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The Martinique Water Resource Management

The Model for the Gestion of Ressources : MGR

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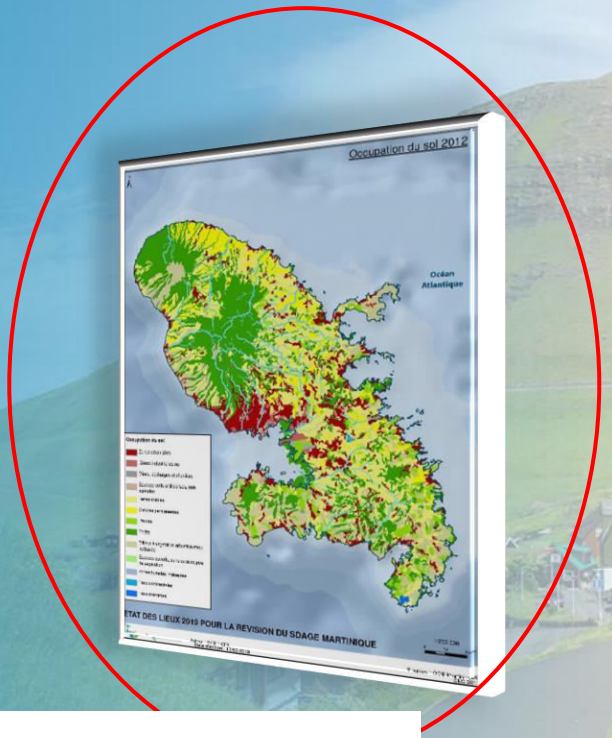
Martinique Water Office

Thursday 5 September 2024

Martinica is, a Caribbean basin, a French overseas island on the Americas.



- Population : **349 925** (2024)

- Geography : 1128km², Fort-De-France, Moutain Pelée (volcano / UNESCO world heritage site)
- Climatic & natural caracteristics : tropical zone, earthquake, storms, rainfall, biodiversity, etc…

Contextual information

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Abundant, high-quality resource potential
A situation in terms of user satisfaction that is out of all proportion to other overseas territories

But :
- difficulties in mobilising this resource, **an alarming climate change signal**, already systematic non-compliance with minimum biological flowrate * and water turns for irrigation, etc.
- **technical and organisational difficulties**
- **financial difficulties** in covering investments with the bill (water pays for water?), need for external funding (EU, OFB, etc.)

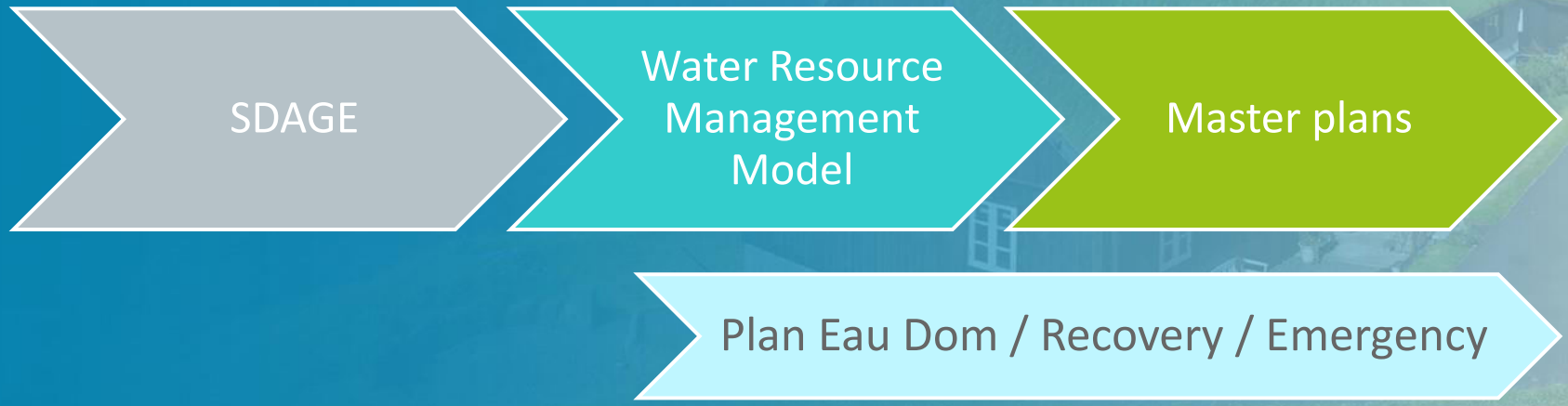
=> Need to model

The genesis of MGR

- ODE to assess of the **economic and social impacts of water management** from 2013-2014 → **high water prices, leading to a high rate** of water poverty (27% of users)**

- The **MGR** responds to **measure n°1** of the Programme of Measures of the SDAGE (= the official water management master plan for Martinique):

"Develop a water resource management model that takes into account all uses (drinking water, irrigation, industry, etc.) and resources (surface and underground).



