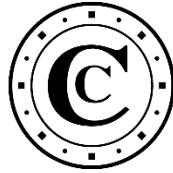


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INSUFFICIENT FLOOD RISK PREVENTION IN ÎLE-DE-FRANCE

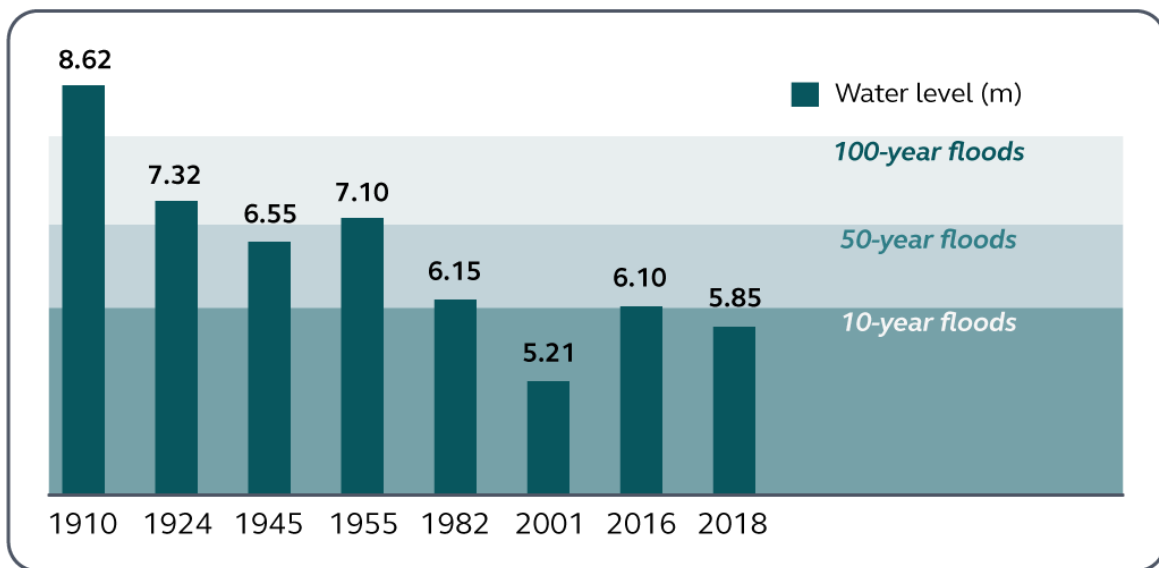
Public thematic report

November 2022

Executive Summary

Flooding is a major natural risk in the Seine river basin, ranking just after drought. A major flood of the Seine river, similar to that of 1910, could cause up to €30 billion of damage according to a recent OECD assessment. The public authorities have been preparing for this for a long time. In particular, four reservoirs were built upstream of Paris between 1949 and 1990, both to maintain the river's low water flow and to protect the capital and its conurbation from winter flooding.

Historical flood water levels at the Austerlitz bridge in Paris from 1910 to 2018



Source : Eure Departmental Territory Directorate (DDT), presentation to the Seine river flood risk prevention plan steering committee meeting of 11 April 2019

Since the "major rivers" plans for the Loire in 1994, the Rhône in 2004 and the Seine in 2007, the aim has been to prevent flood risks by initiating a sustainable development approach for each river basin. The implementation of the European Water Framework Directive in 2000, which aims to achieve good ecological and chemical status of water bodies by 2027, and the 2007 Floods Directive on the assessment and management of flood risks, has led to the widespread use of new tools such as flood risk management plans.

However, the floods of 2016 and 2018 rekindled awareness of this major risk in Île-de-France. In recent years, these floods have given rise to several reports by the Organisation for Economic Cooperation and Development, the General Council for the Environment and Sustainable Development and the General Inspectorate of Administration, and it is now important to verify whether the recommendations have been acted upon.

The joint panel of the Court of Accounts and the Île-de-France Regional Audit Chamber sought to assess the state of awareness of the risk linked to a 100-year flood of the Seine river, as well as the objectives set and the financial means deployed to prevent this risk. It then examined the effectiveness and efficiency of the tools designed to reduce the risk: those aimed at controlling the natural flood hazard (dykes and reservoirs, other nature-based solutions) and those aimed at reducing vulnerability by strengthening the resilience of territories.

