Actions for an adaptation of water resources management to climate change

–

French feedbacks

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RÉPUBLIQUE FRANÇAISE

MINISTÈRE
DE LA TRANSITION
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COP23 FIJI
UN CLIMATE CHANGE CONFERENCE
BONN 2017

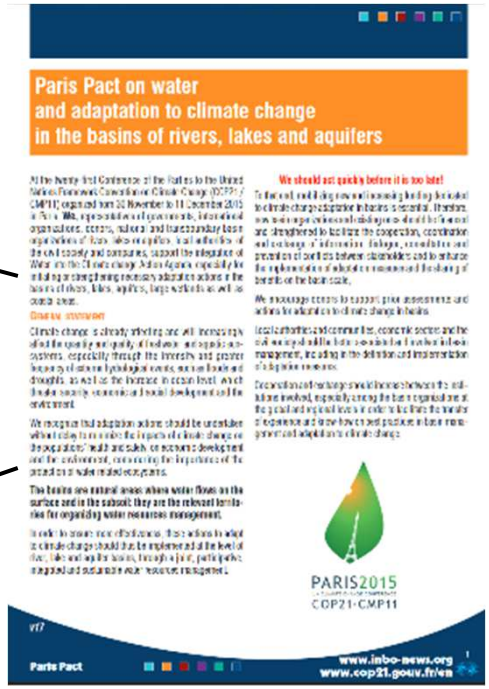
AGENCE FRANÇAISE
POUR LA BIODIVERSITÉ
ÉTABLISSEMENT PUBLIC DE L'ÉTAT

Context

- Paris pact on water and adaptation to climate change in the basins of rivers, lakes and aquifers
  ⟹ signed by 358 basins organizations all over the world.

❷ Adapt basin management planning to climate change:

- at the level of the basins, assess the impacts of climate change and the vulnerabilities and produce strategies for adapting water management to climate change,
- develop basin management plans and actions programs for the implementation of these strategies and measures for adaptation to climate change, and organize regular performance reviews based on suitable indicators,



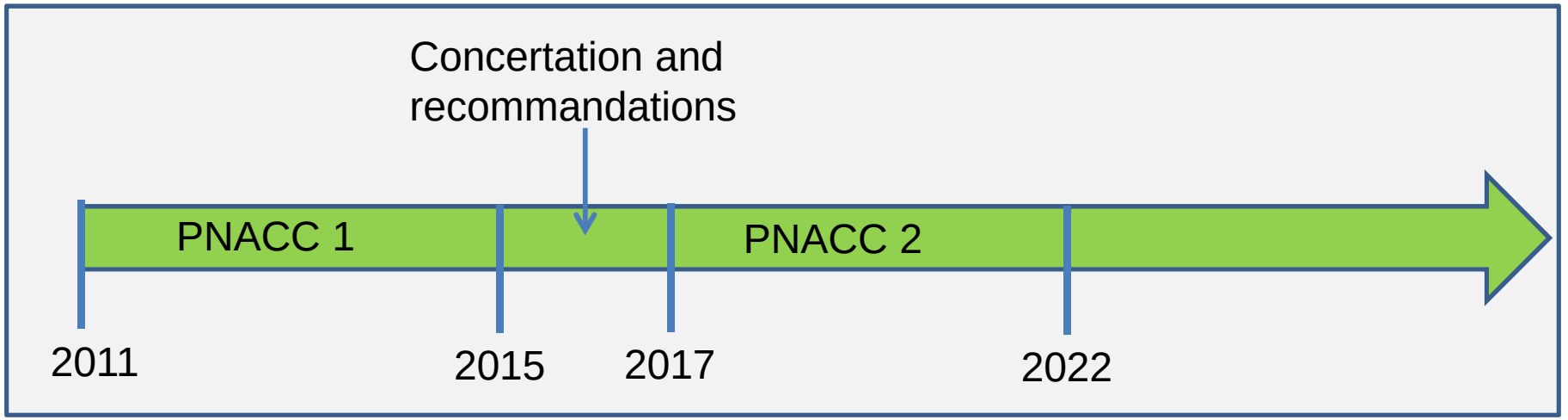
Program

- Introduction
- Adaptating to climate change on Seine-Normandy basin (The Seine-Normandy water Agency)
- Video on sharing of water resources in the Rhone-Mediterranean and Corsica Water Agency
- Climate change and its impacts on risks management in the Seine Estuary (Community of Le Havre conurbation)
- Adaptative management of coastline in littoral wetlands (Coastal conservation authority)
- Discussion and debate

A national plan for adaptation to climate change

- A rolling 5-year plan to
  - ✓ protect people and goods
  - ✓ avoid risks inequitalities
  - ✓ preserve our natural heritage

- cross-sectoral, dealing with 20 topics : health, water, biodiversity, natural hazards, agriculture, forests, urban planning, research, funding, governance…. new version summarized in 6 activity fields



Not focused on water resources management !

Why building a strategy by river basin?

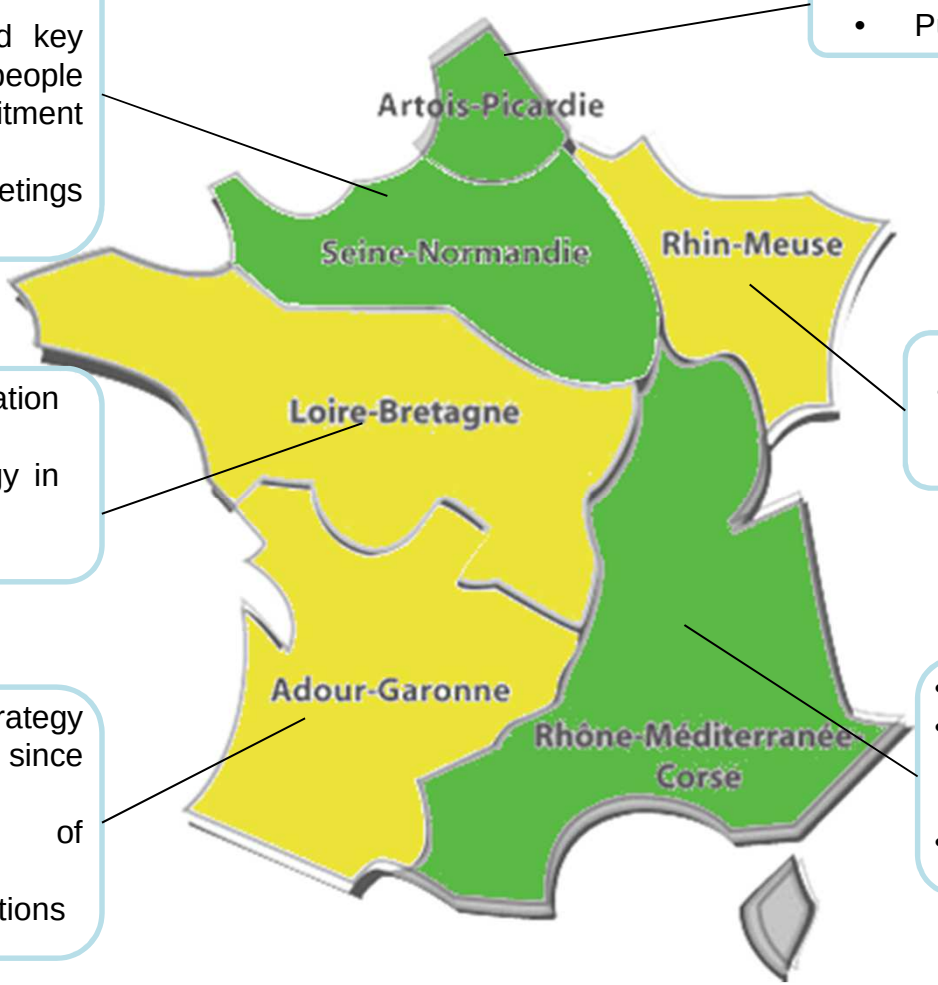
- 6 water agencies in France for each big river basin and a water office for each ultramarine river basin
- Water agencies are public institutions implementing and coordinating water and environment policies on territories
- They support actions contributing to water resources and environments protection thanks to water royalties
- A users committee representing local authorities, farmers, industries and associations of nature protection and consumers protection discuss about bi political guidances for the territory.
- Water agencies have signed in the Paris Pact in 2015 on water and adaptation to climate change in the basins of rivers, lakes and aquifers

→ Water agencies insure solidarity and equity between water stakeholders

Progress on implementation of adaptation strategies

- Adoption in Dec. 2016 by the river basin comittee
- Involvement of diverse and key actors (more than 200 people have signed the commitment declaration)
- Formations and informal meetings for intern staff

- Published Nov. 2016
- Public awareness



- Strategy out for consultation until vote in April 2018
- Presentation of the strategy in public forums
- Formations

- Presentation of a first version in Sept. 2017

- Co-construction of the strategy with the river basin comittee since May 2016
- Elaboration of maps of vulnerability
- Definition of a typology of actions

- Adoption in 2014
- Use of maps of vulnerability for the operational implementation
- In progress for Corsica

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Implementation of adaptation strategies in watersheds

- **Climate change adaptation plan** for water resources management are being developed **by watersheds**
- **Different status :** 3 plans adopted / 3 plans in progress in metropolitan France
- **Different methodologies** to implement these plans
- **Debates exist concerning the vectors for action**
- **Every agencies are considering adaptation of climate change as a criterion for their actions that can be subsidized in their multi-annual program but at different degree.**

WATER RESOURCES MANAGEMENT AND CLIMATE CHANGE

Co-building of a strategy for climate change adaptation on Seine-Normandy river basin

Why building a strategy by river basin?

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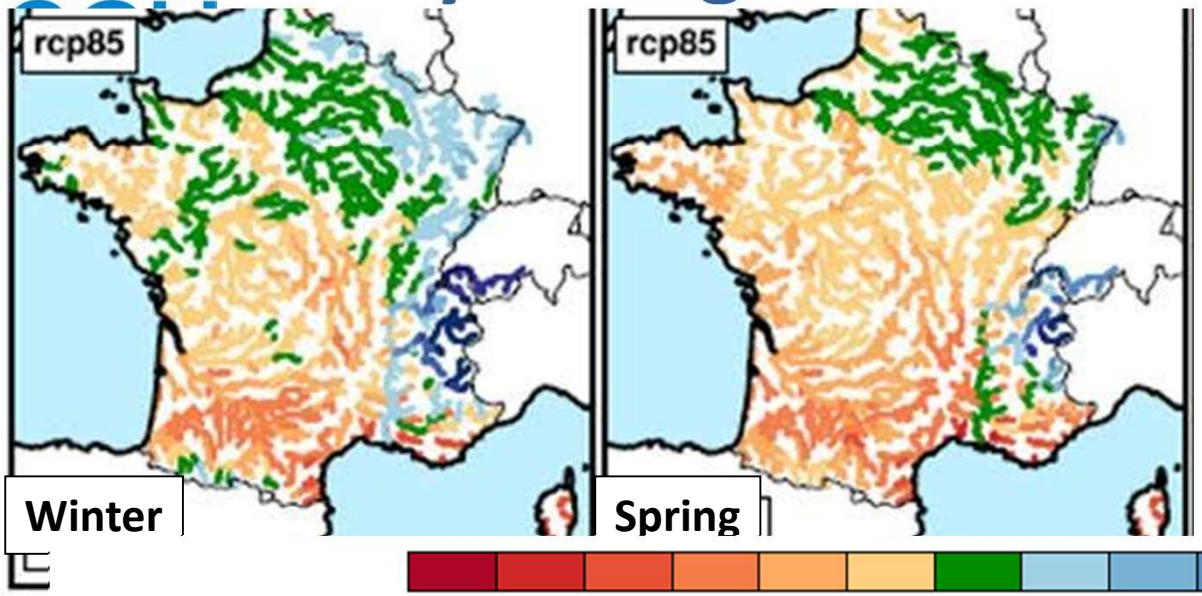
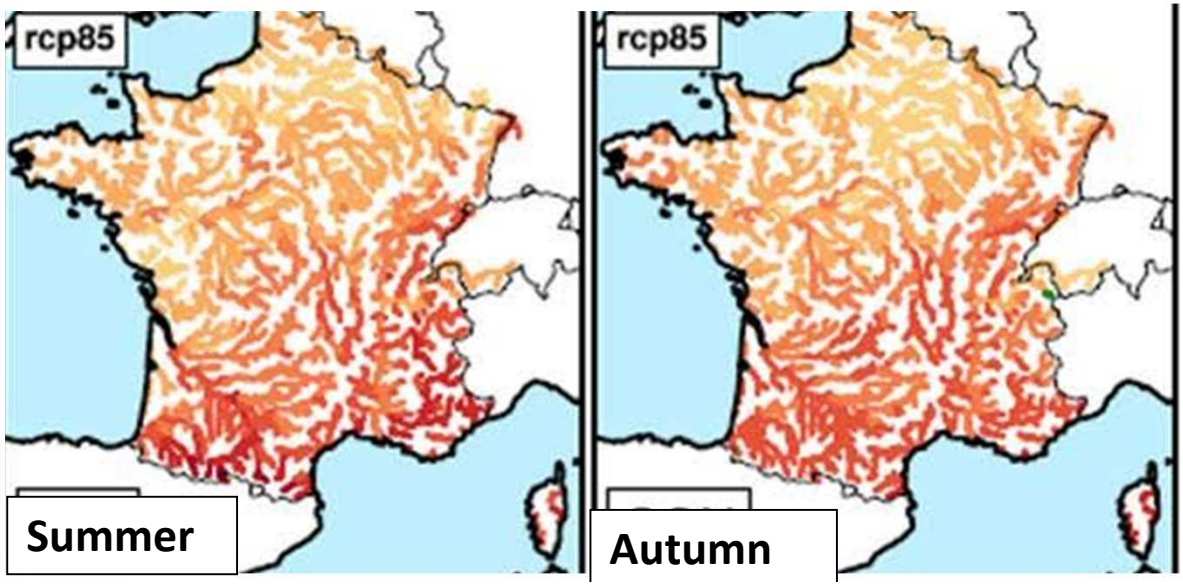
Why taking action on climate change?