What is MGR ?

The MGR is a technical tool

- **decision support**
- **a consultation process** that **encompasses all economic uses of** water resources:
  - domestic,
  - agricultural
  - industrial
- which provides a **global view of the subject** across the whole island
- **multi-disciplinary foresight** : hydrological, hydraulic, economic, environmental and social
- **an innovative** analysis that will provide input for the development of a master plan for resource management on the scale of the island

MGR objective

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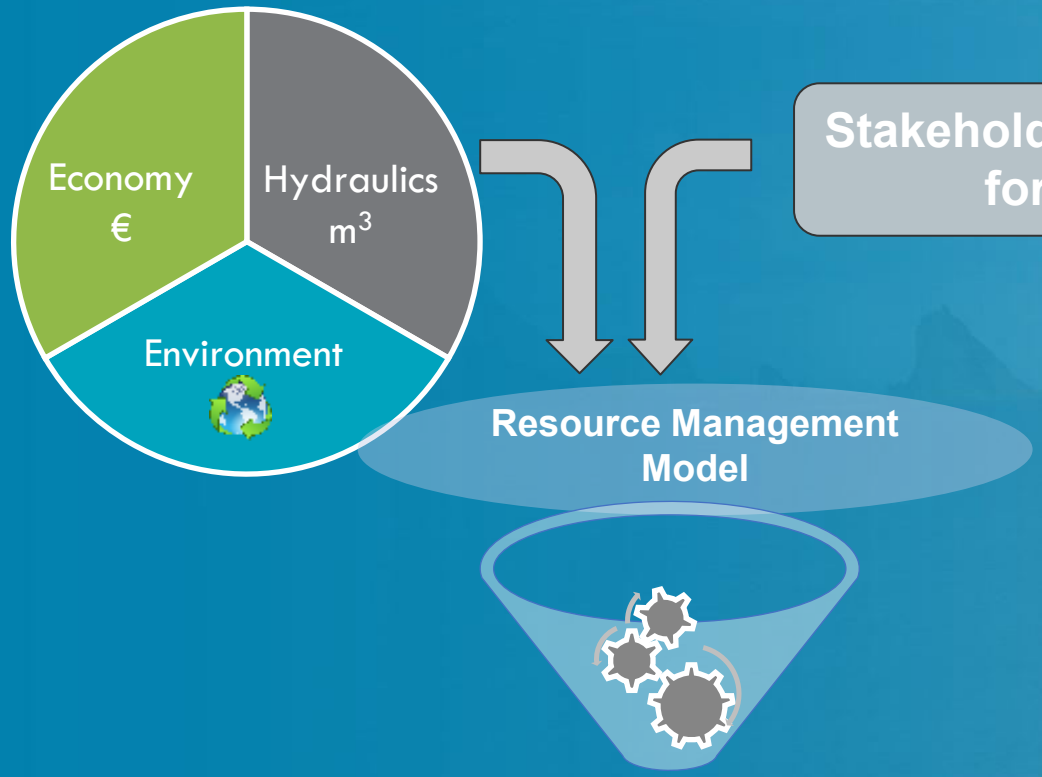
"To provide quality water, in sufficient quantity and at an affordable price, all year round and for all uses, while complying with environmental regulatory requirements".



Stakeholder expectations in the form of scenarios

Trade-offs between different water management objectives :

- Satisfaction of one or more uses,
- minimise management costs or risk,
- meet environmental objectives,
- etc.

Decision-making aids

- Interpretation and analysis of scenario results
- Formatting these interpretations and analyses
- Feedback for all

Structure of MGR

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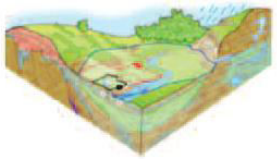
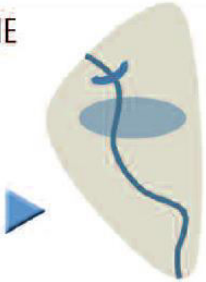
HYDROLOGIE





Cycle de l'eau

- Pluie
- Rivière
- Nappe
- ...