The distinction between hazard and risk

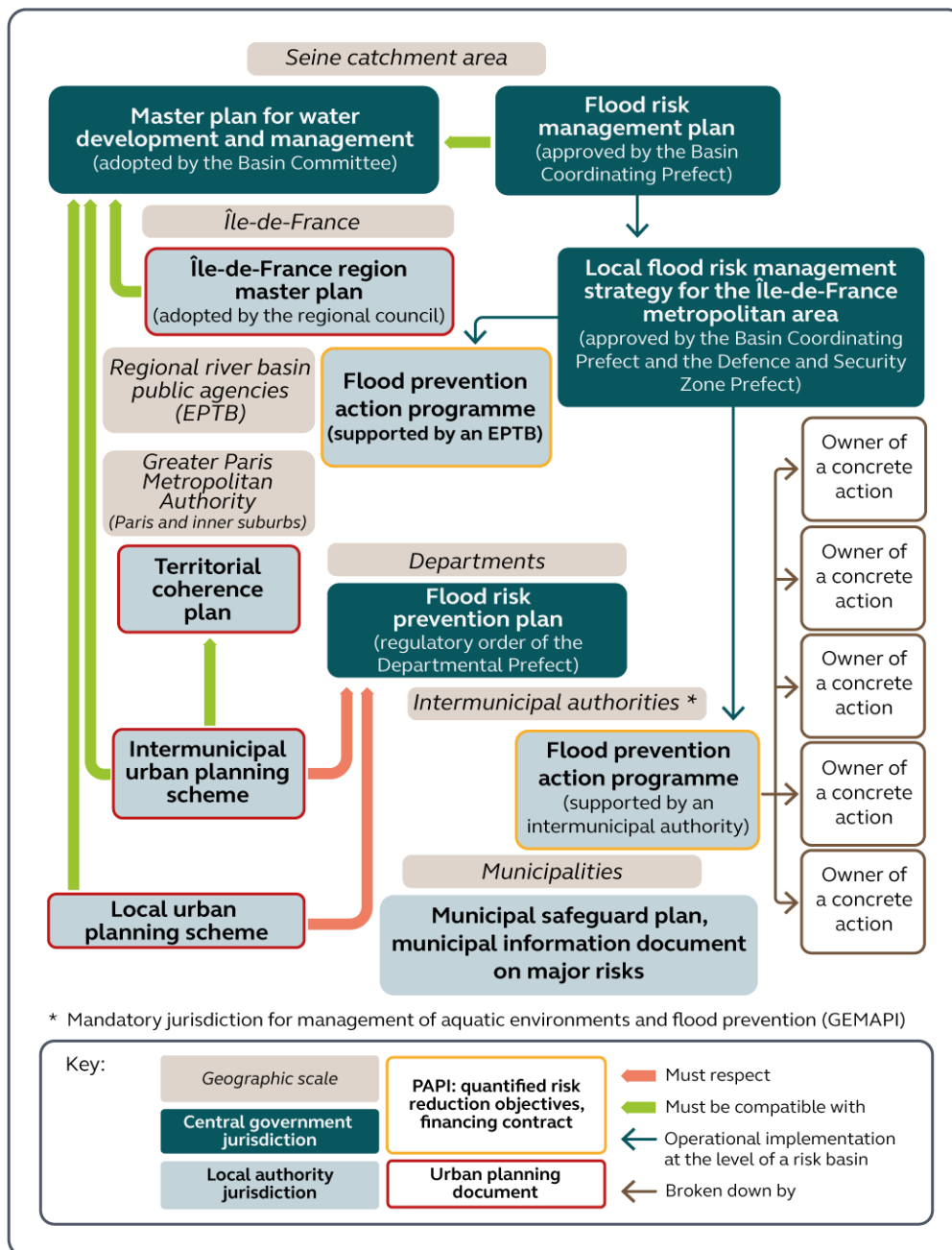
A hazard is a natural or technological phenomenon that is more or less likely in a given area. Vulnerability expresses the foreseeable effect of this phenomenon on factors related to humans and their activities. A hazard that occurs in a place where there is no human presence or property is not a risk. A risk is the combination of a hazard and a situation exposed to the hazard: it can be defined as the probability of occurrence of damage taking into account the interaction between damage factors (hazards) and vulnerability factors (settlements, distribution of assets).



