# New strategies in France and Europe for sustainable river basin management

Régis Thépot administrateur territorial général Secrétaire général adjoint de l'Académie de l'eau rteau@orange.fr

5 ColomBIOdiversidad - May 2018

### Introduction

A presentation based on 30 years of experience on Loire and Seine river management two of the most important rivers in France



#### **Presentation**

- From conflicts at the end of the eighties about dams construction to Plan Loire Grandeur Nature
- Nowadays what sustainable relation between cities and river basins in the climate change context?
- What strategies in the future for integrated and sustainable river basin management? How to act in short, mid and long term?

# 1 – From conflicts about dams construction to plan Loire grandeur Nature



#### Loire River Basin







#### Main features of Loire river basin



Basin area :100.000 km2

Length: 1000 km

A very irregural flow

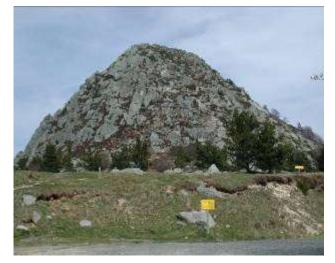
A network of middle size cities

Levees in the middle part of the river built since centuries

An important role for agriculture 4 nuclear power plants and two dams for flow regulation

Development of nature based tourism Vals de Loire site is inscribed in UNESCO world heritage list

