

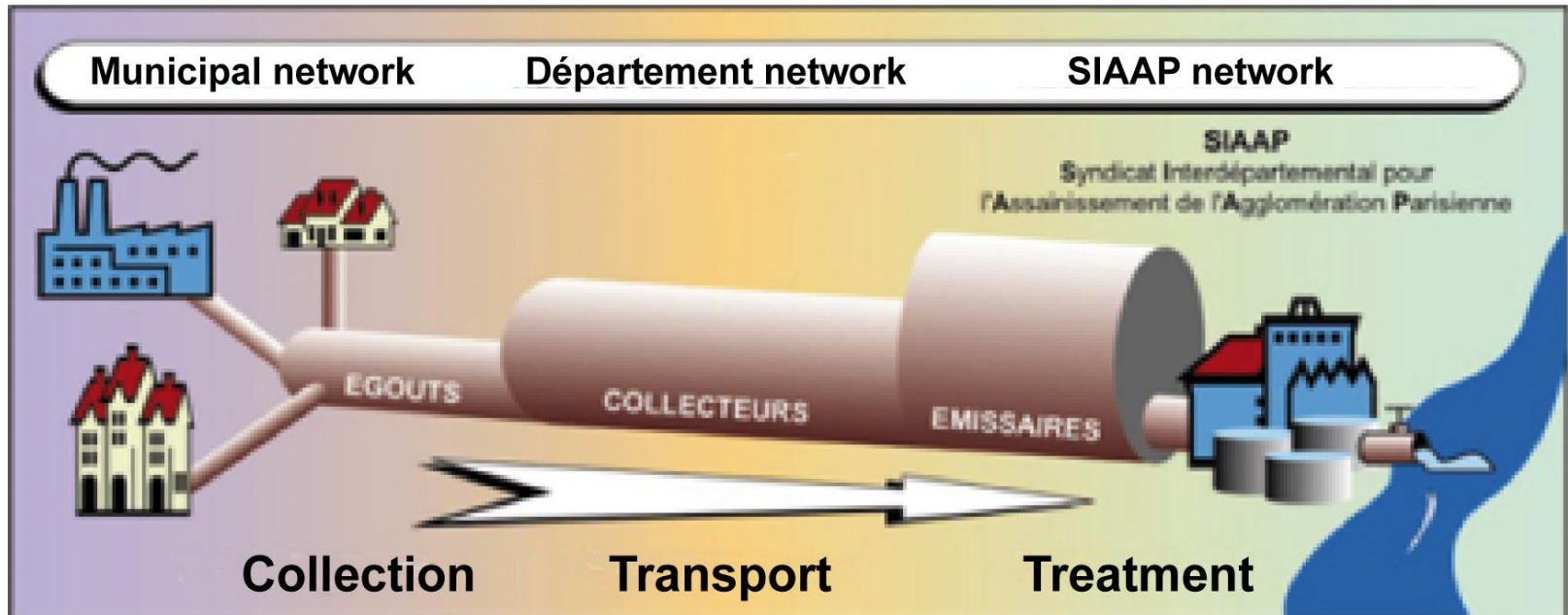
# Climate Change Impacts on Wastewater Utility Management – SIAAP Case Study of the Seine River

SIAAP  
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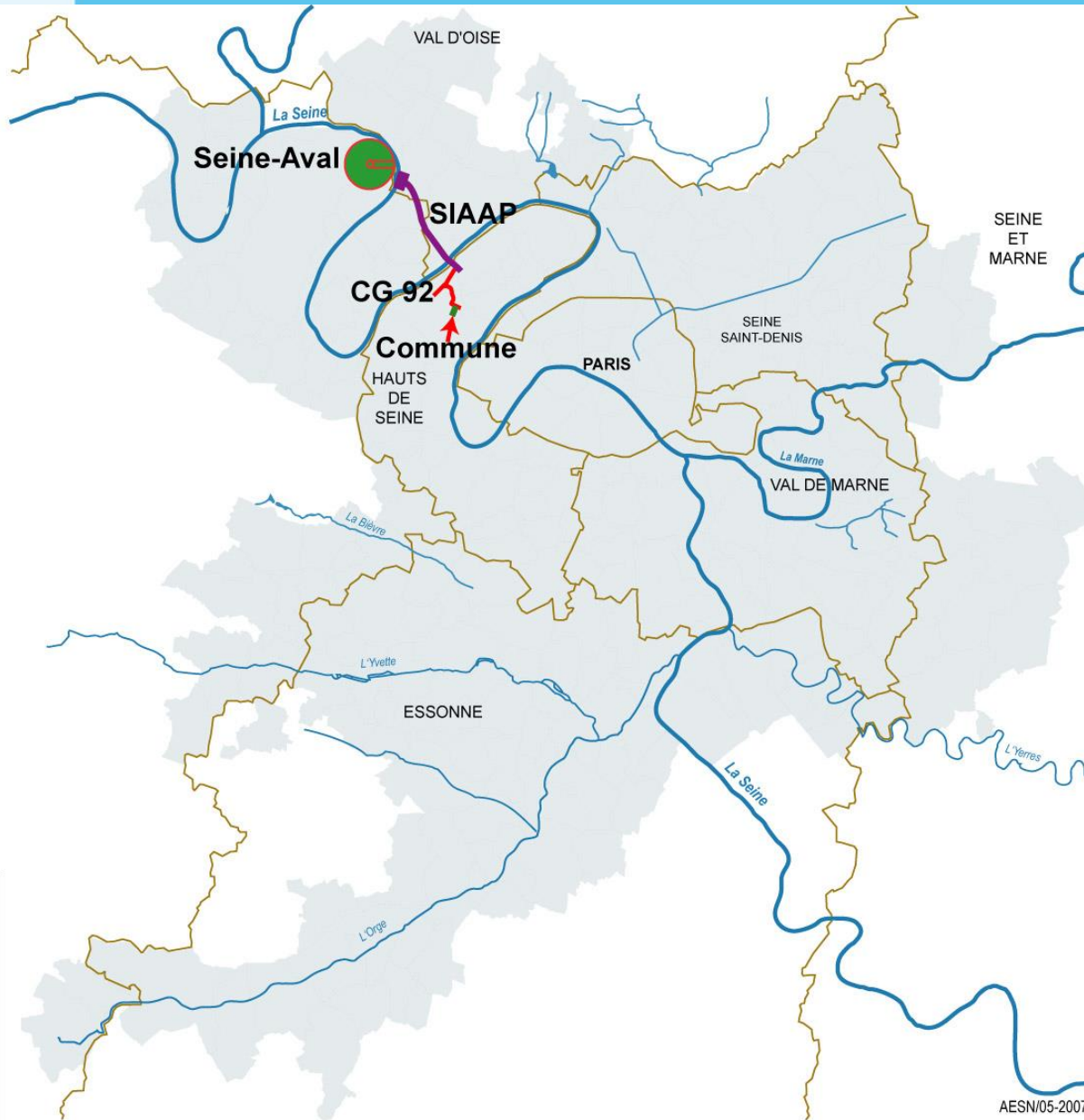


