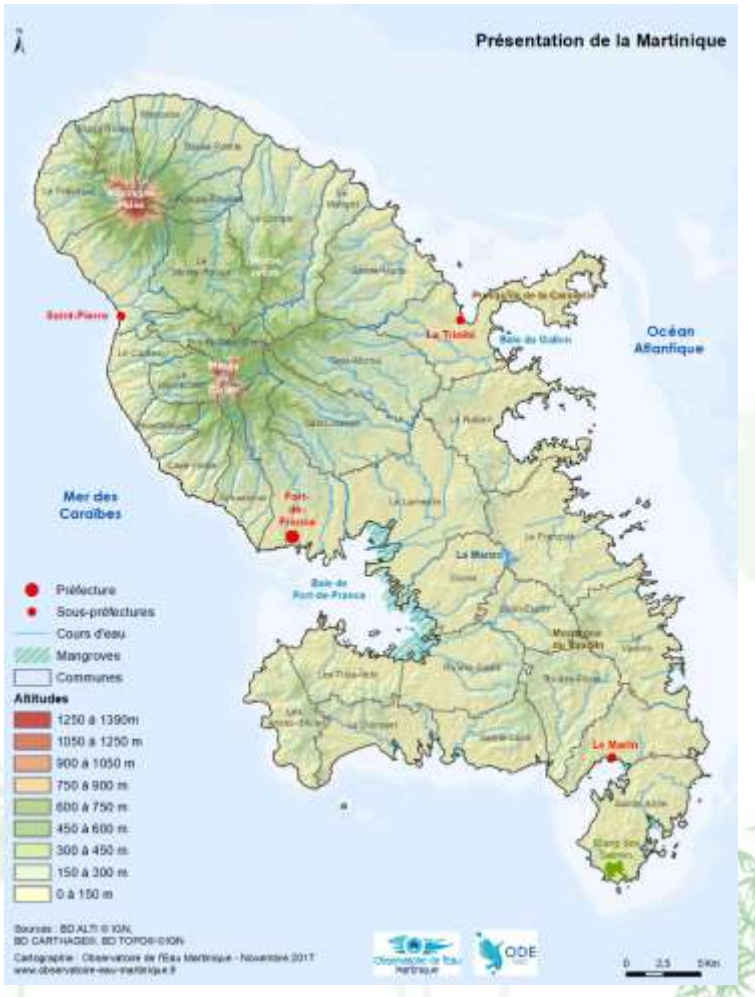
# ATTENTIVE

## French Vertical Flow Constructed Wetlands Under Tropical Climates: Robustness and Reliability of the System

Séminaire de restitution du projet
**Attentive**

17 et 19 octobre 2017
Martinique - Guadeloupe

# VFCW adaptation

# French overseas territories context

## Issues

High population growth

Lack of maintenance

Climate (tropical rains)

Sewer (clear water intrusion, $H_2S$)

Price (limited financial capacity, spare parts on importation)