Infrastructures

- Barrage
- Pompage
- Transferts

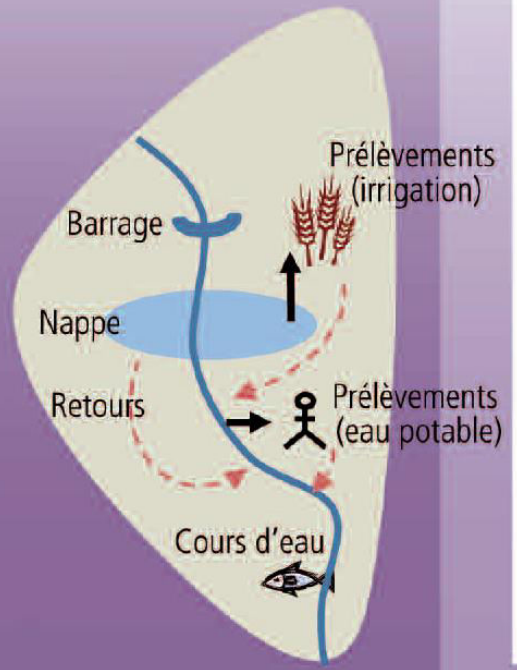
Ressources en eau disponibles

Qualité de l'eau

Volumes prélevables

Fonctionnement hydrologique des milieux

MODELE HYDRO-ECONOMIQUE



ECONOMIE

Valeur des usages de l'eau

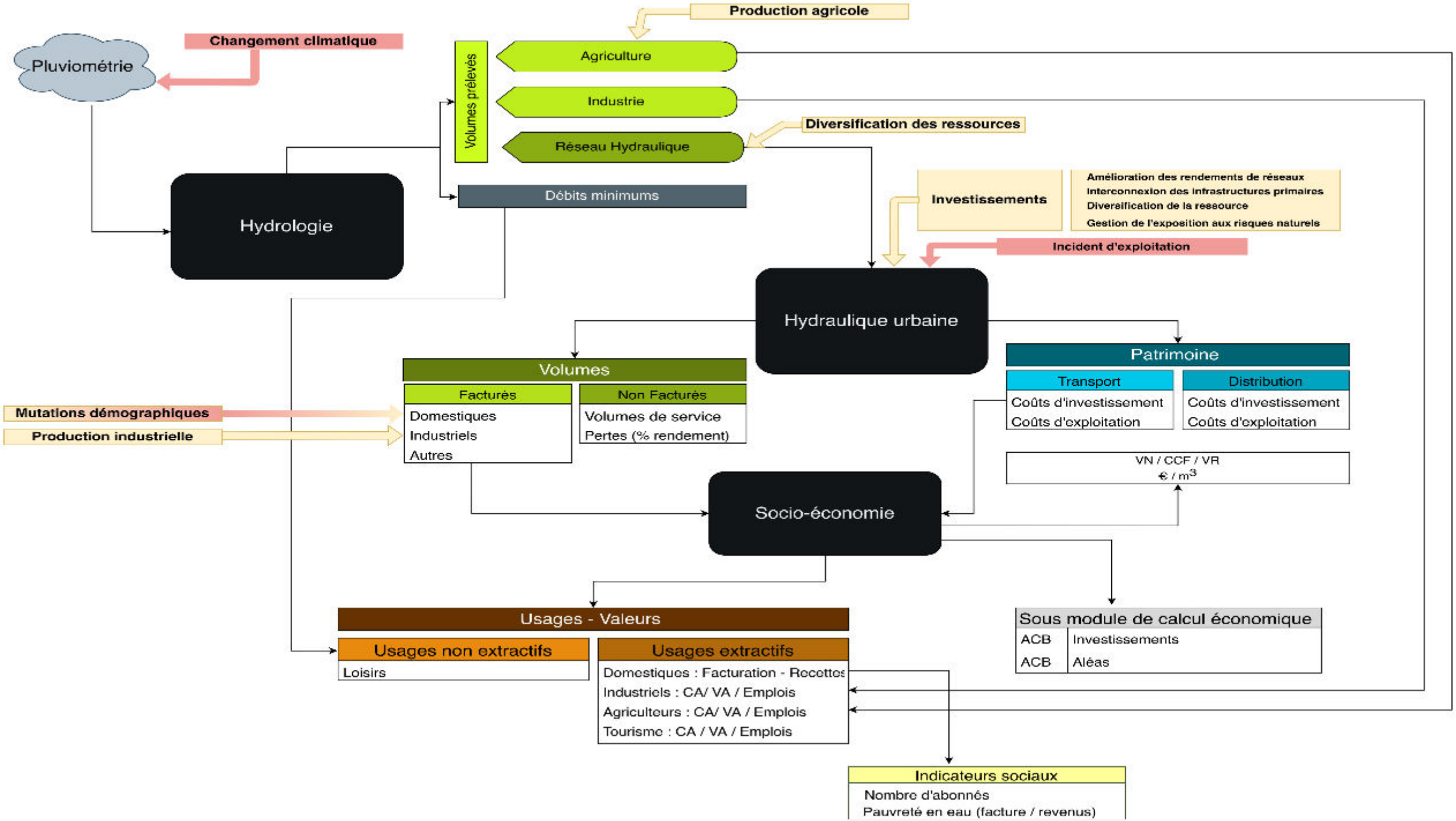
Coûts de gestion

Demande en eau

- Usages agricoles
- Usages domestiques
- Usages industriels
- Usages environnementaux

Volumes consommés

Rejets polluants


Production agricole
Changement climatique
Pluviométrie
Volumes prélevés
Agriculture
Industrie
Réseau Hydraulique
Diversification des ressources
Hydrologie
Débits minimums
Investissements
Amélioration des rendements de réseaux
Interconnexion des infrastructures primaires
Diversification de la ressource
Gestion de l'exposition aux risques naturels
Incident d'exploitation
Hydraulique urbaine
Patrimoine
Transport
Coûts d'investissement
Coûts d'exploitation
Distribution
Coûts d'investissement
Coûts d'exploitation
Volumes
Facturés
Domestiques
Industriels
Autres
Non Facturés
Volumes de service
Pertes (% rendement)
Mutations démographiques
Production industrielle
VN / CCF / VR
€ / m3
Socio-économie
Usages - Valeurs
Usages non extractifs
Loisirs
Usages extractifs
Domestiques : Facturation - Recettes
Industriels : CA/ VA / Emplois
Agriculteurs : CA/ VA / Emplois
Tourisme : CA / VA / Emplois
Sous module de calcul économique
ACB
Investissements
ACB
Aléas
Indicateurs sociaux
Nombre d'abonnés
Pauvreté en eau (facture / revenus)

A shared approach

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Monitoring bodies :

- Steering Comitee : around water and biodiversity basin committee and the ODE Board of Directors, with local authority elected representati**ves**

- Technical Comitee: bringing together all the technical, scientific, institutional and user stakeholders

ODE project owner

Contract awarded to the consortium: IRREED, EGIS, AVISEO, OTHEIS

Study to be carried out between 2019 and 2022

Cost around €340,000

Results : Modelled scenarios

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Satisfying water needs	*Quality of the resource*	*Socio-economic and climate change*	*Financial and social sustainability of water services*
5 scenarios	**3 scenarios**	**4 scenarios**	**2 scenarios**
Securing the resource A - Improving network efficiency B- Primary infrastructure interconnections C- Diversification of the resource **Service continuity** D- Managing exposure to natural hazards E- Operating incidents (various types)	A- Respecting DM in watercourses B - Substitution of chlordecone resources C - Catchment protection perimeter	**Impact of climate change** A - Response to the increase in the severity of lows **Impact of socio-economic change** B- Demographic change C - Agricultural production D- Industrial production	A- Reducing water poverty B- Reduction in the billing base