**SIAAP**  
Service public de l'assainissement francilien  
[www.siaap.fr](http://www.siaap.fr)

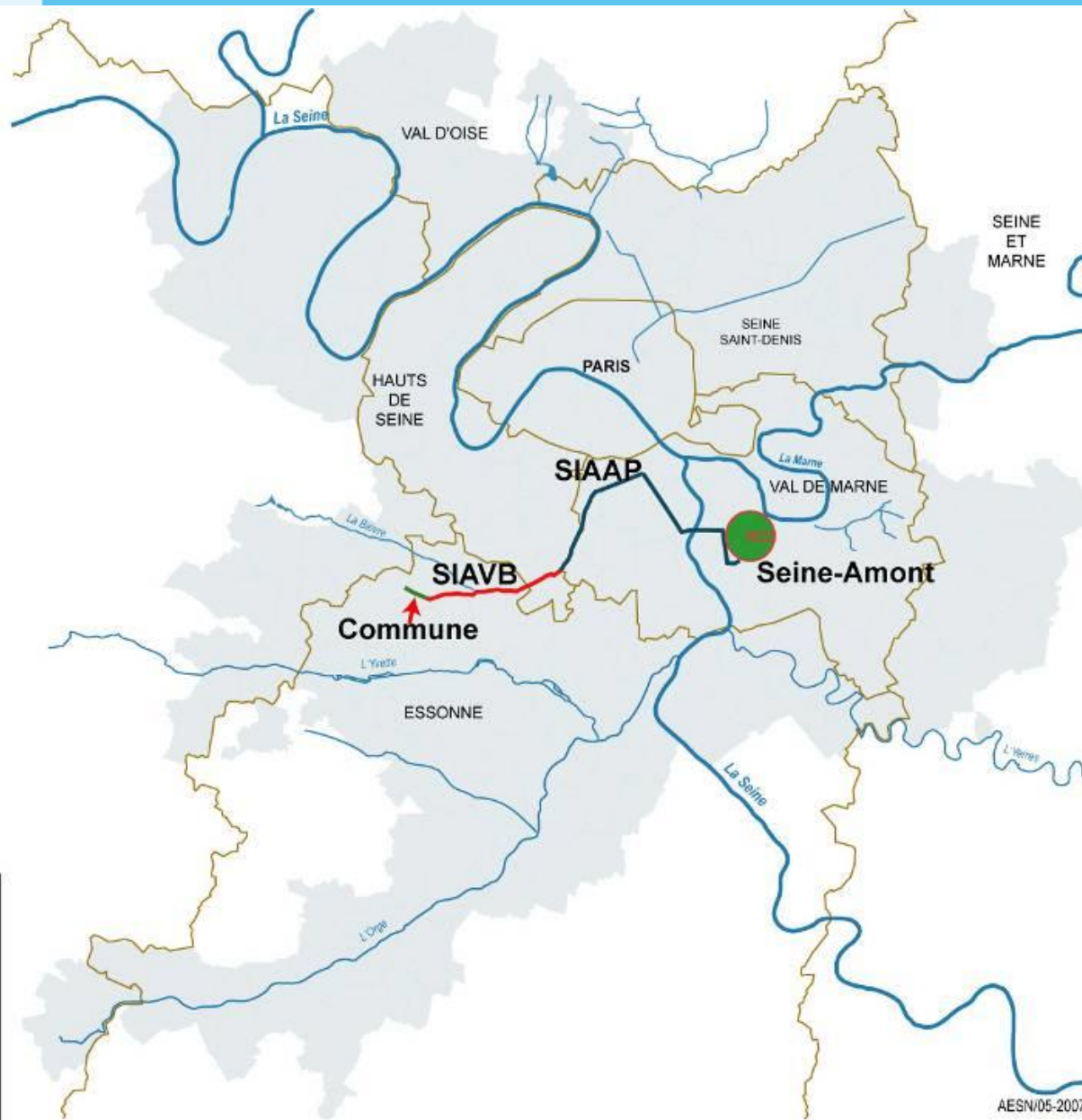
# A multi-layer system



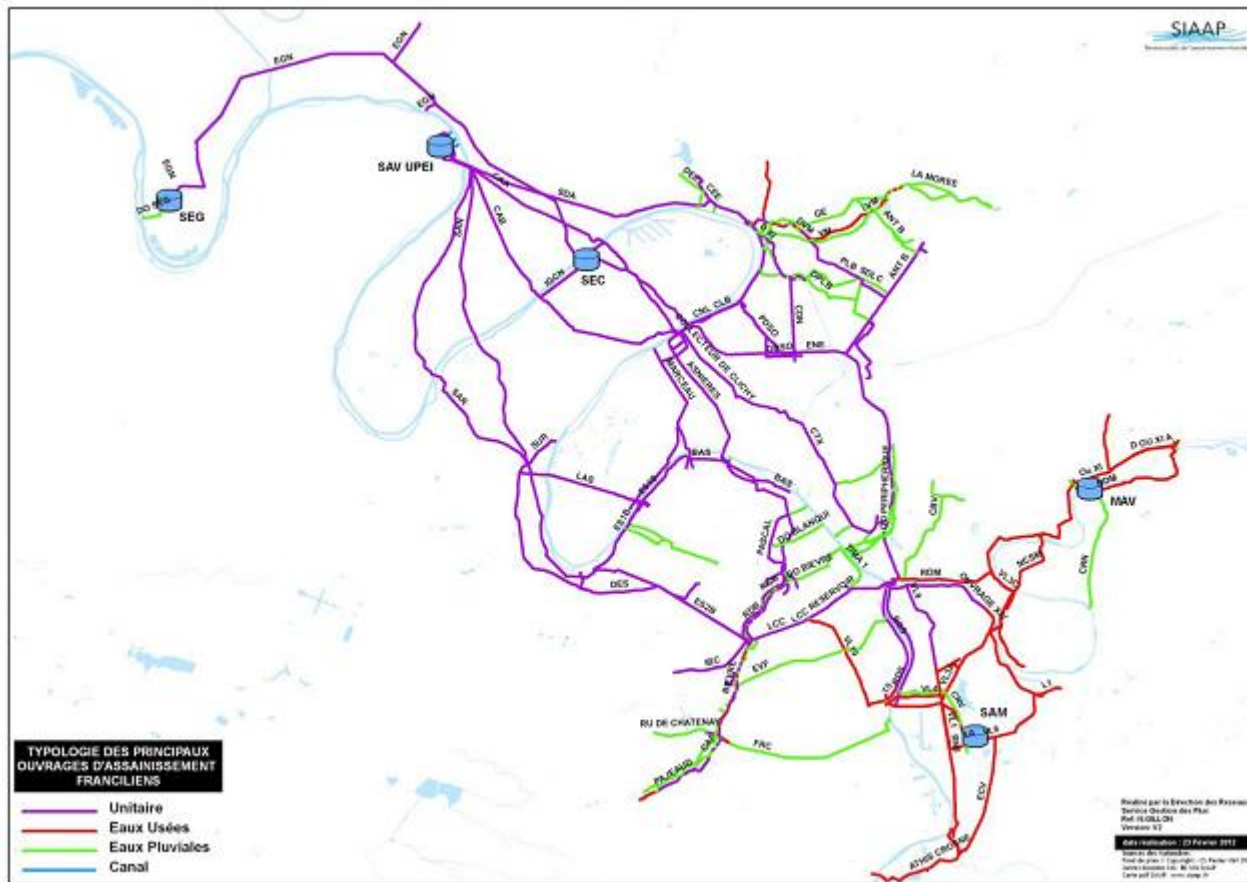