Last big floods: 1846-1856-1866

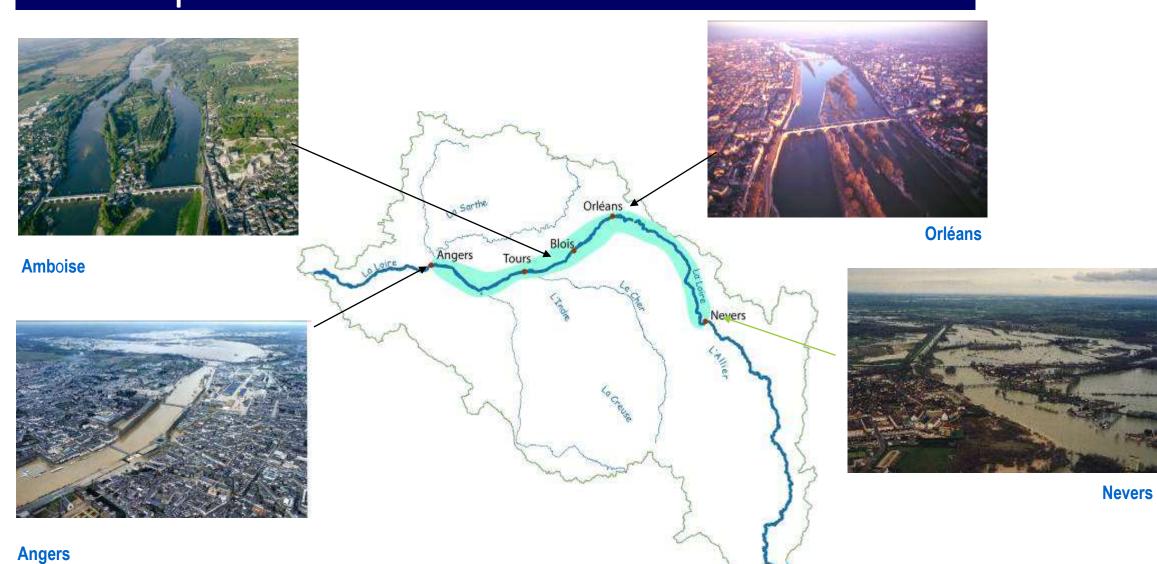


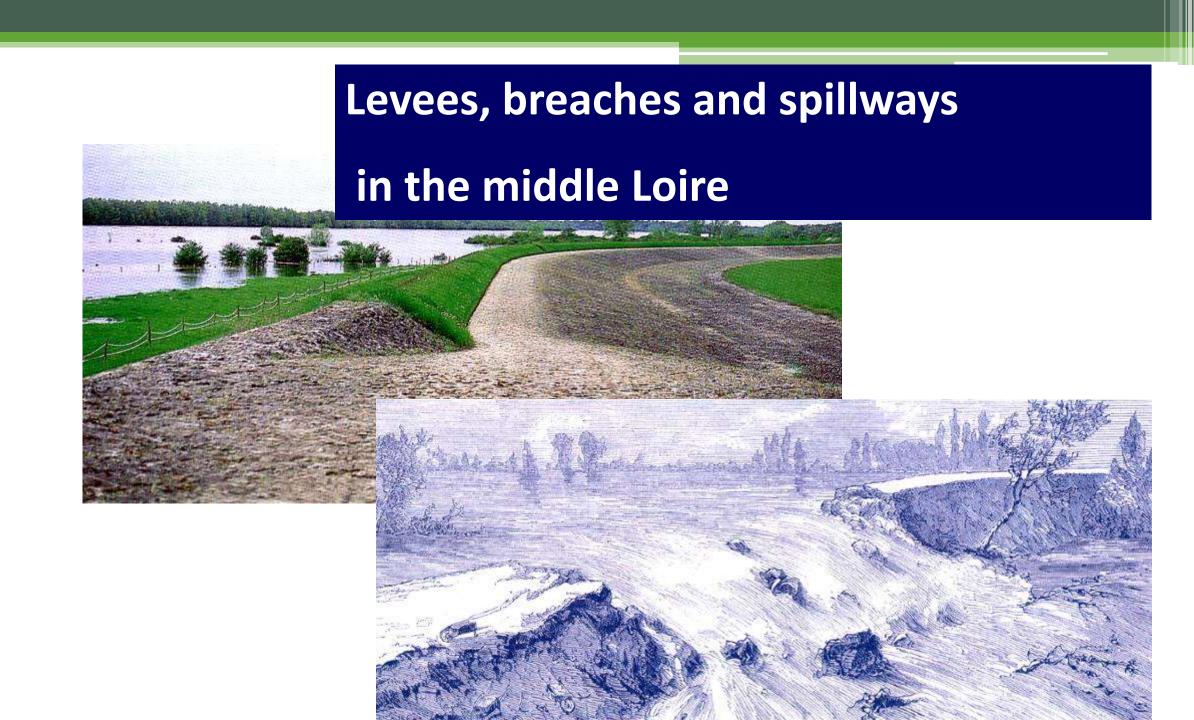


# Upper part of the Loire basin



# Middle part of the Loire basin





# Lower part of the Loire basin

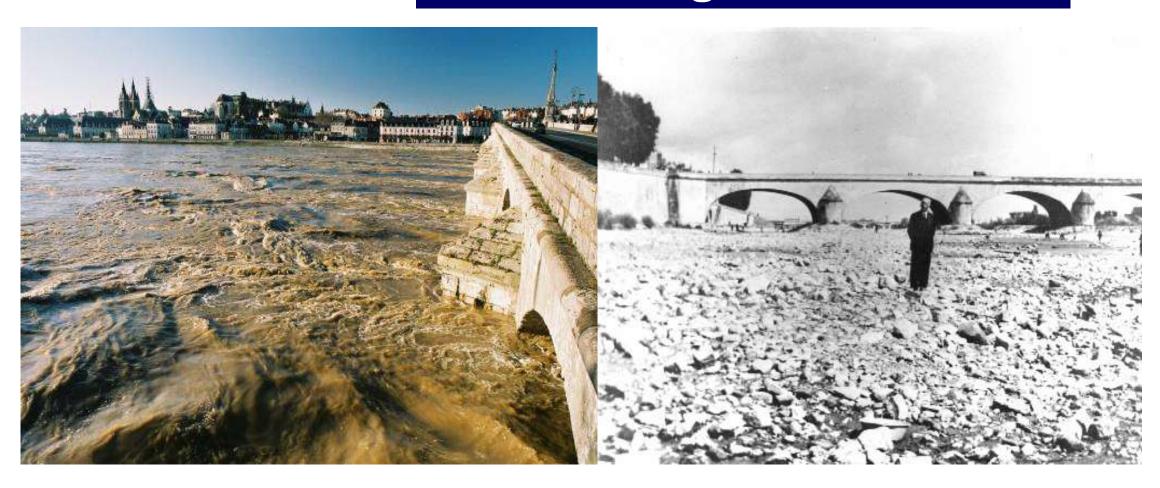


A very irregular flow

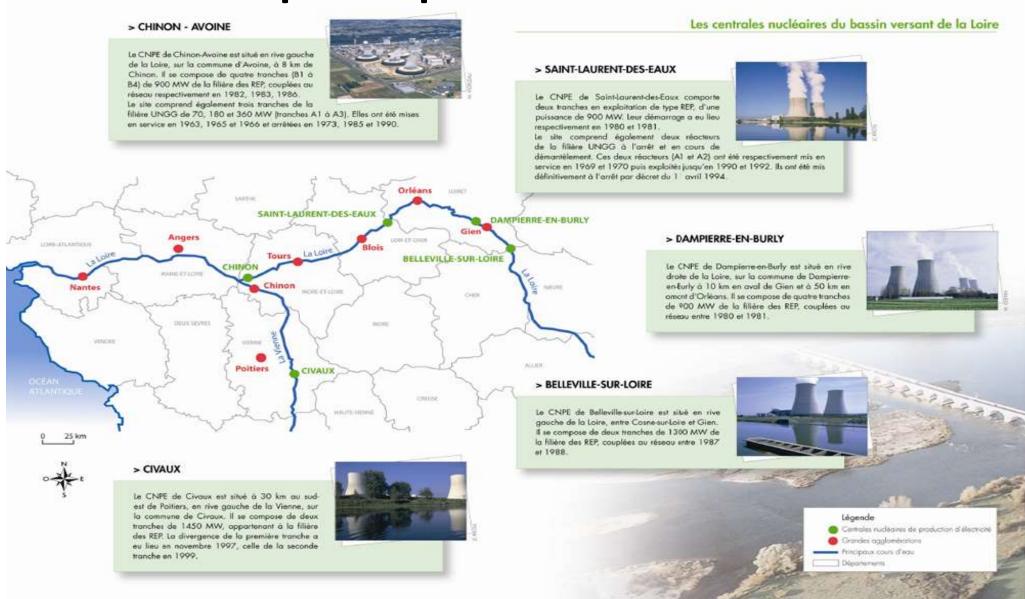


Visit of flooded people near Angers by Napoleon III in 1856

# 2003's flood (middle Loire) 1949's draught



#### Nuclear power plants on the basin

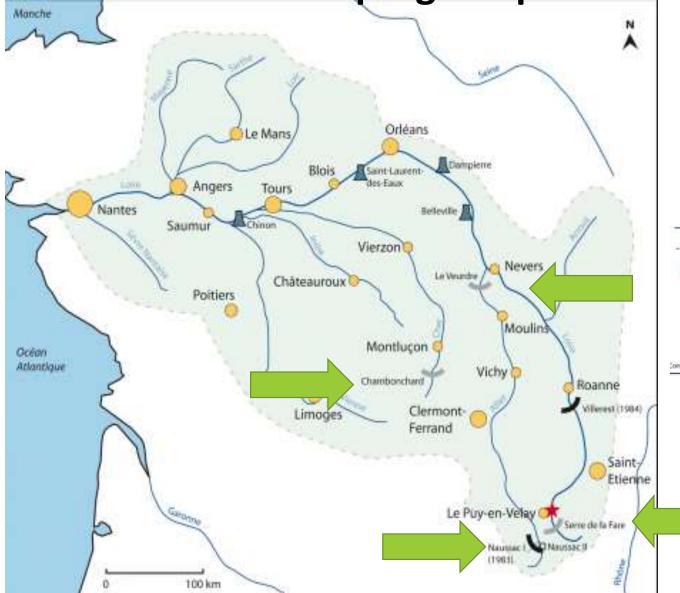


# Villerest and Naussac existing dams





The Loire program planned at the end of the eighties



3 new dams and a pumping station planned for the 10 coming years



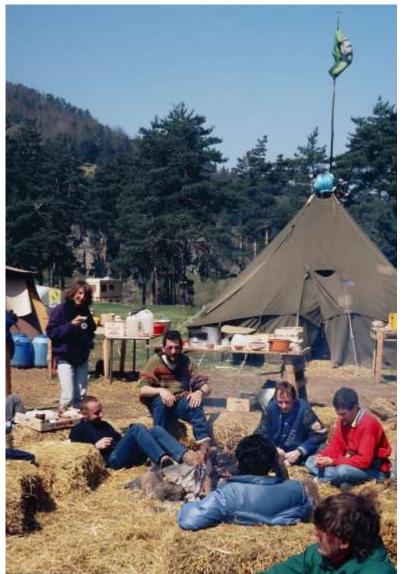
SERRE DE LA FARE project



# Dams against dams...



#### Opponants to Serre de la Fare construction







## Plan Loire grandeur nature

Decided by the government in 1994 after fierce ecological conflicts concerning the construction of new dams

#### **Main Objectives:**

- river basin with a global vision for 10 years (initially, in fact, has been extendend till nowadays) including hydraulic, environnemental and heritage actions)
- a joint approach associating involved actors and scientific assessment

5 key fields of action



#### 5 key fields of action

Safety of population facing flood risks and development of public awareness

Managing water resources and drought risk

Restoring natural aquatic ecosystem and wetlands

**Enhancing the Loire valley heritage** 

**Developing research and data exchanges** 











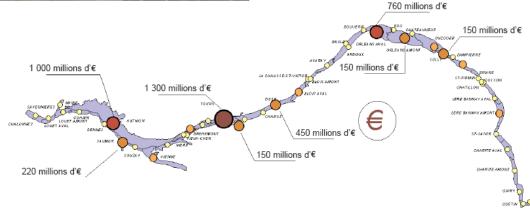