Sludge management

## Needs

Compact

Simple to operate

Hydraulic load variation acceptance

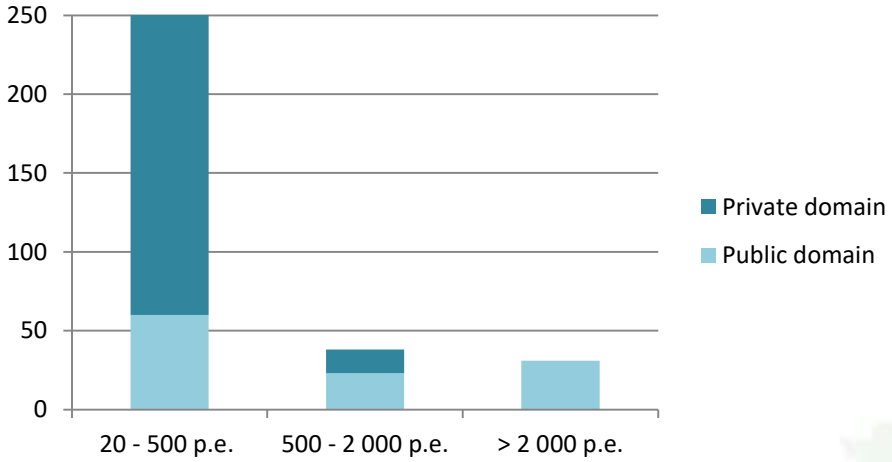
Decentrilized

Limit opex and capex

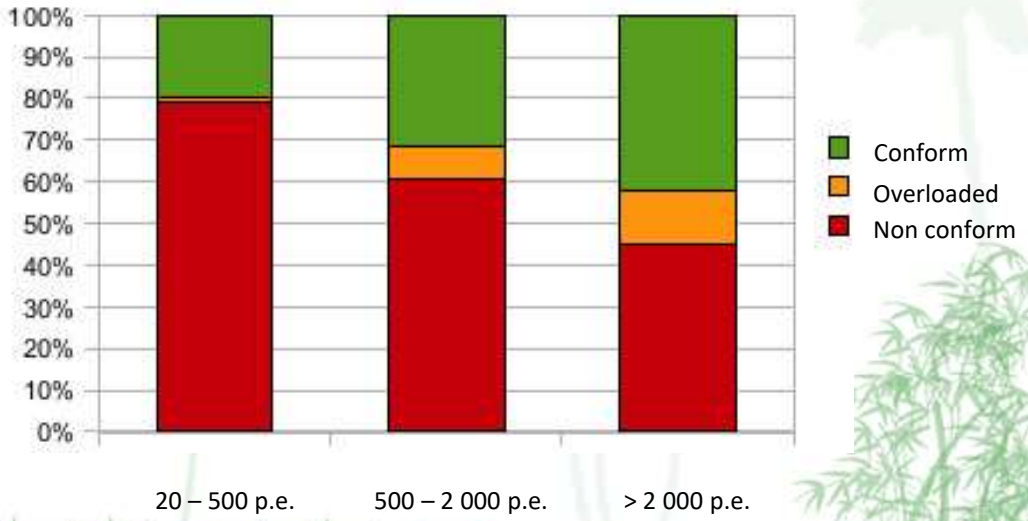
Limit sludge production

# In Martinique

- < 2 000 p.e. systems represent 90% of the plants for 20% of the treatment capacity
- Mainly on private domain
- 60-80% non compliance with national or European regulation