# The route to the WWTP



# The route to the WWTP



# The Waste Water Sewage: 440 km



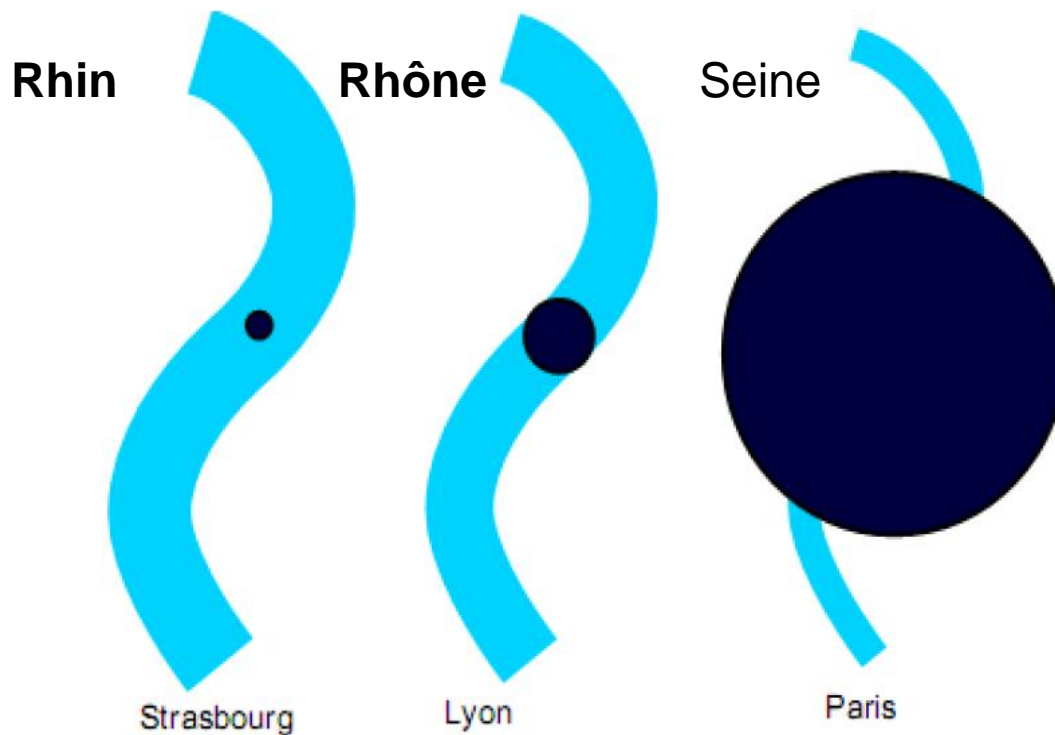
Above 15 000 km of waste water networks  
before SIAAP