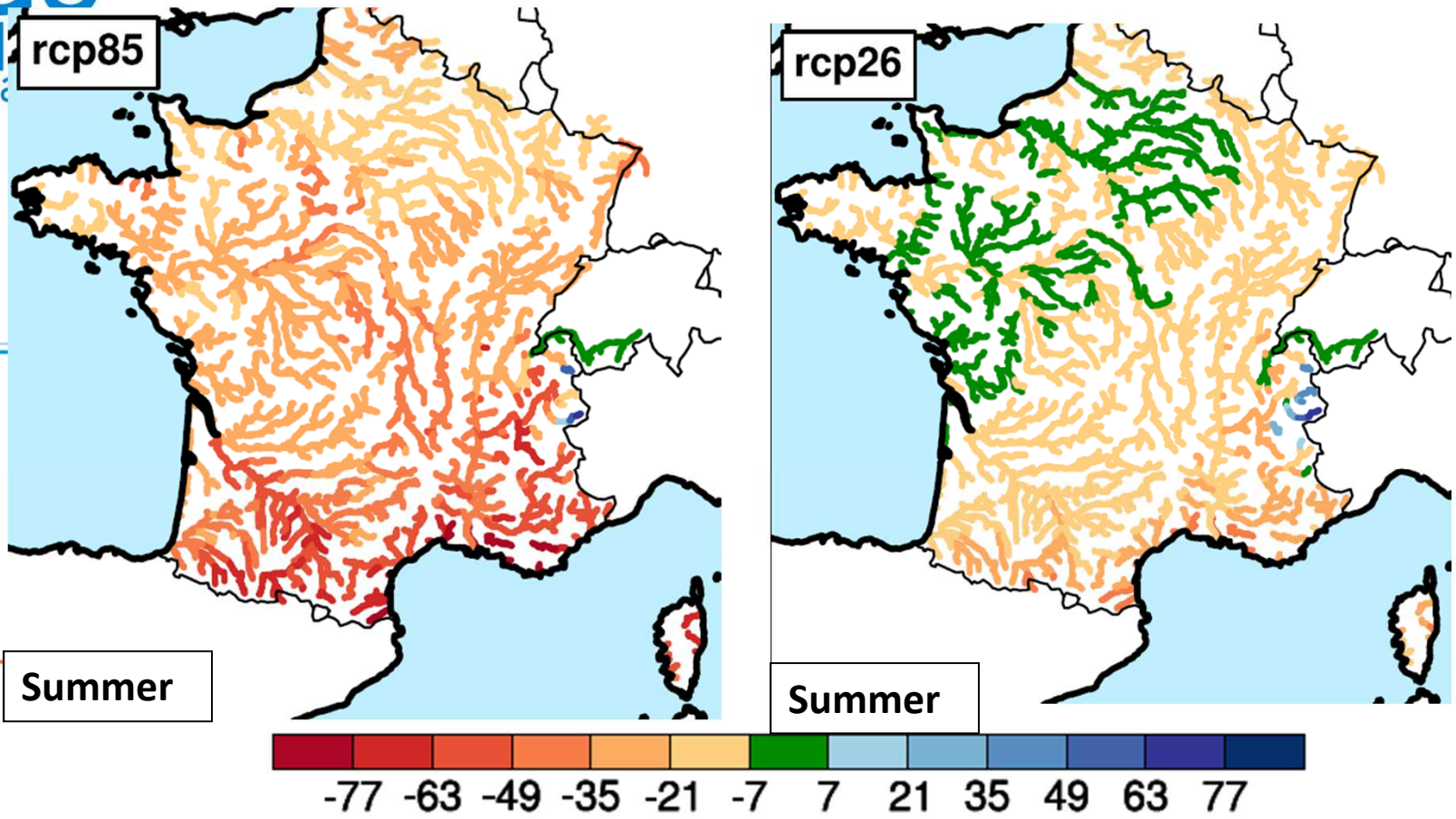
RCP8.5 = worse scenario but probably the trend-based scenario

Evolution of the seasonal river flows in France around 2100: Decrease of 30% of the river flows on Seine-Normandy river basin



ENSEMBLE DONNONS VIE À L'EAU
Agence de l'eau

Why taking action on climate change?



Reducing global carbon emissions would substantially reduce the impacts of climate change on river flows

Impacts of climate change on Seine-Normandy river basin

- ↑ Around 80cm of sea level rise
- ↑ Increase of around 2°C of surface water by 2100
- ↓ Reduction of rainsfalls by around 12% by 2100
- ↑ Increase of evapotranspiration around 23% by 2100
- ↓ Reduction of groundwater recharge by 30% by 2100

A strategy for climate change adaptation, what for?

- ✓ Disseminating information on climate change effects
- ✓ Mobilising water stakeholders by repositioning water policy into long term and global issues
- ✓ Inspiring planning documents with concrete actions

What objectives?

1- Reducing water dependency
2- Preserving water quality
3- Anticipating the consequences of coastal erosion and sea level rise
4- Preserving biodiversity and ecosystems services
5- Increasing infiltration to limit runoffs

What method?

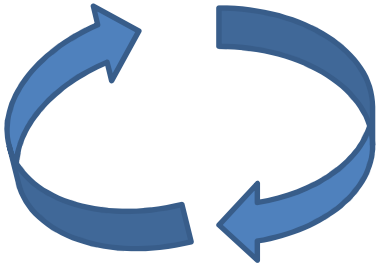
A collaborative strategy…

+ than 30 local and thematic meetings in 2016

17 experts from multiple fields

Water agency guidances

Projects and feedbacks from local representatives and stakeholders



Debates during river basin committees, working groups and local meetings

The expertise of the scientific community

…adopted unanimously by the river basin committee (185 members) in december 2016

Guidelines of the strategy for climate change adaptation

Guidelines for adaptation measures :

- ✓ Non regrettable measures, inexpensive, using few resources
- ✓ Multifunctional for environment
- ✓ Mitigating for climate
- ✓ Seeking for solidarity among different territories and actors

The cost of preventive measures is lower than the price of inaction

Strategic responses for river basin stakeholders

Declined in 46 actions and sub-actions and highlighting good practices already implemented on the river basin

A : Facilitate infiltration into the ground and revegetate cities

B : Restore the connectivity and the morphologyof watercourses and littoral environments

C : Co-produce local knowledge on climate

D : Develop sustainable agricultural and forestry systems

E : Reduce pollutions at its source

F : Decrease water consumption and optimize water withdrawal

G : Ensure the supply of drinking water

H : Deal with rising sea levels

I : Adapt the management of navigation

J : Enhance management and governance around the resource

K : Develop the follow-up and the knowledge

Experts committee opinion

- ✓ Increase the infiltration into the ground in urban and rural zones to better manage water quality, runoffs and low-flows
- ✓ Replanting riparian forest and arrange expanding floods areas
- ✓ Enhance the co-production of hydrologic and climatic knowledge
- ✓ Accompagny agriculture to resilient, diversify and water-saving systems
- ✓ Reducing pollutions directly at its source to limit risks on water quality

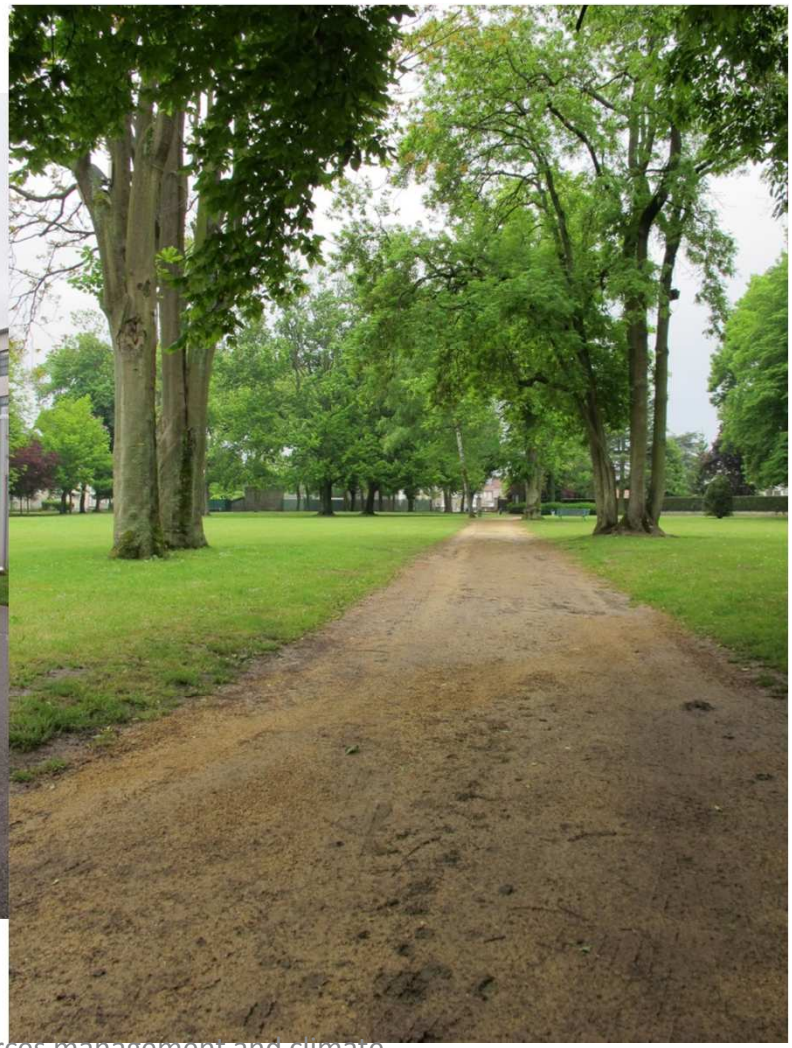
Some actions should remain as « last resort » :

- ⚠ Malaptation
- ⚠ Non mitigating

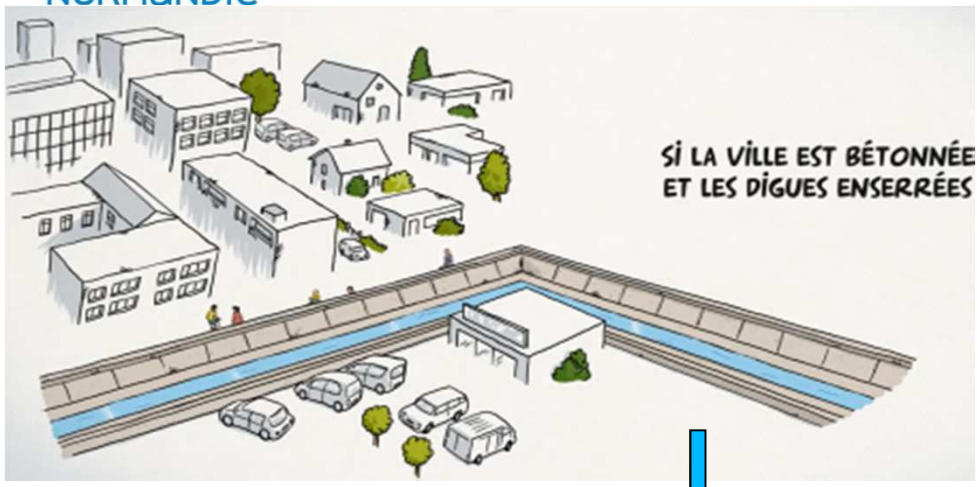
Structure of strategic responses

- **Made of local contributions**
- Key actor(s) : Local authority/industry/farmers etc
- Objective: quantity/quality/biodiversity/floods/coast/all
- Territory : urban/rural/coastal/all
- Links with mitigation
- Links with SDAGE and PGRI (planning document)
- Other legislation
- Indicative cost: From 1 to 3 (with examples)
- How to implement this action? : financial supports, tax incentives, law evolution, study, training etc
- Co-benefits : health, landscape, social,..
- Local examples

Facilitate infiltration into the ground and revegetate cities



Restore the connectivity and the morphology of watercourses : arranging expanding floods areas



And now, what is happening on Seine-Normandy river basin?

- We have sent the committment for adaptation to climate change to the 8300 elected representatives
- We organized events on climate change (international, national, local) to share views and questions
- We train our own services and fund special education actions
- We fund pilot projects to develop research and know-how
- We integrate a trend-based scenario for 2030 into our inventory report 2019
- We increased our support for the actions that the strategy recognized as more important and we seek for a better incentive
- We elaborate comon action plan with some impacting actors
- We will integrate climate change into agreements with local authorities

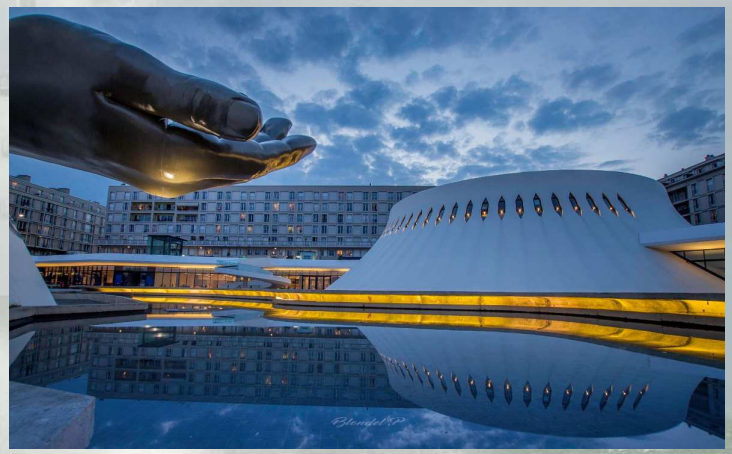
L'efficacité de l'adaptation de tous dépendra du niveau d'ambition de chacun

The effective adaptation of all will depend on the level of ambition of each

Climate change and its requirements

to manage major risks

in Seine estuary and Le Havre



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RISQUES MAJEURS

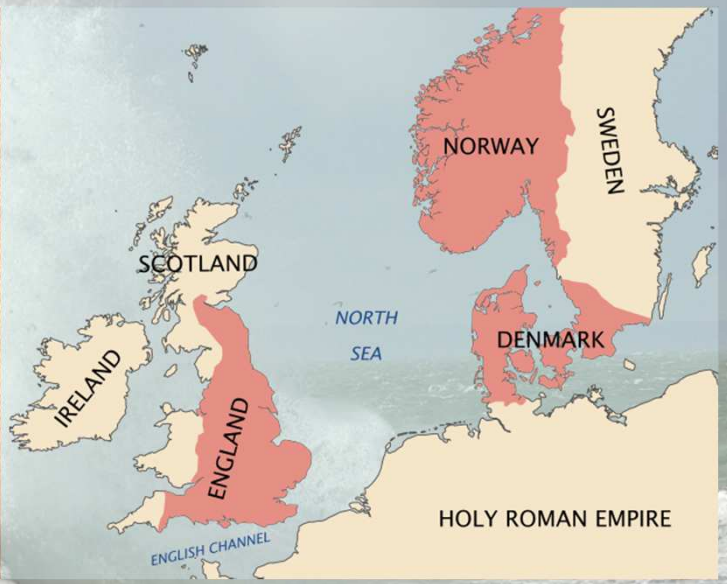
Pascal
MALLET

ORMES
Observatoire des Risques Majeurs de l'Estuaire de la Seine
Animateur
Commission
SURCOTES MARINES

D'après la légende de Knut le Grand (roi de Danemark , de la Norvège et de l'Angleterre) :

Quoique le Roi décide, quoiqu'il exige,

la mer et la marée fluent et refluent sans son consentement !



