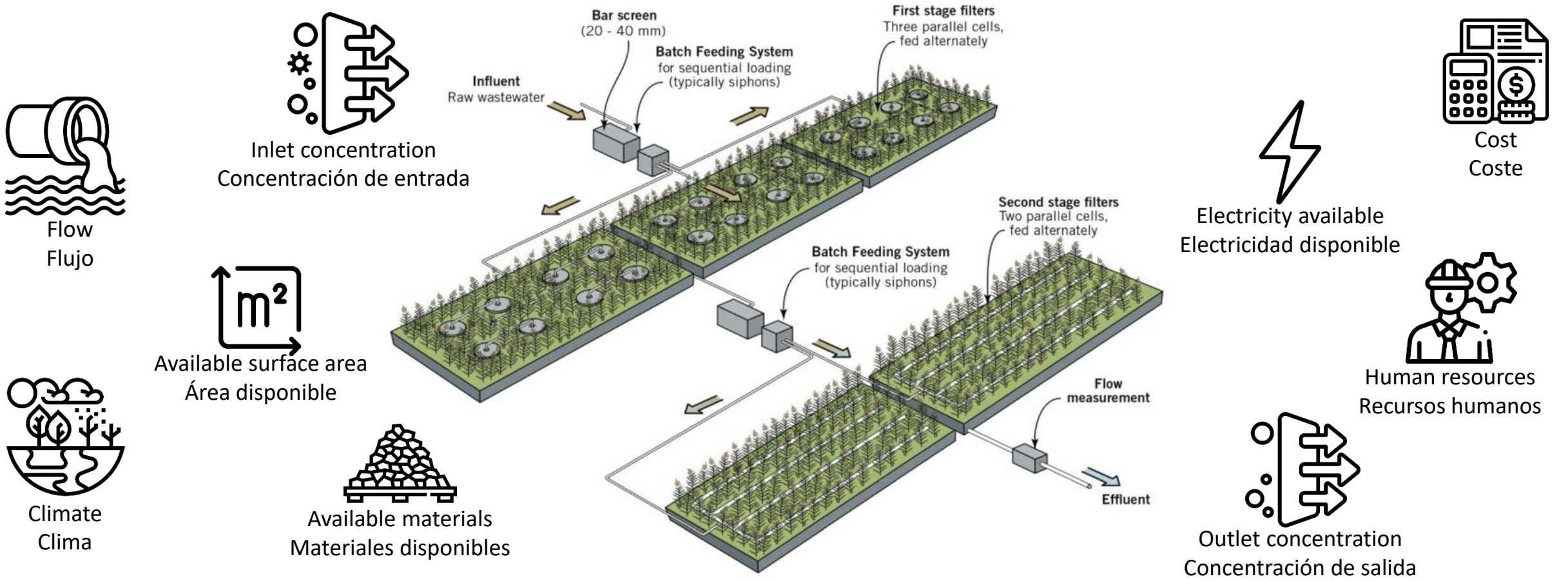


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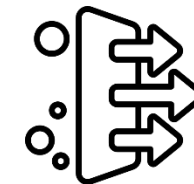
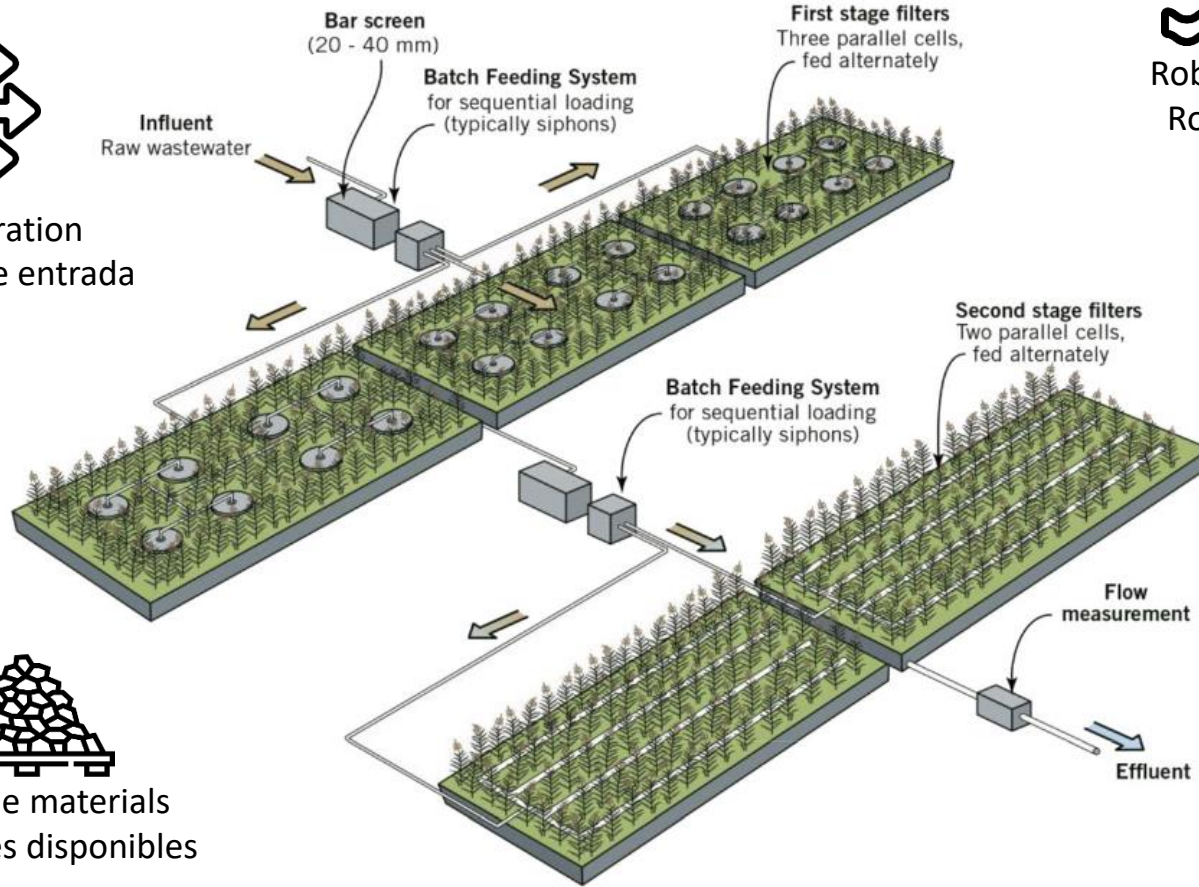
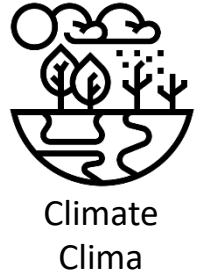
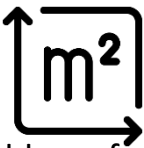
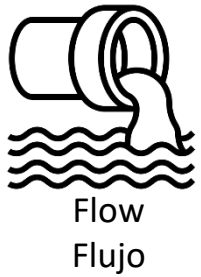
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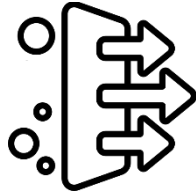
Treatment chain selection – Selección de la cadena de tratamiento

How it works - Funcionamiento

- Calculation of limiting surface areas - Cálculo de las superficies limitadas



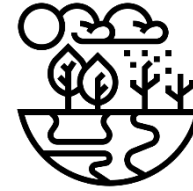
Inlet concentration
Concentración de entrada



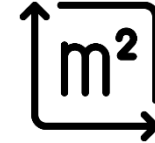
Outlet concentration
Concentración de salida



Flow
Flujo



Climate
Clima



Available surface area
Área disponible

	V30	V50-80	V30 + R	V50-80 + R	VNS/S	VNS/S R	VNS + LB	VNS/S + LB	VNS/S + VNS	VNS/S + VNS R	VNS + H	FS + VNS	FS + H
Niveau de traitement													
MES	80	90	85	92	90	92	92	95	95	95	85	85	70
DBO	80	90	85	92	90	92	92	95	95	95	85	85	70
DCO	75	90	80	92	85	92	92	95	95	95	85	85	70
NTK	60	80	70	85	60	70	90	90	90	92	60	60	20
NT	20	20	25	25	50	70	20	50	50	50	60	20	20
P	20	20	20	20	20	20	20	20	20	20	20	20	20
E.Coli (Log)	1,5	2	1,5	2	1,5	1,5	1,5	1,5	2	2	2	1,5	1,5
Coliformes (Log)	1,5	2	1,5	2	1,5	1,5	1,5	1,5	2	2	2	1,5	1,5

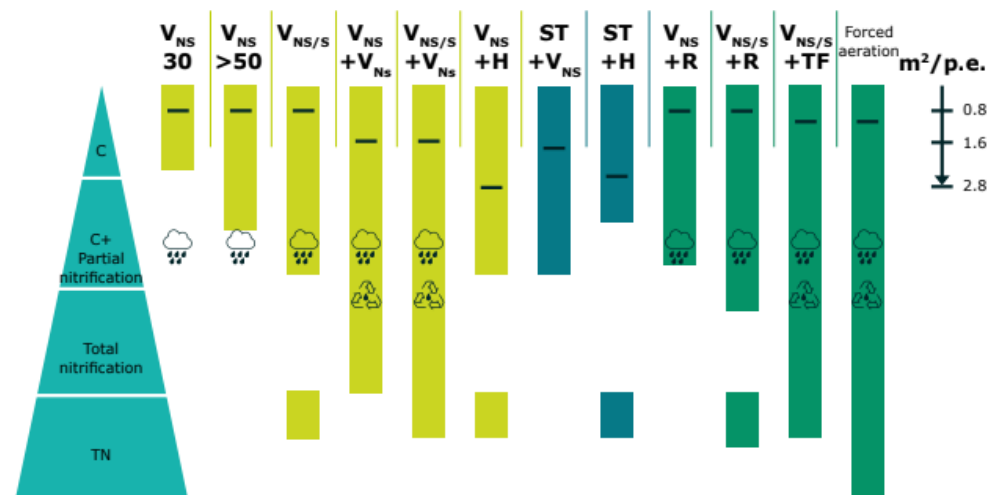
Treatment chain selection - Selección de la cadena de tratamiento






How it works - Funcionamiento

- Elimination on technical criteria - Eliminación por criterios técnicos


 Electricity available
 Electricidad disponible


 Available materials
 Materiales disponibles

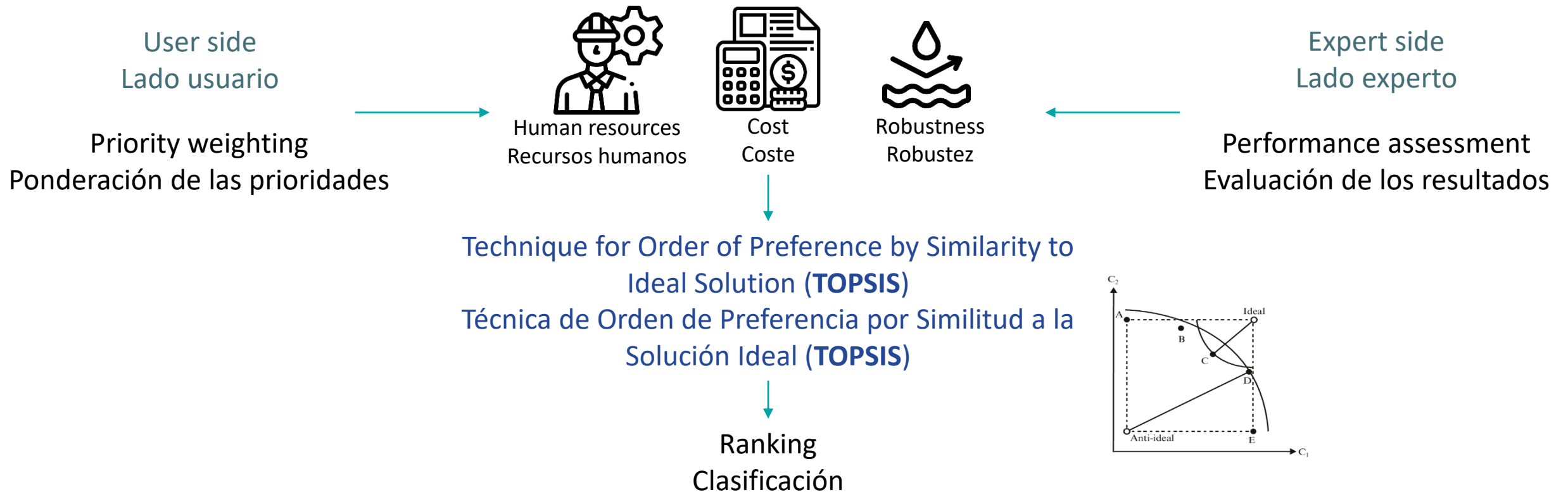


	Can accept storm events	V_{NS}	Vertical no saturated	+R	+ Recirculation
	Reuse treated wastewater	$V_{NS/S}$	Vertical no saturated/saturated	+TF	+ Trickling Filter
	By gravity	H	Horizontal	C	Carbon
	Fecal sludge management	ST	Septic Tank	TN	
	Electricity needs				

Treatment chain selection - Selección de la cadena de tratamiento

How it works - Funcionamiento

- Solution ranking - Clasificación de las soluciones



Treatment chain selection - Selección de la cadena de tratamiento

Example - Ejemplo

User side					Results													
Please fill in blue cells only. By default, objective concentration values correspond to the LBS Protocol.					Ranking													
1. Inlet concentration / Outlet objective:					Treatment chain	VNSf	VNSf (50-80)	VNSf + R	VNSf (50-80) + R	VNS/S	VNS/S R	VNSf + TF	VNS/S + TF	VNS/S + VNS	VNS/S + VNS R	VNSf + H	ST + VNS	ST + H
Inlet concentration	Outlet objective - Manual	Outlet objective (effective)	LBS Protocol		Ranking	1	2	0	0	2	0	0	0	6	0	5	4	0
					Outlet concentration													
TSS (mgTSS/L)	477	120	120		TSS (mgTSS/L)	95,4	47,7	71,55	38,16	47,7	38,16	38,16	23,85	23,85	23,85	71,55	71,55	143,1
BOD5 (mgBOD5/L)	491	120	120		BOD5 (mgBOD5/L)	98,2	49,1	73,65	39,28	49,1	39,28	39,28	24,55	24,55	24,55	73,65	73,65	147,3
COD (mgCOD/L)	698	698	698		COD (mgCOD/L)	174,5	69,8	139,6	55,84	104,7	55,84	55,84	34,9	34,9	34,9	104,7	104,7	209,4
TKN (mgTKN/L)		0	0		TKN (mgTKN/L)	0	0	0	0	0	0	0	0	0	0	0	0	0
TN (mgTN/L)		0	0		TN (mgTN/L)	0	0	0	0	0	0	0	0	0	0	0	0	0
TP (mgTP/L)		0	0		TP (mgTP/L)	0	0	0	0	0	0	0	0	0	0	0	0	0
E.Coli (Log)	720	720	720		E.Coli (Log)	22,77	7,20	22,77	7,20	22,77	22,77	22,77	7,20	7,20	7,20	22,77	22,77	
Coliformes (Log)		0	0		Coliformes (Log)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
					Surface limit													
2. Electricity (reliable) ?	No	Please select yes or no			Minimal surface (m²)	773	773	773	773	773	773	839	806	1024	1024	1835	4635	5794
3. Sand available ?	Yes	Please select yes or no																
4. Daily WW flow (m3/day)	118																	
5. Available aera (m²)	5000																	
6. Rate from 1 to 5 the importance you give to each criteria : (1 = not important / 5 = important)																		
Cost			3															
Robustness			5															
Operation			1															