# Seine River Catchment



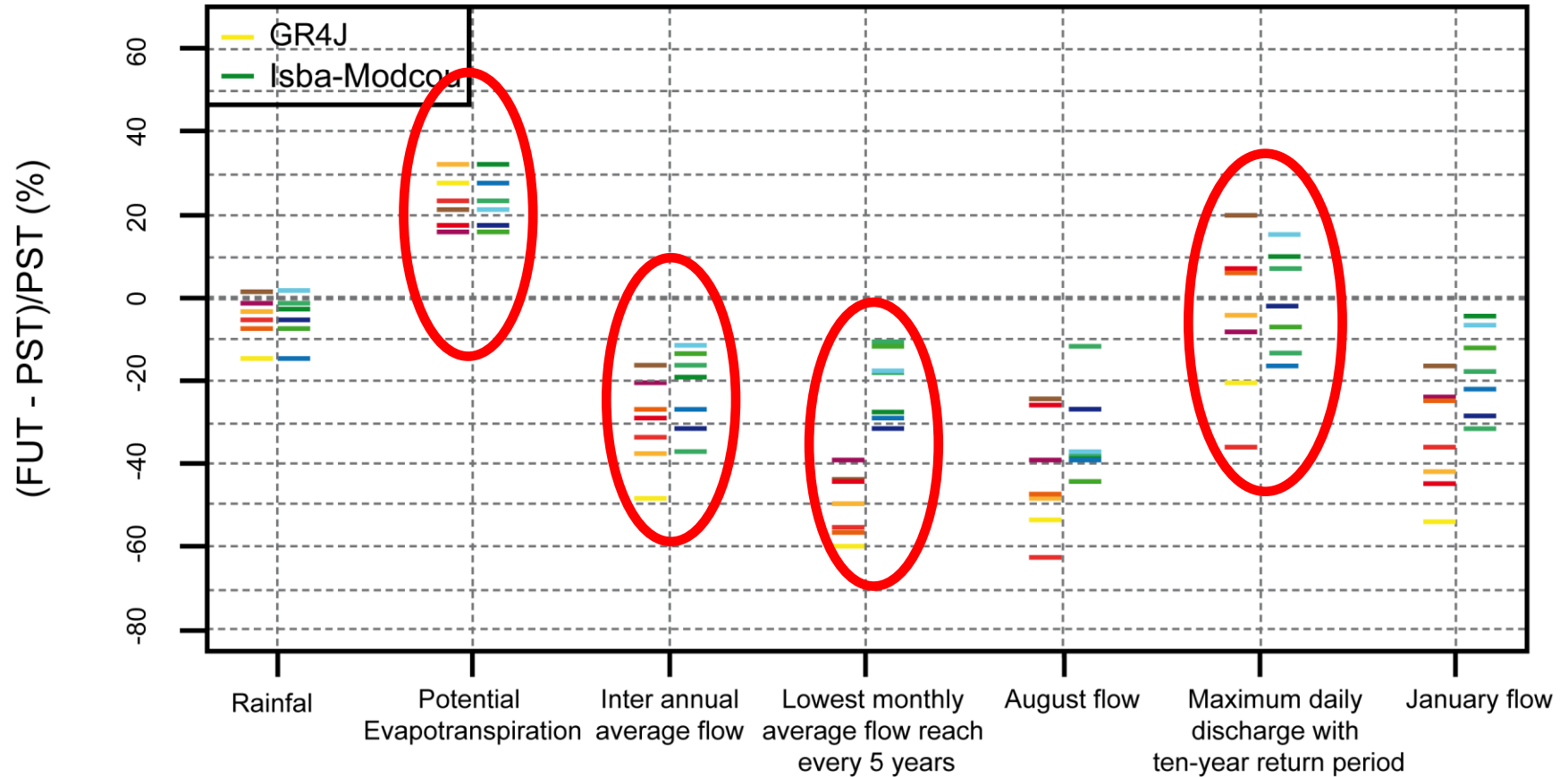
## ❑ Seine river low flow in Paris : 94 m<sup>3</sup>/s



m <sup>3</sup> /d/inhabitant	65	18	<b>1,2</b>
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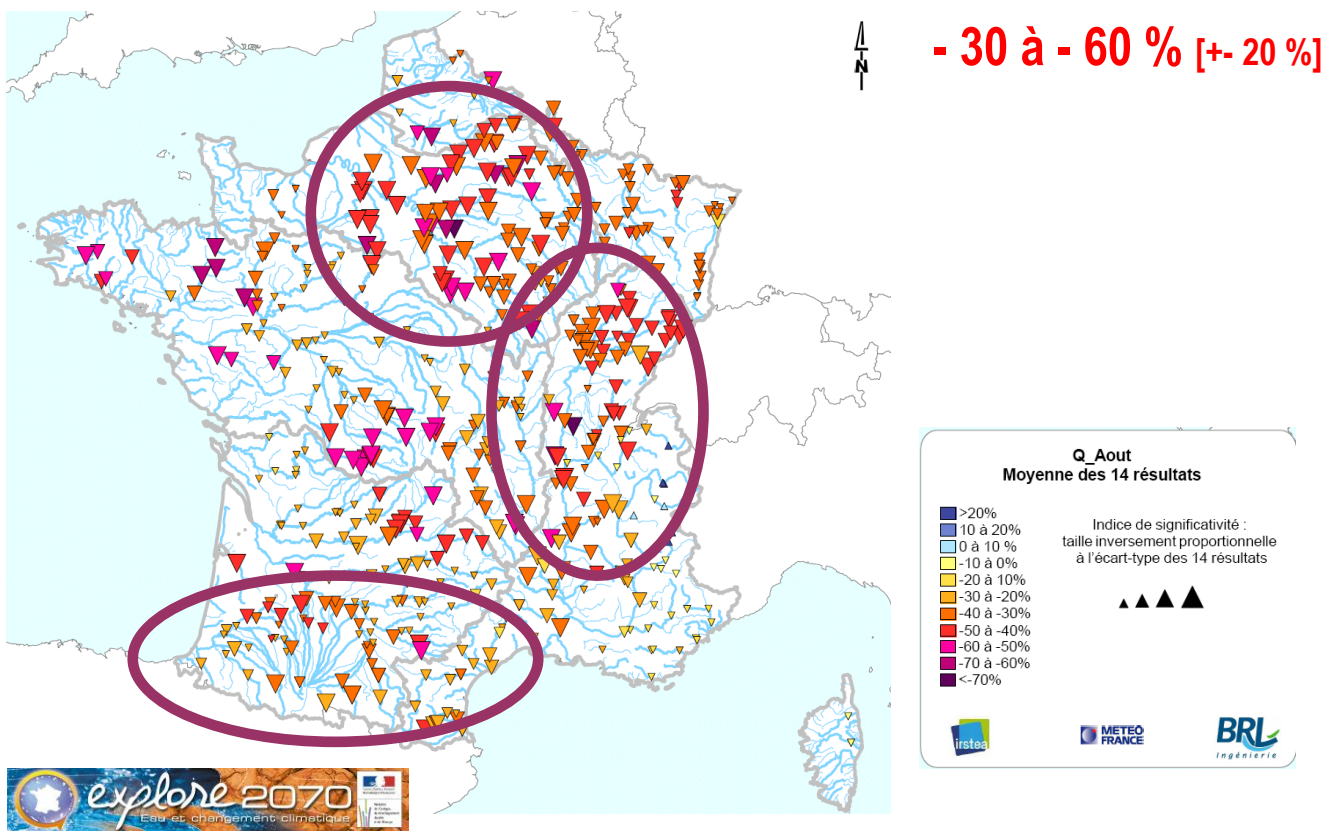
Source : DRIEE