Conclusions

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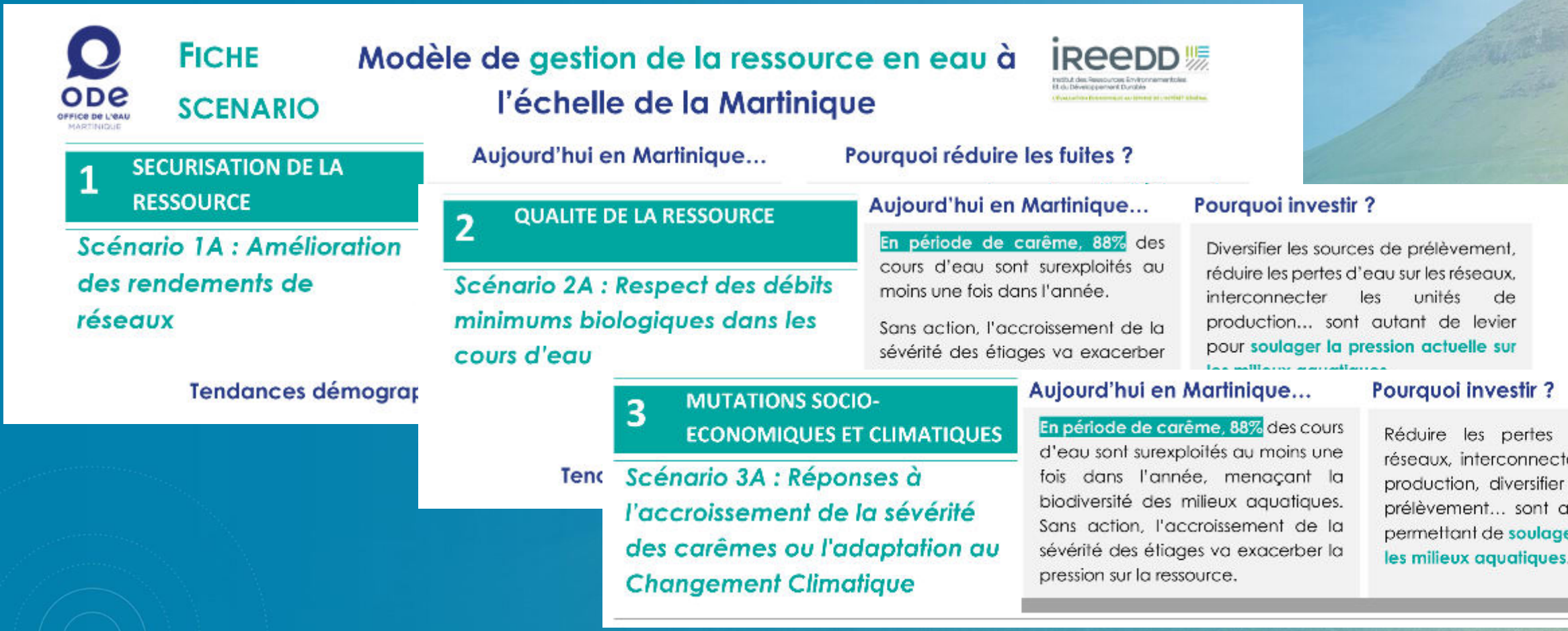
Results = sheets for each question



FICHE SCENARIO

Modèle de gestion de la ressource en eau à l'échelle de la Martinique

ODE OFFICE DE L'EAU MARTINIQUE

iReedd

1 SECURISATION DE LA RESSOURCE

Scénario 1A : Amélioration des rendements de réseaux

Aujourd'hui en Martinique…

Pourquoi réduire les fuites ?

Tendances démograp

2 QUALITE DE LA RESSOURCE

Scénario 2A : Respect des débits minimums biologiques dans les cours d'eau

Aujourd'hui en Martinique…

En période de carême, 88% des cours d'eau sont surexploités au moins une fois dans l'année.

Sans action, l'accroissement de la sévérité des étiages va exacerber

Pourquoi investir ?

Diversifier les sources de prélèvement, réduire les pertes d'eau sur les réseaux, interconnecter les unités de production… sont autant de levier pour soulager la pression actuelle sur

3 MUTATIONS SOCIO-ECONOMIQUES ET CLIMATIQUES

Scénario 3A : Réponses à l'accroissement de la sévérité des carêmes ou l'adaptation au Changement Climatique

Aujourd'hui en Martinique…

En période de carême, 88% des cours d'eau sont surexploités au moins une fois dans l'année, menaçant la biodiversité des milieux aquatiques. Sans action, l'accroissement de la sévérité des étiages va exacerber la pression sur la ressource.

Pourquoi investir ?

Réduire les pertes d'eau sur les réseaux, interconnecter les unités de production, diversifier les sources de prélèvement… sont autant de levier permettant de soulager la pression sur les milieux aquatiques.

Conclusions of the studies

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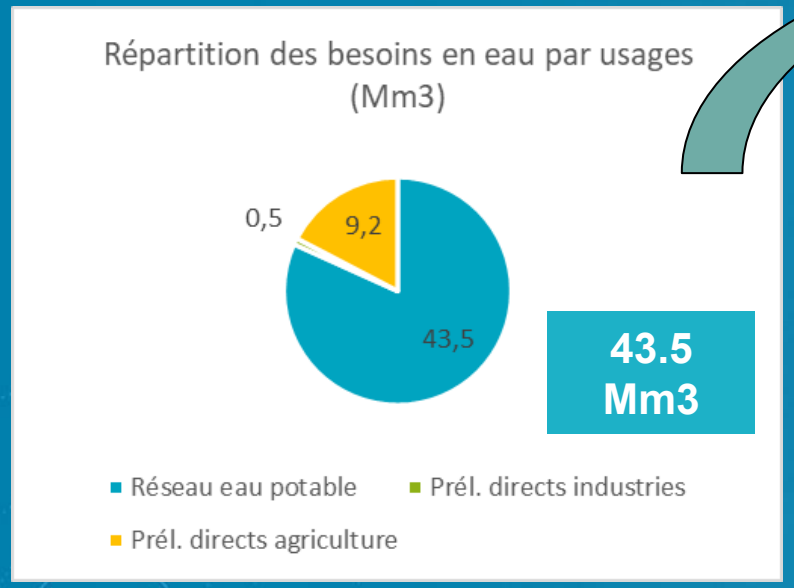
In 2055 :