Wastewater characterization : Black Bay
 Caracterización de las aguas residuales : Black Bay

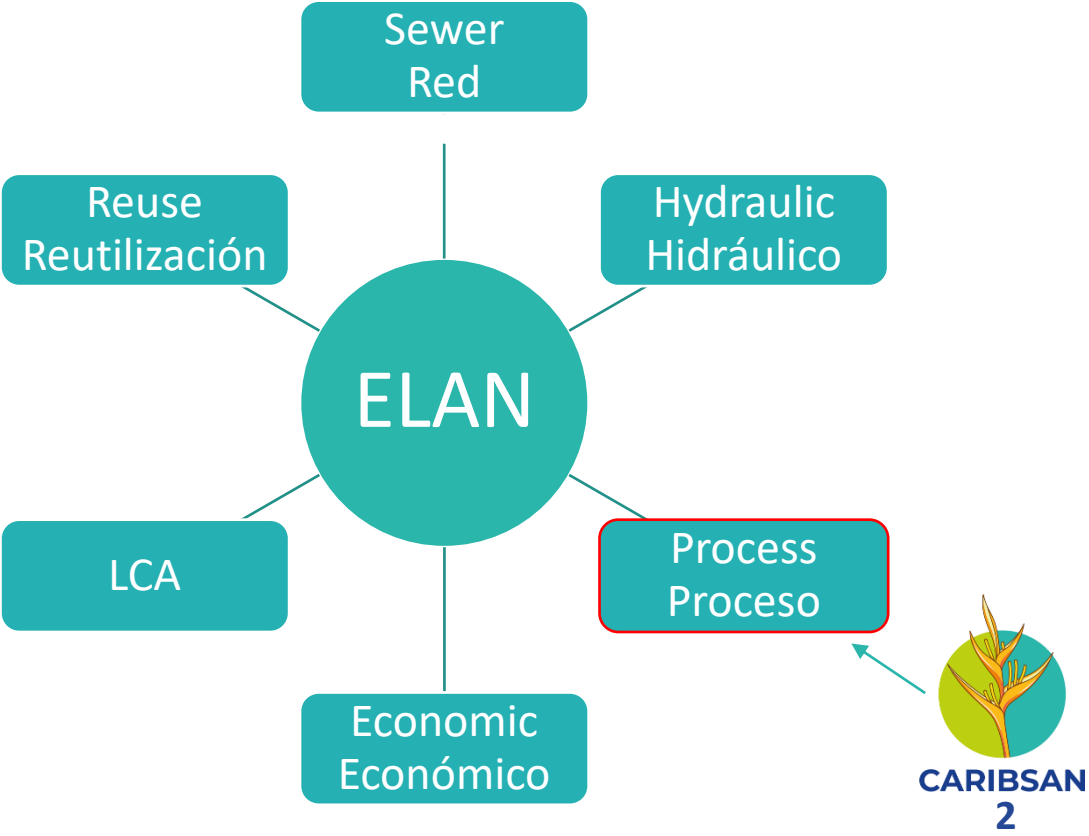


Continuation of the project - Continuación del proyecto : CARIBSAN 2

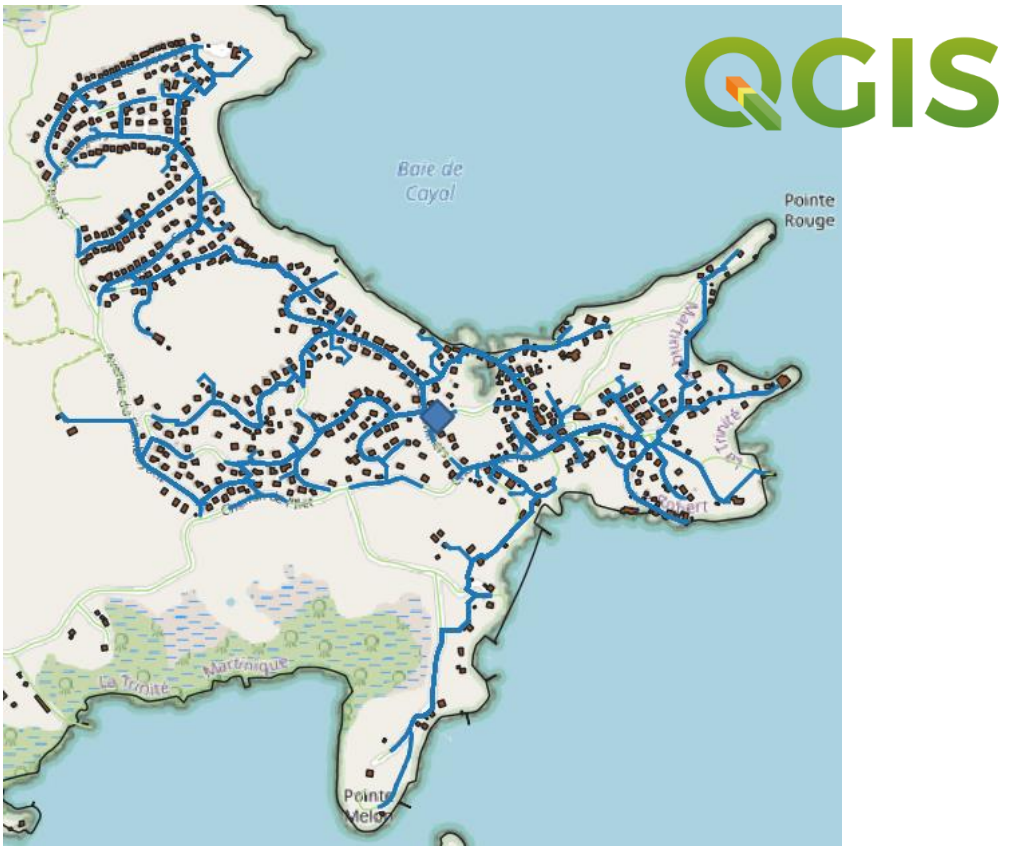
ELAN tool - ELAN herramienta

urban water planning scenarios for sustainable cities

Escenarios de planificación de las Aguas urbanas para ciudades sostenibles



Projet CARIBSAN

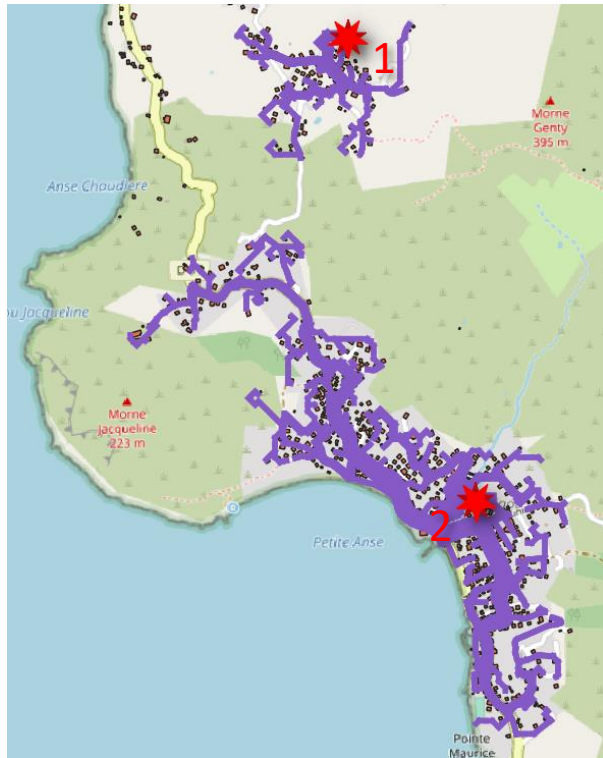


Continuation of the project - Continuación del proyecto : CARIBSAN 2

More advanced pre-sizing - Predimensionamiento más avanzado

Centralized solution – Solución centralizada

Decentralized solution - Solución descentralizada

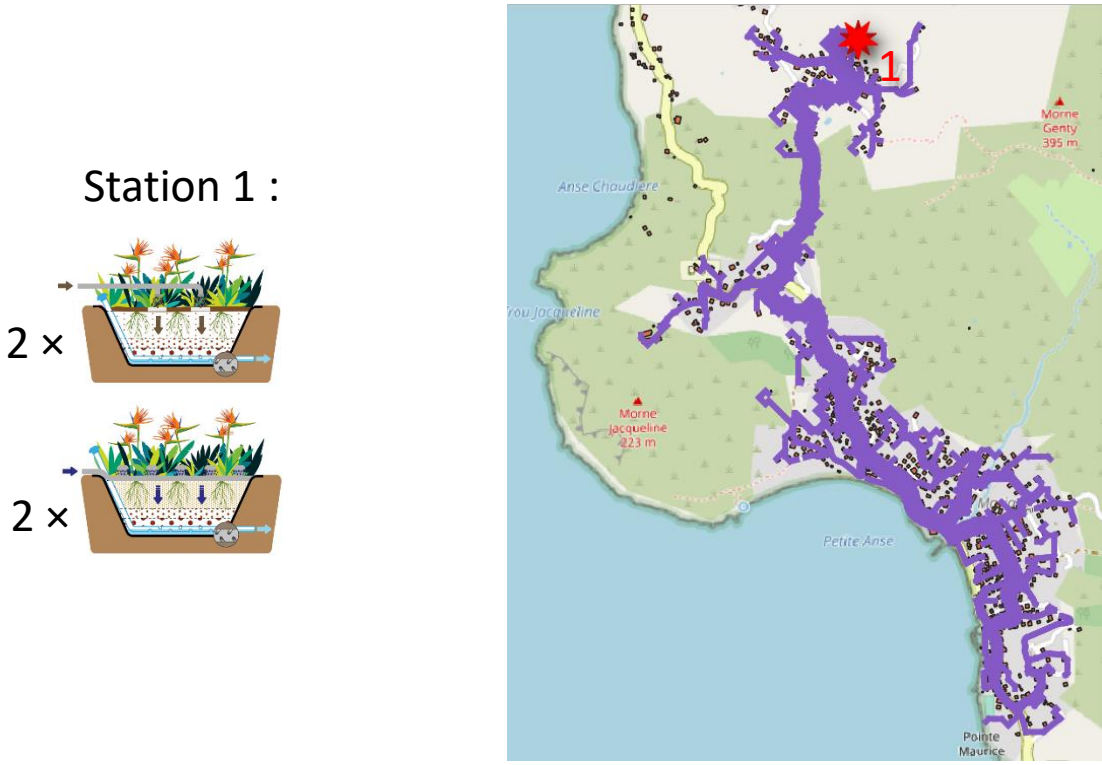


Exemple - Ejemplo

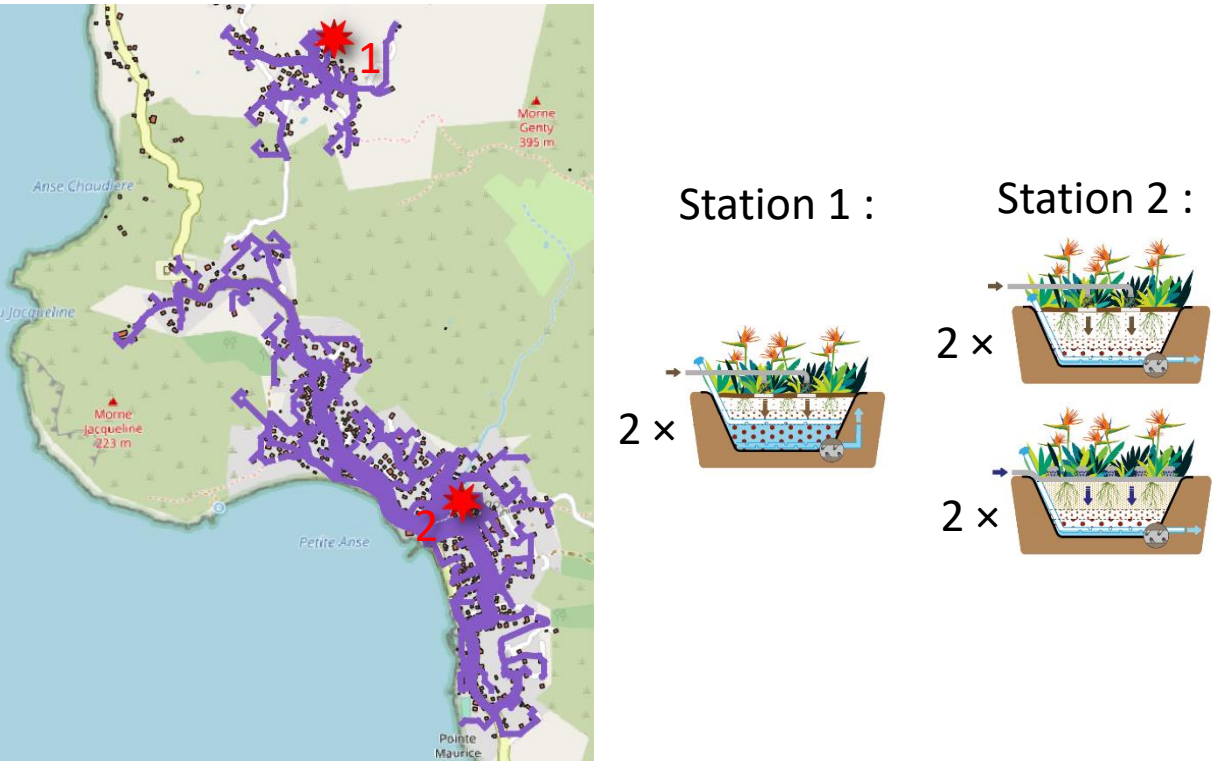
Continuation of the project - Continuación del proyecto : CARIBSAN 2

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Centralized solution – Solución centralizada



Decentralized solution - Solución descentralizada



Exemple - Ejemplo

Continuation of the project - Continuación del proyecto : CARIBSAN 2

More advanced pre-sizing - Predimensionamiento más avanzado

Centralized solution – Solución centralizada



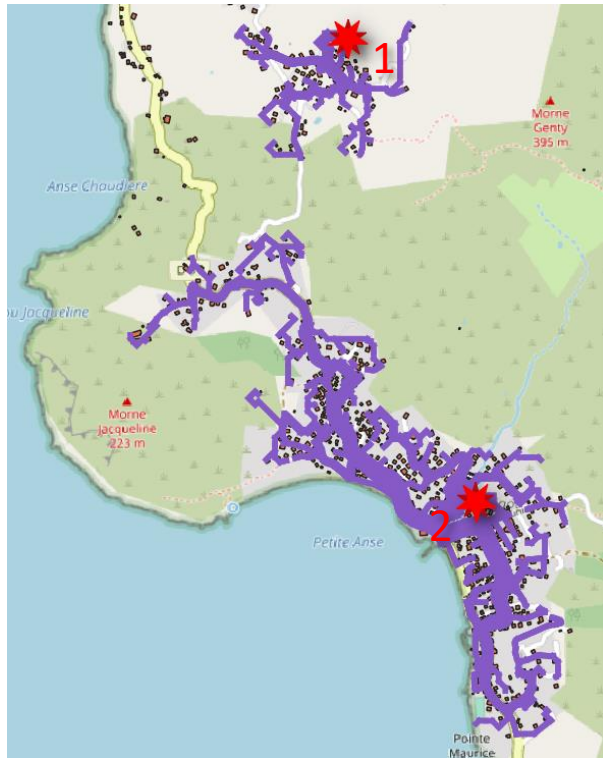
Station 1 : 150 m³/day



Decentralized solution - Solución descentralizada



Station 1 : 50 m³/day
Station 2 : 100 m³/day



Exemple - Ejemplo

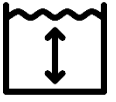
Continuation of the project - Continuación del proyecto : CARIBSAN 2