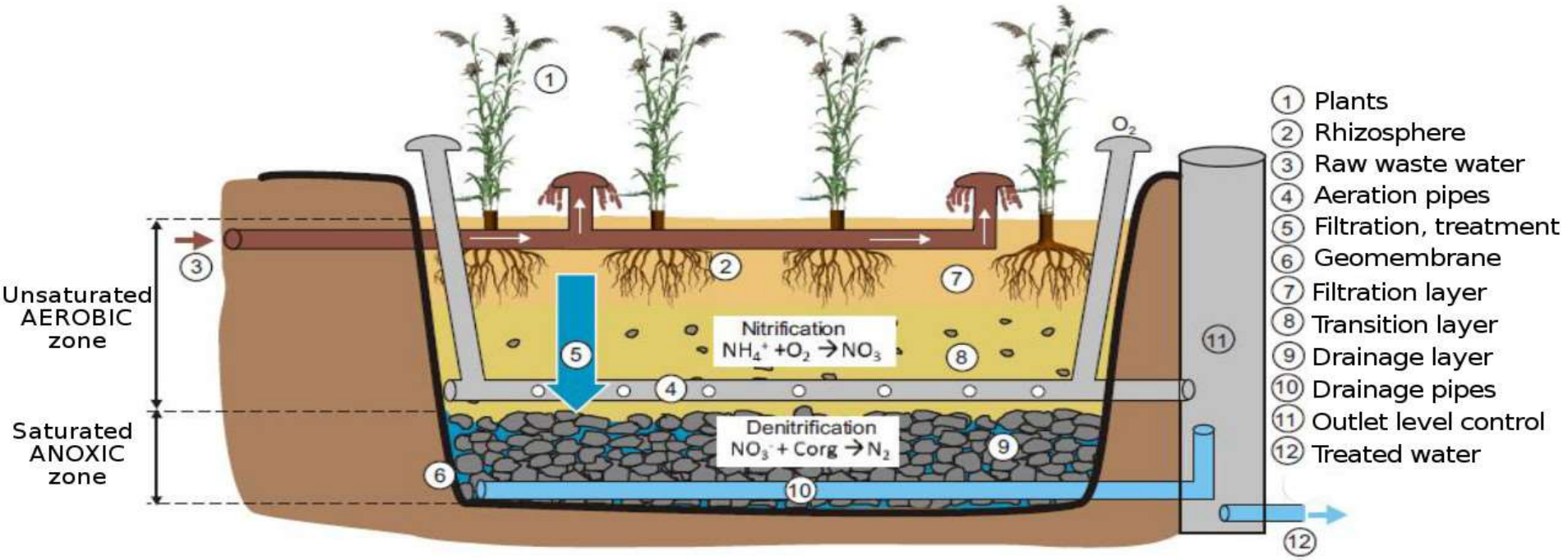



Distribution regarding plants capacity (Martinique, 2014)




Compliance regarding regulation (Martinique Water Police, 2014)

# VFCW unsaturated / saturated (0.8 m²/p.e.)




- *Unsaturated filtering layer* : 40 cm 2/4 mm gravel
- *Transition layer* : 15 cm 11/22 mm gravel, with aeration pipes (0.25 lm/m²)
- *Saturated layer* : 40 – 60 cm 20/40 mm gravel

# Taupinière treatment plant (Martinique island)

VFCW (900 i.e.):

- 2 lines with 2 VFCW US/S (0.8m²/i.e. → 4x180 m²)
- 2nd stage = trickling filter
- Objectives : 90% carbon pollution, 80% nitrogen pollution
- Decanted sludge → 1st stage