- River flows would be reduced by **-26%.**
- Dry seasons will be longer and harsher
- There will be less water in wet years (**-31% of volumes to be collected**) and much less in dry years (**-75%**).

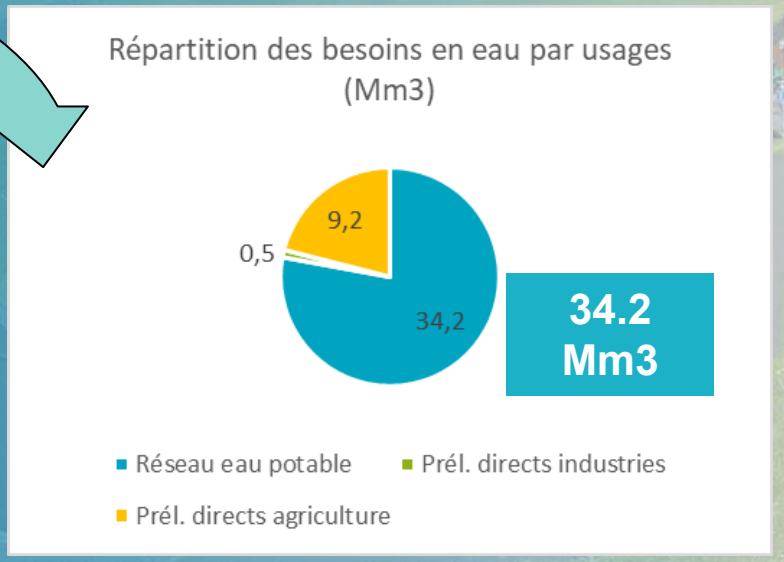
Extractive uses of water in 2022



-31% reduction in withdrawable volumes in **wet years**

-75% reduction in withdrawable volumes In **dry years**

Extractive uses of water in 2050



Conclusions of the studies

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The economic costs associated with a dry year in 2055

Demographic projections	Dry year
	78%

Case in point:

- **Public contract April 2022**
- **Subject of the contract:** Supply and delivery of bottled spring water
- **Brief description of the contract**: Bottled still non-carbonated spring water for the various municipal services and to meet the requirements of the Emergecy plan.

If nothing is done

- Conflicts of use will be exacerbated by increasingly severe water shortages
- Water requirements for irrigation will increase
- More severe droughts will have a significant impact on compliance with minimum biological flow in Martinique's rivers
- If drinking water utilities fail to anticipate the impact of demographic trends, combined with more severe droughts, they will have no alternative but to increase the price of water.
- A 2050 water strategy for Martinique should be drawn up at island level

Conclusions

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In the absence of an adaptation strategy :

The **tension** surrounding water resources can be summed up as follows

Compliance with minimum biological flow *versus* water use

1. The **number of water cuts is likely to increase and the associated economic costs will be greater.**

2. Demographic changes will reduce the revenue of drinking water utilities, which will be forced to **raise water prices** to maintain their financial equilibrium.