More advanced pre-sizing - Predimensionamiento más avanzado

Centralized solution – Solución centralizada



Station 1 : 150 m³/day



Sizing the depth
Dimensionar de la profundidad



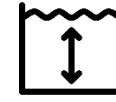
Sizing the surface area
Dimensionar de la superficie



Decentralized solution - Solución descentralizada



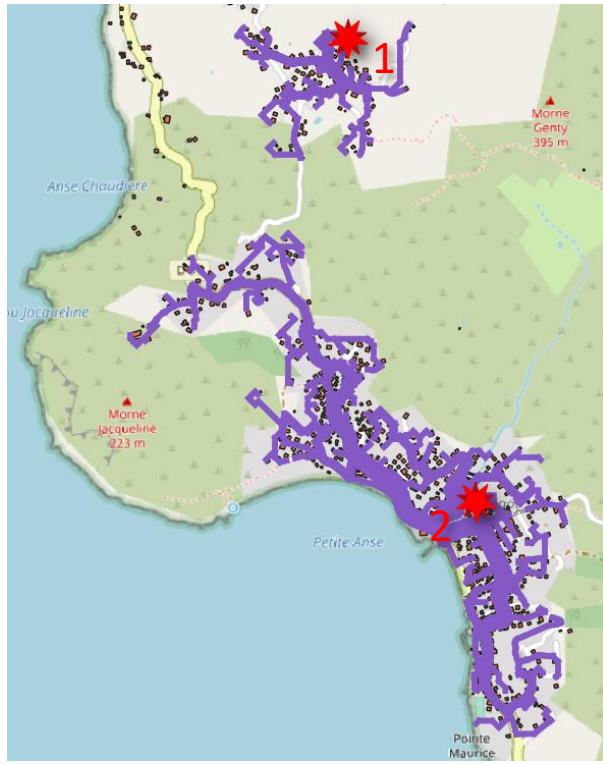
Station 1 : 50 m³/day
Station 2 : 100 m³/day



Depth sizing × 2
Dimensionar de la profundidad × 2



Sizing the surface area × 2
Dimensionar de la superficie × 2



Exemple - Ejemplo

Continuation of the project - Continuación del proyecto : CARIBSAN 2

More advanced pre-sizing - Predimensionamiento más avanzado

Centralized solution – Solución centralizada

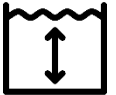
Decentralized solution - Solución descentralizada



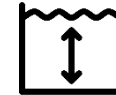
Station 1 : 150 m³/day



Station 1 : 50 m³/day
Station 2 : 100 m³/day



Sizing the depth
Dimensionar de la profundidad



Depth sizing × 2
Dimensionar de la profundidad × 2



Sizing the surface area
Dimensionar de la superficie



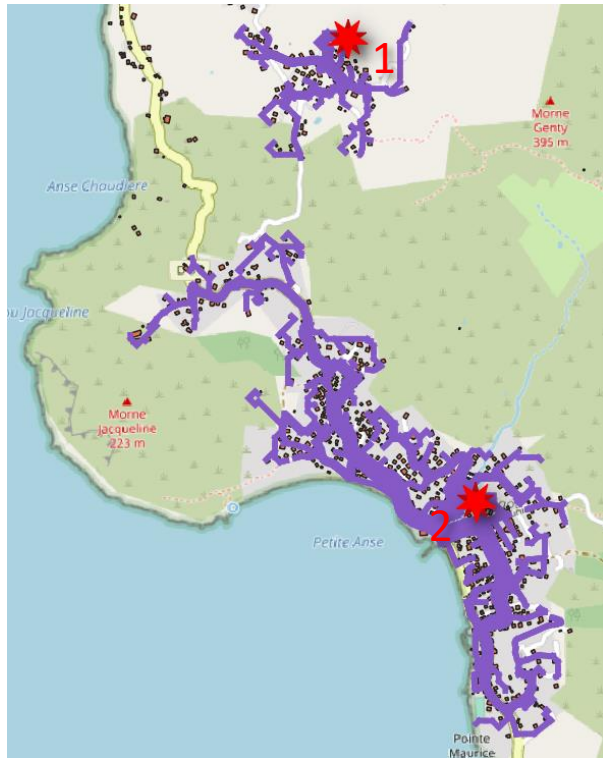
Sizing the surface area × 2
Dimensionar de la superficie × 2



Sewer : 800 000 \$
Stations : 300 000 \$



Sewer : 500 000 \$
Stations : 400 000 \$



Exemple - Ejemplo

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Vision stratégique et site pilote à Cuba

Strategic overview and pilot site a Cuba

Visión estratégica y sitio piloto de Cuba

INRH



INRAE



Visión estratégica

“Asimilación de la tecnología de Filtros Plantados como sistemas de tratamiento en Cuba.”

En el caso del tratamiento de aguas residuales, la visión estratégica implica una comprensión profunda de los desafíos y oportunidades en este campo, así como una comprensión clara de los objetivos a largo plazo que se desean alcanzar.

Esto puede incluir la implementación de tecnologías innovadoras y sostenibles para el tratamiento de aguas residuales, la mejora de la eficiencia en el uso de recursos y la reducción de costos, así como la promoción de prácticas responsables y éticas en la gestión de residuos.

Una visión estratégica sólida también implica estar al tanto de las regulaciones y políticas gubernamentales relacionadas con el tratamiento de aguas residuales, y trabajar en colaboración con otros actores clave en el sector para lograr objetivos comunes.

En resumen, una visión estratégica sólida es esencial para el éxito a largo plazo en el tratamiento de aguas residuales, permitiendo una planificación efectiva y una adaptación a los cambios en el entorno empresarial y regulatorio.

Objetivo Estratégico

Promover técnicas innovadoras de tratamientos de aguas residuales basada en la naturaleza para la mejora de los indicadores de gestión de saneamiento de forma segura.

Objetivos Específicos

1. Estudiar la tecnología de filtros plantados para su implementación como sistema de tratamiento de aguas residuales en Cuba

- 1.1 Capacitación del personal técnico para introducción de la tecnología a implementar.
- 1.2 Demostrar la factibilidad de la implementación de los filtros plantados.
- 1.3 Definición de las áreas de estudio.
- 1.4 Capacitación del personal técnico para proyección de la tecnología a implementar.
- 1.5 Realización de estudios preliminares y proyecto de aplicación de los filtros plantados en las áreas de estudio.
- 1.7 Generalización y divulgación de resultados obtenidos.

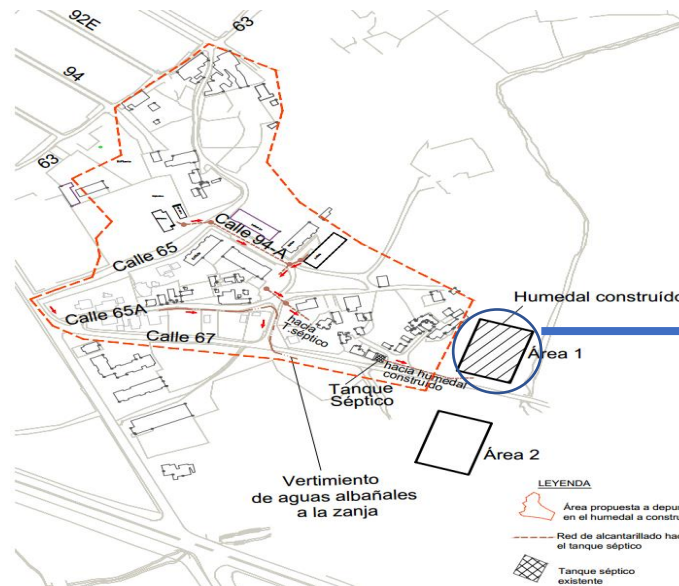
Presentación del sitio de Pogolotti

Zona del Gran Parque Metropolitano



Principales criterios utilizados para la selección del área de estudio:

- Ubicación estratégica para la disposición final.
- No existencia de órganos de tratamientos.
- Estado de redes de alcantarillado en el área de estudio.
- Impacto social.



Presentación del sitio de Pogolotti

Estudios Realizados

Ingeniero geológicos



Topografía



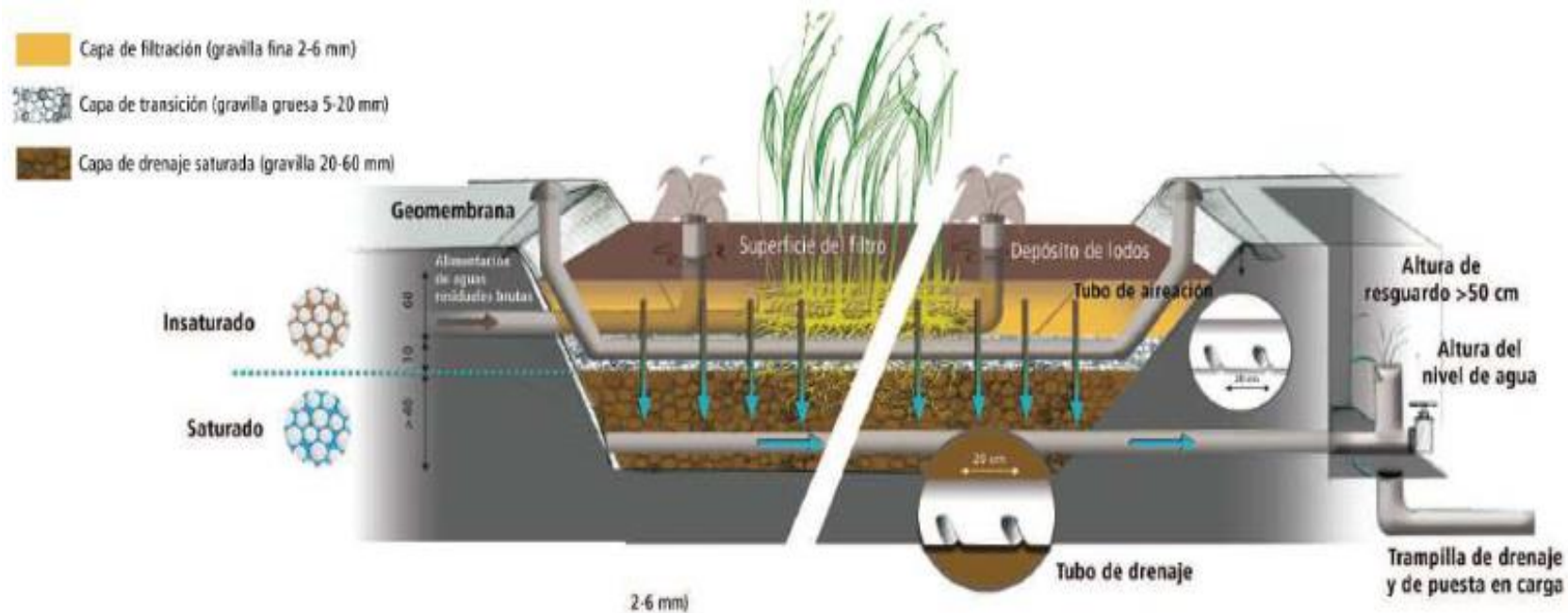
Hidroquimicos



Presentación del sitio de Pogolotti

Después de realizar los estudios, la caracterización de las redes existentes y la comparación con estudios anteriores, determinamos que la configuración del humedal a construir en Pogolotti:

Humedal Artificial Vertical (Saturado / No Saturado)



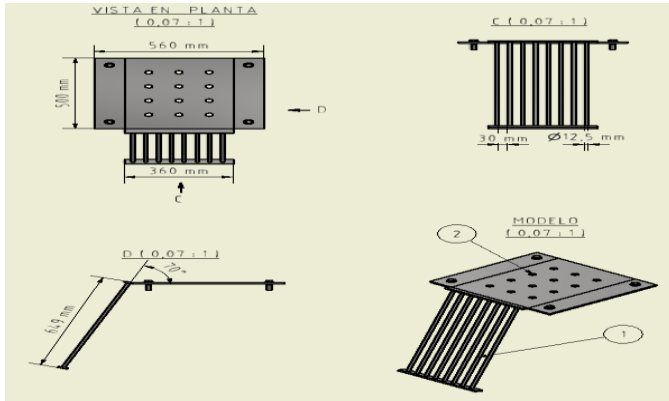
Presentación del sitio de Pogolotti

Flujo Tecnológico



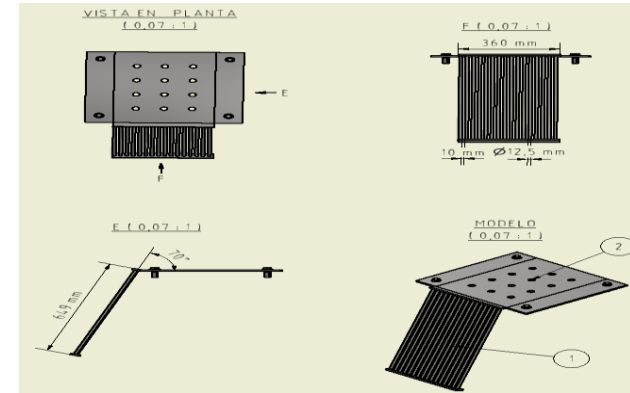
Pretratamiento

Desbaste de Gruesos



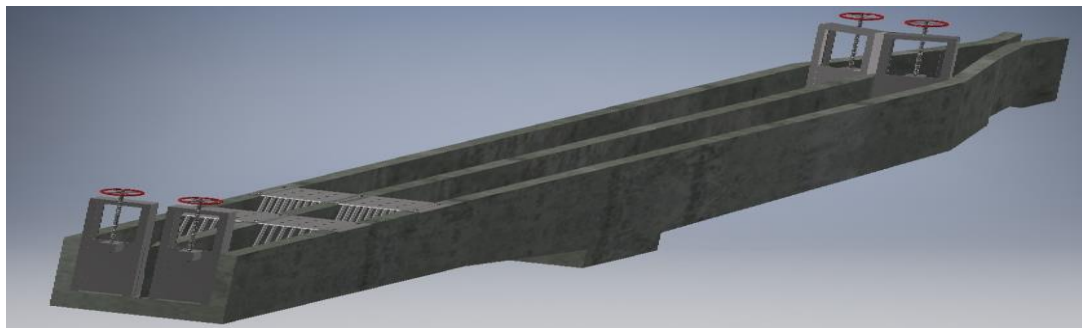
Ancho de la reja	350mm
Largo de la reja	693m
Inclinación con la vertical	60°
Espaciamento	30mm
Diámetro de barra	12,5mm
Número de barras	8u
Número de espacios	9u
Ubicación de la reja	2m

Desbaste de Finos



Ancho de la reja	350mm
Largo de la reja	693m
Inclinación con la vertical	60°
Espaciamento	10mm
Diámetro de barra	12,5mm
Número de barras	15u
Número de espacios	16u
Ubicación de la reja	1m

Diseño de Desarenador

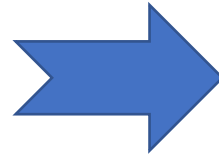


Número de canales desarenadores	2
Altura del agua en el canal	0,2m
L del canal a partir de carga de sedimentación y ancho	5m
Ancho del canal	0,35m
Carga hidráulica de sedimentación real	24m ³ /m ² /h
Velocidad en la cámara para Qmedio	0,1m/s
Velocidad en la cámara para Qmax	0,2m/s

Sistema de Tratamiento Principal

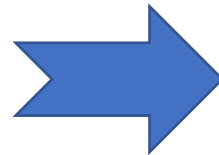
Metodologías de Diseño Humedal Artificial Subsuperficial Vertical

- Metodología basada en la regla general o área específica requerida por población equivalente según (Lombard Latune R & Molle P, 2017)



1200m² (Dos celdas de 600m² cada una)

- Metodología de Cargas Aplicadas



1120m² (Dos celdas de 560m² cada una, dictadas por el NtK)

El estudio topográfico determinó una disponibilidad en el área para la construcción del humedal de 2200m².