Source: ©AURCA 2021

Crisis management was only addressed to assess its role in reducing the impact of floods. Finally, the investigation analysed the extent to which the governance and sustainable management strategy of the Seine river in recent years has contributed to preventing flood risk.

Organisation and tools of the flood prevention policy



Source: Court of Accounts

There is a major risk of flooding in the Île-de-France region, the severity of which is insufficiently taken into account by local government and the population

Understanding of the hazard is improving

Floods on the Seine usually occur slowly, although episodes concentrated over shorter timespans (12 to 24 hours) have been observed in recent years on some tributaries of the Seine (Grand Morin, Petit Morin, Loing). Many maps covering overflow flooding, which is now

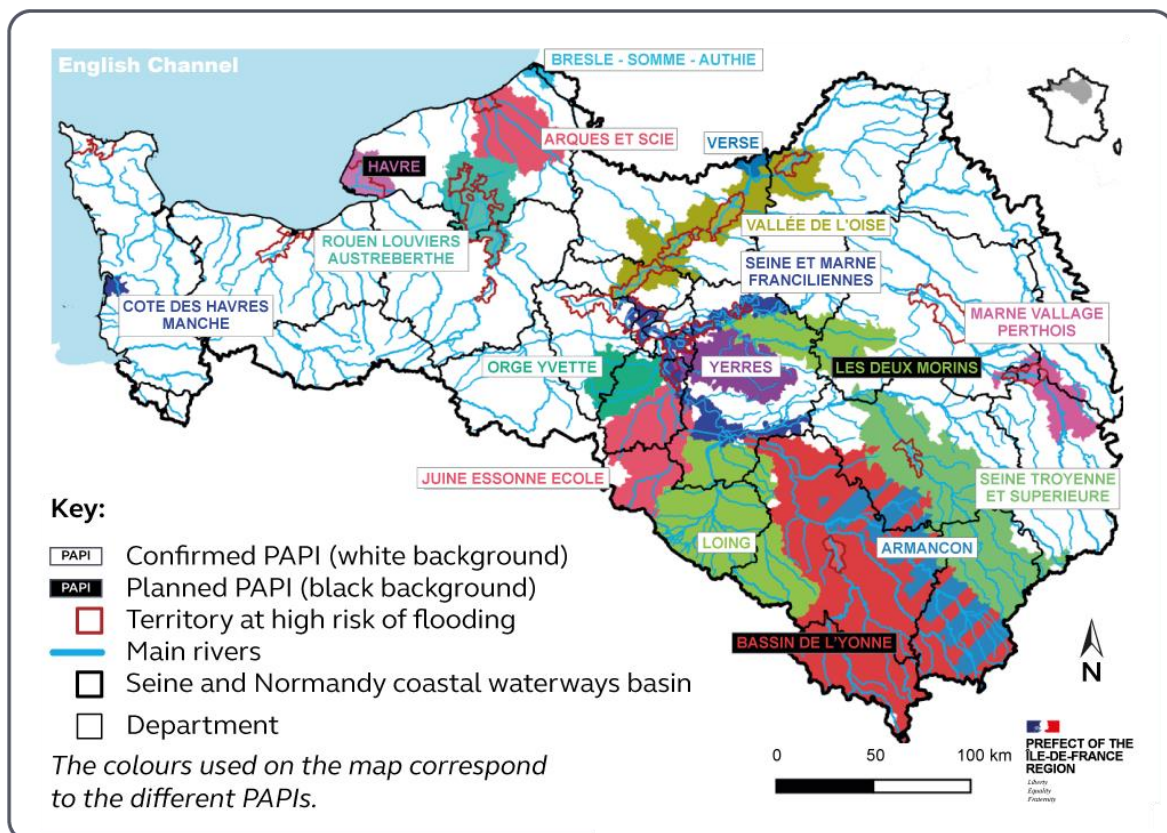
well understood, are available to the general public through flood risk prevention plans (PPRI) or on dedicated websites such as [Géorisques](https://www.georisques.gouv.fr/) or cartoviz.institutparisregion.fr.