To be rational and realist !

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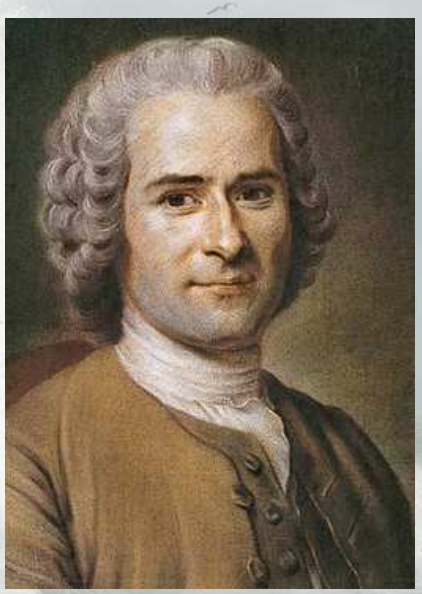
Depuis Jean Jacques Rousseau (XVIIIème s.),

les catastrophes naturelles

relèvent aussi de la responsabilité humaine



To be responsible !

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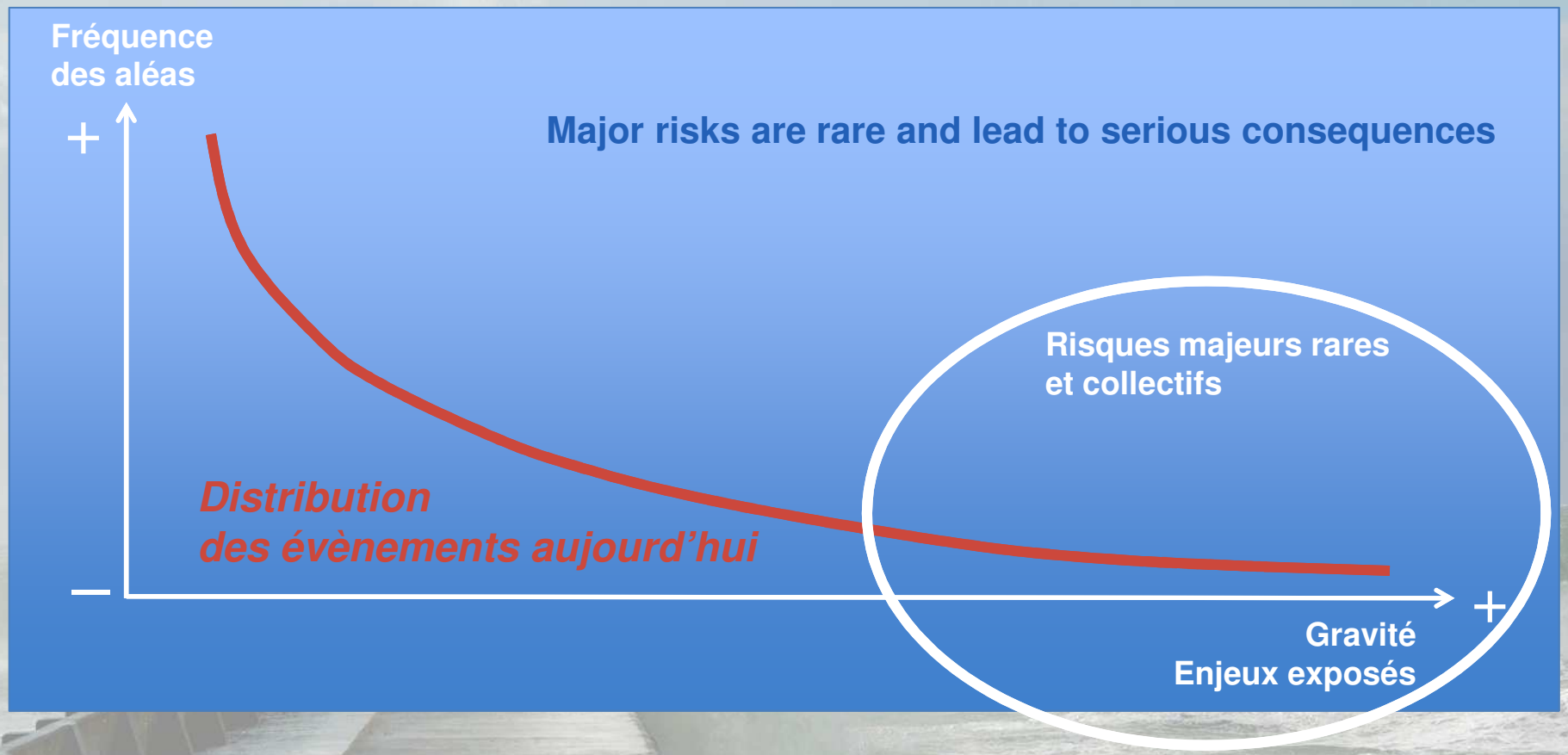
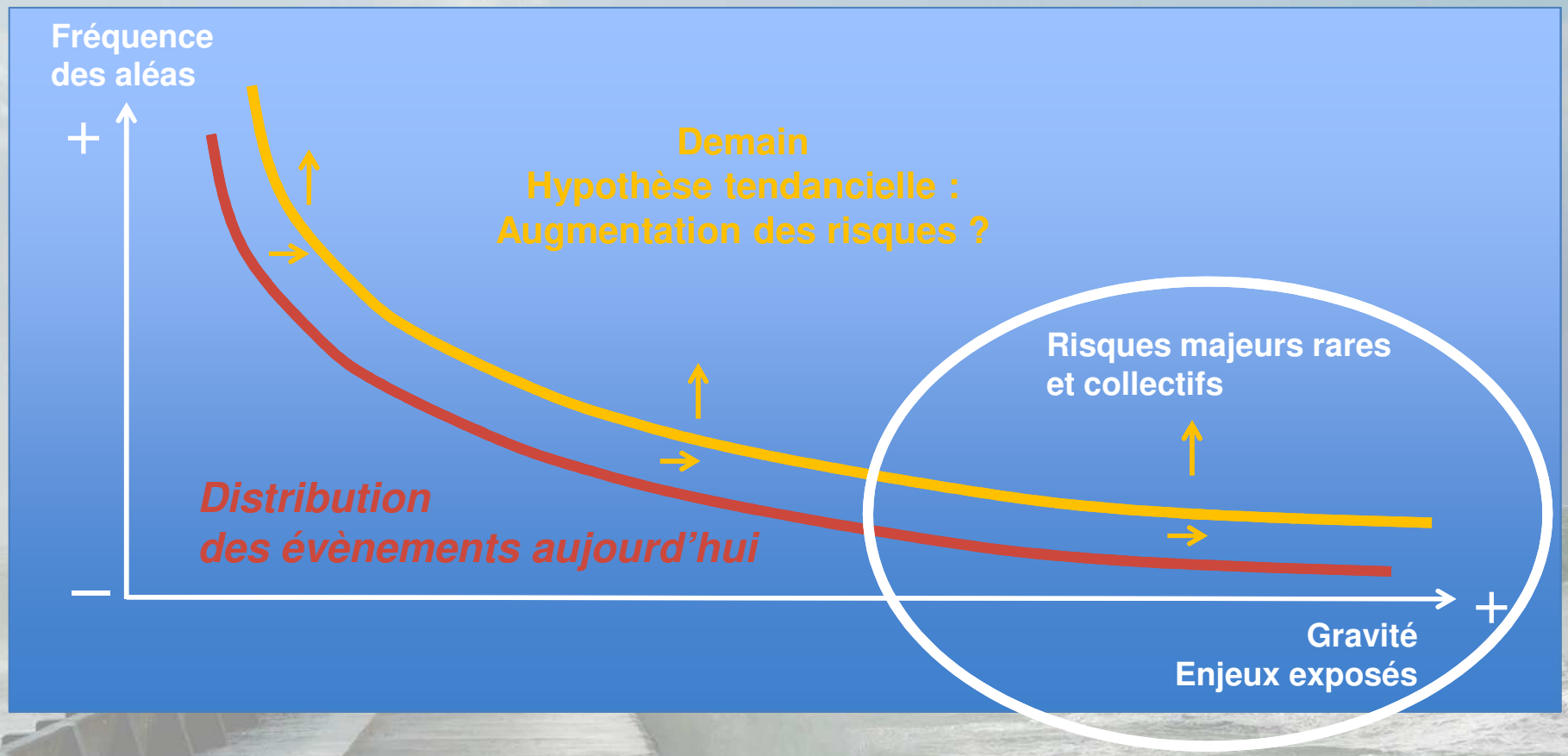
Climate change and its requirements to manage major risks in Seine estuary and Le Havre

What are major risks ?



Climate change and its requirements to manage major risks in Seine estuary and Le Havre

What are major risks and how to deal with them in the future ?



Two management approaches : issues or/and hazards ?

1) action on existing and future issues ?

2) action on evolution of natural hazards ?

Climate change and its requirements to manage major risks in Seine estuary and Le Havre

1 - What issues ? Land management, its consequences and stakeholders

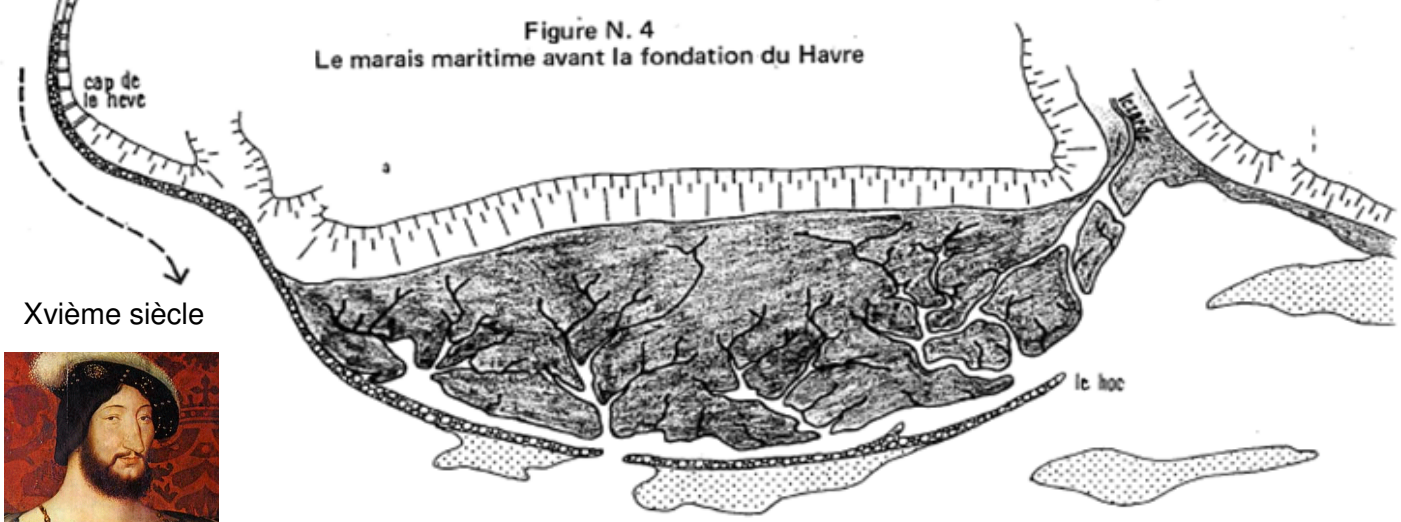
Climate change and its requirements to manage major risks in Seine estuary and Le Havre

Seine estuary : a territory highly modified by human activities for the 500 past years ?