# Main outputs of the Loire experience

- 25 years later in many fields Plan Loire grandeur nature, born from an ecological conflict is still in France and Europe an example of river basin management, especially for stakeholders involvement and its research program with new actions planned for climate change adaptation
- Two important outputs are the reference assessment of middle Loire flooding risk including the global program achieved for business continuity planning and the preservation of the Atlantic salmon

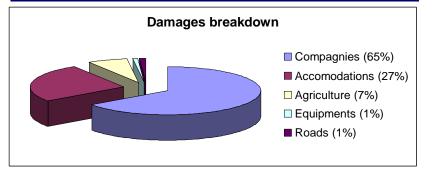
#### Middle Loire risk flooding assessment





- 240 towns and villages
- 300.000 inhabitants
- 115.000 accomodations
- 15.000 companies
- 72.000 employments
- 87.000 ha for agriculture

#### Estimated damages: 10 billions €



# An « industrial » approach on the Loire basin in order to increase flood resilience



In the middle Loire 15.000 companies are in flood prone areas, and :

- 2500 companies have carried out an assessment of their vulnerability and taken actions to reduce it
- 400 companies have implemented effective and urgent measures to reduce their vulnerability including business continuity management plans

#### Restoration of Loire migratory fishes

 The Plan Loire grandeur Nature is aiming at reconciling economic development, flood control and environment protection on the Loire basin

 It has planned several measures aiming at restoring the populations of Loire-Allier migratory fish: Atlantic salmon, the most symbolic migratory species, but also eel,

sea-trout, shad and lamprey.