However, flooding due to rising groundwater and runoff is harder to understand. Yet runoff accounts for about a third of the damage insured in the Île-de-France region. It must be a major focus of public policy in the coming years. Central government must ensure that all stakeholders (citizens, companies, government departments) have access to information available on this risk, particularly on flooding by rising groundwater, which has recently become better understood.

Local authorities have only implemented flood prevention action programmes very recently

In accordance with the requirements of the 2007 Directive on the assessment and management of flood risks, areas at significant risk have been identified in Île-de-France. Two local flood risk management strategies (the "Île-de-France metropolitan area" strategy, overseen by central government and covering the entire Île-de-France region, and the Meaux strategy) have been adopted, as well as eight flood prevention action programmes (known as PAPI). Only two of these action programmes are relatively old: the one for the Seine and Marne rivers in the Île-de-France region, managed by the Seine Grands Lacs territorial public agency, and the one for the Yerres. All the others have been produced since 2018. The perimeters have evolved as floods have occurred: the floods of the Loing and the Juine in 2016 led to the adoption of new action programmes.

Status of flood prevention action programmes in the Seine-Normandy basin



Source: Île-de-France Regional and Interdepartmental Directorate for the Environment, Planning and Transport (DRIEAT), river basin delegation, August 2021

Because of the interest of these action programmes for all flood risk prevention stakeholders (citizens, non-profit organisations, companies, insurers, elected representatives, etc.), a database accessible to all should be set up to monitor their progress.

A lack of ambitious and coordinated risk prevention objectives for local authorities in Île-de-France

According to the OECD, a 100-year flood reaching the maximum water level of the 1910 flood (8.60 metres at the Austerlitz bridge) would cause direct damage of nearly €30 billion. The Caisse centrale de réassurance estimates that damage to insured property alone would be €19 billion, which is higher than the threshold at which it can call on the central government guarantee (€2.7 billion).

Cost of direct damage according to flood scenarios

Water level at Austerlitz bridge	Cost
7.23 m flood (1924 flood)	€3.2 bn
Flood of 8.12 m (level that the 1910 flood would reach today)	€13.5 bn
8.62 m flood (maximum water level reached during the January 1910 flood)	€29.4 bn

Source: OECD, 2014.

Despite the amount of potential damage, local and regional authorities have not set quantified targets for reducing this damage. Consequently, they make little use of the major natural risk prevention fund for the Île-de-France region: the cumulative amount of its commitments amounted to €65 million and expenditure totalled €23 million from 2009 to 2021, well below the levels of other regions affected by flood risk.

It is therefore necessary to strengthen the ambition of flood prevention action programmes in terms of risk reduction and for the local and regional authorities to provide the corresponding financial resources.

Low risk awareness among the population

Even though initiatives are being taken by central government departments, some local government authorities and insurers, awareness-raising actions need to be strengthened over time and evaluated using perception indicators.