# Simplified trickling filter (0.1 m²/p.e.)

COMBIPUR®

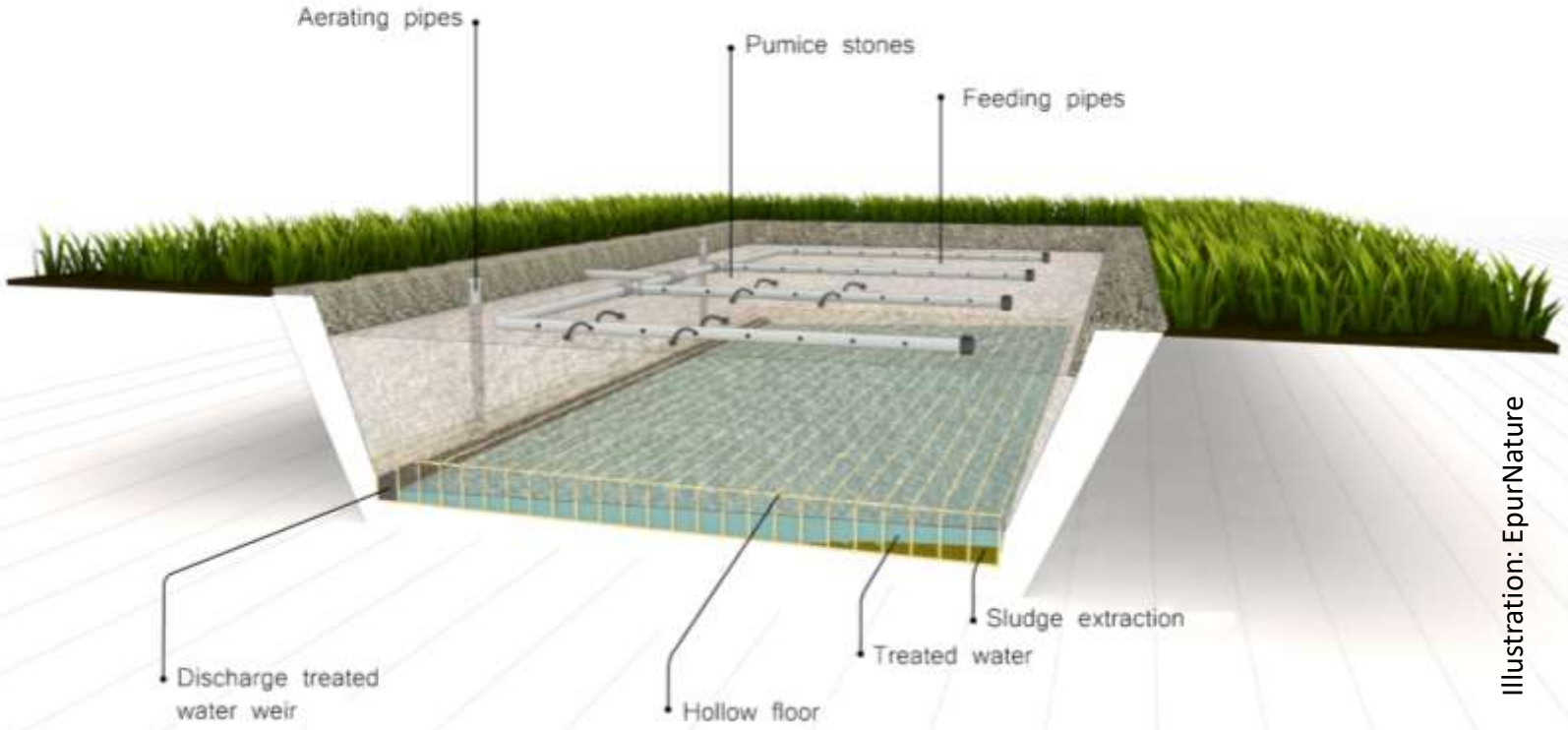



Illustration: EpurNature

- 150 cm of pumice stones
- 2 feeding networks working alternatively
- HLR: 1.5 m/d

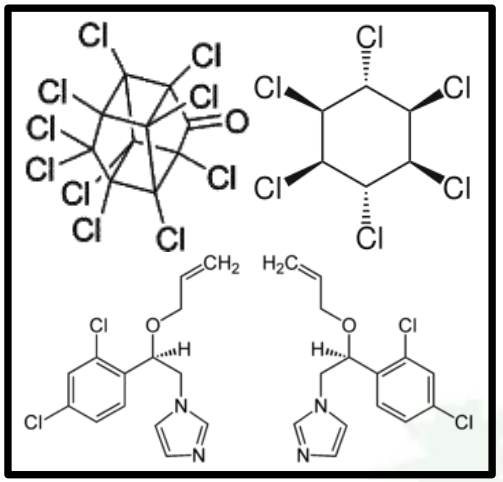
# Adaptation to FWI situation

35 analyses field missions on the plant

33 substances analyzed each time

22 tropical plant species tested (small area)

9 tropical plant species tested (on the plant)



# Tests Batch

## Results synthesis

- 4 very interesting species : good osmotic regulation, stress tolerance
  - *Heliconia psittacorum*
  - *Cana indica*
  - *Costus spiralis*
  - *Clinogyne comorensis*

Zingiberales order

- Cyperus familly (*Cyperus alternifolius/involucratus, Cyperus papyrus, Cyperus alopercuroïdes, Cyperus articulatus*) is also interesting but shows lower performances

- 12 species were removed

*Heliconia psittacorum*

*Cana indica*

*Costus spiralis*

*Clinogyne comorensis*

# VFCW adaptation

Nitrogen removal

Organic loads variations

## Performances of French VFCW tropical design … Robustness and Reliability ?

Rainy events acceptance (hydraulic overloads)