 2 dams demolitions and a construction of a large hatchery have been achieved

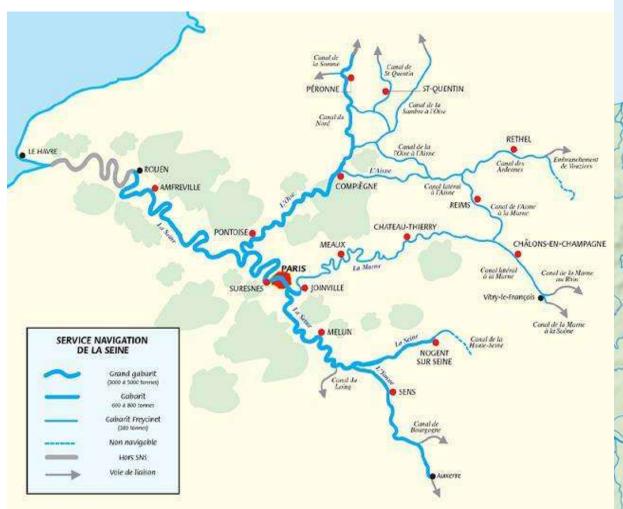


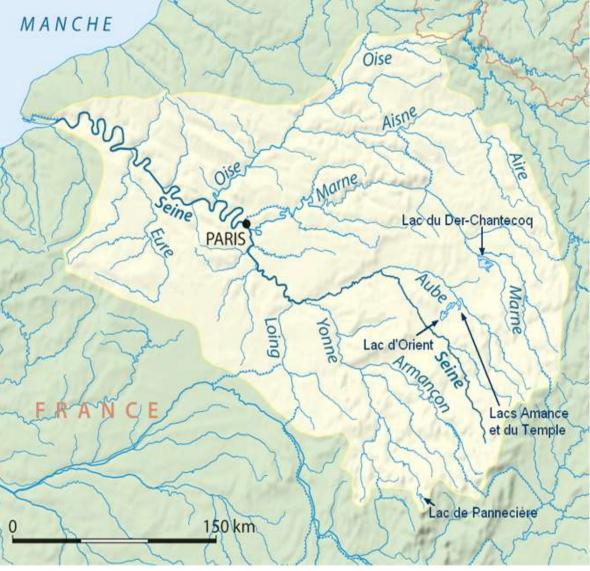
Roberto Epple

# 2 – What sustainable relation between cities and river basins in climate change context?



# **Example of Paris** and Seine river basin







## Main features of Seine river basin

**Basin area: 78.000 km2** 

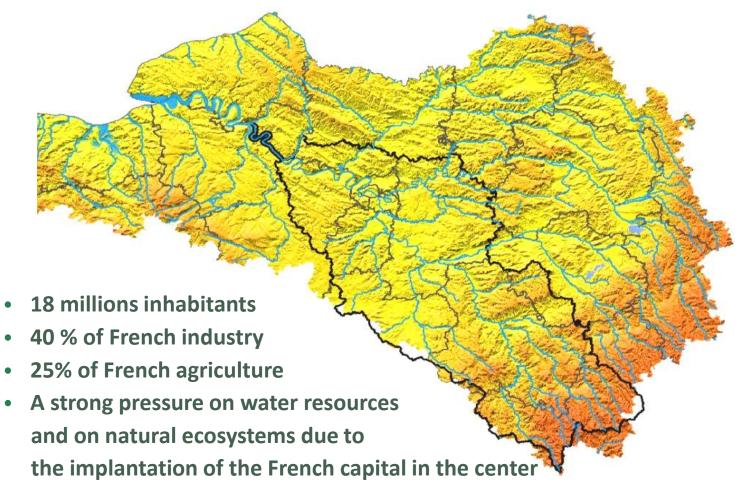
Length: 780 km

**Generally slow and long** 

floods

Last big flood in 1910





A big city Paris, located along a small river ...

### Drought is a major issue for Paris region

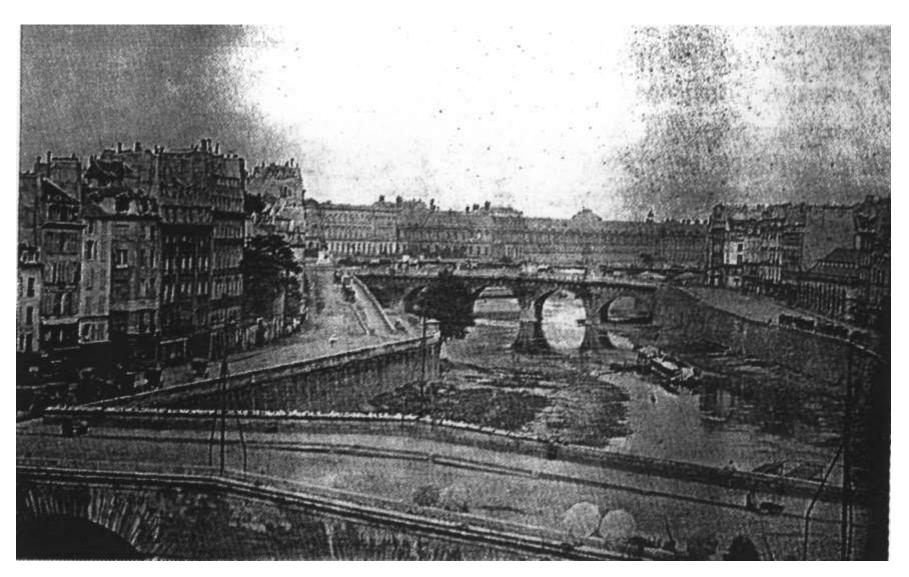
70 % of the drinking water of the central part of the region is produced from surface water

1 nuclear and 1 thermal power plant are located on the Seine riverside

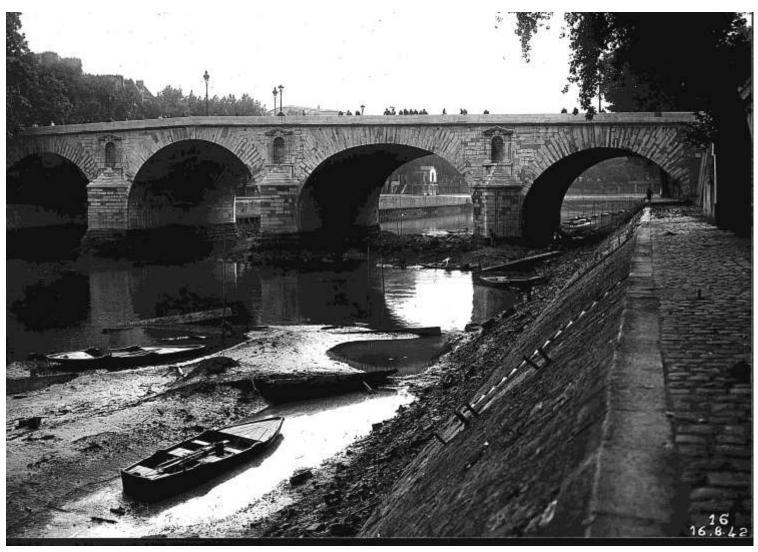


The output of the Paris water sewage and treatment system is a main issue for the water quality of downstream Seine as its average flow is at a low level