Action to reduce flood risk remains limited

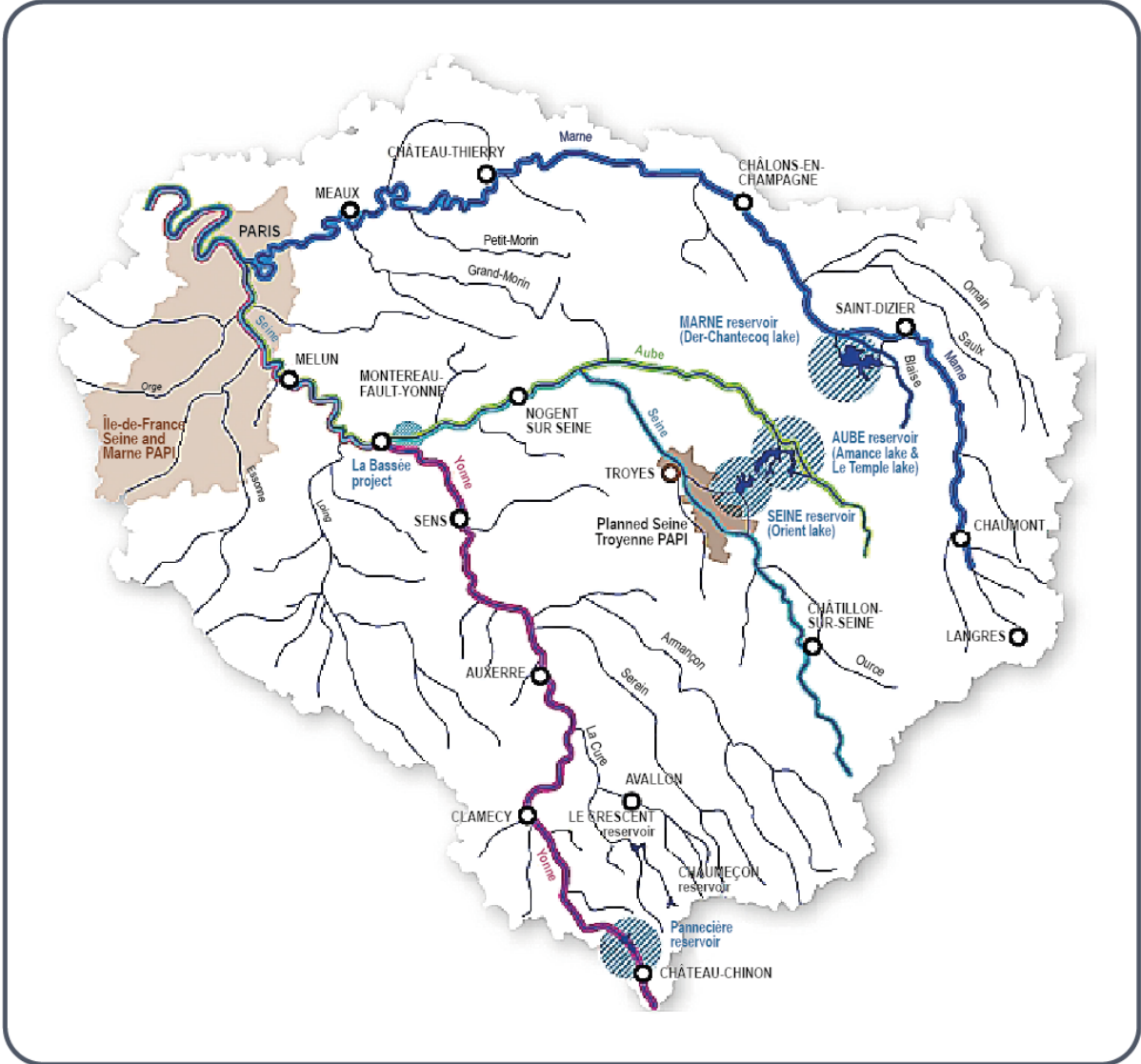
Dykes, protection works and upstream-downstream coherence: major investments to be planned

The Paris conurbation is much less protected against major floods than other international cities: the theoretical level of protection concerns a return period for a flood event of 30-50 years for the inner suburbs, 10-20 years between the Pont d'Iéna and Issy-les-Moulineaux, and 100 years for the rest of Paris. In comparison, London is protected against a 1,000-year flood return period and is aiming for protection for a return period of 10,000 years by 2100. Frankfurt's new districts and critical infrastructure are protected against a flood event with a return period of two hundred years.

The management of dykes was reorganised following the 2014 law on the modernisation of territorial public action and the creation of metropolitan areas, which entrusted the management of aquatic environments and flood prevention (known as Gemapi) to intermunicipal authorities for cooperation between local authorities.

In the Île-de-France region, the Greater Paris Metropolitan Authority has taken over the management of some 120 km of dykes and walls, previously managed by the departments, with difficulty and delay. It will have to ensure that they are brought up to standard, using the tax that the 2014 law allows it to raise. However, the departments have made different management choices: for example, the Val-de-Marne department has retained the management of its own dyke network by delegation, while the Hauts-de-Seine department has transferred the management of its network to the Metropolitan Authority. The four reservoirs managed by the Seine Grands Lacs public agency, which serve to maintain low water flows throughout the Seine river basin and prevent winter flooding, benefit all neighbouring communities. However, they are located upstream of certain floods and are insufficient to curb a 1910-type flood. This justified the launch of a pilot retention basin project at La Bassée, located at the junction of the Seine and Yonne rivers. The continuation of the project is conditional on the assessment of its environmental impact and the commitment of the necessary funding (€600 million, 2013 value).