# VFCW and Adaptation to Climate Change

VFCW IS AN INCREASED WASTEWATER TREATMENT CAPACITIES CHOICE FOR ADAPTATION

# Other uses

## Will be used in Martinique for:

- Individual sanitation
- Rum distilleries
- Fruit juice plants
- Discharge leachate
- Sludges treatment

# Reward

1st national prize on alternative wastewater management award

GRAND PRIX 2014
du génie écologique

*Le génie écologique au service de*
la gestion alternative des eaux usées et pluviales

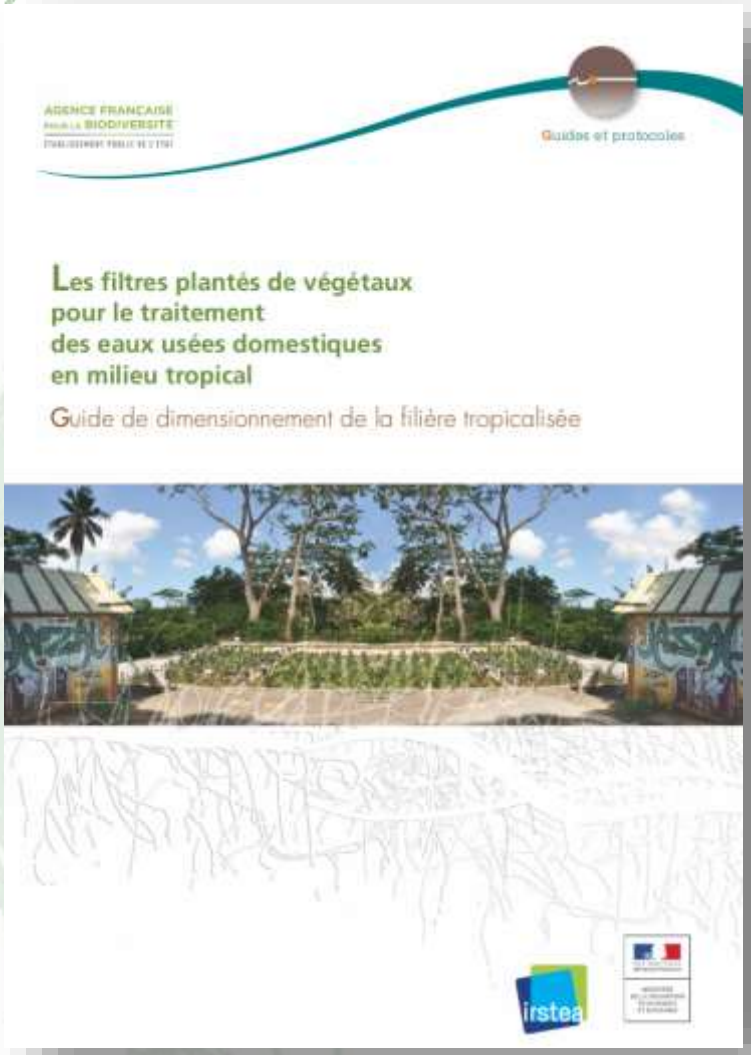
***Projet***
Traitement des eaux usées domestiques par filtres plantés de macrophytes adaptés au contexte tropical

***Porté par***
le Syndicat intercommunal du centre et du sud de la Martinique,
IRSTEA et COTRAM assainissement,
ainsi que les offices de l'eau de Martinique et Guadeloupe.

*Remis à Paris, le 21 octobre 2014*

**Ségolène ROYAL**
ministre de l'Écologie,
du Développement durable et de l'Énergie
Ségolène Royal

# Documentation




- Guidelines for VFCW in tropical area
- Available in French
- http://epnac.irstea.fr/dom/
- Soon in English and Spanish

# Thank you for your attention !