# The Seine river in Paris in 1850



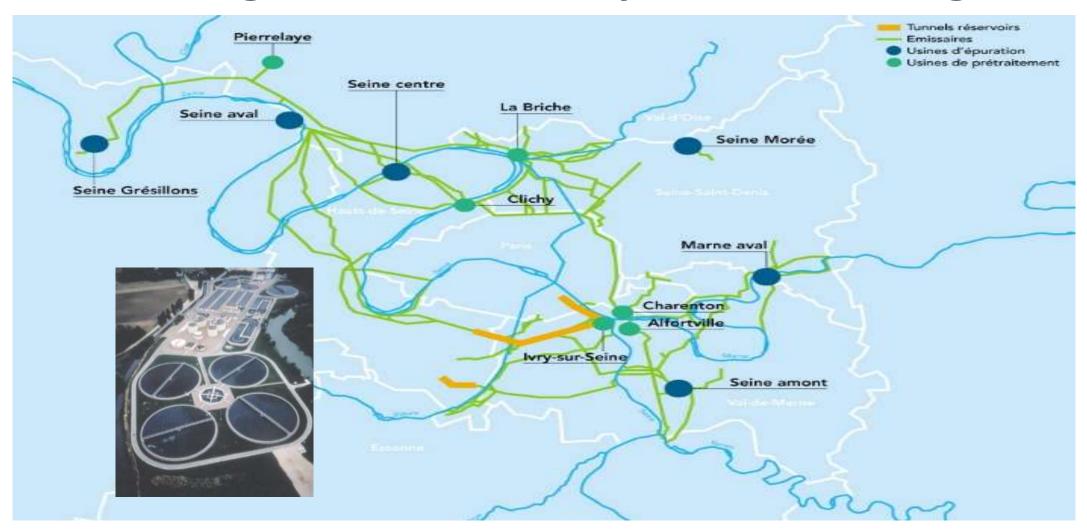
# 1942 Summer in Paris



## Drinking water system of Paris region



#### Water sewage and treatment system of Paris region



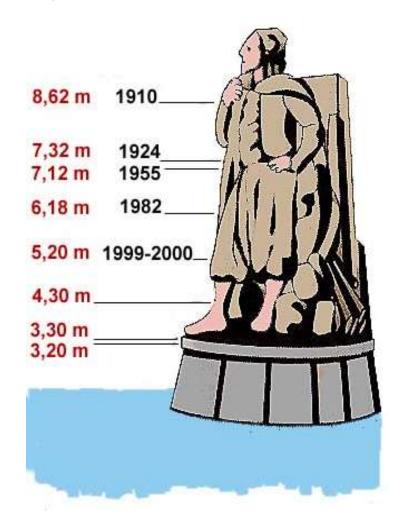
#### Paris in 1910: 2 millions inhabitants flooded



# A flood risk still there...



# Impact of a 1/100 flood in Paris Ile-de-France region



- About 40 billions € of direct damages
- 3% increase of public debt
- Most of the critical networks highly impacted for at least several months
- About 850 000 flooded inhabitants
- And 60 000 companies

OECD Review : Seine Basin Ile de France – Resilience to major floods - 2014

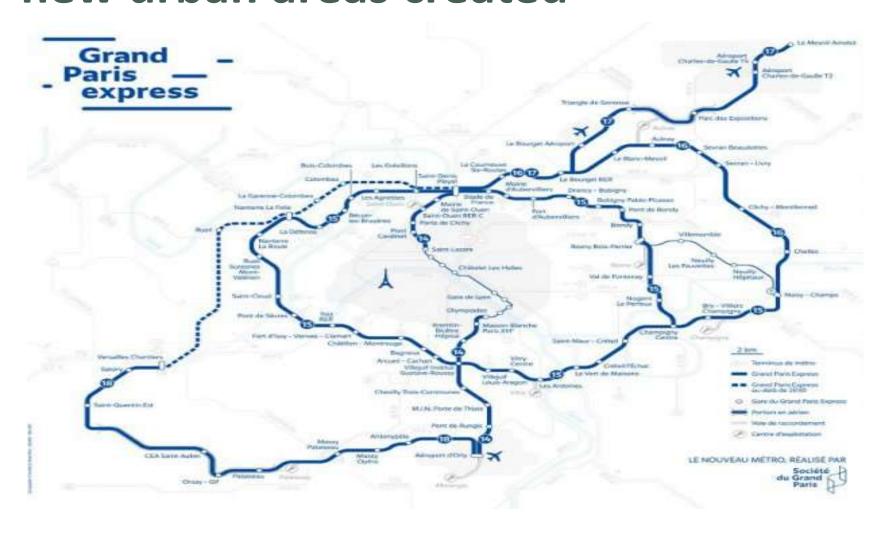
### A fragile balance between Paris region and its river basin

- In Paris region public awareness of the fundamental links between urbanized areas and the Seine river basin is at a poor level
- Most of the territories are not in direct relation with the Seine and its main tributories (as Marne and Oise) but in reality all of them are directly or undirectly impacted by it.

### The Paris region is permanently interacting with its river basin because of:

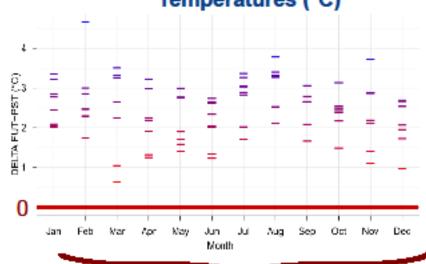
- Development of urbanization and public transportation
- Climate change and extreme events impacts
- Strong pressures on water quality and biodiversity
- = the existing and fragile balance between ecology and human activities is not guaranteed and there may be unexpected bifurcations in the future

## New public transportation planned for Paris with new urban areas created



### Climate scenarios What are the possible climate changes?

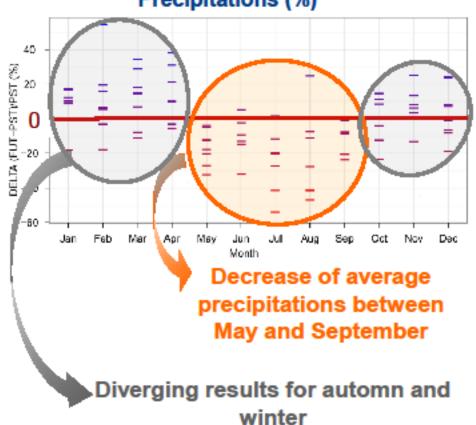
### Evolution of Monthly Average Temperatures (°C)