Los resultados del diseño fueron comprobados mediante la carga hidráulica.

Diseño de Tanque de Alimentación

1 Selección de Capa Líquida

2 $V_{lote} = A_{celda} * CapaLíquida$

3 $N_{cargas} = \frac{Q_{med}}{V_{lote}}$

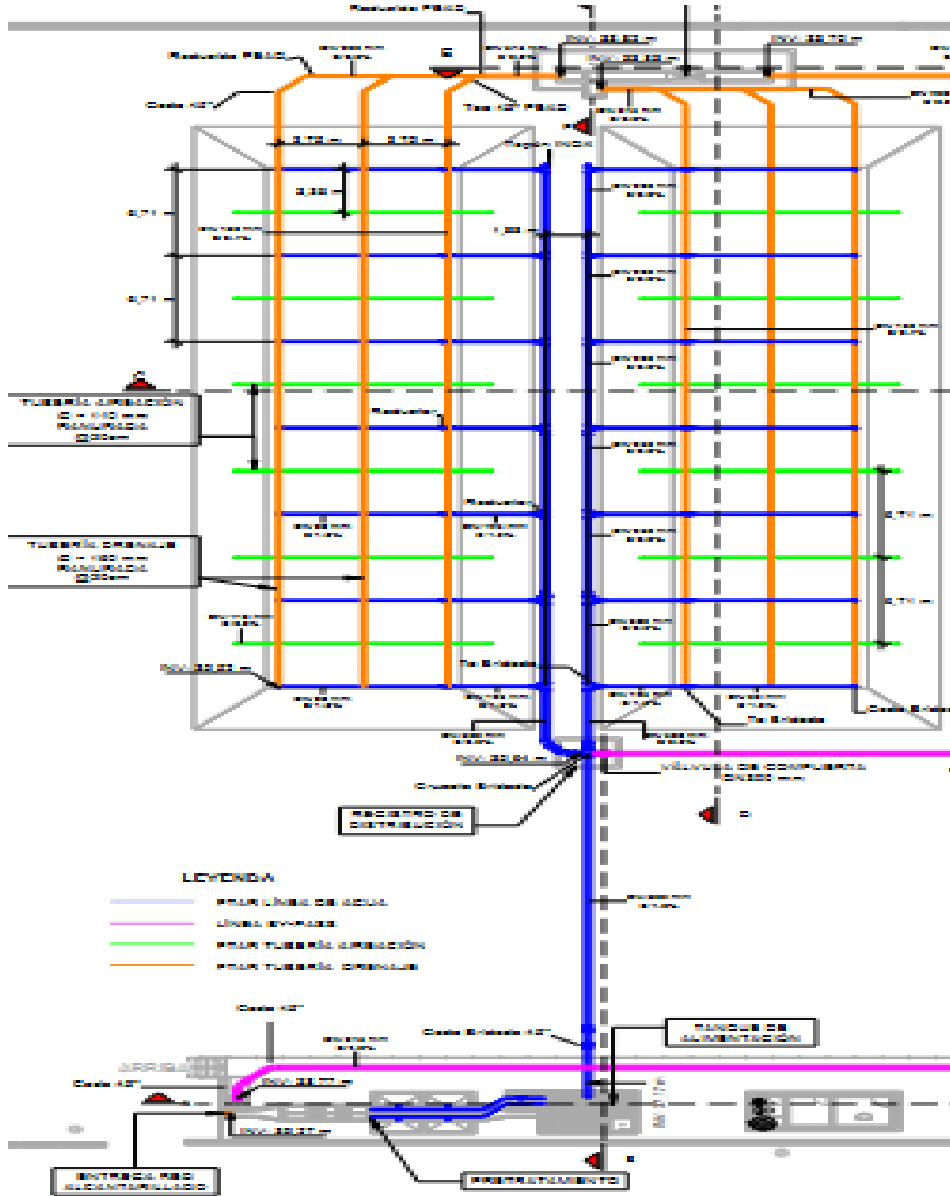
4 $Flujo por Lotes = \frac{A_{celda}}{0,6m^3/(m^2 * h)}$

5 $t_{pusaciones} = \frac{V_{lote}}{Flujo por Lotes}$

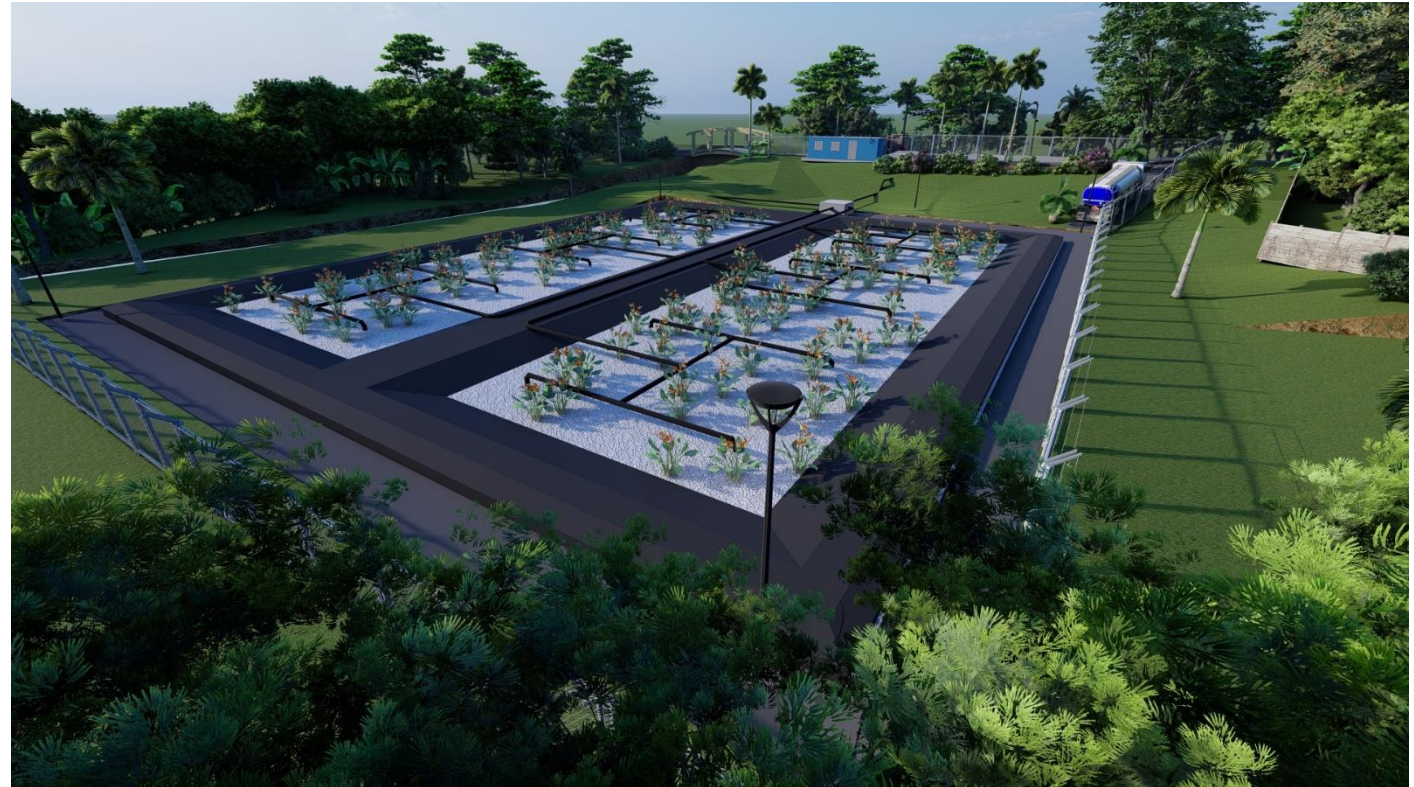
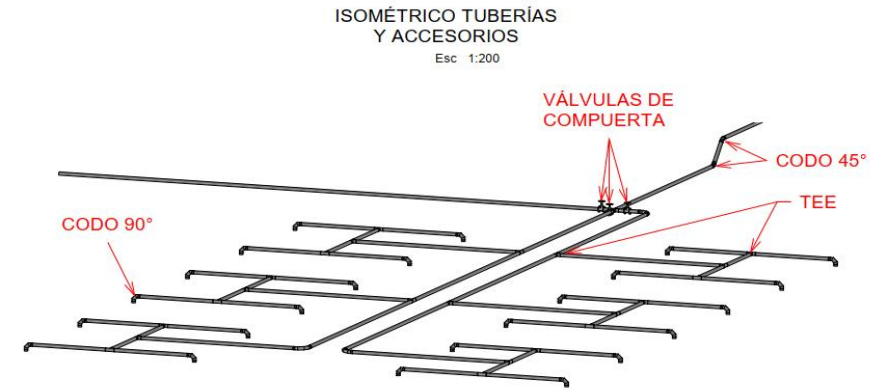
	Clasificación de las aguas residuales (Allende 2000)	Resultados de estudios Hidroquímicos
	Media	
Selección de capa líquida	2 cm	2 cm
V_{lote}	15 m ³ /lote	8.96 m ³ /lote
N_{cargas}	22.4 cargas por día	37.5 cargas por día
Flujo por lotes	450 m ³ /h	268,8 m ³ /h
$t_{pulsación}$	2 min	2 min
Determinada por	NTK	Carga Hidráulica

Observación: El tanque de alimentación puede poseer teóricamente para el dimensionamiento el volumen de un lote o superior a este

Diseño de sistema de distribución



Para optimizar la repartición de los efluentes en la superficie del filtro alimentado, el número de puntos de alimentación es 1 cada 50 m² de filtro.



Posible vegetación a emplear

Familia Heliconiaceae



Heliconia caribaea Lam.

Nativa

Heliconia stricta Huber

Cultivada en Pinar del Río

Familia Costaceae



(*) *Costus spiralis* (Jacq.) Roscoe

No indígena pero
posiblemente naturalizado



Cheilocostus speciosus

(J. Koenig) C. Specht

Naturalizada

Familia Cannaceae



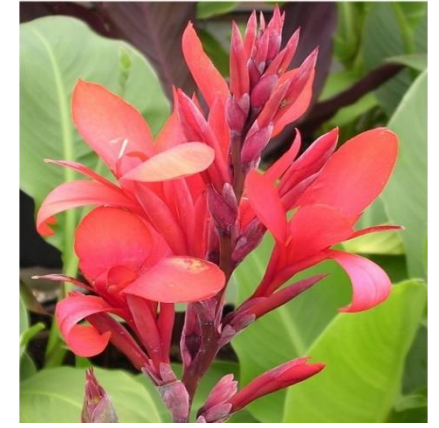
(*) *Canna indica* L.

Presente pero dudosamente indígena



Canna glauca L.

Presente pero dudosamente indígena



Canna coccinea Mill.

Presente pero dudosamente indígena

Familia Cyperaceae



(*) *Cyperus articulatus* L.

Nativa



(*) *Cyperus papyrus* L.

No indígena pero
posiblemente naturalizado

Familia Strelitziaceae

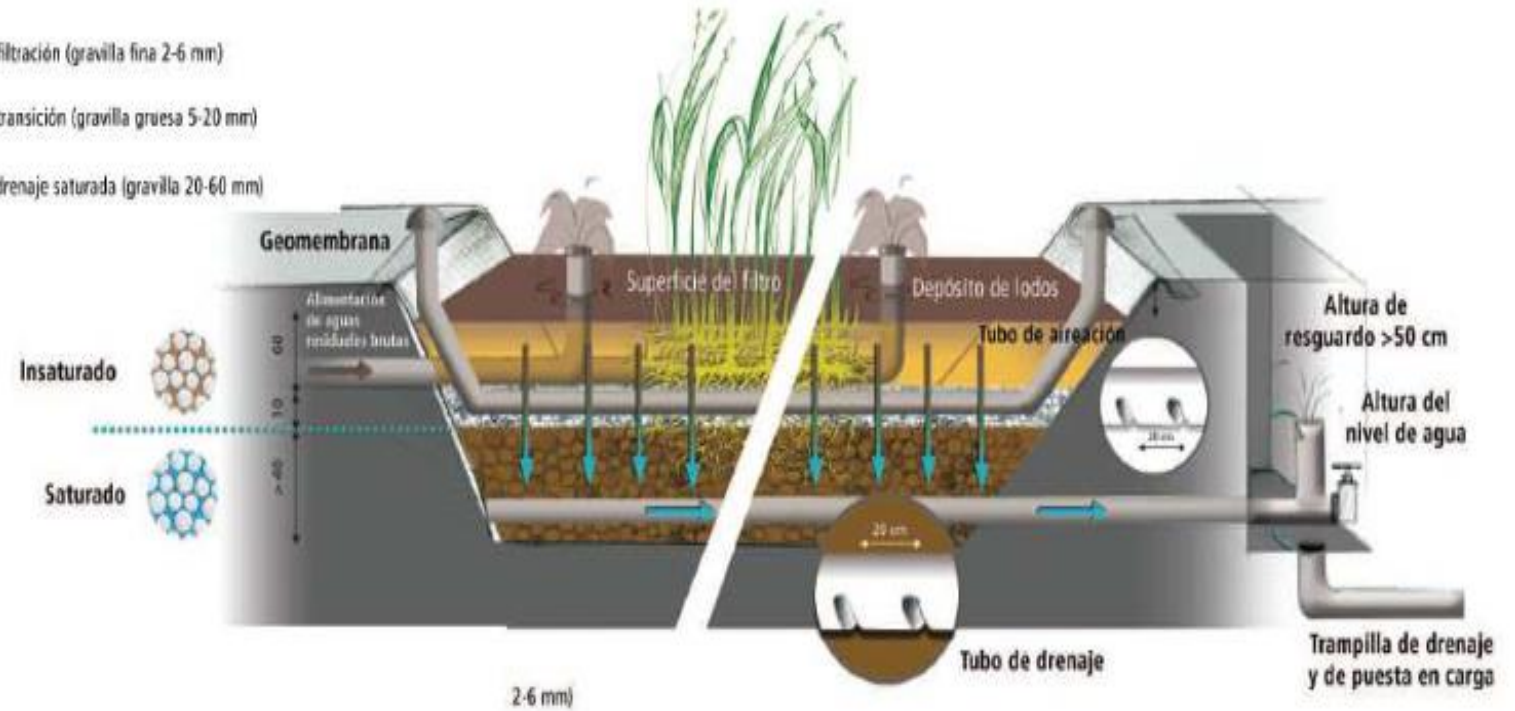


Strelitzia nicolai Regel & K.Koch

Cultivada

Medio de Soporte Locales a Emplear.