Le marais maritime avant le Havre

Tidal Swamp upstream before Le Havre

Figure N. 4
Le marais maritime avant la fondation du Havre



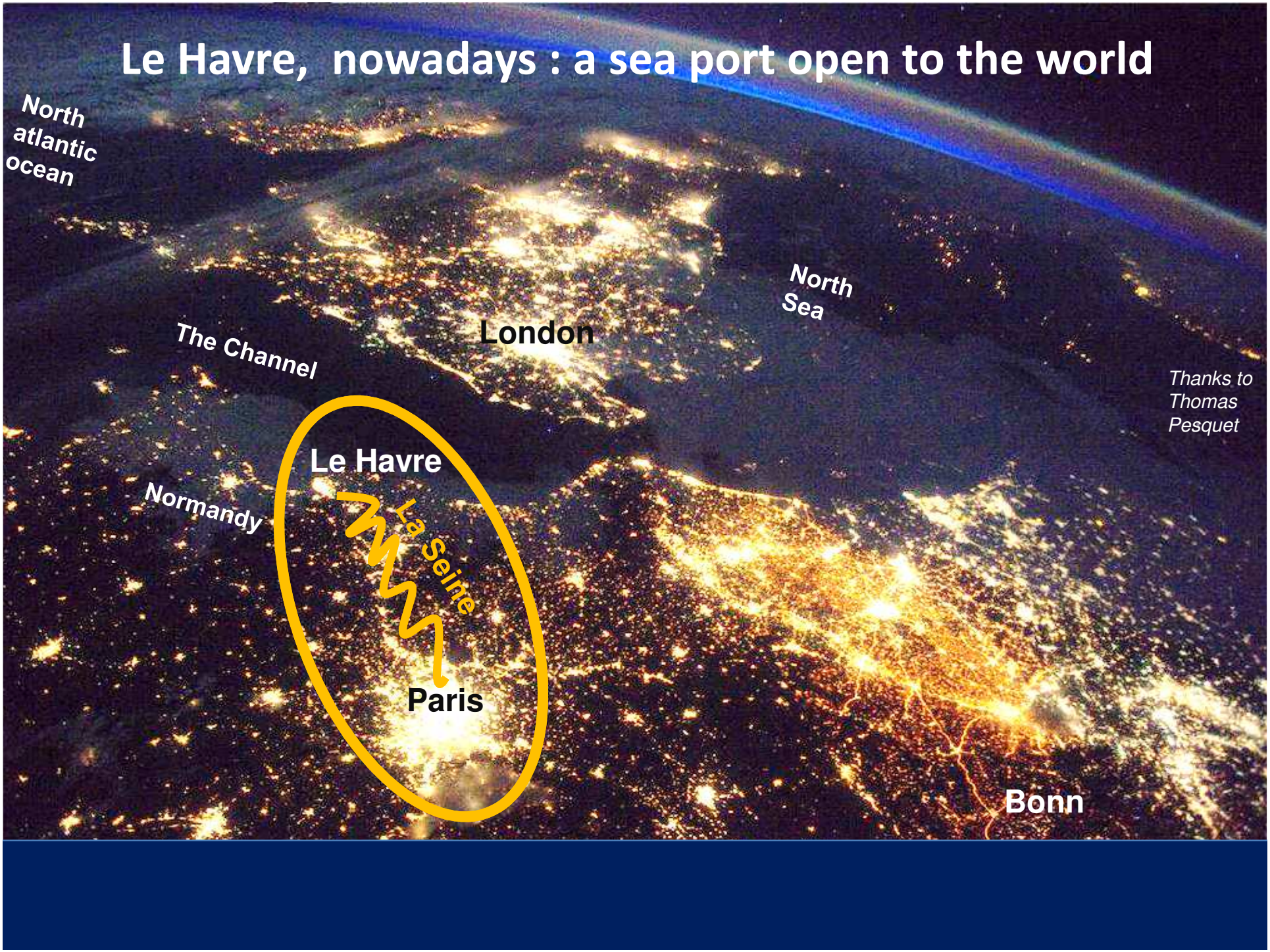
Xvième siècle

Seine estuary

courant d'antifer
falaise
talus
cordon littoral
herbus et vasieres
chenaux et crique
bancs mobiles de l'estuaire

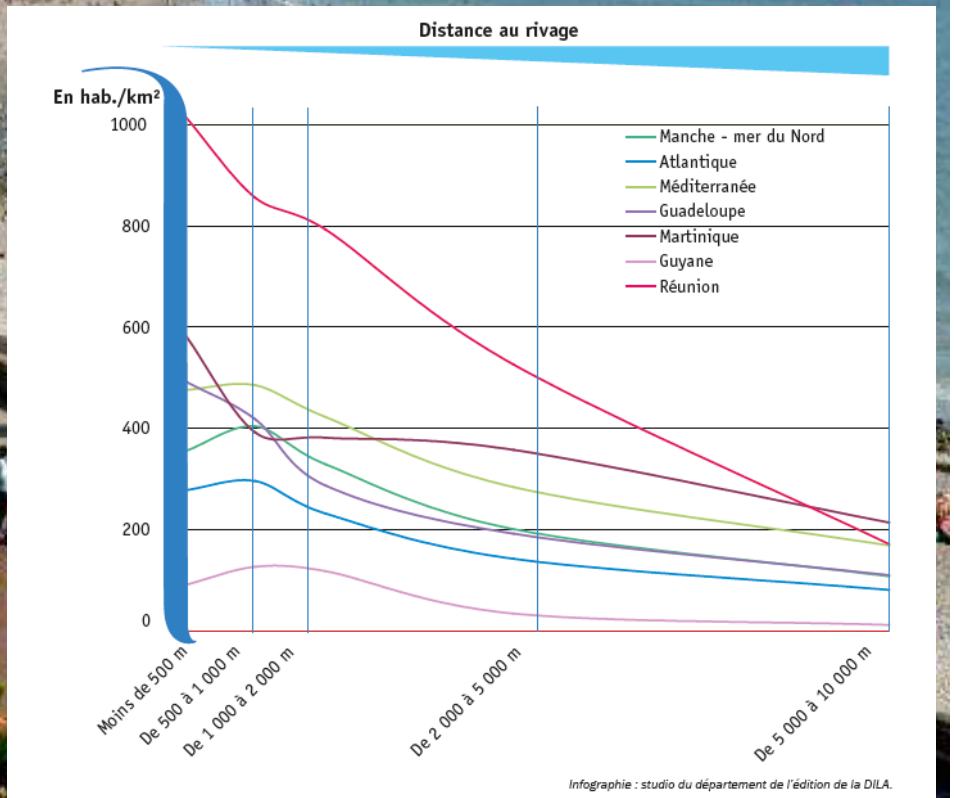
CL. LECHEVALIER - 1974

Le Havre, nowadays : a sea port open to the world



Climate change and its requirements to manage major risks in Seine estuary and Le Havre

An important population growth along the coast of Le Havre and France



Infographie : studio du département de l'édition de la DILA.

Figure 4 – Estimation de la densité de population sur le littoral en fonction de la distance à la mer

Source : UE-SOeS, CORINE Land Cover, 2006 – © IGN, BD Carto® , occupation des sols, 2000 – Insee, Contours Iris 1999 et 2006. Traitements : SOeS (Observatoire national de la mer et du littoral).

Le littoral dans le contexte du changement climatique - Rapport au Premier ministre et au Parlement - ONERC 2015
La documentation Française

Climate change and its requirements to manage major risks in Seine estuary and Le Havre

How to protect 400,000 inhabitants and develop economics activities

MAIN ECONOMIC SECTORS IN LE HAVRE & ITS REGION

A major industrial hub

- 1st French chemical platform
  - More than 5,275 kilotons of products / year
- 1st French petrochemical complex
  - 24.3 tons of crude oil processed / year
  - The 2 largest refineries in France

MAIN ECONOMIC SECTORS IN LE HAVRE & ITS REGION

A leading logistics hub

- 1.4 million sqm of warehouses, 350,000 sqm planned
- 600 companies – 17,000 professionals
- Customs clearance in less than 5 min
- Postponed TVA payment procedure

1 200 ÉTABLISSEMENTS SUR ZONE INDUSTRIELLE PORTUAIRE DU HAVRE, **SOIT 31 000 EMPLOIS** (2015)

1ER PÔLE PÉTROCHIMIQUE FRANÇAIS

1ER PORT MONDIAL POUR LE TRANSPORT DES VINS ET SPIRITUEUX

400 000 CROISIÉRISTES ATTENDUS EN 2017

LE HAVRE : UNE ZONE D'EMPLOI DE **400 570 HABITANTS** (en 2013)

1ÈRE PLATEFORME FRANÇAISE POUR L'IMPORT-EXPORT DE VÉHICULES NEUFS

UN PORT ACCESSIBLE **24H/24 ET 7 JOURS /7** SANS CONTRAINTE DE MARÉE

PLUS DE **135 000 EMPLOIS** (2015) SUR LA ZONE D'EMPLOI, DONT 20 % DANS L'INDUSTRIE ET 41,8 % DANS LE COMMERCE, LES TRANSPORTS ET LES SERVICES

151 ESCALES DE NAVIRES DE CROISIÈRE PROGRAMMÉES EN 2017

600 ports RELIÉS

1ER PORT FRANÇAIS POUR LE COMMERCE EXTÉRIEUR

PLUS DE **15 000 ÉTABLISSEMENTS** DANS L'AGGLOMÉRATION HAVRAISE **SOIT 88 360 EMPLOIS** SUR LE TERRITOIRE DE LA CODAH

Positive Planet FR @PositivePlanetF · 4 h
#PositiveINFO Le Havre fête ses 500 ans ! Une ville engagée dans le développement économique et social des banlieues lehavre.fr/ma-ville/le-ha... pic.twitter.com/ILIvaTjqSA
Le Havre, CODAH, LeHavre et 3 autres

MAIN ECONOMIC SECTORS IN LE HAVRE & ITS REGION

A dynamic services sector

- 70,000 jobs, more than **42% of the working population**
- **Know-how in international trade, engineering, insurance, customer relationship management**

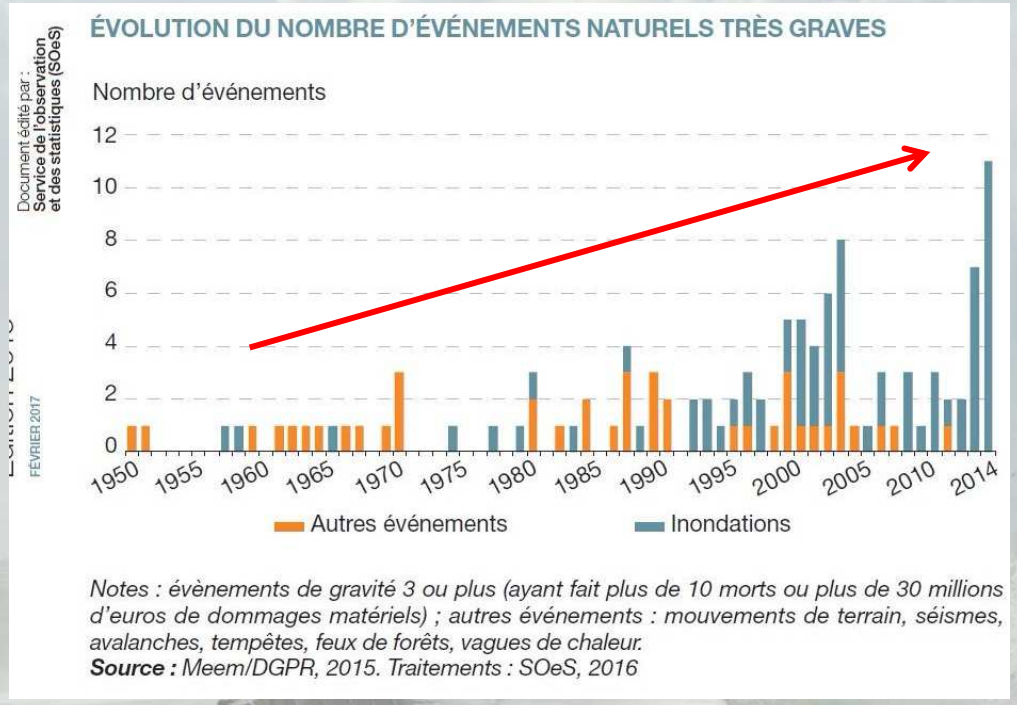
MAIN ECONOMIC SECTORS IN LE HAVRE & ITS REGION

A leading logistics hub

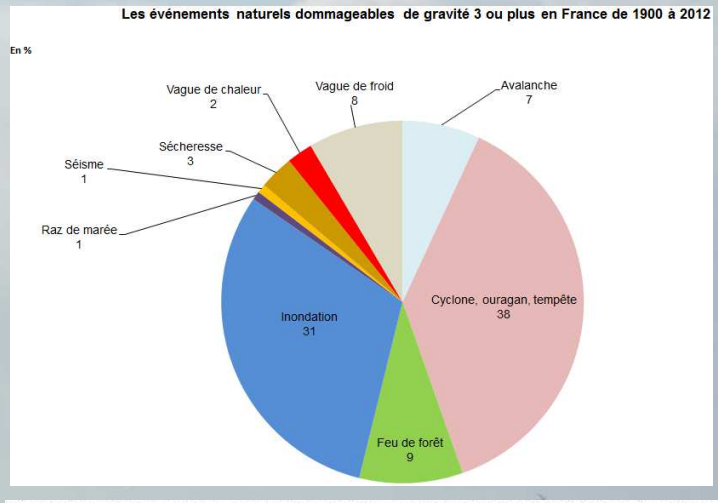
- 1st French port for international trade, containers traffic
- **More than 66 million tons** of good handled in 2016
- Connected to **more than 600 ports** (75 regular lines)
- Able to berth **the biggest ships 24-7**

Climate change and its requirements to manage major risks in Seine estuary and Le Havre

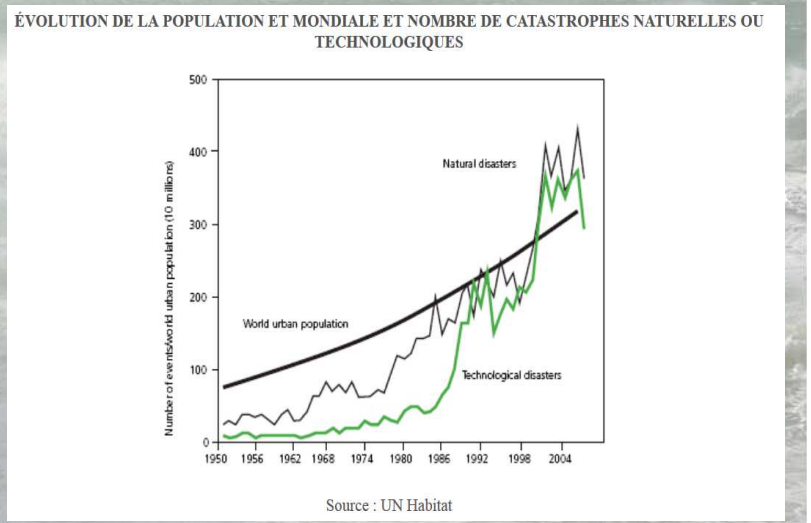
Past observation show an aggravation of natural risks in France and all over the world