+1.5 à +3.5°C for most of tested scenarios



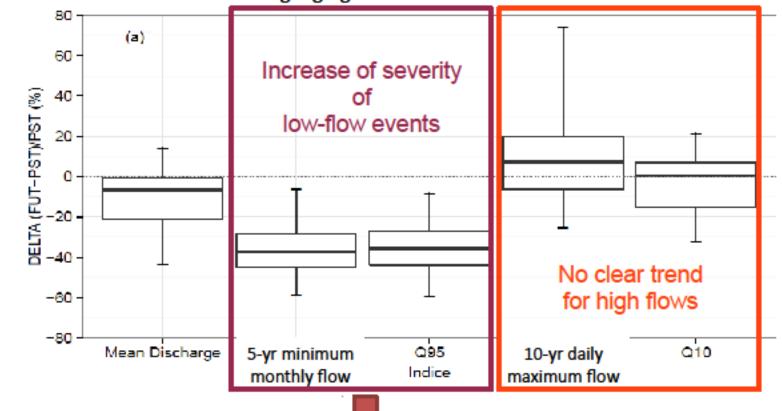
#### Evolution of Monthly Average Precipitations (%)



SHF, Paris, 8 october 2015

### Evolution of flows in natural conditions

Distribution of the relative evolution of flow indices using the two models and the 7 climate simulation for the 25 gauging stations





May have strong impacts on future reservoir management during summer

SHF, Paris, 8 october 2015

### Two main actions have been launched to « cope with »

#### **ADAPTATION**

A climate change adaptation strategy was adopted for the whole Seine basin at the end of **2016.** Its main goals are:

- 1/ To save water
- 2/ To develop solidarity between the different parts of the basin and stakeholders
- 3/ To promote « no-regret » actions

#### **RESILIENCE**

### PAPI (action program for flood prevention) adopted in 2014 with 3 mains objectives:

- 1/ Increase "flood risk culture"
- 2/ Stabilize cost of potential damages in short term and reduce it in mid term
- 3/ Reinforce resilience of main public services (energy, telecommunications, transport, sanitation, energy and educational services)

### Strong pressures on water quality and biodiversity

Since the end of the 1980's water quality has improved with the help of very important investments in water sewage network and treatment systems (for drinking and polluted waters)

For instance today more than 30 species of fishes are counted in the Seine river and the drinking water meets the EU standards

But the situation is less satisfactory for emerging new pollutants

A key issue is also the risk of water quality degradation induced by the predictable flow decrease causing the increase of pollutants concentration

In the same time the Paris region development is increasing pressure on water quality and biodiversity

### New actions to preserve water resources

- Public awareness campaigns to reduce the uses of water and the discharges of waste water in the sewage network and the river
- Focussed campaigns on micropollutants
- Research, studies and experimentation for new treatment systems
- New investments for waterquality and sanitation





= a new balance to find: prevention/treatment

### Main outputs of the Seine experience

- As OECD pointed it in its review the governance issue is a major one for flood management in Paris Ile-de-France region. This statement is also pertinent for situations in which a very big city is located along a «small river » and the right levels of strategy and action must still be found
- Climate change adaptation and development of a river and basin culture for the inhabitants of urban areas are the priorities for the future

### 3- So what? What strategies and actions for the future?

These two examples shows that the main features of the Loire and Seine may be different but that common strategies and actions are emerging and converging for river basin management in France and Europe



### A dramatic situation: a bridge over a dry riverbed...



Ispahan – march 2018

### Frameworks and key issues

2 main EU directives for water and river basin management: 2000 water framework and 2007 flood directive (reflecting for the first time climate change in water policy) Horizon 2020 EU's Research and innovation programme

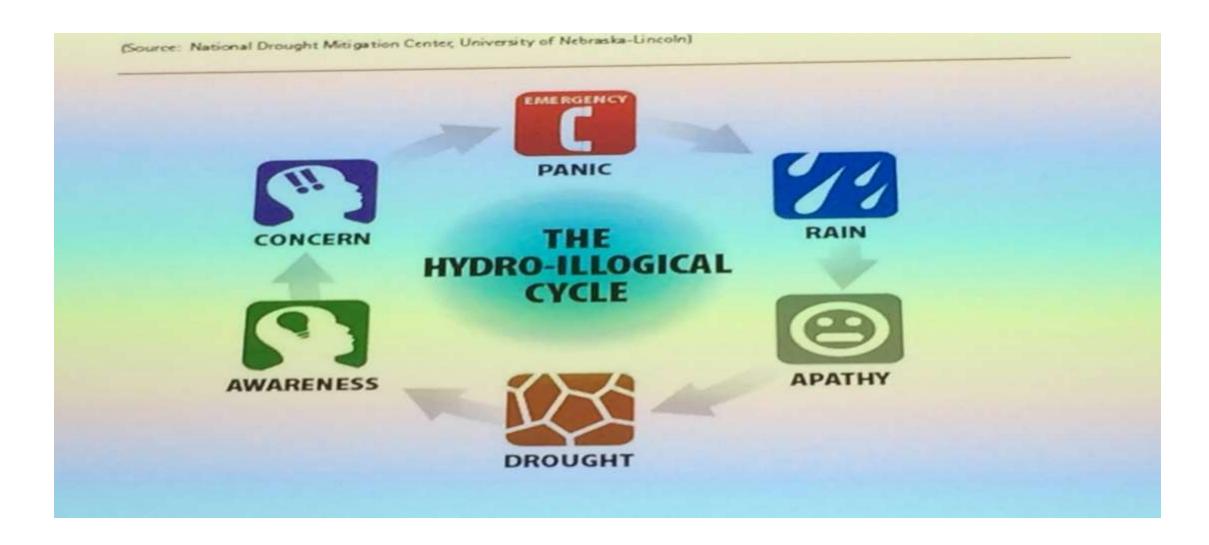
Sendai ONU framework for disaster risk reduction introducing the new « build back better » concept