- Capa de filtración (gravilla fina 2-6 mm)
- Capa de transición (gravilla gruesa 5-20 mm)
- Capa de drenaje saturada (gravilla 20-60 mm)



60 cm grava de 20 – 60 mm de espesor



Capa de Drenaje saturada

10 cm grava de 5 – 20 mm de espesor



Zona de transición

50 cm grava de 2 – 6 mm de espesor



Capa de filtración no saturada



Actualidad



Perspectiva



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Vision stratégique et sites pilotes en Dominique

Strategic overview and pilot sites in Dominica

Visión estratégica y sitios piloto de Dominica

Bernard Ettinoffe

Dominica Water and Sewerage Company Limited



INRAE



Strategic overview: Vision & Status report

Vision:

- To promote the use of Constructed Wetland Technology (CW)/planted filters as a viable wastewater treatment technique in new pilot territories (Dominica, St Lucia and Cuba.) which will enable nationally holistic improvement in wastewater treatment.
- To use CARIBSAN to assist towards achievement of Sustainable Development Goals Target 6.3, which aims to **“halve the percentage of untreated waste water”** disposed in the environment.
- To protect the environment and inhabitants by promoting the treatment of wastewater using Nature Based Solutions (CW).
- To strengthen the capacity of staff to design and maintain wastewater collection and treatment systems, especially those involving planted filters.

Status Report

-Wastewater evaluation of two pilot sites (La Plaine ~135 residents and Cotton Hill~ 300 residents) completed;

Test kit for water analysis received; Automatic samplers received.

-Preliminary studies received from CORISAV Sept 30th and shared with project designers.

-Final designs are now nearing completion. Site layouts under review.

-ESIAs to be done for both sites; Surplus CARIBSAN funds can only cover La Plaine; 4 consultants invited to quote. 2 quotes received; final selection pending.

Presentation of La Plaine site:

La Plaine Pilot Wetland is to be constructed under CARIBSAN Phase 2.

- Existing wastewater treatment plant does not function properly resulting in unbearable odours and risk to residents and road users from waterborne pathogens; demonstrated failure of on-site disposal (septic tank).
- The general aim of the project is to promote innovative, nature-based wastewater treatment techniques that enhance the local natural heritage.

Specific objectives include:

- Raising awareness and training of local stakeholders around the environmental and human issues concerning sanitation using shared tools and resources.
- Development of a multi-criteria method to guide decision-makers in defining sanitation projects employing CWs.
- Improvement of the constructed wetlands (CW) technology and deployment more widely through technical collaboration between partners, knowledge sharing, feedback on experiences, and dissemination of results.

Wastewater Characterization at La Plaine Apartments & PR:

DOWASCO undertook a monitoring campaign in order to analyse the wastewater to allow for case-specific sizing of the wetland elements.

Numerous samples were collected and transported to Martinique for testing.

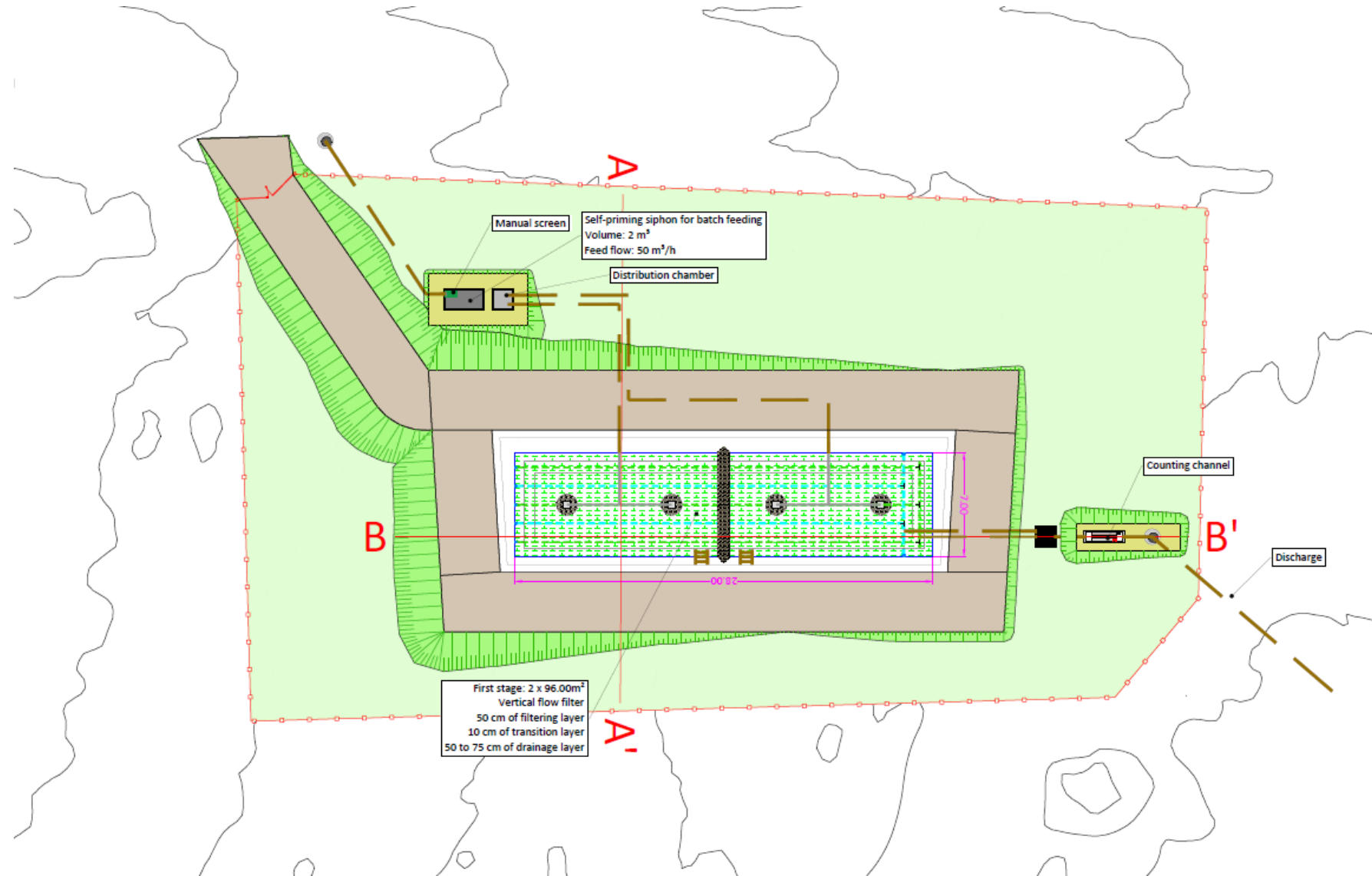
Listing and specifications for laboratory equipment have been provided for procurement which will upgrade DOWASCO's testing capability; some of which have been delivered.

DOWASCO has worked alongside the CARIBSAN Communications personnel to provide sensitization on the project, through social media posts, radio programmes, and Water Week features.

A communications expert engaged by CARIBSAN (Stephanie Saxemard) visited the La Plaine Apartments in April 2023 with DOWASCO's PRO to prepare a video documenting the sampling.



Design of the wetland for La Plaine:



Location of Proposed La Plaine Constructed Wetlands:



Digging Test Pits at Cotton Hill Site:

Geotechnical, soil, and hydrogeological data has been compiled by CORISAV (for both sites.) and analysis of wastewater quality was performed by DOWASCO for limited Cotton Hill samples.

The proposed site at Cotton Hill is Government owned and does not face challenges of land acquisition.



Location of Proposed Cotton Hill Constructed Wetlands:



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Vision stratégique et site pilote à Sainte Lucie

Strategic overview and pilot sites in Saint Lucia

Visión estratégica y sitios piloto de Santa Lucia

Water & Sewerage Company Inc.



INRAE



UNION EUROPÉENNE



Strategic overview

The Water & Sewerage Company – WASCO Saint Lucia

- committed to providing quality and excellence in water and wastewater services
- continues to pursue various technologies for effective wastewater management
- focuses on the installation of systems that ensures
 - the effluent is safe and in conformity with national/regulatory standards
 - environmental sustainability

WASCO in partnership with CARIBSAN aims to address and improve the inadequate method of wastewater treatment at Black Bay to improve the quality of the effluent discharged into the river

Description of Site

CARIBSAN PILOT SITE - Black Bay, Vieux Fort

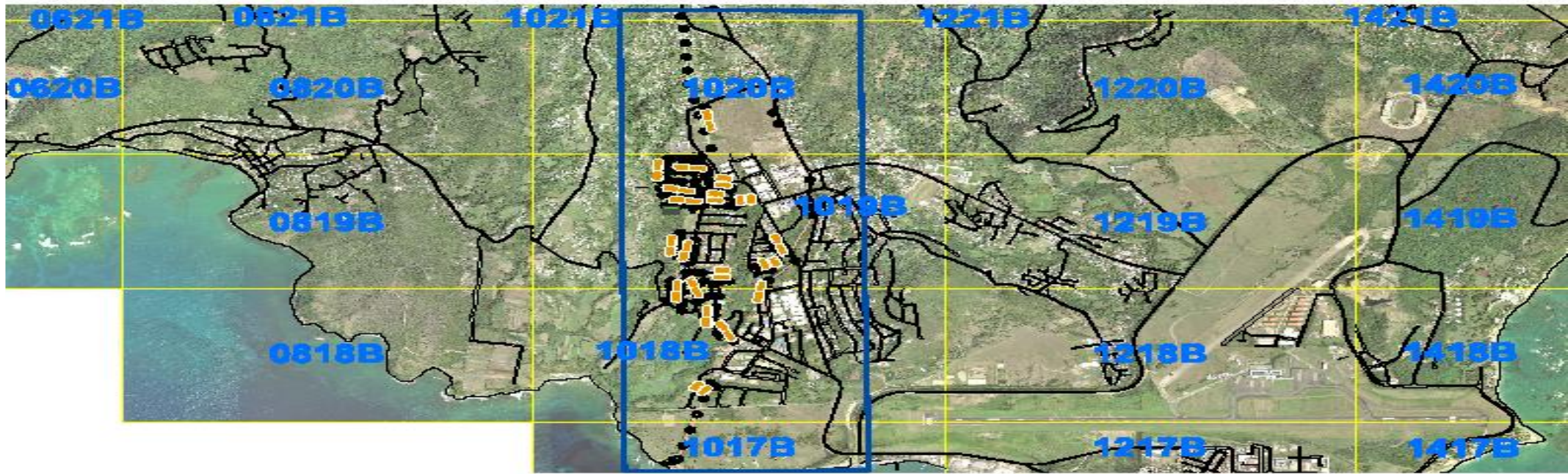


CARIBSAN – Saint Lucia

Black Bay Vieux- Fort - Pilot Site

- Population - Approximately 600
- Wastewater System - Untreated wastewater collected through a dual septic tank system
- Disposal – effluent discharges directly into the Black Bay River

Black Bay Wastewater Network



Black Bay Site Layout



Black Bay Pilot Site



Existing Treatment Plant



Black Bay - Series of 2 septic tanks

Black Bay Pilot Site



Black Bay - Access



Outlet



Downstream discharge

Presentation of Black Bay site

Wastewater Characteristics & Loads

Survey at Black Bay: 2021 – 2023

- inlet concentration representing the 90 percentile of all the inlet values to guarantee treatment efficiency
- calculated based on a production of water per capita and the number of people that will be connected to the treatment plant
- daily water consumption of about 230 L/d/capita

Parameters	COD	BOD	TSS	N
Concentrations (mg/L)	585	336	298	21
Daily load (kg/d)	80.4	46.4	41.1	2.9


Presentation of Black Bay site


Recommended Treatment Wetland System

- Gravity-fed system
- To guarantee 30 mg/L for BOD and TSS while being as compact as possible (one stage)
- Implement a Vertical unsaturated/saturated system with:
 - 60 cm of 2/6 mm gravel unsaturated followed by
 - 10 cm of 8/15 mm gravel unsaturated (transition layer) followed by
 - 50 cm of 15/30 mm gravel (40 cm being saturated)

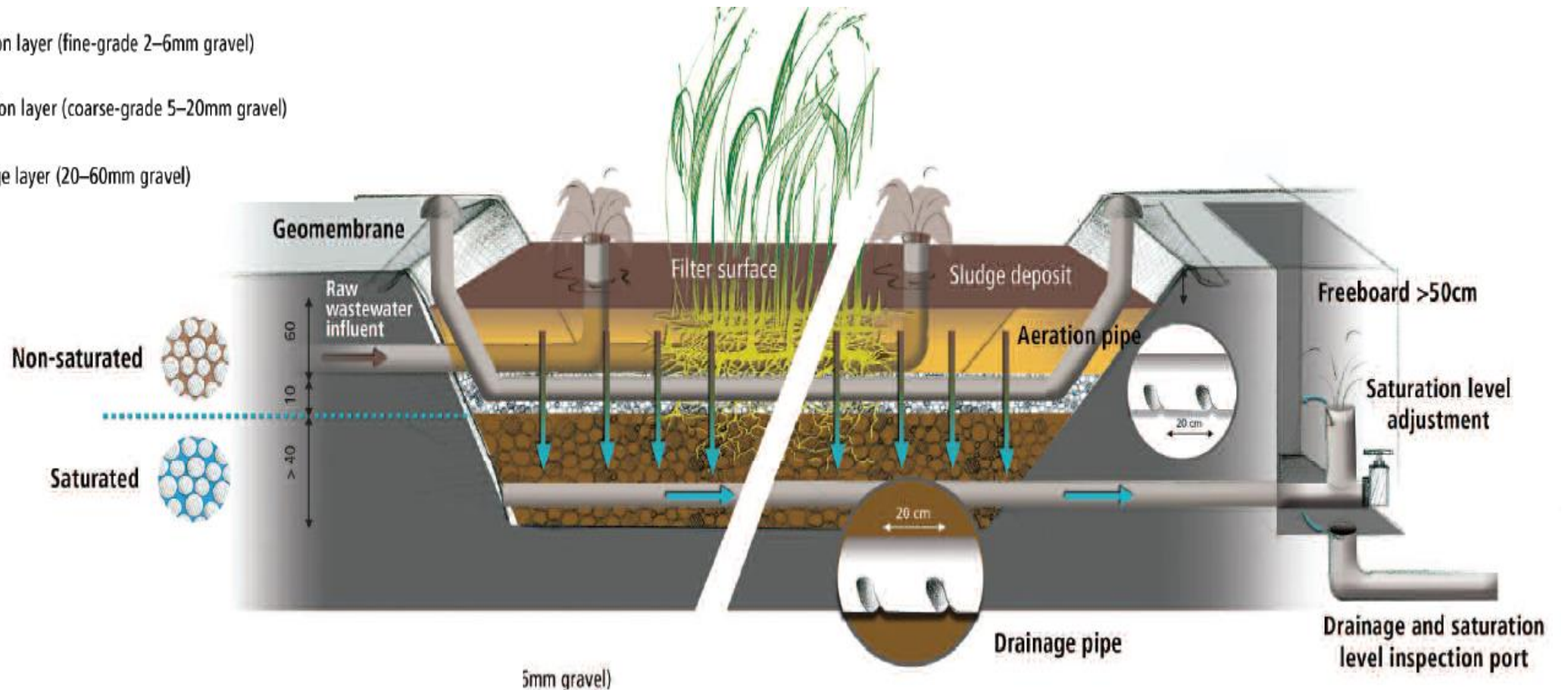
Presentation of Black Bay site

Unsaturated/saturated vertical filter

 Filtration layer (fine-grade 2–6mm gravel)