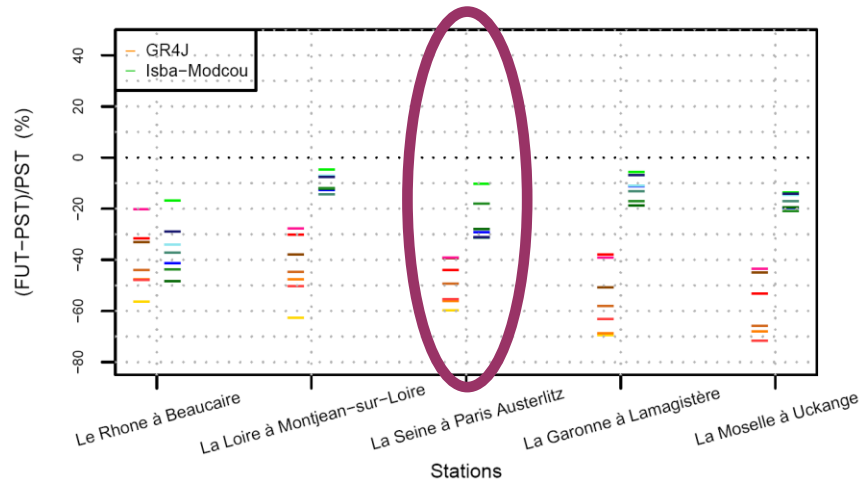
**From + 1° C to +3° C**



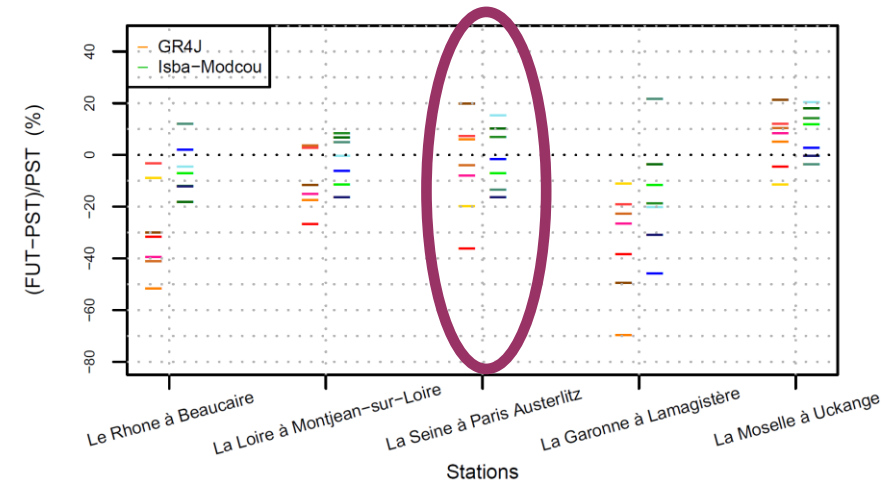


## Evolution du **débit mensuel min. quinquennal (QMNA5)** entre 1961-1990 et 2046-2065

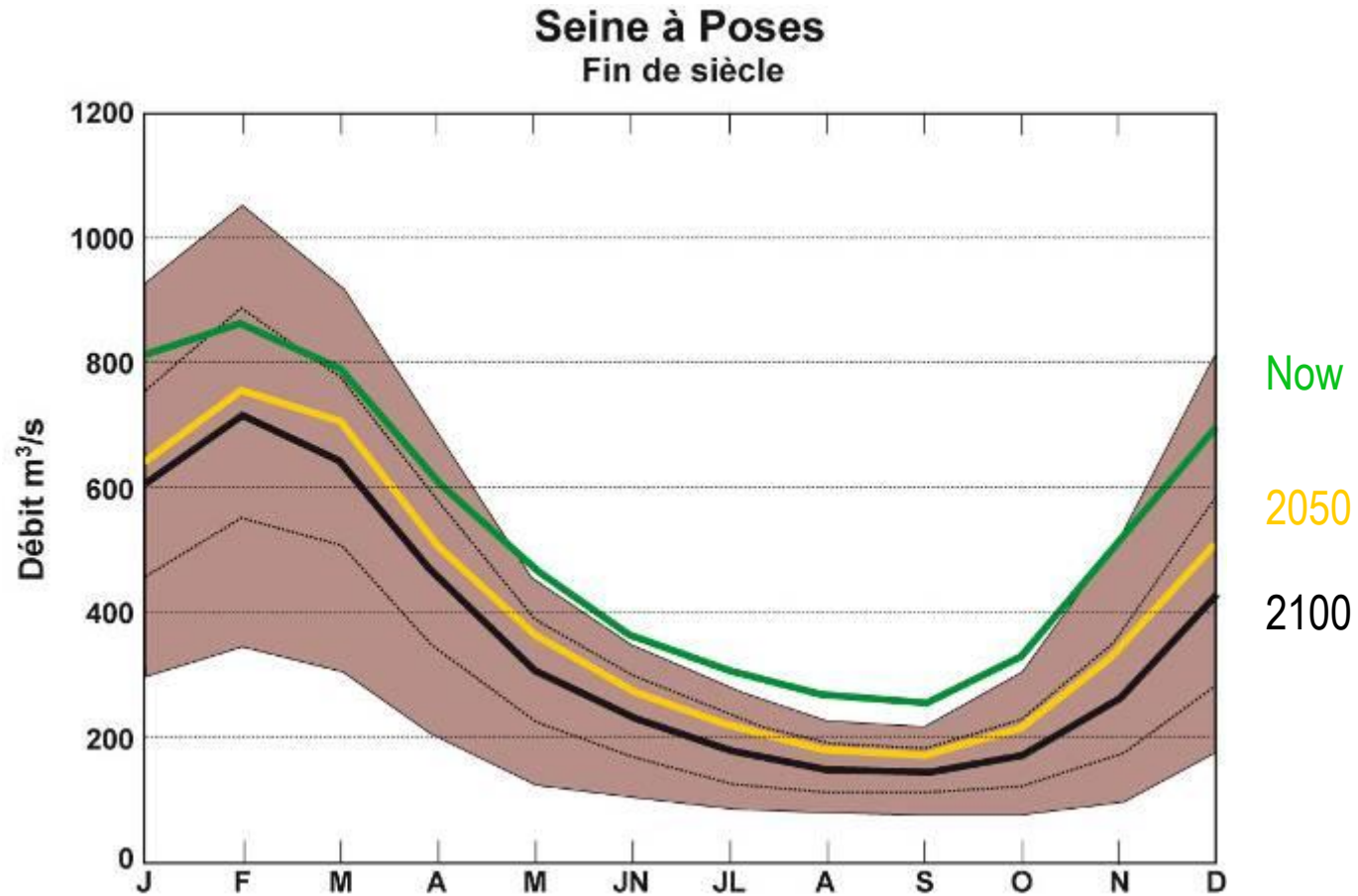