Grands Lacs and the La Bassée project



Source: EPTB Seine Grands Lacs public agency

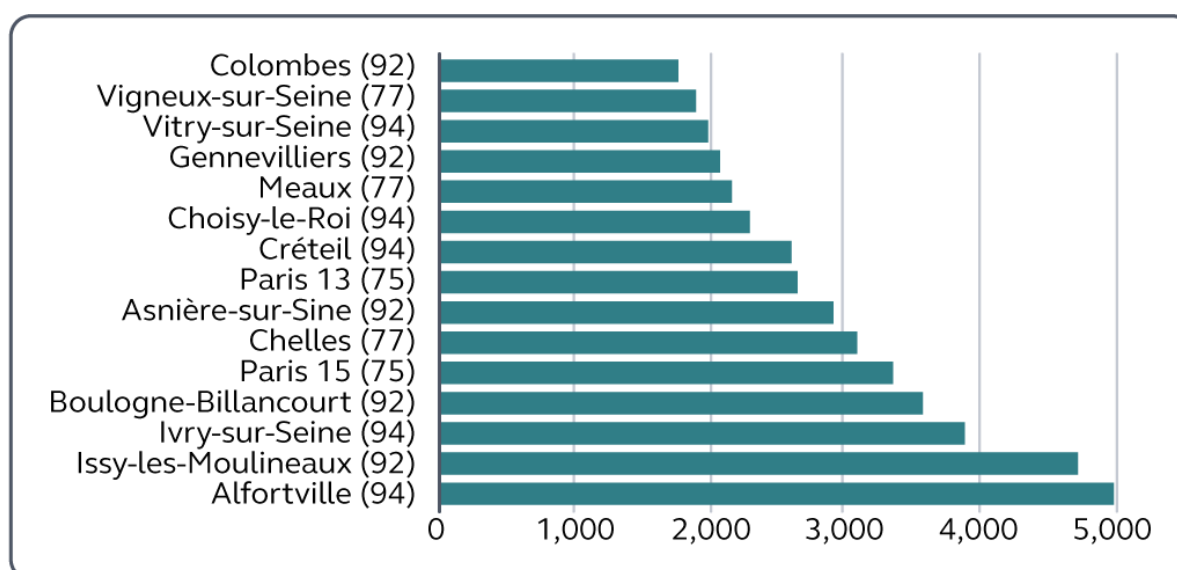
Slow achievements in dynamic flood mitigation and the restoration of natural infiltration and runoff capacities

The preservation and restoration of floodplains are an important means, identified in the Seine river basin flood risk management plan, to slow down floods and reduce damage downstream. However, these operations are slow and difficult to carry out, particularly because of the need for consultation with farmers. The EPTB Seine Grands Lacs public agency has thus been charged, within the framework of the flood prevention action programme for the Seine and Marne rivers in the Île-de-France region, with identifying potential floodplains with a view to defining pilot territories. In addition, the renaturing of the areas most at risk took the form of an emblematic €83 million operation in Villeneuve-Saint-Georges on the banks of the Yerres, where the floods of 2016 and 2018 were particularly devastating.

Reducing vulnerability: a major challenge, actions to be reinforced

One way to reduce vulnerability is to regulate urban development in areas at risk: this is the purpose of the flood risk prevention plans adopted over the last 20 years, which are binding on urban planning documents.

Number of homes built in flood zones between 2000 and 2018 (flood risk prevention plan hazards, 100-year flood)



Source: Institut Paris Région, based on 2020 land tax files (DGFIP), Flood Risk Prevention Plan Hazards (Drieat)