 Transition layer (coarse-grade 5–20mm gravel)

 Drainage layer (20–60mm gravel)



Presentation of Black Bay site

Unsaturated/saturated vertical filter

- The table presents the surface to implement regarding each parameter

Parameters	COD	BOD	TSS	N	Hydraulic
Limiting load on the filter in operation	350 g/m ² /d	150 g/m ² /d	150 g/m ² /d	30 g/m ² /d	0.45 m/d
Surface to implement (m ²)	230	310	275	97	307

Presentation of Black Bay site

Unsaturated/saturated vertical filter

- Based on these considerations each filter should be designed for at least 310 m² so a total of 620 m² for each filter
- Increasing the total surface to 700 m² would allow for more robustness for storm event acceptance

Presentation of Black Bay site



Wastewater Equipment and Apparatus

Procurement of Laboratory Equipment, reagents & supplies to allow WASCO's Laboratory to test for wastewater quality parameters

- Multi-meter
- ProQuatro Polarographic DO pH ORP Quatro 4 Meter Includes ProQuatro handheld, 605790-4 ISE/ISE/DO/Cond/Temp cable, 605101 pH sensor, 605102 ORP sensor, 605203 polarographic DO sensor, and 603075 soft sided carrying case





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CARIBSAN

Question / Réponse
Question / Answer
Preguntas y Respuestas

28 novembre 2023



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CARIBSAN

Workpackage 3

Renforcement des capacités

Capacity building

Capacitación





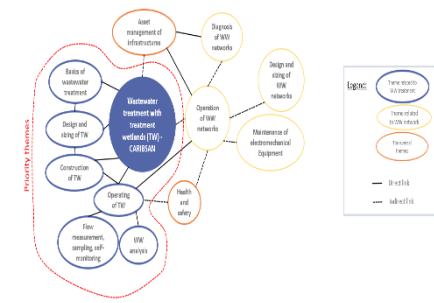
Ignatius JEAN

Executive director



Élaboration de plan de formation

Drafted training plans



Evaluation des besoins de formation sur la base de :

- L'organisation actuelle du service public de l'eau, d'entretiens et visites sur le terrain, les compétences requises et disponibles
- Les retours d'expérience suite aux premiers webinaires et sessions de formation

→ Rédaction de plans de formation donnant la priorité aux thèmes directement liés aux Filtres Plantés de Végétaux

Training needs assessed on the basis of:

- Current water utility organization, site visits, required and available skills.
 - Feedbacks following the first webinars and training sessions
- Draft training plans prioritise topics directly related to wetland treatment

Formation « initiale »
et
réplication à Cuba



Renforcement de capacités

Capacity building

172 participants sur 26 jours à 9 sessions de formations (salle, pratique, terrain)

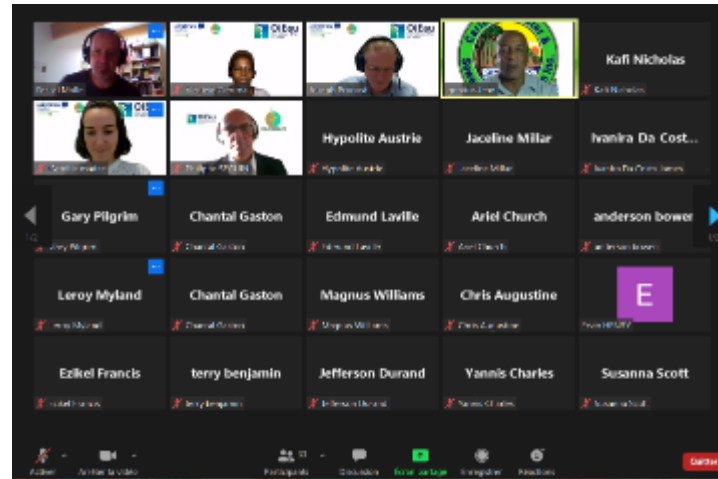
Plus de 200 participants à 3 webinaires

40% ♀, 60% ♂, 3 langues, 13 pays et territoires

172 participants over 26 days in 9 training sessions (classroom, practical, field)

More than 200 participants in 3 webinars

40% ♀, 60% ♂, 3 languages, 13 countries and territories



Renforcement de capacités / Capacity building

Date	Féminin	Masculin	Total général	Lieu	Langue	Thème
2022/05	8	8	16	Cuba	ES	conception
2022/06	4	13	17	Martinique	EN	principes, monitoring
2022/10	7	7	14	Martinique	FR	principes, monitoring
2022/12	10	12	22	Martinique	ES	conception
2022/12	6	5	11	Martinique	EN/ES	communication
2023/04	5	5	10	Martinique	FR	principes, monitoring
2023/05	3	12	15	Martinique	ES	principes, monitoring
2023/10	4	15	19	Cuba	ES	construction
2023/10	16	32	48	Cuba-En ligne	ES	principes
2021/12	13	24	37	en ligne	EN	principes
2022/01	3	5	8	en ligne	ES	principes
2022/03	68	91	159	en ligne	FR	principes
Total	147	229	376			



Antigua and Barbuda
 Barbados
 Cuba
 Dominica
 Etats-Unis
 France
 Guadeloupe
 Guyane française
 Martinique
 Saint Lucia
 Saint-Barthélemy
 Saint-Martin
 Trinidad and Tobago

Renforcement des moyens techniques

Strengthening technical resources

Fourniture de matériel aux partenaires (livrés ou en cours de livraison ; 80 articles):

- Prélèvements (préleveurs automatiques, flaconnage, protection)
- Mesures de terrain (sondes, mallette)
- Laboratoire
- Informatique (hardware)



Supply of equipment to partners (delivered or in the process of being delivered; 80 items):

- Sampling (automatic samplers, bottles, protection)
- Field measurements (probes, case)
- Laboratory equipment
- IT (hardware)



Fiches techniques / Technical resources

- 6 fiches procédés
- 6 process sheets
- 2 fiches visite terrain
- 2 site visit sheets
- 1 visite virtuelle
- 1 virtual visit

FRENCH VERTICAL FLOW TREATMENT WETLAND

DESCRIPTION

1. Influent (raw treated effluent)
2. Filter layer (medium grain)
3. Transition layer (coarse grain)
4. Drainage layer (coarse gravel)
5. Effluent (treated effluent)

HUMEDAL CONSTRUIDO DE FLUJO VERTICAL (CON UNA CAPA SATURADA)

DESCRIPTION

1. Aspersión de efluentes
2. Capa de arena gruesa
3. Capa de arena gruesa saturada
4. Capa de arena gruesa
5. Capa de drenaje
6. Efluente tratado

AERATED TREATMENT WETLAND

DESCRIPTION

1. Influent (raw treated effluent)
2. Aeration equipment
3. Filter layer (medium grain)
4. Transition layer (coarse grain)
5. Drainage layer (coarse gravel)
6. Effluent (treated effluent)

VERTICAL FLOW TREATMENT WETLAND (USING SAND)

DESCRIPTION

1. Influent (raw treated effluent)
2. Filter layer (medium grain)
3. Transition layer (coarse grain)
4. Drainage layer (coarse gravel)
5. Effluent (treated effluent)

FILTRE PLANTÉ DE VÉGÉTAUX À ÉCOULEMENT HORIZONTAL

DESCRIPTION

1. Influent (raw treated effluent)
2. Filter layer (medium grain)
3. Transition layer (coarse grain)
4. Drainage layer (coarse gravel)
5. Effluent (treated effluent)

Maupeou

Blaise-salle, Martinique, France

CAPACITY
48 kg / BOU / d
600 m³

PRESENTATION
Contracting authority: Communauté d'Agglomération de l'Espère Sud Martinique
Operator: Société Martiniquaise des Eaux
Design/Construction: Syntex / COTRAM assainissement
Commissioning: 2015/2024

TREATMENT PROCESS CHAIN

Pre-treatment screening
Stage 1: Vertical Filter - Heliconia
Stage 2: Horizontal sand filter

PURIFICATION PERFORMANCE

Parameter	COE	NO ₃	TSS	RA	NT
Average influent	98%	92%	95%	70%	98%
Average outlet	100 mg/L	17 mg/L	19.9 mg/L	19.9 mg/L	19.9 mg/L

Taupinière

Le Diamant, Martinique, France

CAPACITY
70 kg / BOU / d
1200 m³

PRESENTATION
Contracting authority: Communauté d'Agglomération de l'Espère Sud Martinique
Operator: Société Martiniquaise des Eaux
Design/Construction: Syntex / COTRAM assainissement
Commissioning: 2015/2024

TREATMENT PROCESS CHAIN

Pre-treatment screening
Stage 1: Vertical Filter - Heliconia
Stage 2: Horizontal sand filter

PURIFICATION PERFORMANCE

Parameter	COE	NO ₃	TSS	RA	NT
Average influent	98%	92%	95%	70%	98%
Average outlet	100 mg/L	17 mg/L	19.9 mg/L	19.9 mg/L	19.9 mg/L



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Workpackage 4

Communication
Communication
Comunicación



WP4 Dissémination - Difusión

Website

- >4,300 visits
- >3,000 visitors
- 17 articles published
- 1,000 unique downloads

Facebook

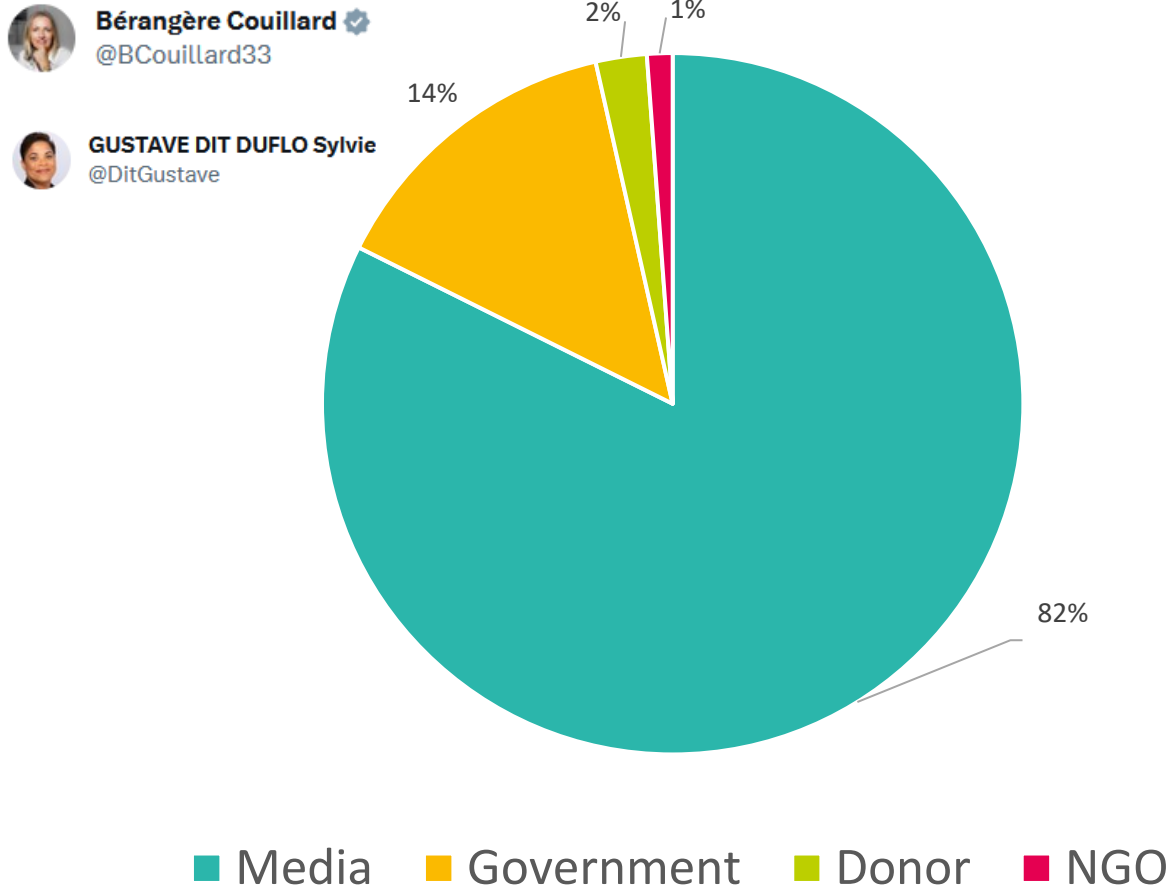
- 230 followers
- 114 publications
- >40,000 reach

Media coverage

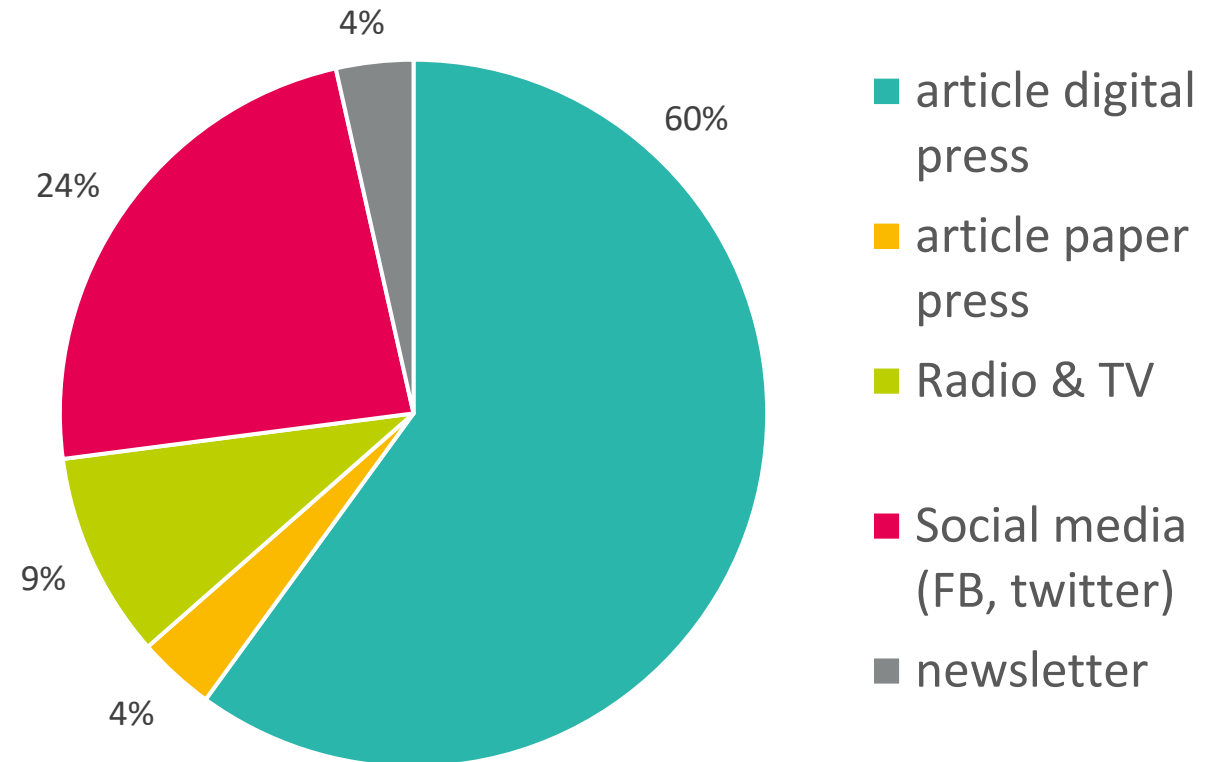
- **86 mentions** of the project recorded (**external** sources)
- **70 mentions in Caribbean media** (website, radio, TV, social network)
- **16 mentions by government officials or donors**

WP4 Dissémination - Difusión

86 mentions of CARIBSAN recorded



Type of media



WP4 Videos

16 in total

- 4 informatives videos

- 4 project visibility videos



Constructed wetlands for wastewater treatment : interviews ...