Reduction of low water flow



Uncertainty on 10-years flood



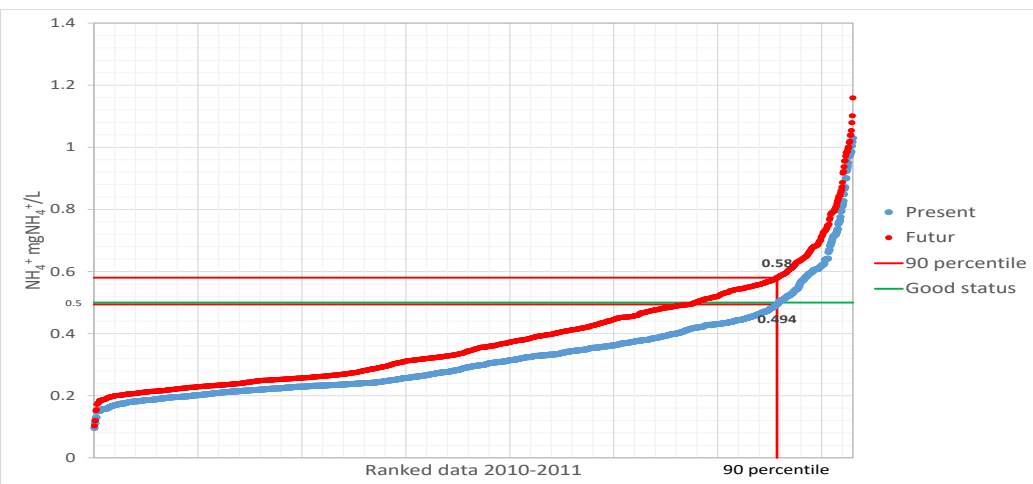
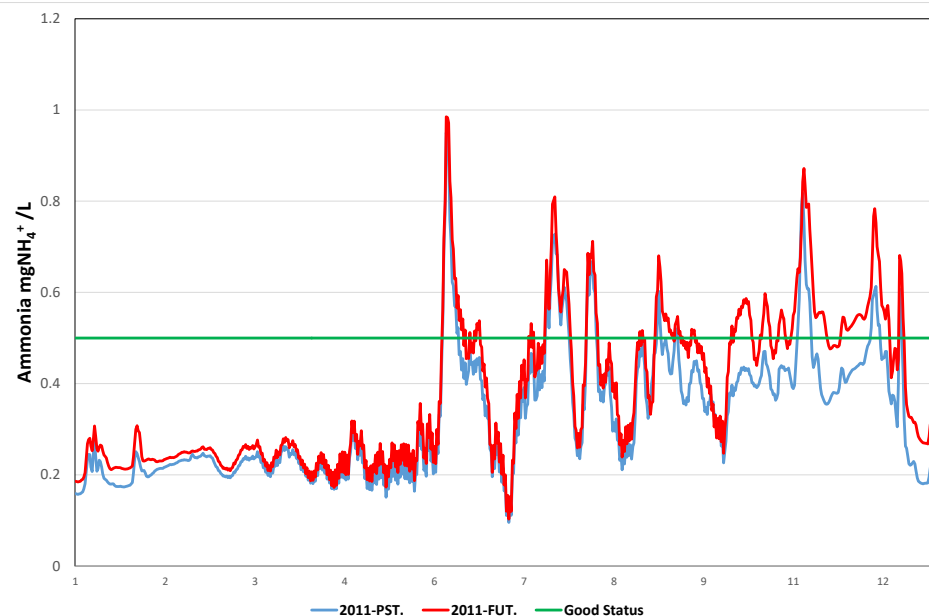
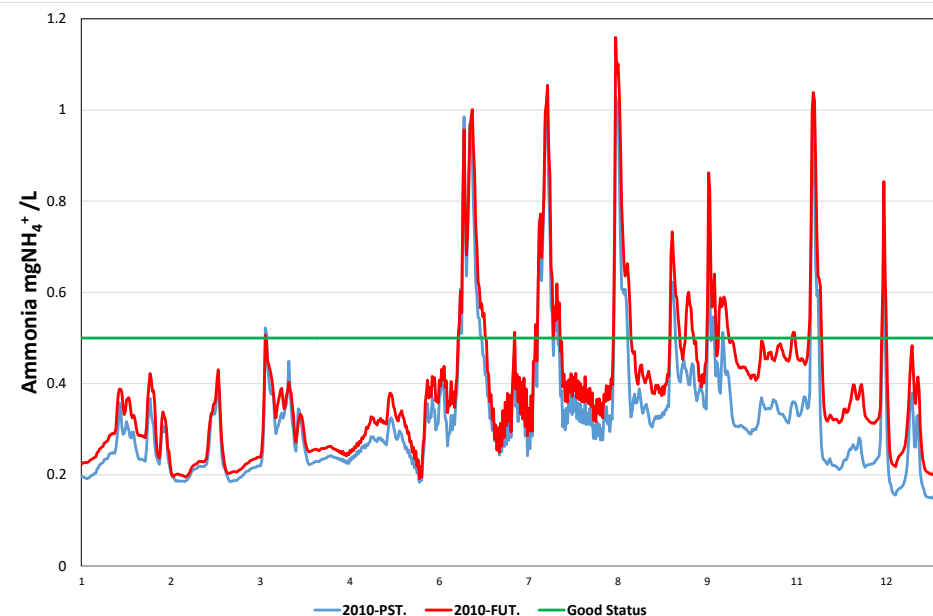
Inter annual average flow