3. The population will find it increasingly difficult to pay its water bill: **the water poverty rate will be** higher

Scenario: Meeting minimum biological flow rates by increasing network efficiency

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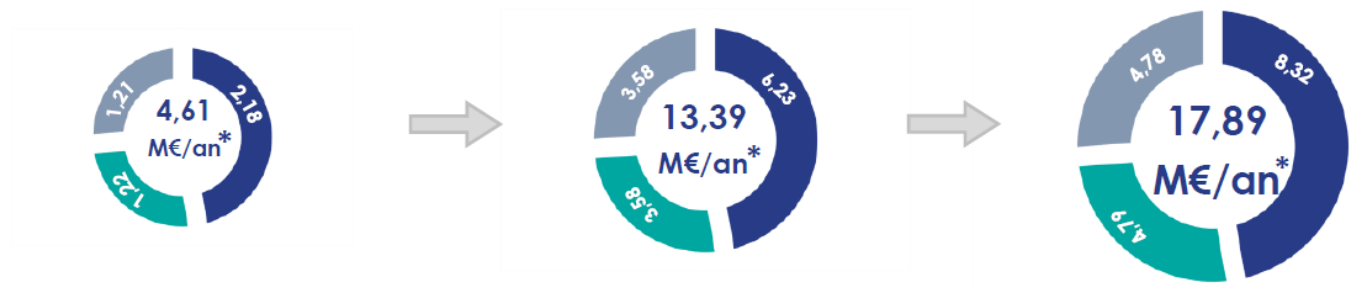
Montant des dépenses (fonctionnement et investissement) par EPCI (M€/an) entre 2022 et 2055



Rendement actuel (≈55%) — 0,25% du linéaire/an

Rendement 65% — 0,7% à 0,8% du linéaire/an

Rendement 85% — 1% du linéaire/an

CACEM CACPM CAESM

: Rythme de renouvellement des réseaux

*Hors 80% de subvention

Part des dépenses de fonctionnement dans le total : 1 à 3%.

Diminution des dépenses - La réduction des volumes produits génère des économies de coûts de traitement :

PARAMETRES :

	Dépenses de renouvellement des réseaux :	Réduction des volumes produits :	Economie de coûts de traitement associés :
Rendements actuels	4,6 M€/an	-23% (-9,35Mm³ entre 2025-2055)	2,2 M €
Rendements 85%	17,9 M€/an	-48% (-19,65 Mm³ entre 2025-2055)	4,6 M €

Scenario: Compliance with biological minimum flows with several areas for improvement

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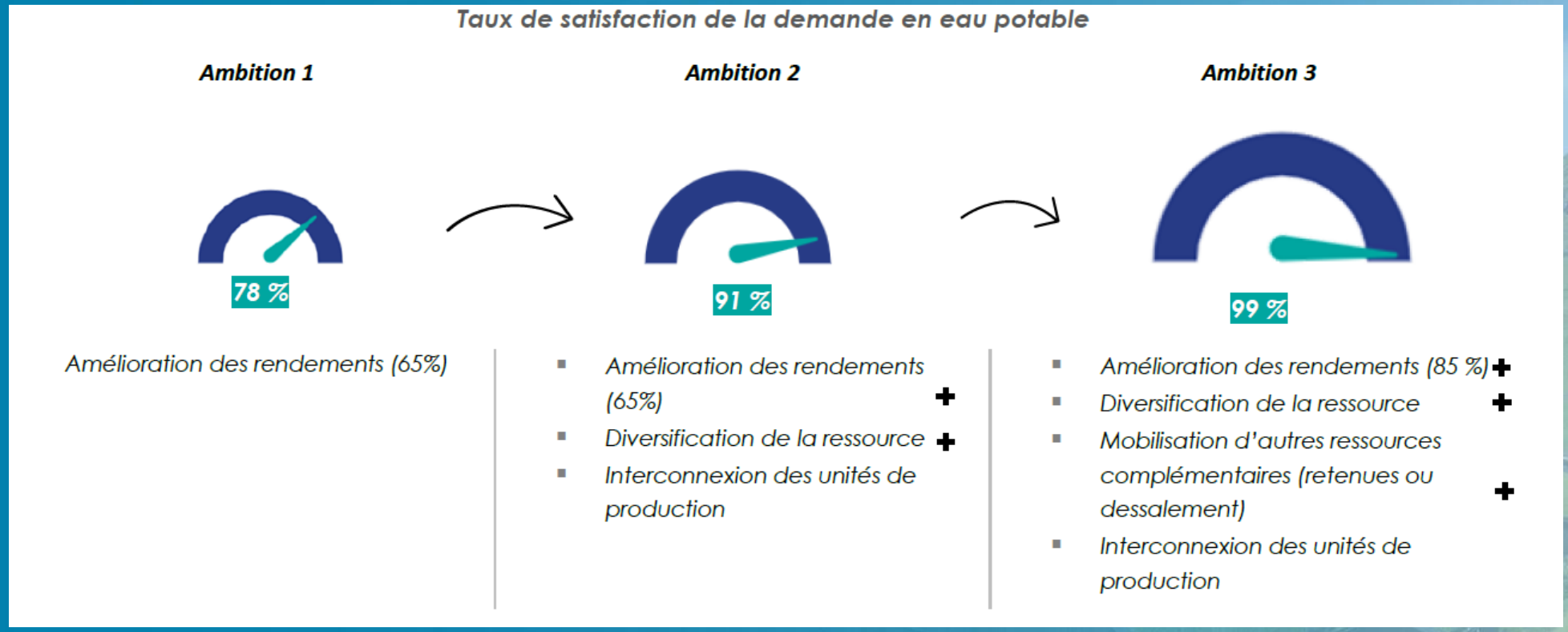