What are treatment wetlands?



CARIBSAN Regional Conference - Highlights



CARIBSAN Regional Conference - video report



CARIBSAN - wastewater characterisation studies to build a...



A look back at the CARIBSAN training in Martinique



Innovative method for wastewater treatment inspired by nature in Sai...








CARIBSAN: first results after one year

- 8 interviews with project partners

WP4 Videos

Your top content in this period

	Content	Average view duration	Views
1	 <p>Constructed wetlands for wastewater treatment : interviews in Martinique Mar 22, 2022</p>	1:41 (54.8%)	669
2	 <p>A look back at the CARIBSAN training in Martinique Sep 5, 2022</p>	0:55 (42.1%)	178
3	 <p>Entretien avec Michela Adin, Directrice Générale de l'Office de l'Eau Martinique (...) Oct 17, 2022</p>	0:52 (37.2%)	148
4	 <p>Que sont les filtres plantés de végétaux? Jun 13, 2023</p>	1:39 (42.4%)	132
5	 <p>CARIBSAN: first results after one year Dec 12, 2022</p>	1:32 (49.5%)	126

WP4 Communication kit

Leaflet

Roll up banner

CARIBSAN, THE CARIBBEAN COOPERATION FOR WASTEWATER TREATMENT INSPIRED BY NATURAL HERITAGE

The majority of the Caribbean population lives near the fragile ecosystems of coastal areas. These zones are used for habitation (domestic pollutants), activities (industrial and agricultural pollutants) and leisure (swimming). However, wastewater is often insufficiently treated, leading to considerable discharges of pollution that are dangerous for human health and ecosystems.

TREATMENT WETLANDS
The example of the Faouillière treatment plant in Diamant commune (Martinique)

CARIBSAN, WHO ARE THE PARTNERS?

The CARIBSAN project carries out research and training to develop the technology of treatment wetlands in Cuba, Dominica, Guadeloupe, Martinique and Saint Lucia. Different configurations are possible for this technology, and CARIBSAN supports beneficiaries to choose the most appropriate option.

INTERESTING FACTS
A method has been specially developed to define the feasibility and most suitable configuration for treatment wetlands. It takes into account: population density, wastewater volumes and pollutant loads to be treated, climate, soil type, regulations, locally available materials and many other socio-economic aspects.

CARIBSAN, A SOLUTION:

- BASED ON NATURE
- SIMPLE BUT INNOVATIVE
- TESTED AND APPROVED
- INDEPENDENT FOR SMALL MUNICIPALITIES
- ADAPTED TO TROPICAL ISLANDS
- RESILIENT TO NATURAL HAZARDS

Which islands are taking part?
Cuba, Dominica, Guadeloupe, Martinique, Saint Lucia

Amount: EUR 2.4 million, cofinanced by the EU through the INTERREG Caribbean programme, the French Development Agency (AFD), and the Water Offices (ODE) of Martinique and Guadeloupe.

Project partners:

Project management: Office De l'Eau Martinique (OEM)

Project operator: International Office for Water (OIEu)

Planning phase 2: June 2023 - December 2023

Project partners: Interreg Caribbean, AFD, OEM, OIEu, ODE Martinique, ODE Guadeloupe, Interreg Caribbean, AFD, OEM, OIEu, ODE Martinique, ODE Guadeloupe.

Interreg Caribbean CARIBSAN

CARIBSAN
THE CARIBBEAN COOPERATION FOR WASTEWATER TREATMENT INSPIRED BY NATURAL HERITAGE

3 GOALS

- Studies for the specification of sites and suitable plant species
- Training of operation teams
- Dissemination of the results throughout the Caribbean

THE CARIBSAN PROJECT IS A SOLUTION FOR WASTEWATER TREATMENT USING TREATMENT WETLANDS

INSUFFICIENT WASTEWATER TREATMENT IN THE CARIBBEAN THREATENS AQUATIC ECOSYSTEMS, COASTLINES, AND HUMAN HEALTH.

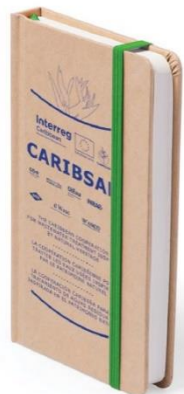
2.2 MILLION EUROS AMONG WHICH 1.1 MILLION COME FROM THE EU ERDF FUND (2014-2020 - 100.000000.0000)

FOR MORE INFORMATION
WWW.CARIBSAN.EU @CARIBSAN

The CARIBSAN project is cofunded by the European Union through the INTERREG Caribbean programme and the French Development Agency (AFD), and the Water Offices (ODE) of Martinique and Guadeloupe.

Project partners: Interreg Caribbean, AFD, OEM, OIEu, ODE Martinique, ODE Guadeloupe.

Goodies



WP4 Indicateurs

Communication	Valeur cible	Réalisation
Nombre d'actions de presse destinées à un public averti réalisées	2 soit 1/an	2
Nombre d'articles de presse destinés au grand public publiés	6	17
Nombre de reportages TV ou radio publiés	1	7
Nombre de brochures (destinées au grand public) conçues	2	3
Nombre de sites Internet créés ou maintenus	1	1
Nombre de visites enregistrées sur le(s) site(s) web	800	>4300
Nombre de visiteurs du site web	800	>3000
Nombre d'actions de promotions et d'évènements de présentation à destination du grand public auxquels les représentants du projet ont participé (événements)	2 soit 1/an	10
Nombre d'actions de promotions et d'évènements de présentation à destination d'un public averti auxquels les représentants du projet ont participé (formations)	4	12
Nombre de followers sur Facebook	300	230
Nombre de participants à la conférence régionale	50	185
Nombre de newsletters présentant CARIBSAN	4	3
Elaboration de la stratégie de communication	1	1
Réalisation d'une vidéo	1	16

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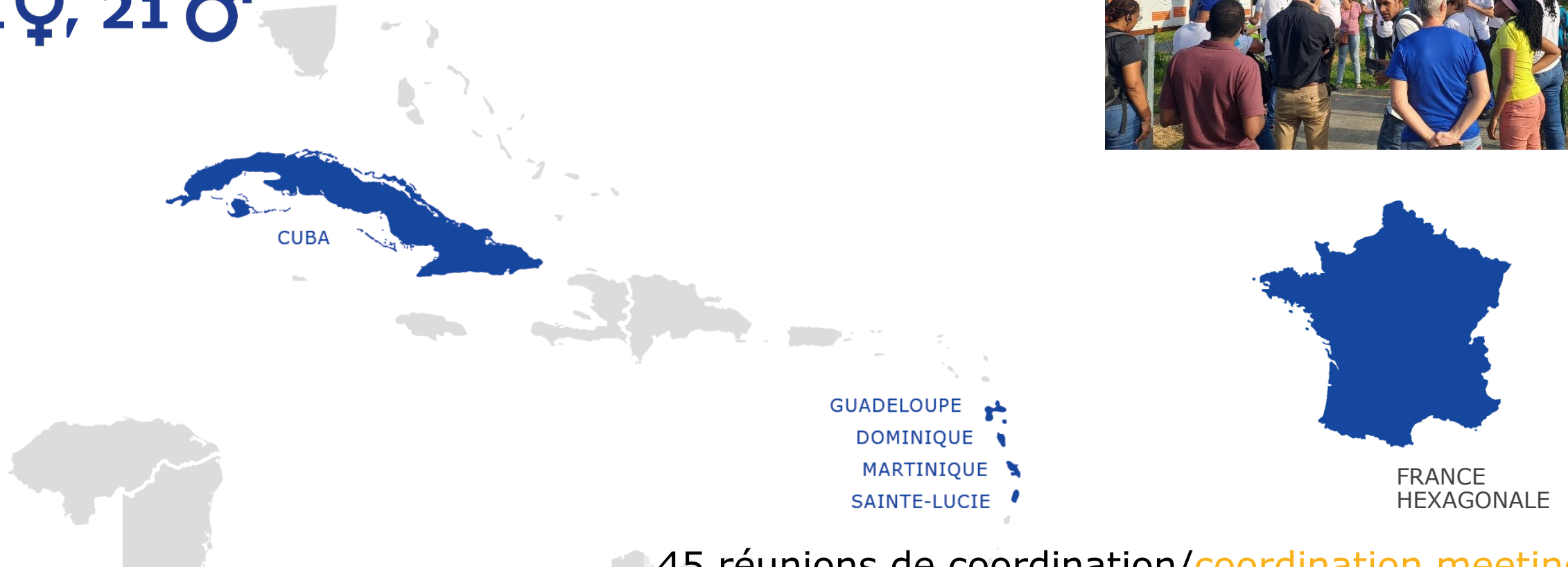
Workpackage 1

Coordination
Coordination
Coordinación



Coopération de 42 experts

21 ♀, 21 ♂



- 45 réunions de coordination/ coordination meetings
- 9 comités de pilotage/ steering committee meetings
- 6 missions (2 par pays)/ 2 missions par country
- 1 Forum de coordination/ coordination forum
- 1 Conférence Régionale/ regional conference
- 9 sessions de formation/ training courses
- 9 Evènements internationaux/ international events



Missions

Cuba : 1 mission institutionnelle et technique, 1 mission technique (botanique, construction)

Dominique : 1 mission institutionnelle et technique, 1 mission technique (caractérisation des eaux usées)

Sainte-Lucie : 1 mission institutionnelle et technique, 1 mission technique (choix du site)

Martinique : 2 évènements d'envergure « Forum 2022 », « Conférence Régionale 2023 » ; 4 formations

Cuba: 1 institutional and technical mission; 1 technical mission (botany, construction)

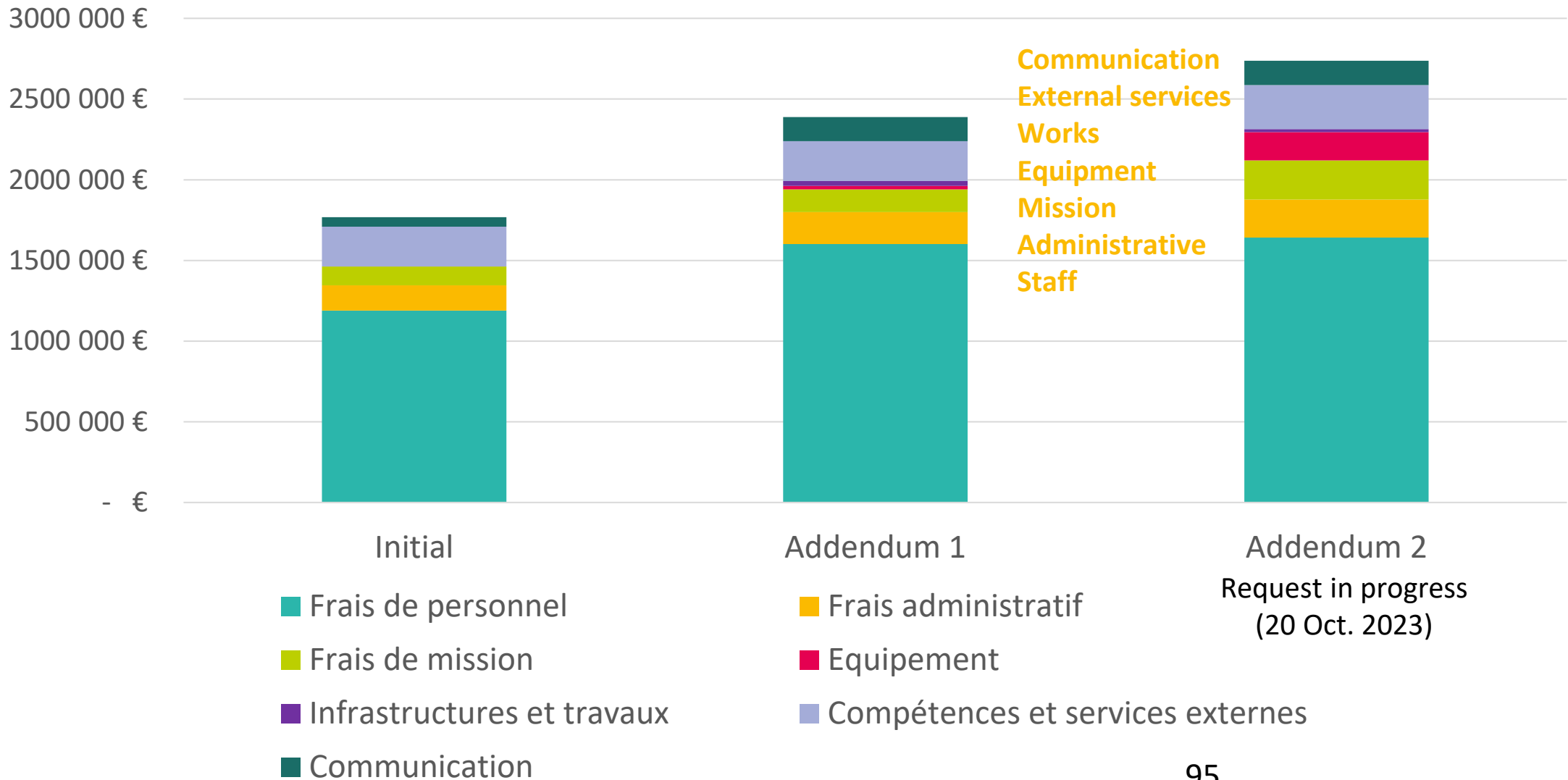
Dominica: 1 institutional and technical mission; 1 technical mission (wastewater characterisation)

Saint Lucia: 1 institutional and technical mission; 1 technical mission (site selection)

Martinique: 2 major events « Forum 2022 », « Regional Conference 2023 »; 4 training courses