- 3 key issues and priorities for a sustainable river basin management:
- To raise public awareness and interest for water, risk and river
- To increase stakeholders involvement wih an innovative top-down/bottom-up governance
- To develop science-based innovation

### To learn again the relation between water, river and city



### To get aware of the risk in order to be prepared...



### To involve stakeholders and raise awareness



# SEREZ-VOUS PRÊT POUR LA PROCHAINE INONDATION ?

**EPISEINE.FR** 

### UN DISPOSITIF COMPLET DE SENSIBILISATION AUX RISQUES LIÉS AUX INONDATIONS

Si les crues de la Seine et de la Marne sont inévitables, la montée de leurs eaux est toujours progressive. Elles vous laissent donc le temps de faire quelques gestes simples pour limiter les dommages et vous rendre le plus autonome possible. Encore faut-il les connaître... C'est là qu'intervient EPISEINE.

Conçu et développé par l'EPTB Seine Grands Lacs, EPISEINE (l'acronyme d'Ensemble pour la Prévention des Inondations du bassin de la SEINE) est un dispositif qui vous explique les bonnes pratiques et les bons comportements, avant, pendant et après la crue. Grâce à lui, vous pourrez ainsi vous protéger, vous, vos proches et vos biens, mais aussi assister votre entourage et vos voisins.

#### CE DISPOSITIF COMPREND:

- episeine.fr, une plateforme collaborative où vous trouverez :
- toutes les infos pratiques pour acquérir les notions essentielles
- des modules d'apprentissage en ligne pour enrichir vos connaissances
- la possibilité de vous inscrire à des formations
- des supports et outils pédagogiques adaptés à toutes les populations (particuliers, entreprises, collectivités, associations...) pour informer, accompagner et former
- des campagnes de communication ciblées qui se déploieront progressivement au cours des prochaines années



Animé par :





Les partenaires d'EPISEINE







SUIVEZ LA BOUÉE JAUNE ! EPISEINE.FR

# Innovation to increase resilience and adapt to climate change cities and river basins

### Some examples of structural measures:

- Eco, smart, flood-proof and « sponge » new cities or urban areas
- Green infrastructures: green and blue corridors, preservation and restoration of water courses, flood expansion areas and wetlands
- Sustainable agriculture and forestry on the basin
- « Build back better » and room for the river
- Innovative buildings

### Some examples of non structural measures:

- Innovative water and river governance at the national, basin and local level
- Development of knowledge, research and monitoring
- Integrated strategies and actions dealing in the same time with water quality and quantity