Source : étude RExHySS

On Seine river catchment, climate change consequences are:

- Increase of annual average temperatures  
→ 2050 : + 1,5° C to + 3° C
- Decrease of Rainfall
- Increase of evapotranspiration  
→ 2050 : + 16 %
- Decrease of the river flow
- Probable increase of river flood but not sure

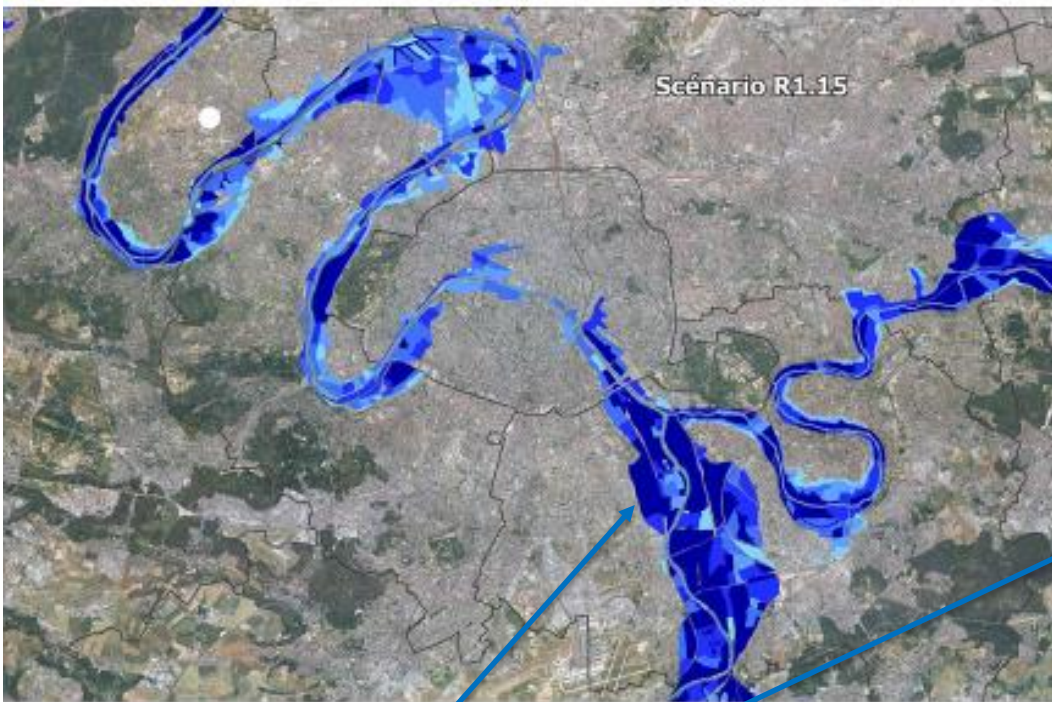
# Impact on River SIAAP Master Plan



Number of unsatisfactory days		
	Present	Future
<b>2010</b>	<b>35</b>	<b>55</b>
<b>2011</b>	<b>36.5</b>	<b>93</b>
<b>2010-2011</b>	<b>71.5</b>	<b>151</b>

- Reaching a high level of performance :
  - Reliable facilities for a daily high performance
  - A strong involvement of stakeholders and users for source control management:
    - ✓ Stormwater
    - ✓ Micropolluants
- Being able of innovation
  - Organisation
  - Waste Water Treatment and sanitation
- Cooperation with the others operators and utilities (*Seine Grands Lacs*)
- The Authorities initiated a plan to fight against the flow decrease, against the river flood
  - it's therefore necessary to adapt the system and make it resilient