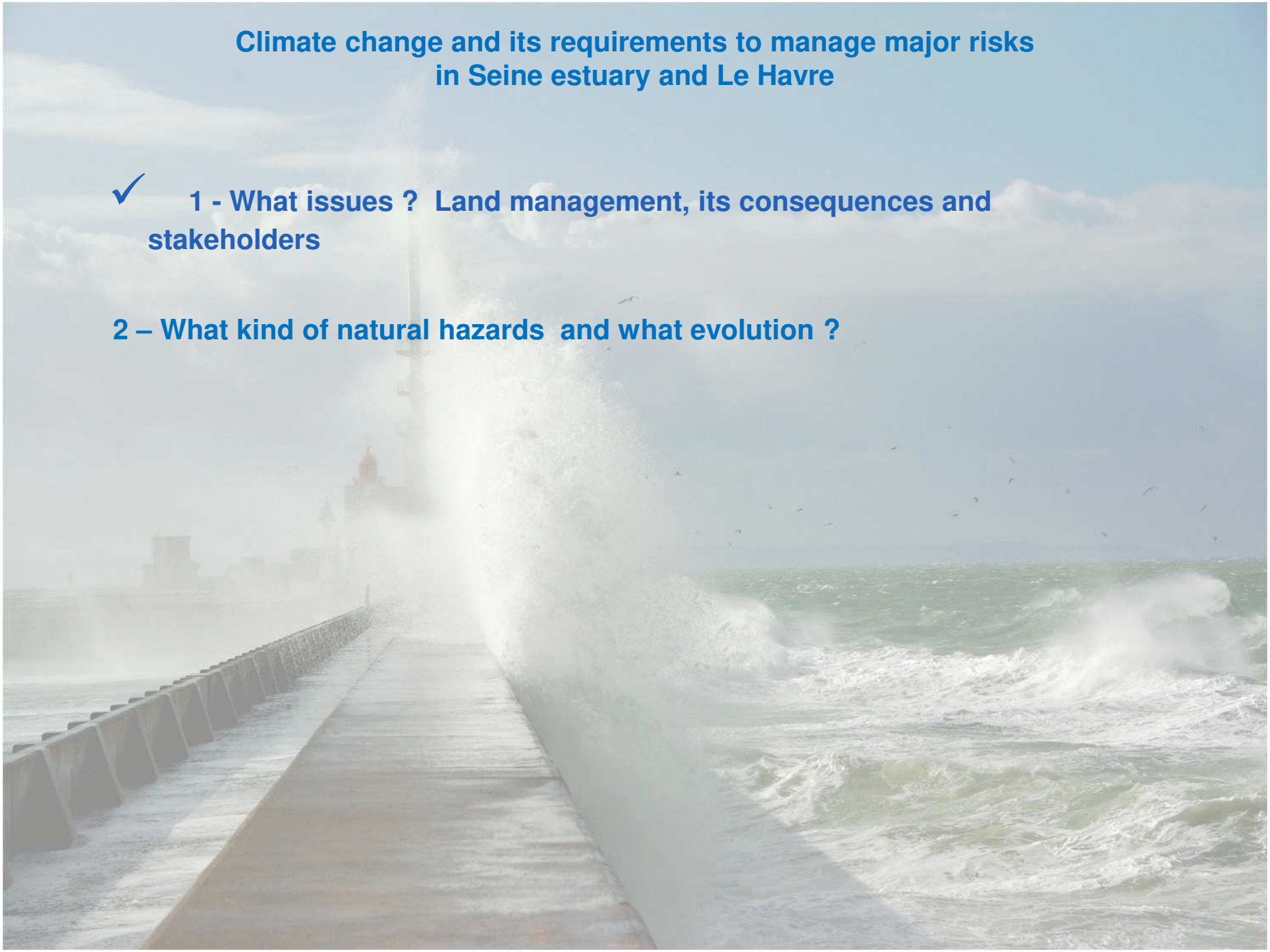
Notes : évènements de gravité 3 ou plus (ayant fait plus de 10 morts ou plus de 30 millions d'euros de dommages matériels) ; autres événements : mouvements de terrain, séismes, avalanches, tempêtes, feux de forêts, vagues de chaleur.
Source : *Meem/DGPR, 2015. Traitements : SOeS, 2016*



Note : événements de gravité 3 ou plus ayant fait plus de 9 morts ou touché plus de 99 personnes ou ayant fait l'objet d'une déclaration d'état d'urgence ou d'un appel à l'aide internationale. Il est possible que le recensement des événements de gravité 3 ne soit pas exhaustif (notamment pour les événements ayant eu lieu entre 1900 et 1950).
Source : EM-DAT: The OFDA/CRED International Disaster Database, www.emdat.be - Université catholique de Louvain - Brussels - Belgium, 2012



http://www.senat.fr/rap/r10-594-1/r10-594-1_mono.html



Climate change and its requirements to manage major risks in Seine estuary and Le Havre

✓ 1 - What issues ? Land management, its consequences and stakeholders

2 – What kind of natural hazards and what evolution ?

Climate change and its requirements to manage major risks in Seine estuary and Le Havre

Modification of climate conditions and its consequences on meteorological events

Natural hazard ? ++ runoff + + floods ++ heat waves

Spécificication of estuaries :

++ marine subversions

- **+ marine storms (waves, maritime surge levels)**
- **+ mean sea level rise =**
  - **- less safety of coastland**
- **+ coastline retreat**
- **+ saltwater intrusion (impact water withdrawals)**

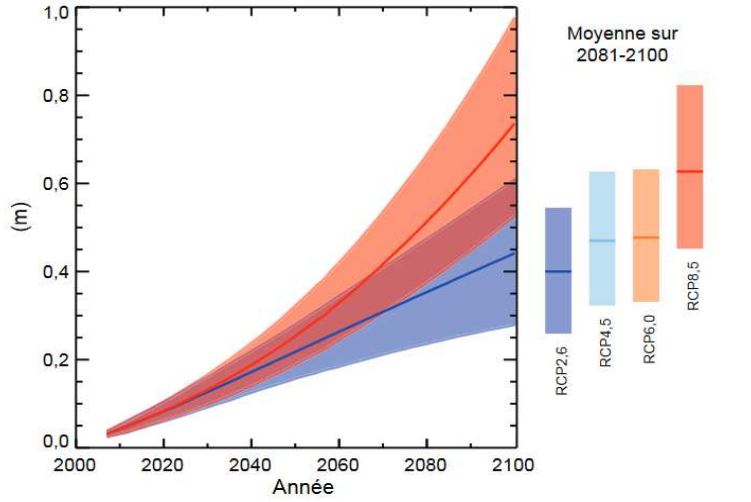


Figure B6 – Projections de l'élévation du niveau moyen global de la mer au XXIe siècle relativement à 1986-2005 pour les deux scénarios d'émission RCP2.6 et RCP8.5. Les plages de couleur autour des courbes correspondent à l'intervalle d'un changement « probable » (67 % de chance). Les barres verticales correspondent à un changement « probable » de la moyenne de la période 2081-2100 pour tous les scénarios RCP, et les barres horizontales aux valeurs médianes associées.

Source : IPCC (2013), Figure SPM.9.

Hypothèse d'évolutions globales en cm du niveau de la mer (ONERC, 2010)

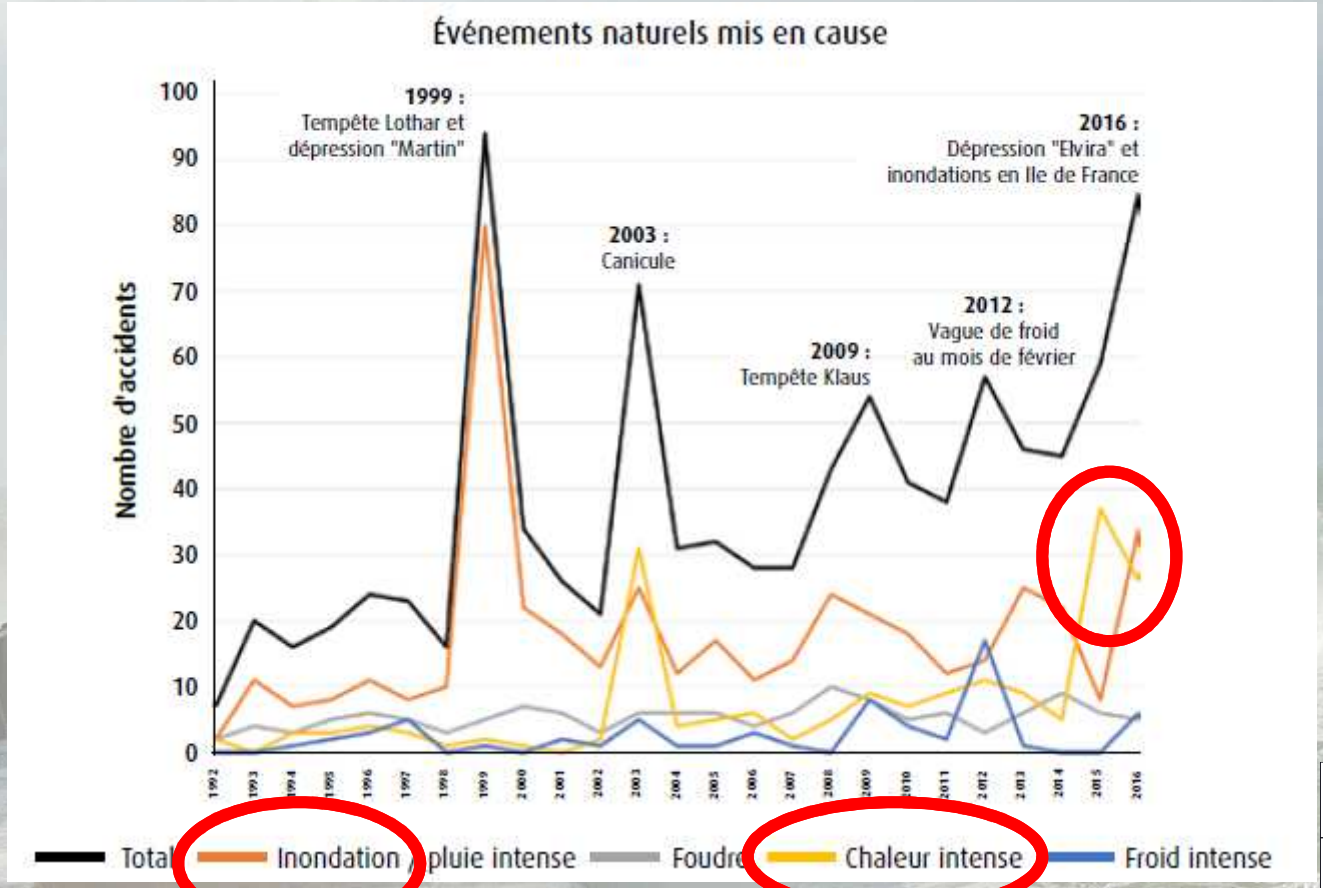
Hypothèse	2030	2050	2100
Optimiste	10	17	40
Pessimiste	14	25	60
Extrême	22	41	100

ONERC
Observatoire National sur les Effets du Réchauffement Climatique

Climate change and its requirements to manage major risks in Seine estuary and Le Havre

++ emerging topic : NaTech Risk (domino effects), natural and technological risks

Technological accidents in France linked to natural events « installations classées »



Bureau d'Analyse des Risques et Pollutions Industriels

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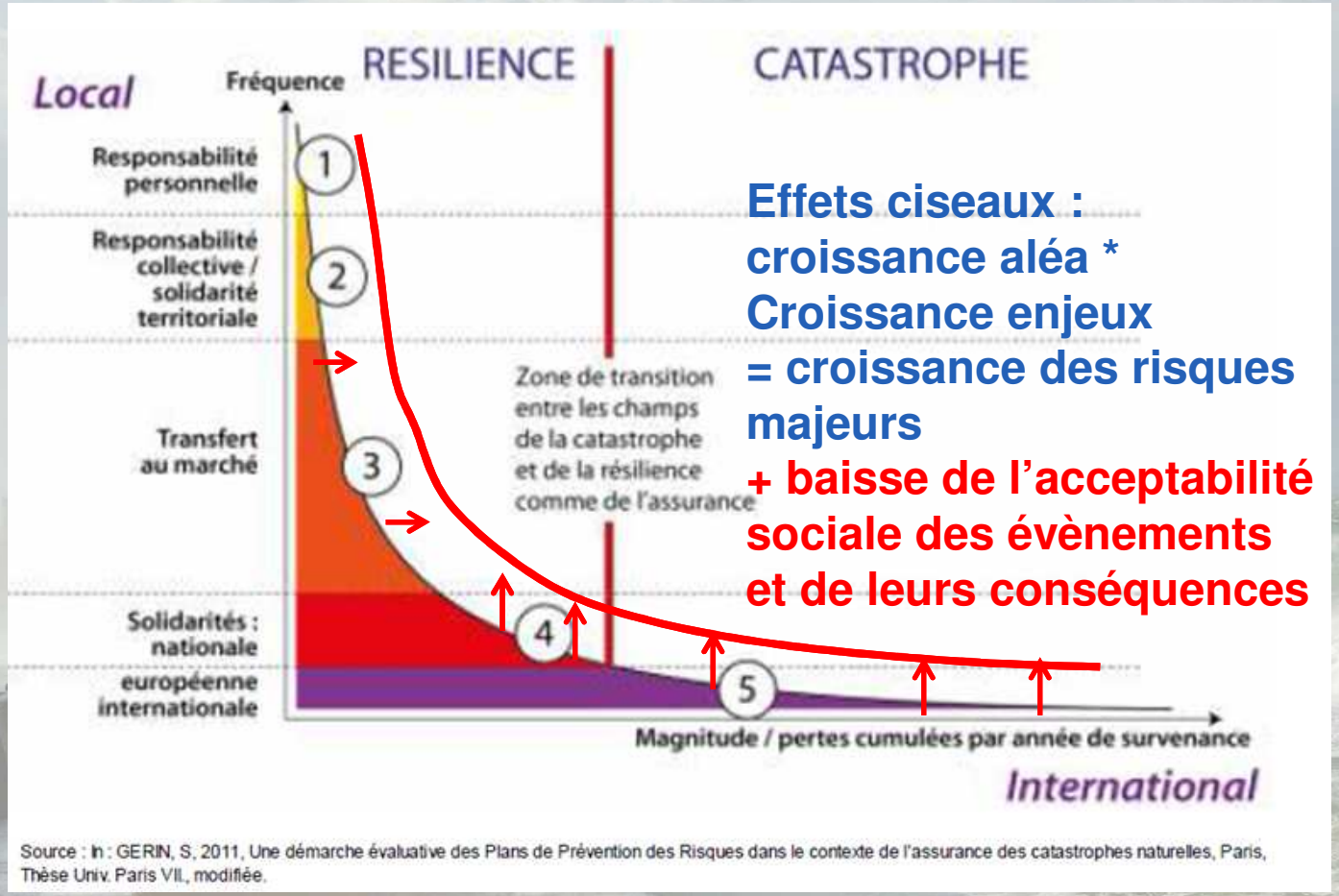
Climate change and its requirements to manage major risks in Seine estuary and Le Havre

The rise of hazards combined with the rise of issues is verified and become the challenge for the future



Source : In : GERIN, S, 2011, Une démarche évaluative des Plans de Prévention des Risques dans le contexte de l'assurance des catastrophes naturelles, Paris, Thèse Univ. Paris VII., modifiée.