### Innovative urban areas

### 海绵城市

**Sponge City** 

海绵城市是指城市能够 像海绵一样,在适应环境变化 和应对自然灾害等方面具有良好的"弹性",下雨时吸水、 蓄水、渗水、净水,需要时将 蓄存的水"释放"或加以利用。

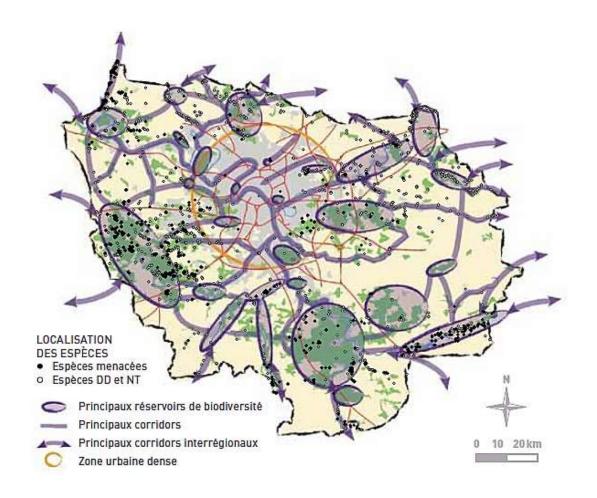




### ... adapted to heat waves, droughts, floods and rich in biodiversity



### **Green and blue corridors**

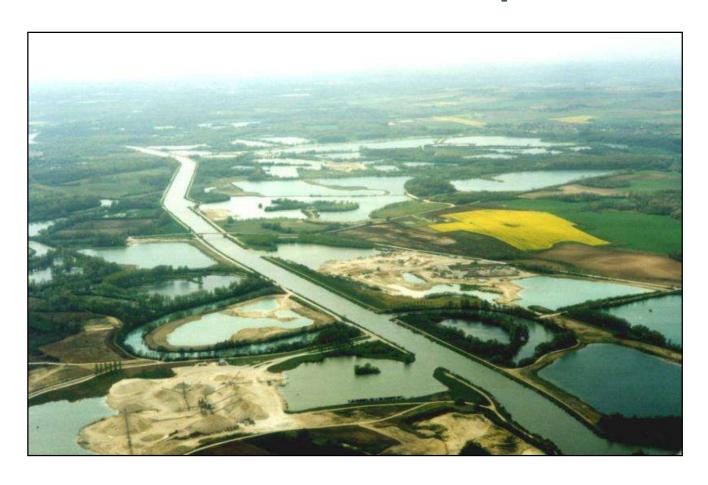




### **Restoration of water courses**



### Preservation of flood expansion areas and wetlands





### Build back better and room for the river



### **Innovative buildings**





### Towards a new innovative and collaborative governance

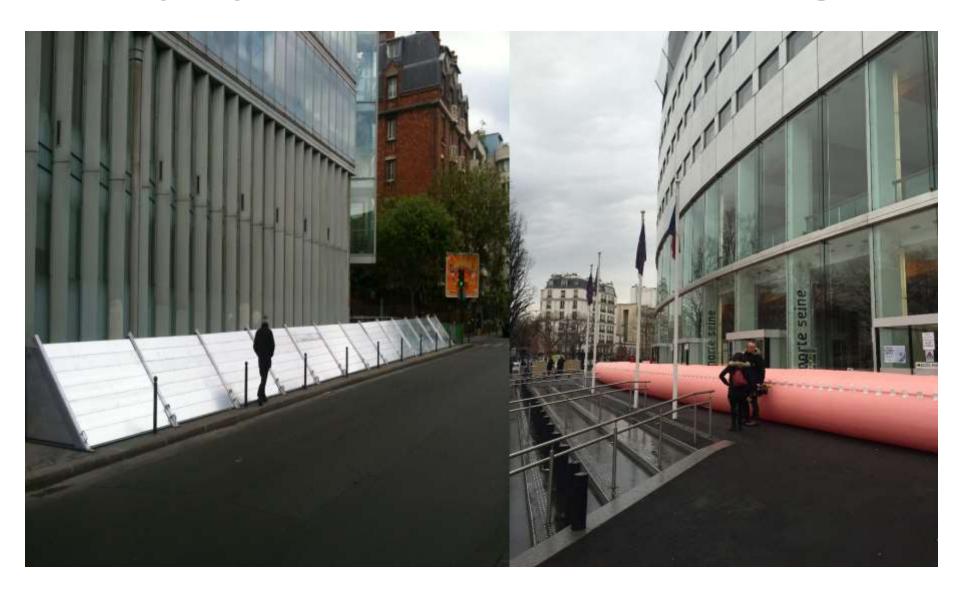
The **complexity** of water and river management and the **uncertainties** in front of us are asking an **adapted and collaborative governance** based on:

- A long-term based trust between the main stakeholders (including national and local policy makers, water and risk managers, researchers, NGO's, and media)
- A balanced top-down/bottom-up approach including local, basin and national aspects
- A multidisciplinary approach

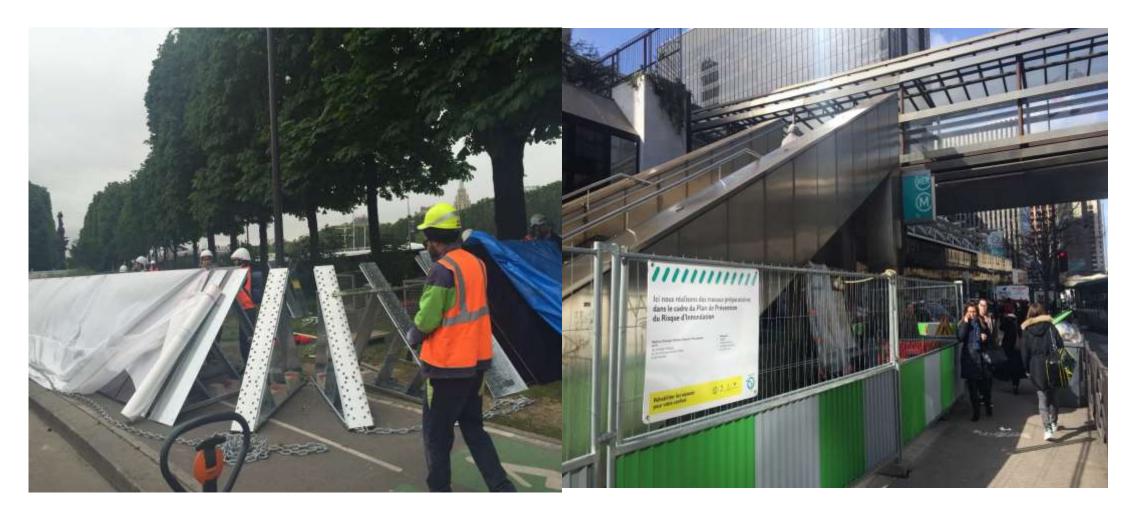
### Think globally and act locally

- Integrated water and river management must include in an holistic approach:
- flood and drought prevention
- water quality
- Ecosystem and biodiversity protection and restoration
- Local strategies and actions are needed

### To be prepared for local crisis management



### To get more resilient public utilities



### Main messages for sustainable river management

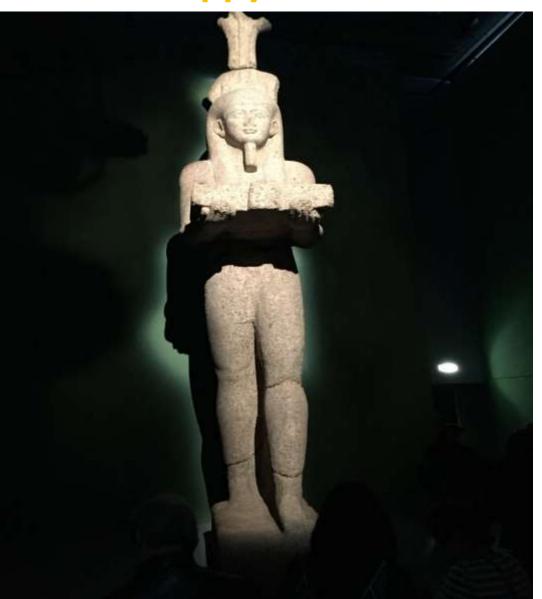
- Adapted governance and long terme vision are necessary
- Strategies must be holistic and « no-regret » based on prevention, adaptation and resilience
- They must be based on solidarity (upstream/downstream-rural/urban)
- Strategies must integrate hydraulic works in more global and territorial projects and promote water saving

And last but not least to come true on the field, strategies must be fully accepted and understood by local river residents and involved stakeholders (for this purpose pilot sites and exchanges of good practice must be encouraged)

### In conclusion we must learn again to live happy with our rivers!

### Hapy Nile god

Hapy was the god of the annual flooding of the Nile in ancient Egyptian religion



### Thank you for your attention!