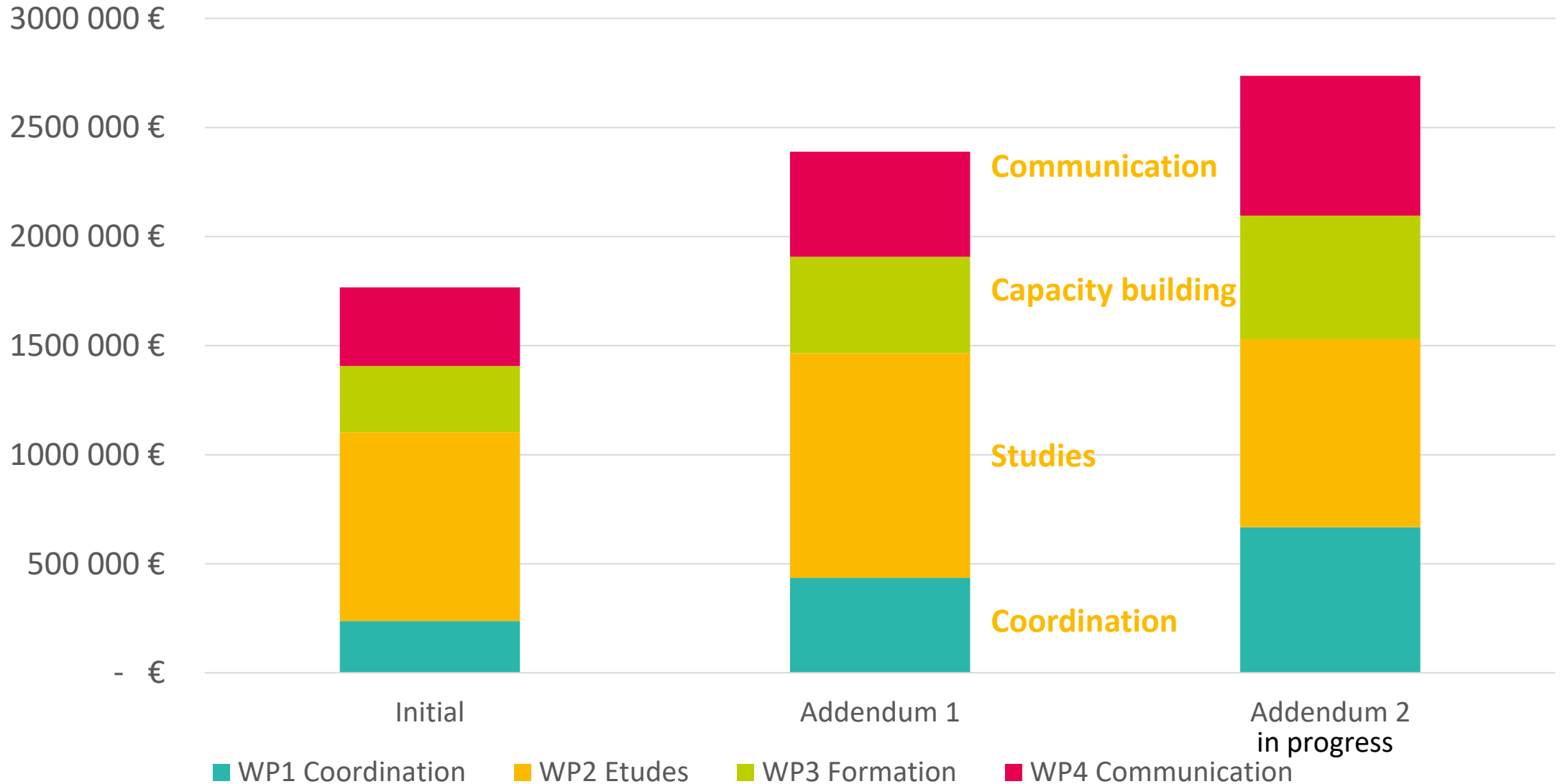
Evolution du budget par poste de dépenses

Budget trends by expenditure item



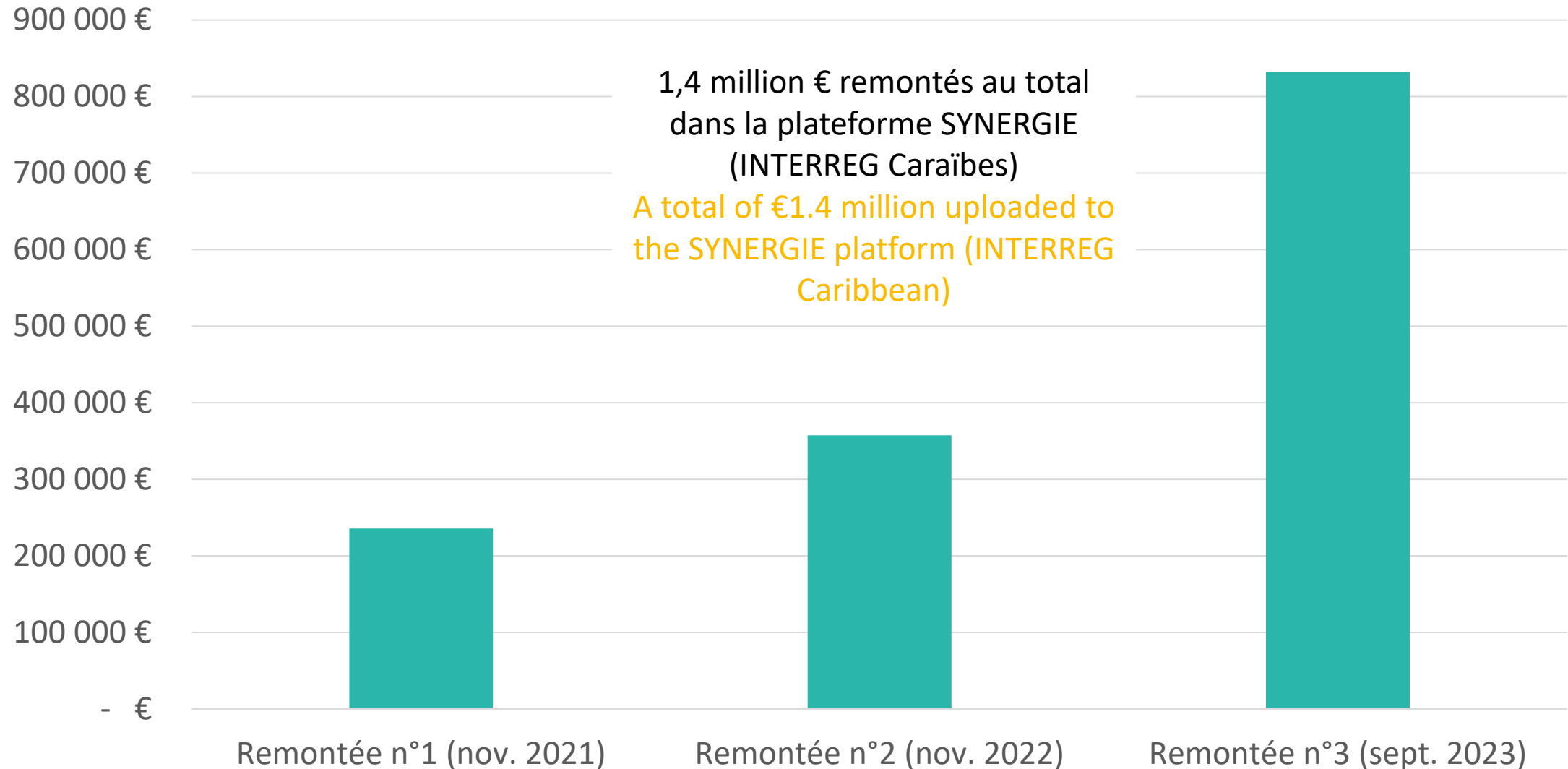
Evolution du budget par activité

Budget trends by activity



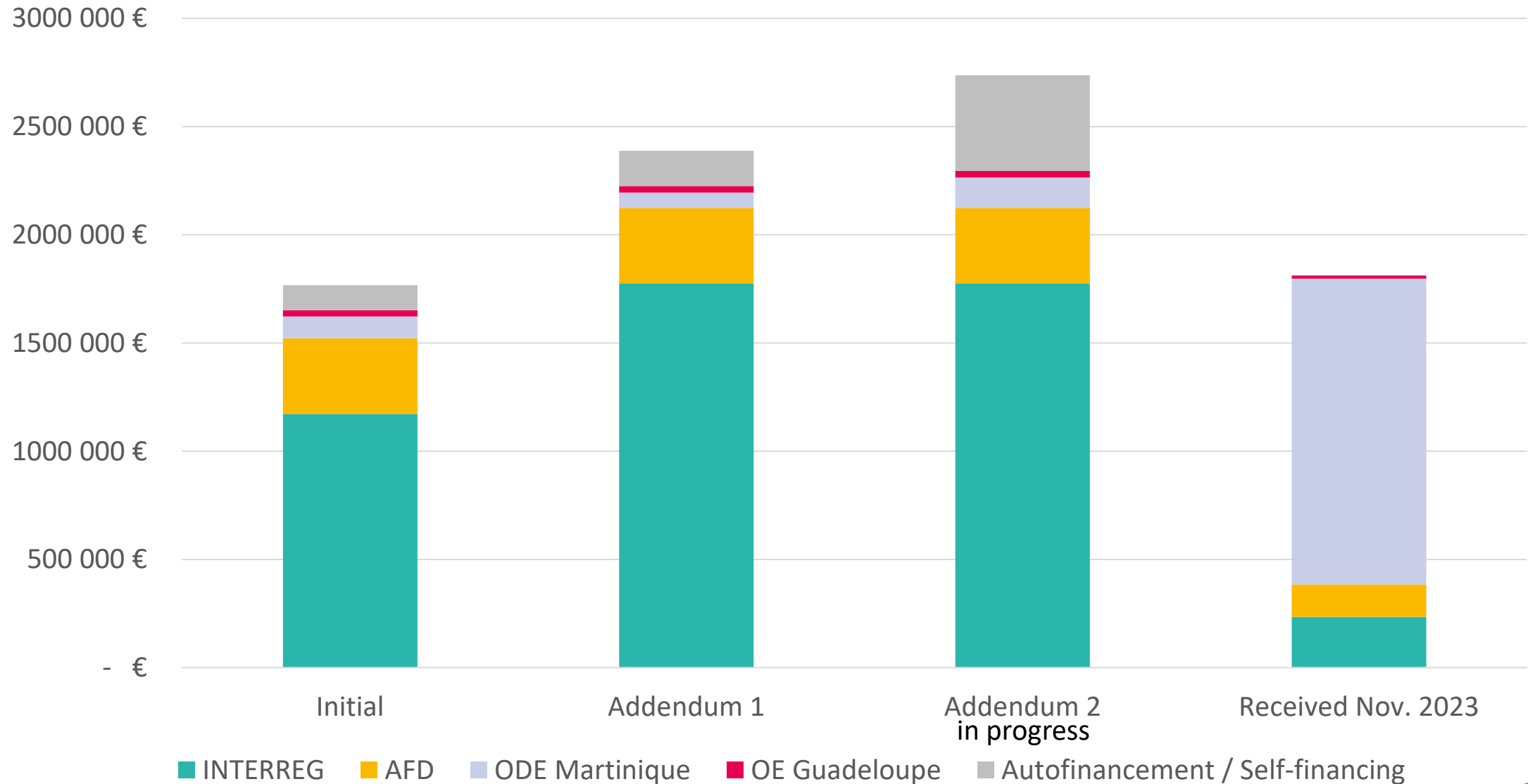
Evolution des remontées de dépenses

Information on expenditure



Evolution des recettes prévisionnelles

Change in forecast revenue



Indicateurs / Indicators

Indicateurs de résultat prévus	Valeur cible	Réalisation
Nombre d'initiatives transnationales/transfrontalières en faveur de la protection de la biodiversité animale et végétale	1	1
Nombre d'espèces endémiques protégées - indicateur proposé	3	0
Nombre de personnes sensibilisées aux FPV (ateliers de sensibilisation, conférence régionale, actions de communication, etc.)	100	500
Nombre de personnes ayant suivi une formation technique	30	376

Indicateurs de réalisation	Valeur cible	Réalisation
Nombre d'aires d'écosystèmes forestiers, agricoles, et d'aquaculture bénéficiant de mesures de gestion commune et de conservation	1	0
Nombre de dispositifs de suivi et d'évaluation du développement du tourisme durable	1	0
Nombre d'évènements de valorisation communs organisés (conférence régionale, visite d'études)	2	3
Nombre d'études projet réalisées pour la conception de filtres plantés de végétaux	3	7
Nombre de sessions de sensibilisation organisées	3	3
Nombre de formations techniques organisées	5	12

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Question / Réponse
Question / Answer
Preguntas y Respuestas

28 novembre 2023



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Perspectives et conclusion

Outlook and conclusion

Perspectivas y conclusión

28 novembre 2023





Gaëlle HIÉLARD

*Decentralised cooperation
project manager*



Point de vue des directrices de l'ODE M et l'OiEau

Views of ODE OiEau directors

Opiniones de las directoras ODE OiEau



Michéla ADIN

Director



**Stéphanie
LARONDE**

*Director of
Institutional &
Technical Cooperation*



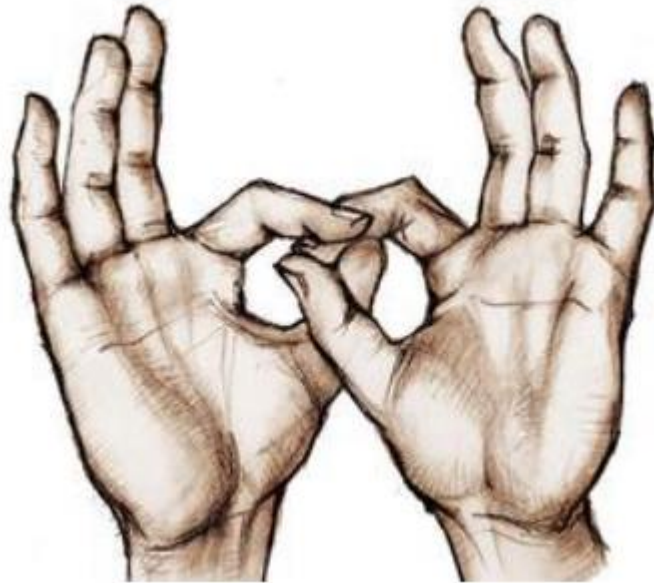
Michéla ADIN

Director



CARIBSAN Family portrait

Do the Sign and Smile !



Sign « Together » in French sign language

**Merci
Thank you
Gracias
Mèsi an chay**

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The CARIBSAN project is cofinanced by the European Union, through the INTERREG Caraïbes programme in respect of the European Regional Development Fund, the French Development Agency (Agence Française de Développement, AFD), and the Water Offices (ODE) of Martinique and Guadeloupe.



UNION EUROPÉENNE



AGENCE FRANÇAISE
DE DÉVELOPPEMENT



Instituto Nacional
de Recursos Hidráulicos
REPÚBLICA DE CUBA



Dominica Water and Sewerage Company Limited



WASCO
WATER & SEWERAGE COMPANY, INC.



Caribbean Water &
Sewerage Association, Inc.
C.A.W.A.S.A. Inc.