Climate change and its requirements to manage major risks in Seine estuary and Le Havre

A population that become aware

of an aggravation of major risks

and that launches collectively actions

to a better adaptation

Climate change and its requirements to manage major risks in Seine estuary and Le Havre

1st step : a local approach of co-constructing a knowledge base on marine submersion thanks to an association dedicated to major risks management of Seine estuary « ORMES »

ORMES
Office des Risques Majeurs de l'Estuaire de la Seine

Local round-table of stakeholders

Integration of local knowledge with additional scientific and technical knowledge can improve disaster risk reduction and climate change adaptation (*high agreement, robust evidence*)

Commission « maritime surge levels » (CTeeSMES)

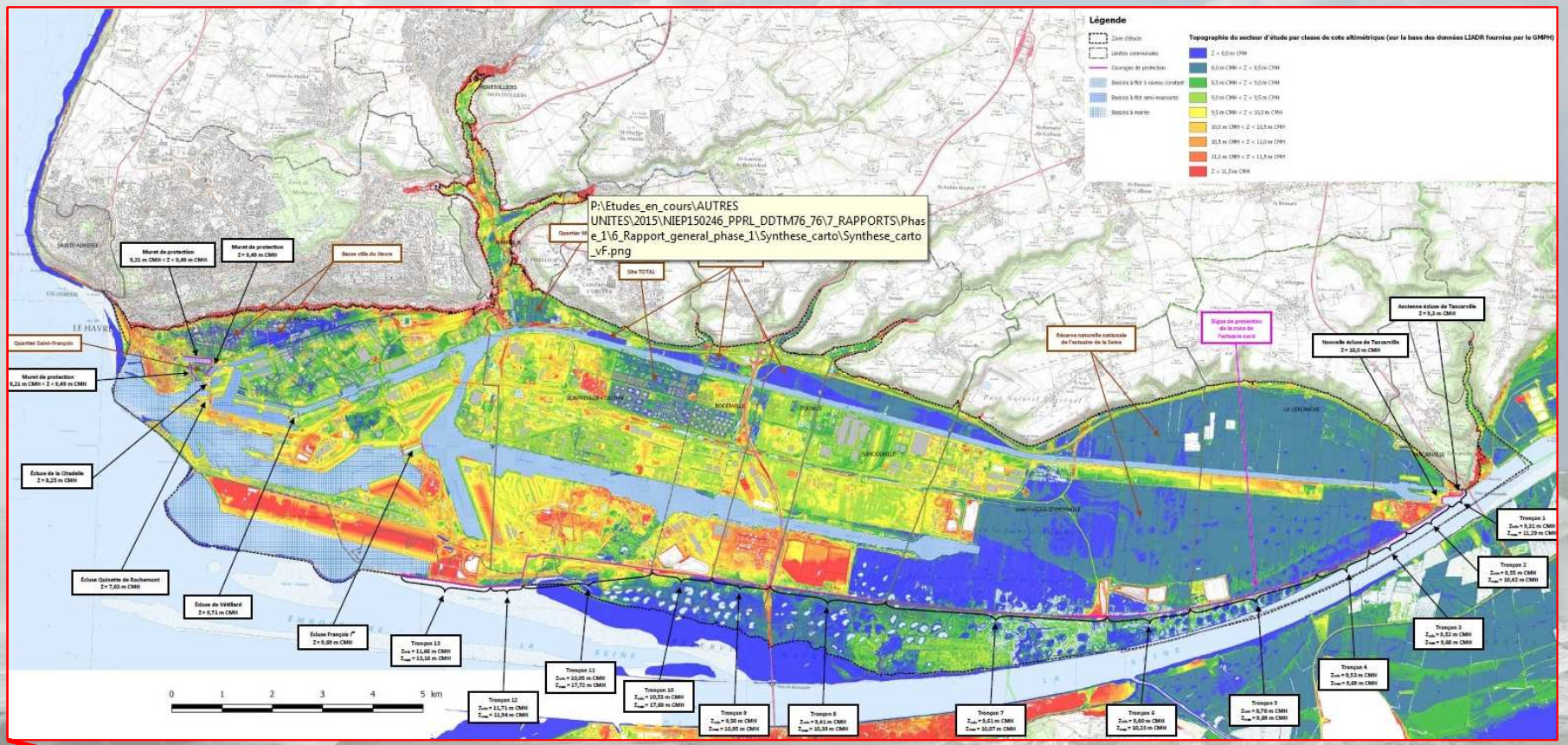
Interdisciplinary working group of local stakeholders and researchers

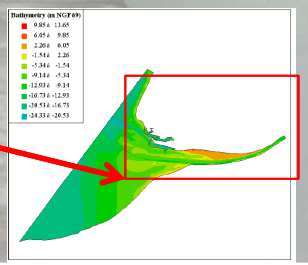
For a better knowledge of :

- water levels and wave heights near the coast;
- to determine the location of water entrance in inlands and to calculate the volumes of waters inside harbour basins, at the mouth of the Seine Estuary and in storage areas of the floodplain;
- to get a better knowledge of the exposure of elements at stake to submersion hazard.

Climate change and its requirements to manage major risks in Seine estuary and Le Havre

Example : improve accurate knowledge on topography : coproducing a lidar over estuary





+ bathymetry

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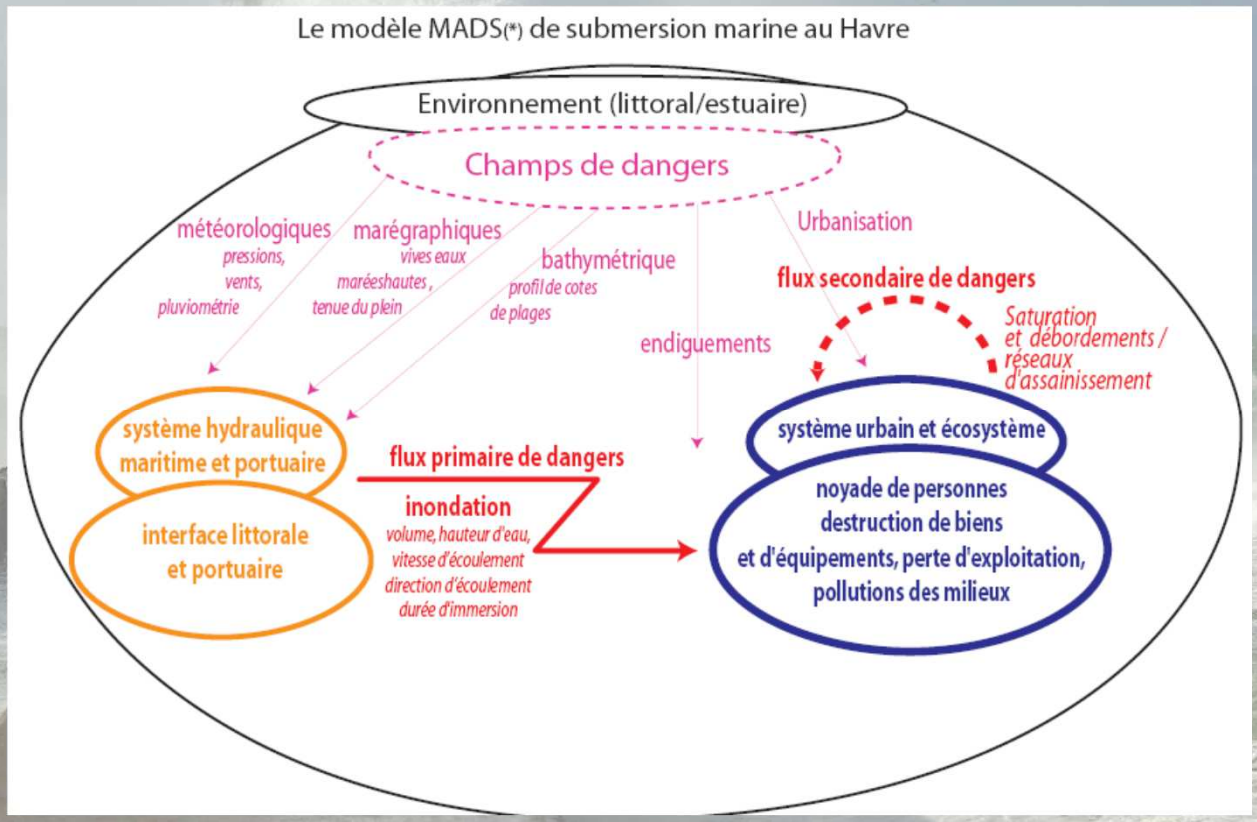
Simple but essential question :

Where would sea flood expand ?

Cindyniques conceptual model

CODAH-DIRM



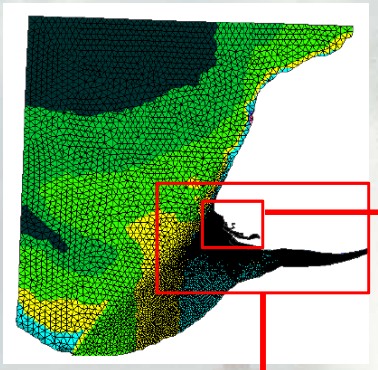
M. Deglaire, P. Mallet 2010

Climate change and its requirements to manage major risks in Seine estuary and Le Havre

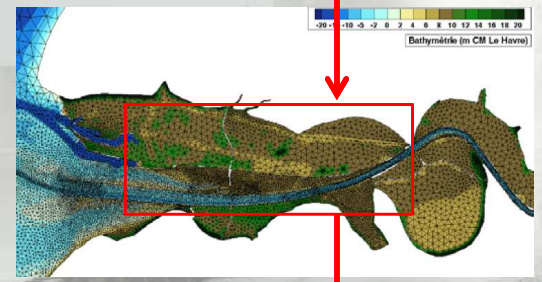
Simple but essential question :

Where would sea flood expand ?

Model« SEA »
CEREMA

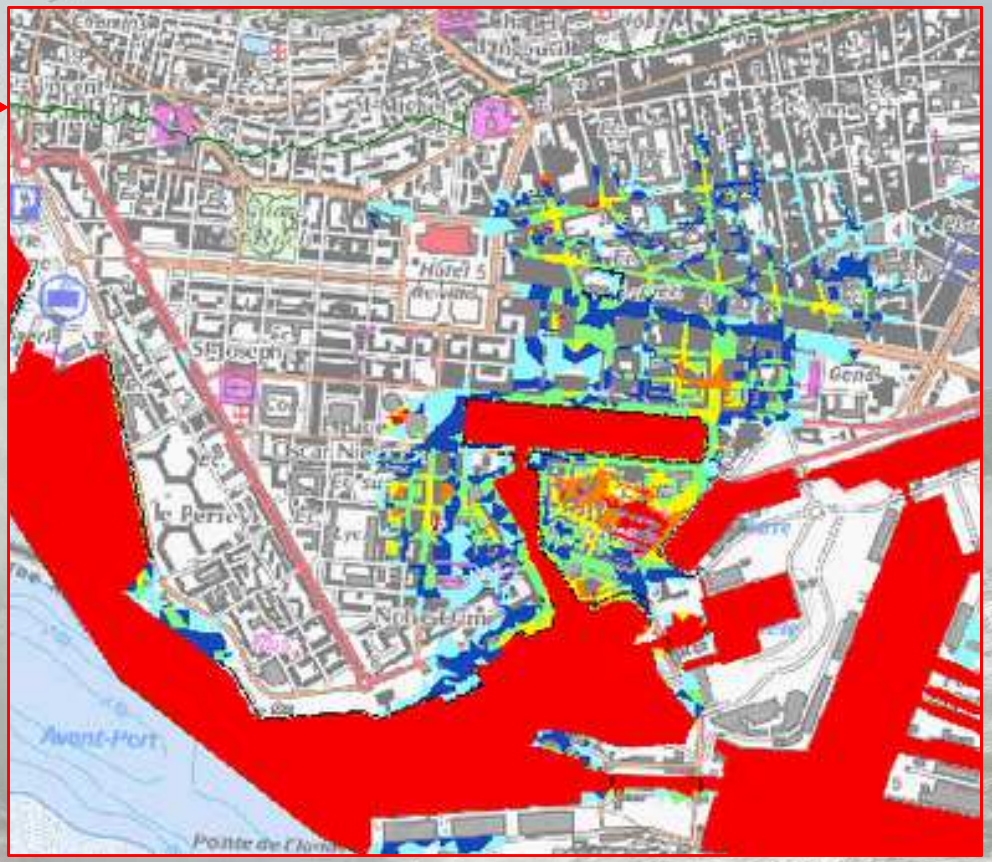


Modele «SEINE RIVER »
GIP SEINE AVAL



Model « coastal defence structures »
GPMH

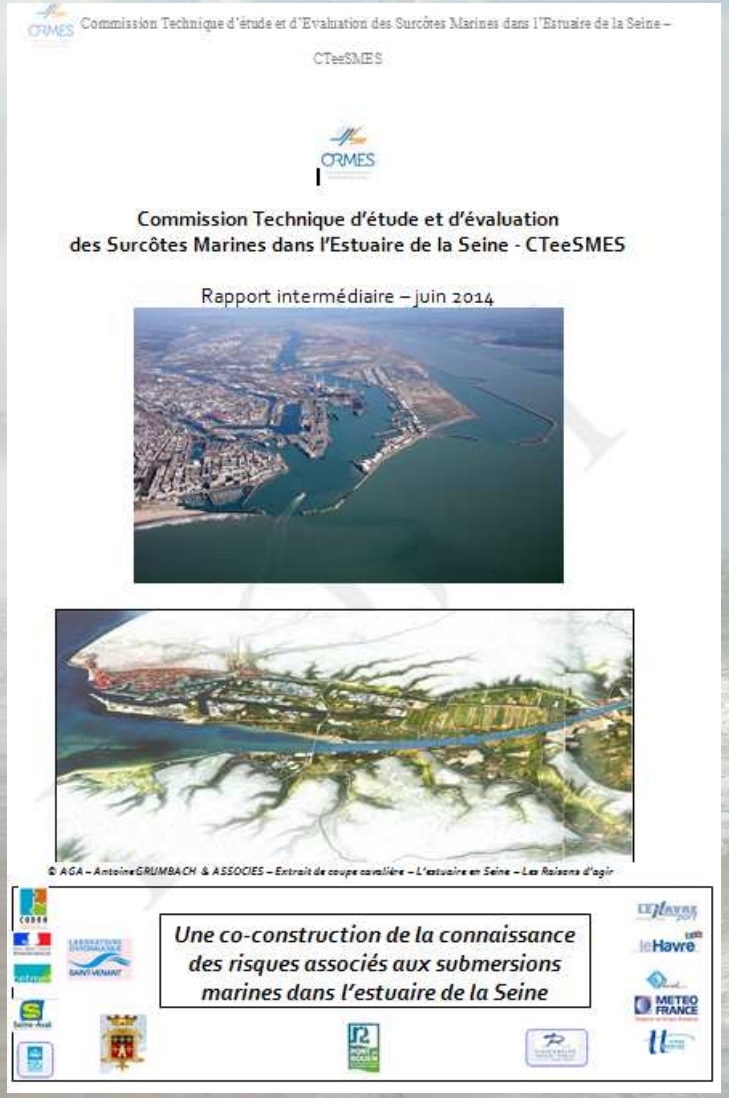
hydrodynamic model « LE HAVRE CITY »
CODAH-DCE



Coupling of four hydrodynamic models to get a integrated picture of major risks

Climate change and its requirements to manage major risks in Seine estuary and Le Havre

Sharing research results by publications



Climate change and its requirements to manage major risks in Seine estuary and Le Havre

2nd step : emergence of potential collective actions

AXIS 1 – get organized !