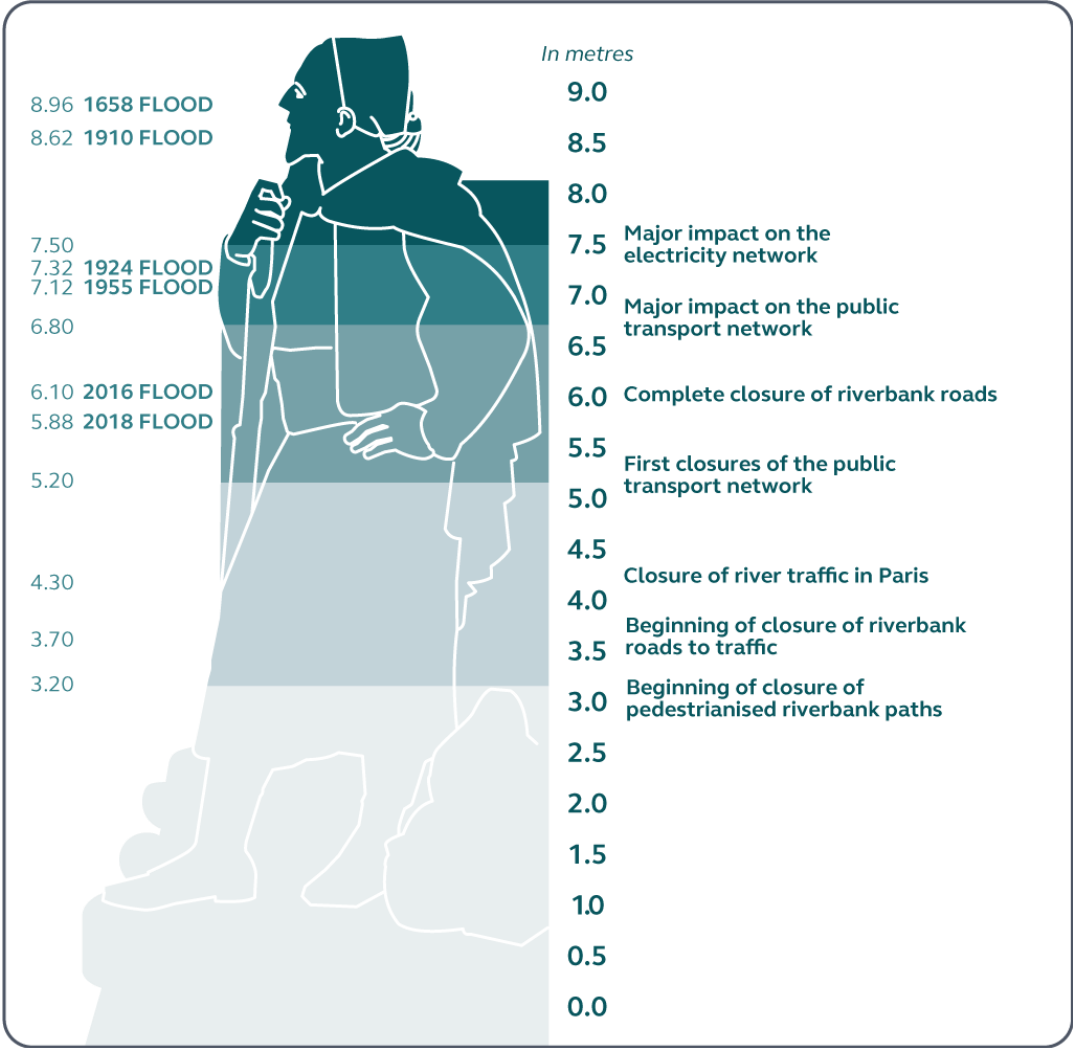
Despite these regulations, the population density in flood-prone areas in the Paris region has continued to increase, no doubt due to the limited constraints of these plans. They are dated and incomplete and do not take into account the risks of runoff or rising groundwater. In addition, some stakeholders point to inconsistencies between departments. However, the revision of these plans is not a central government priority.

Progress on housing resilience remains too limited. Firstly, it is necessary to take better account of the risk of flooding in urban planning documents, which are currently inadequate in this respect. For example, an analysis of the first draft of the territorial coherence plan, adopted in January 2022 by the Greater Paris Metropolitan Authority, shows that its content falls far short of central government recommendations in terms of flood risk prevention. Similarly, it is essential that local urban planning schemes, which are now drawn up by intermunicipal authorities, incorporate the provisions of flood risk prevention plans. Central government services must step up their awareness-raising and monitoring activities in this area.

It is also important that development operations integrate flood risk resilience requirements at a very early stage. Some urban renewal projects have recently done so. The Île-de-France Regional and Interdepartmental Directorate for the Environment, Planning and Transport has drawn up the "resilient neighbourhood charter" in consultation with various stakeholders. In general, insurance companies have a greater role to play in making stakeholders more accountable.

The high vulnerability of infrastructure networks (electricity, gas, telecommunications, digital network, transport, heating, drinking water, sanitation), is a major issue, but was underestimated until the floods of 2016 and 2018.