R1.15

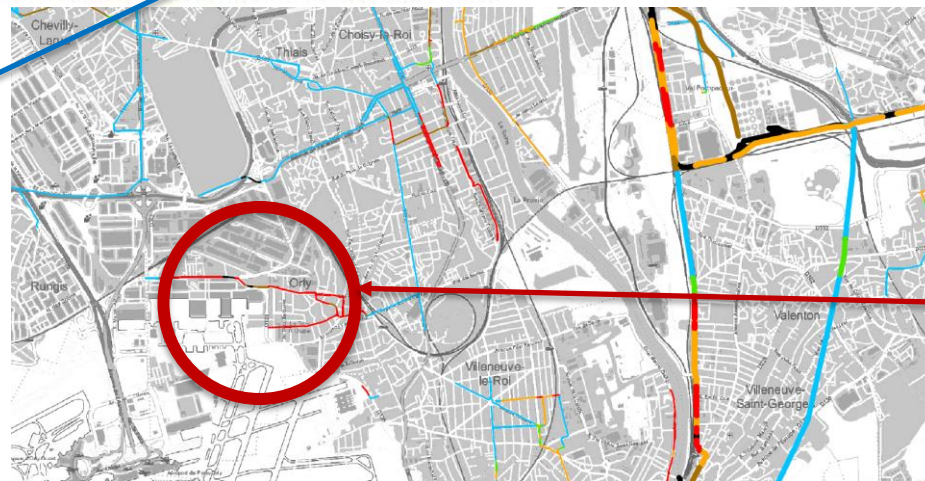
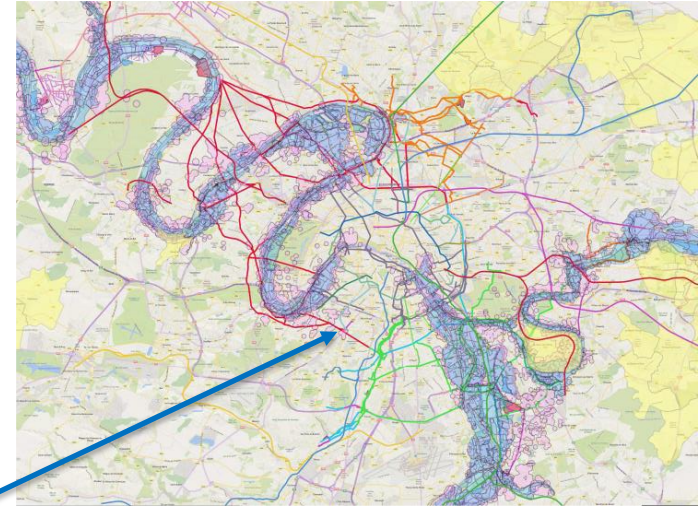
H <  
0,5m

0,5 -  
1 m

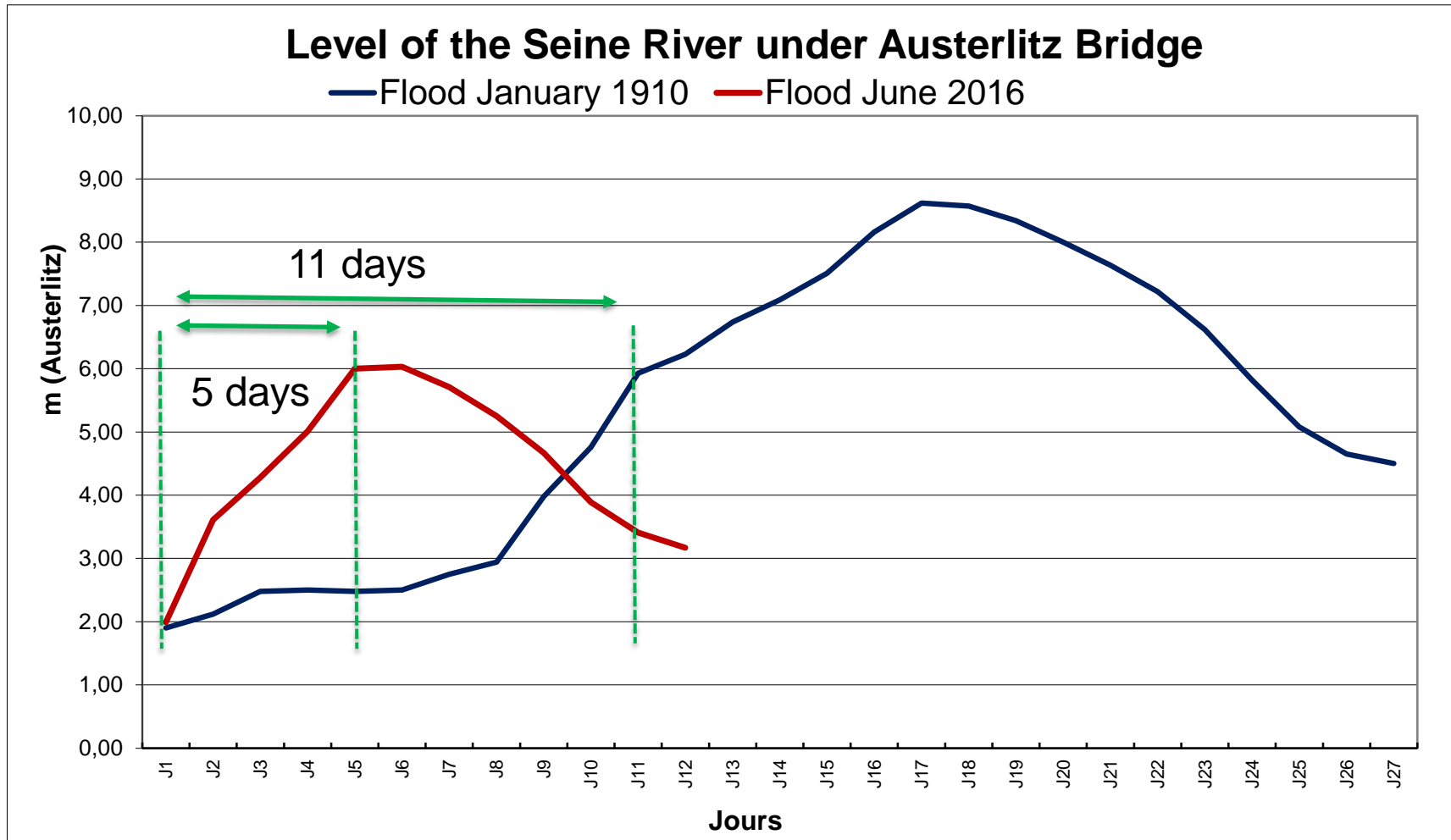
1 -  
1,5 m

1,5 -  
2 m

> 2 m



Flood of  
waste  
water  
networks



**Flood at the end of the spring not managed such as the winter flood by Seine Grands Lacs**

- Vulnerability study on the sanitation system as basis for prevention of flood
  - With the departments, the municipalities, the operators
  - To know where are the probable disorders du to the flood and the waste water system
  - To know the impact of flood and rain on waste water system and how to make the system resilient
  - To inform and raise the awareness of the citizens
  - A dynamic model for predicting impacts and to anticipate flood behaviour (flooding maps)
- Preparedness with exercices



## Vulnerability study on the sanitation system as basis for prevention of flood