Early warning, warning, assistance, safeguard, business continuity, recovery process, etc.

AXIS 2 – Dynamic flow management

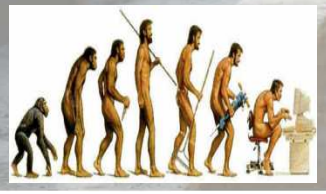
Floodgates, etc.

AXIS 3 : Prevention, land and urban management, architecture, lanscape design

Innovation & résilient urban conception (Build better and Build back better).

AXIS 4 : Civil engineering protections

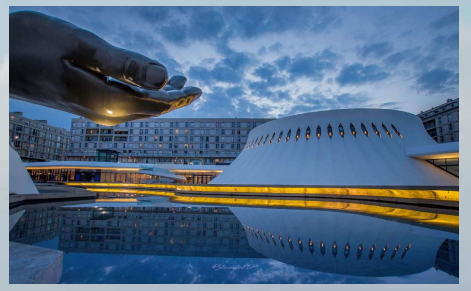
Technological systems, networks, building protection, coastal defence structures



AXIS 5 : Develop and take advantage of our knowledge, our risk culture :
=>> formation and communication

Climate change and its requirements to manage major risks in Seine estuary and Le Havre

Any questions and see you in Le Havre



LE HAVRE – NORMANDY

Live in Le Havre

- **Live by the seaside**
  - A 2-km long beach in the town centre
  - All the watersports available: sailing, paddle, kitesurf, rowing, canoe-kayak...
  - Near famous seaside towns such as Deauville, Trouville, Etretat, Honfleur...
- Easy moves: **one of the shortest average commuting time in France** (19 min vs 26 min for comparable conurbations and 36 min for Paris region)
- One of the greenest cities in France with 750 ha of gardens and parks into the city, more than 40 m² per resident

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BONN 2017

CODAH Communauté de l'Agglomération Havraise
Directeur-adjoint RISQUES MAJEURS

Pascal MALLET

ORMES Observatoire des Risques Majeurs de l'Estuaire de la Seine
Animateur Commission SURCOTES MARINES

Climate change and its requirements to manage major risks in Seine estuary and Le Havre

ANNEXE : L'adaption, une réponse adaptée…?

Scenario	Inondations fluviales et côtières		Inondations urbaines		Sécheresses géotechniques	
Actuel	1,8		0,6		0,6	
Scenario d'émission	Augmentation des inondations fluviales et côtières		Augmentation des inondations urbaines		Augmentation des sécheresses géotechniques	
	Sans adaptation	Avec adaptation	Sans adaptation	Avec adaptation	Sans adaptation	Avec adaptation
Elevé	26,5	1,8	12,8	5,5	0,9	N/A
Bas	7,3	3,3	3,7	0,6	0,4	N/A

Tableau 18 : Estimation de l'évolution du coût annuel moyen des dommages en fonction de la mise en œuvre de mesures d'adaptation pour les pouvoirs publics (source : ABI, 2006)

Sarah Gérin 2011: inondations fluviales et côtières, les inondations urbaines et la sécheresse géotechnique, sur l'ensemble du territoire du Royaume-Uni à l'horizon 2080. **L'étude** (ABI, 2006) **prévoit une forte augmentation des coûts, en l'absence de mesures de mitigation et d'adaptation**. Cette augmentation pourrait atteindre 20 fois les coûts actuels pour les inondations urbaines. Cette étude met également l'accent sur l'importance des facteurs socio-économiques qui peuvent conduire à des effets inattendus. Ainsi, elle met en évidence que dans un contexte de forte croissance économique, de hauts scénarios d'émissions pourraient conduire à un plus grand intérêt des mesures adaptatives, en produisant une réponse plus efficace que les conditions économiques le permettraient sous un scénario d'émission bas. »

Le

Conservatoire du littoral

Coastal wetlands management and Climate Change

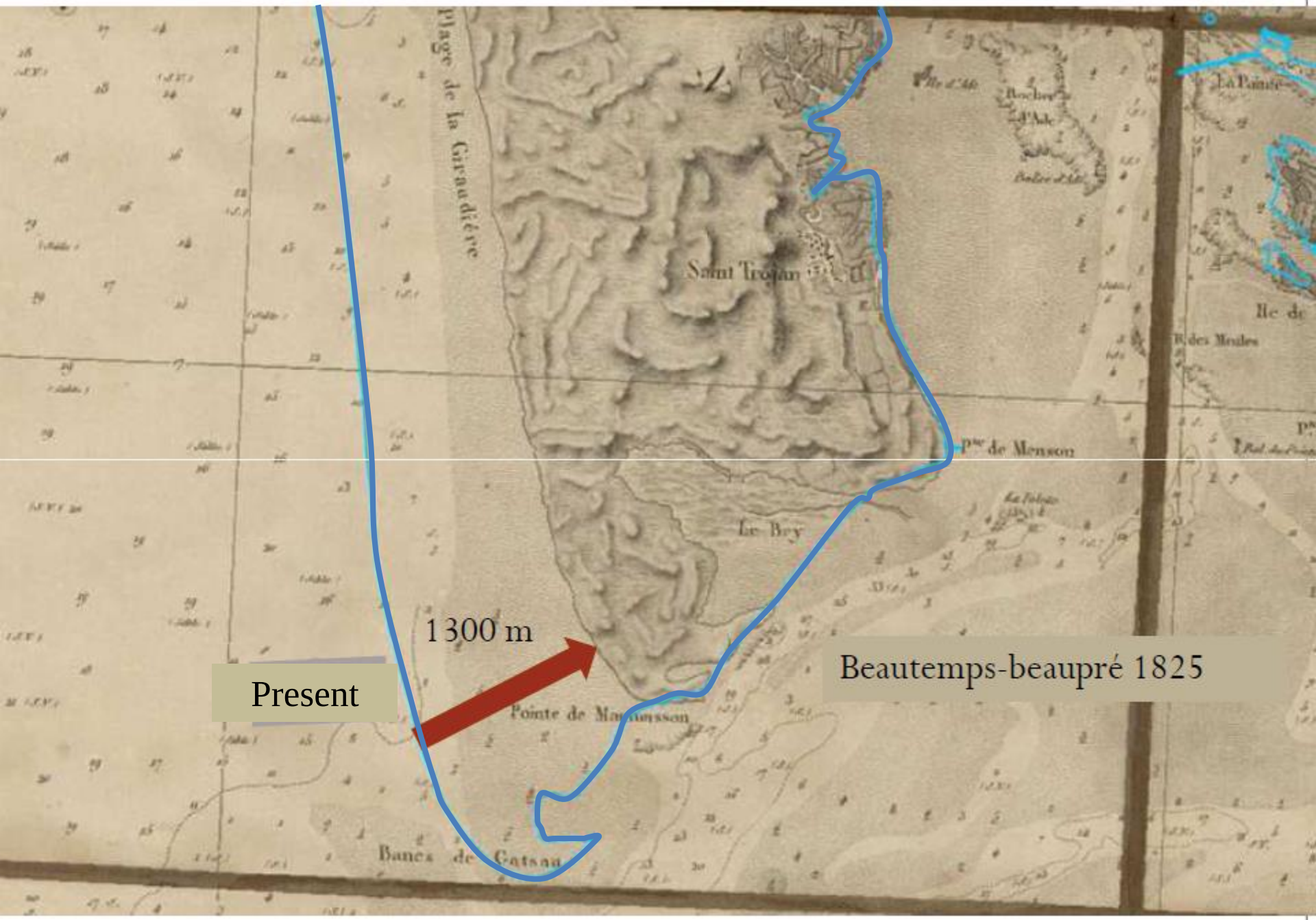
Patrick BAZIN, Head-officer of

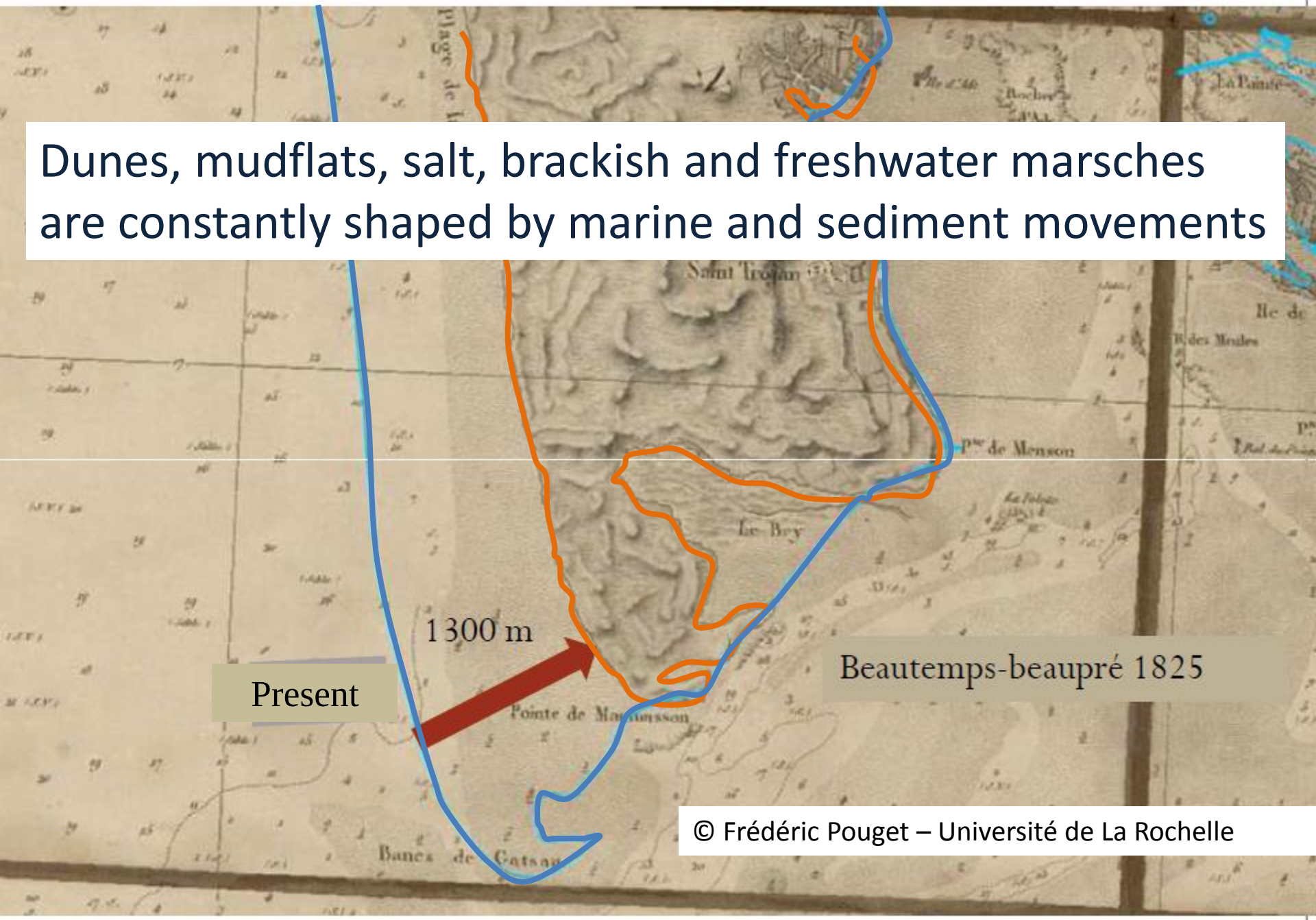
Heritage Management Department

What is Conservatoire du littoral ?

- The Conservatoire du littoral is a land trust organisation defending on the long term the protection of the most sensitive areas on French coasts. It is a public agency created in 1975, aiming at protecting the coastal shores, respecting natural sites and the ecological balance, by land acquisition.
- The acquired lands become inconstructibles and inalienables.
- After 40 years of actions, 700 natural sites are protected, open to all, covering 195,000 Ha and 1,500 Km of banks : 15 % of the french coastline. The sites of the Conservatoire welcome more than 30 millions of visits per year.
- The Conservatoire doesn't ensure direct daily management but owner's obligations as coverage of management plans, duties of rehabilitation or heavy developments and duties of upgrading security.
- Sites owned by the Conservatoire are directed by a local dynamic management. The management is realized by agreements with local authorities, publics institutions or NGOs.