85% improvement in performance without further action: only 81% satisfaction with usage

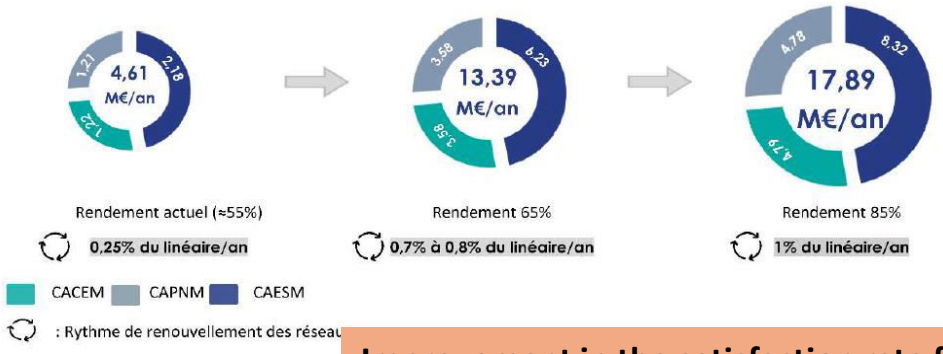
The only satisfactory solution is composite

MGR's main conclusions

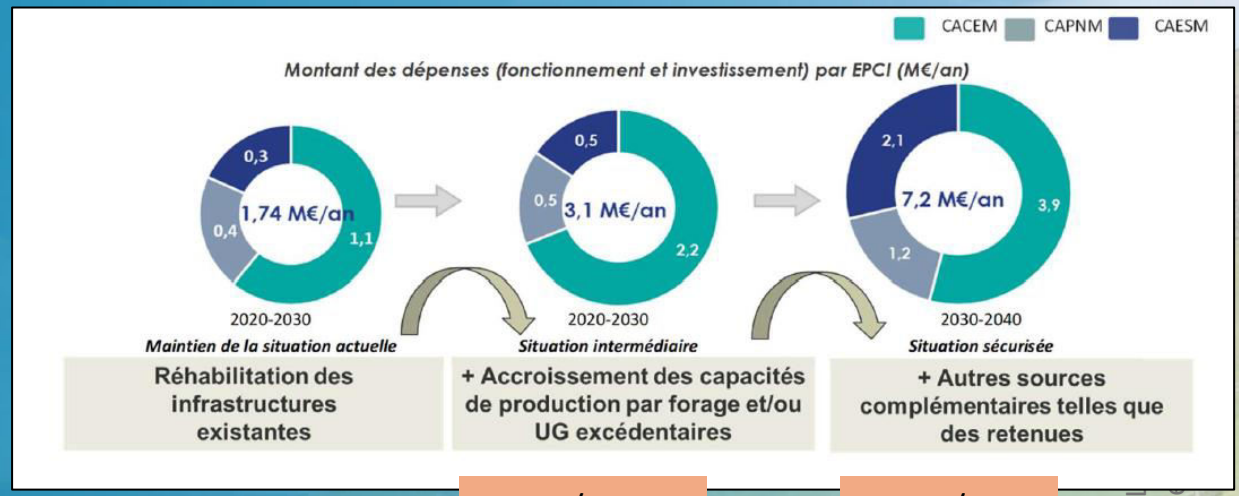
Constat : 44% des eaux prélevées et traitées n'arrivent pas au robinet.

Actions évaluées :

Trois niveaux d'ambition en termes d'objectif de rendement (55%, 65% et 85%) ont été envisagés. La figure ci-dessous présente le coût annuel de chaque objectif par EPCI.



Improvement in the satisfaction rate for uses of only 3% in Lent



Situation sécurisée

Toutes les usines de production sont interconnectées

Nouvelles interconnexions : 1,2 M€/an
Renforcement des interconnexions existantes : 0,4 M€/an
Nouvel ouvrage : 0,7 M€ /an

L'impact financier sur les finances des services d'eau potable reste marginal

+2c€/m3

→ Need a COMPOSITE STRATEGY

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