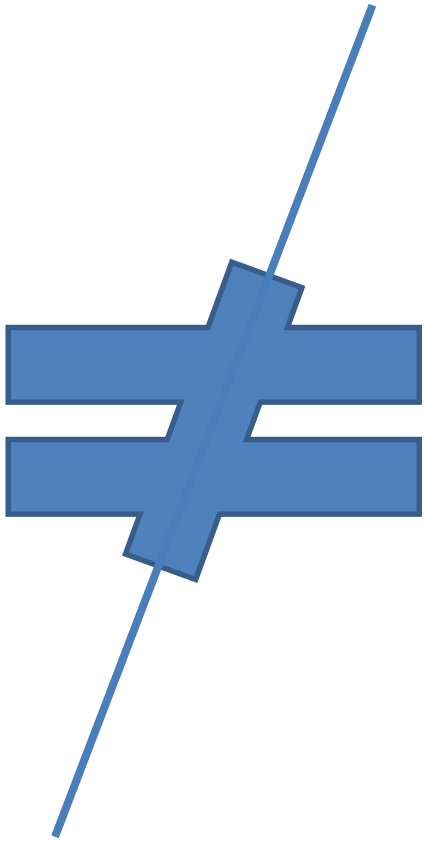

Foreword
A brief demonstration about coastal dynamics


Plage de la Giraudière
Saint Trojan
Le Bey
Pte de Menson
1300 m
Present
Beautemps-beaupré 1825
Pointe de Mauvinsson
Bancs de Gatsau


Dunes, mudflats, salt, brackish and freshwater marsches are constantly shaped by marine and sediment movements
Saint Trojan
Le Bey
1300 m
Present
Beautemps-beaupré 1825
Pointe de Maumusson
Bancs de Gatsau
© Frédéric Pouget – Université de La Rochelle

Changing coast

Sea level rise



Fixed coastline

Vulnerable goods

Change engineering and change minds

The adapto project

With the adapto project, the Conservatoire attempts to demonstrate that natural areas, if they are healthy and wide enough, can be efficient to protect against coastal risks and therefore contribute to adaptation to climate change. These nature based solutions are ***efficient****, can* ***save public funds*** *and allow ecosystemic services to provide* ***benefits****.*

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COP21-CMP11

adapto

Life

The adapto project

Ten sites experiences (with diverse ecosystem and landscapes profiles and economical, social and risk management issues) will constitute laboratories. On each site, demonstrative activities will be planned (opening of polders, dyke restoration, relocation of infrastructures, ...). The objectives will be to implement a real project of territory, with a shared vision among local stakeholders.

The 10 examples will offer a set of solutions regarding local context, with potential replication in European countries (as Adapto sites are located in Channel/North Sea, Atlantic and Mediterranean shores, as well as on tropical coasts). The exchanges with other European initiatives for flexible coastal management will enhance sharing of experiences and networking on these topics.

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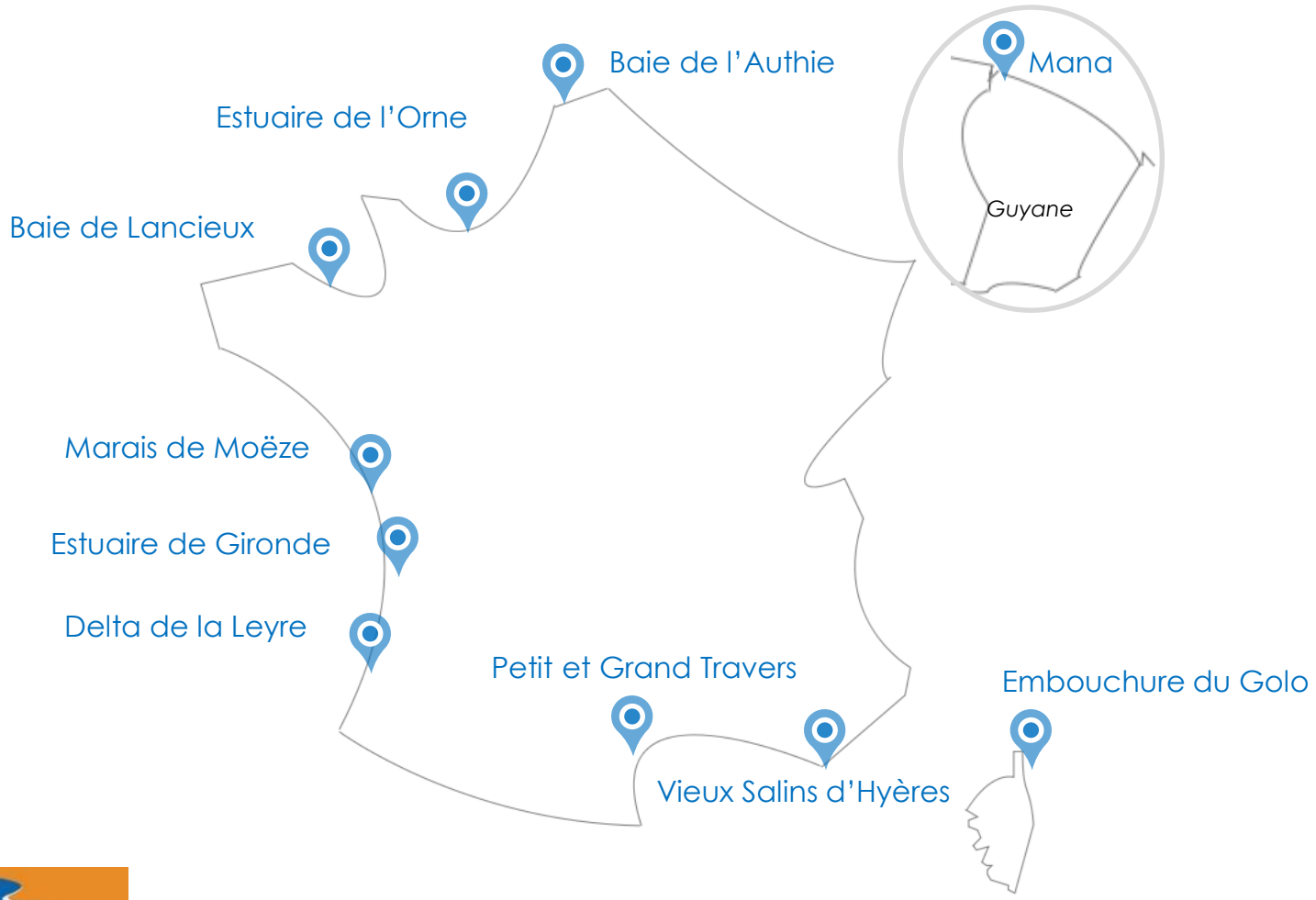
adapto

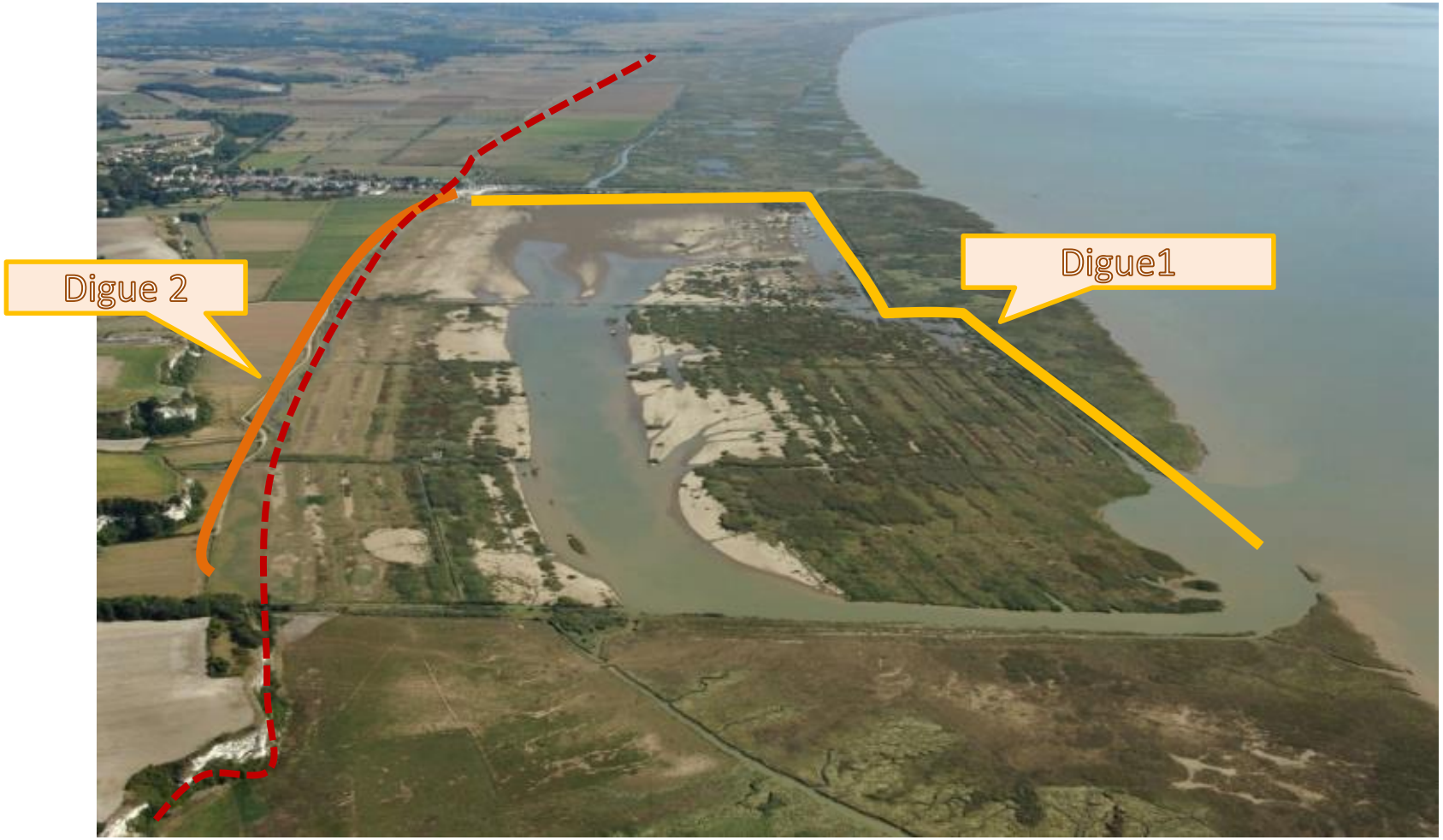
Life

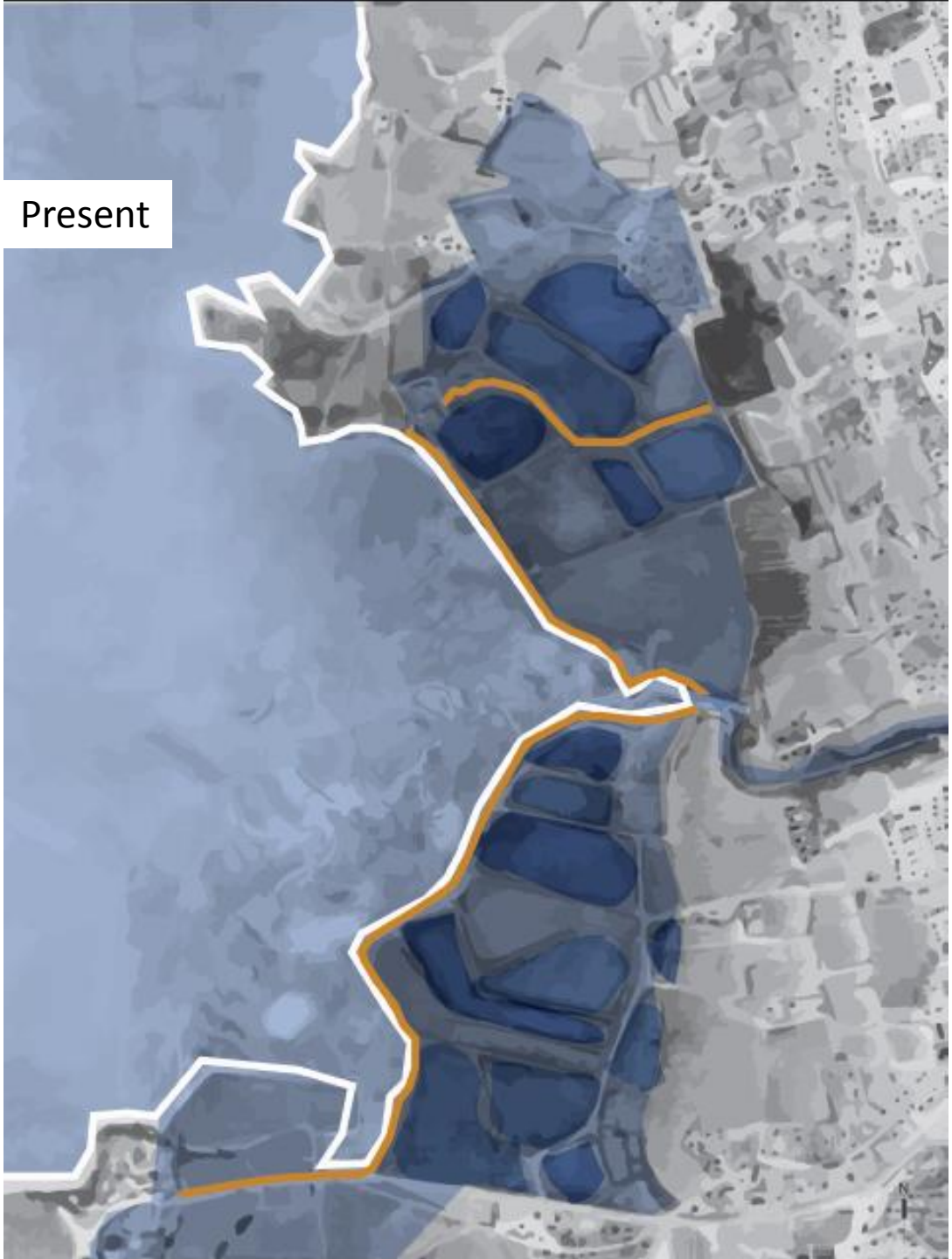
Adapto Location of the 10 sites



Case study : L'Ile Nouvelle, Gironde estuary

Case study : Mortagne, Gironde estuary




Present

Tomorrow :
an interface
where land and
sea can merge

Adapto methodology

Coastal risks management

Social perception

Economy of engeenering
Territorial economy

Quality of lanscape and biodiversity


Thank you for your attention

Climate change and water resources management

-

French feedbacks

eau seine NORMANDIE – Agence de l'eau

Conservatoire du littoral

CODAH – Communauté de l'Agglomération Havraise

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Conclusions

- **Collecting data at national scale allow to identify vulnerable hydrogeosytems and understand their general functions**

- **Actions of adaptation to climate change need to be taken at :**

  - ✓ **basin scale to ensure solidarity within the territory, from upstream to downstream**

  - ✓ **local scale to address specific issues related to their aquatic environment (marine submersion in estuaries and biodiversity in coastal wetland)**

to involve water stakeholders and citizens for the preservation of water resources and aquatic biodiversity.

Thank you for your attention !

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