The Seine river (measured at the Paris-Austerlitz station, left hand scale) and the main impacts on infrastructure networks



Source: General Secretariat of the Paris Defence and Security Zone.

Under pressure from central government, operators have become more aware of the need to carry out vulnerability assessments and to strengthen their networks. However, their level of preparedness is very disparate and major investments need to be made.

Action to reduce the vulnerability of small and medium-sized enterprises is non-existent. These companies are not among the priorities of the Paris Île-de-France Chamber of Commerce and Industry, nor of the region, which could provide support in line with its jurisdiction in the field of economic development.

Finally, the cultural heritage of the Île-de-France region is very concerned by the risk of flooding, but the Ministry of Culture has not yet effectively overseen action to reduce its vulnerability.

The need for more crisis management support for municipalities

Crisis management preparedness is an essential component in reducing the probability of damage and thus the risk of flooding. Its effectiveness and cost-benefit ratio are appreciated and emphasised by all stakeholders. However, it requires coordination of public and private stakeholders, which is very complex to put in place. Simulation exercises are an interesting way of preparing the populations and local authorities concerned, as demonstrated by the Sequana exercise, which took place shortly before the 2016 floods. It deserves to be repeated, even in a more modest form, in order to maintain stakeholders' vigilance. The legal obligation to draw up local emergency plans is only met by 60% of municipalities in the Île-de-France region; compliance with the obligation to test the plans every five years is even lower. The reason for this is probably the lack of penalties for these failures.

Absence of a coordinated strategy for the Seine basin

Île-de-France is part of the Seine river basin. It is at this level that central government, local government and all stakeholders (network operators, non-profit organisations, companies, insurers, etc.) must coordinate their efforts with a view to effectively managing flood risk prevention. However, this coordination is insufficient in the Seine river basin.

The loss of a global vision since the end of the Seine plan

Like the other "major rivers" plans before it, the initial ambition of the 2007-2013 Seine plan was to ensure the reciprocity of environmental, social and economic interests and flood prevention. With €121 million of financial commitments shared between central government, the water agency and the regions, its main lines of action concerned flooding, water quality, environmental quality and sustainable development of the river.

However, the Seine plan was not renewed in 2014. Only a second interregional planning contract, supported by the Basin Coordinating Prefect, was signed for the period 2015-2020 between central government and the regions of Basse-Normandie, Île-de-France, Champagne-Ardenne and Picardie. This contract, totalling €99 million, refocused on three themes: climate change; flood risk management; preservation and restoration of water resources and aquatic areas and species. The absence of any economic component reflects the disengagement of the regions.

Unlike the Loire and Rhône-Saône plans, the Seine plan has not gained effective support from the various stakeholders, particularly the regions, for a shared vision of the river and common objectives. This is due to three notable differences with the other major river plans. The total amount of the interregional planning contract was low, including for dedicated flood prevention actions. The financial involvement of the regions was low with the exception of Grand Est. Its governance did not involve the wide network of stakeholders.

During the 2015-2020 period, a "Seine plan committee" was led by the Île-de-France Regional and Interdepartmental Directorate for the Environment, Development and Transport, in partnership with the Seine-Normandie water agency. It played a role in coordinating the stakeholders technically concerned by the risk of flooding, before being abolished in 2021. As such, there is no working forum on topics relating to the risk of flooding of the Seine river involving all stakeholders (elected representatives, technicians, non-profit organisations) like the "stakeholder forums" organised in the Loire and Rhône river basins.

Accordingly, the Court recommends that central government and the competent local government authorities report annually on the progress of the flood risk prevention policy by bringing together representatives of all stakeholders.

The need to strengthen the role of the Coordinating Prefect

The Seine river basin is characterised by a lack of interest and unifying commitment on the part of local government upstream and downstream of the Paris region. For example, the Île-de-France region refuses to commit to flood prevention, even though some required action comes directly under its jurisdiction in terms of land use planning and economic development. This dispersion of action and stakeholders in the Seine basin is contrary to the principle of solidarity, which is supposed to be the cornerstone of the national flood risk strategy, and which aims to share responsibilities and efforts to reduce the negative consequences of flooding fairly between all territories and stakeholders: upstream-downstream, urban-rural, right bank-left bank. This lack of federation of stakeholders explains the abolition of the Seine plan and has led to uncoordinated strategies.

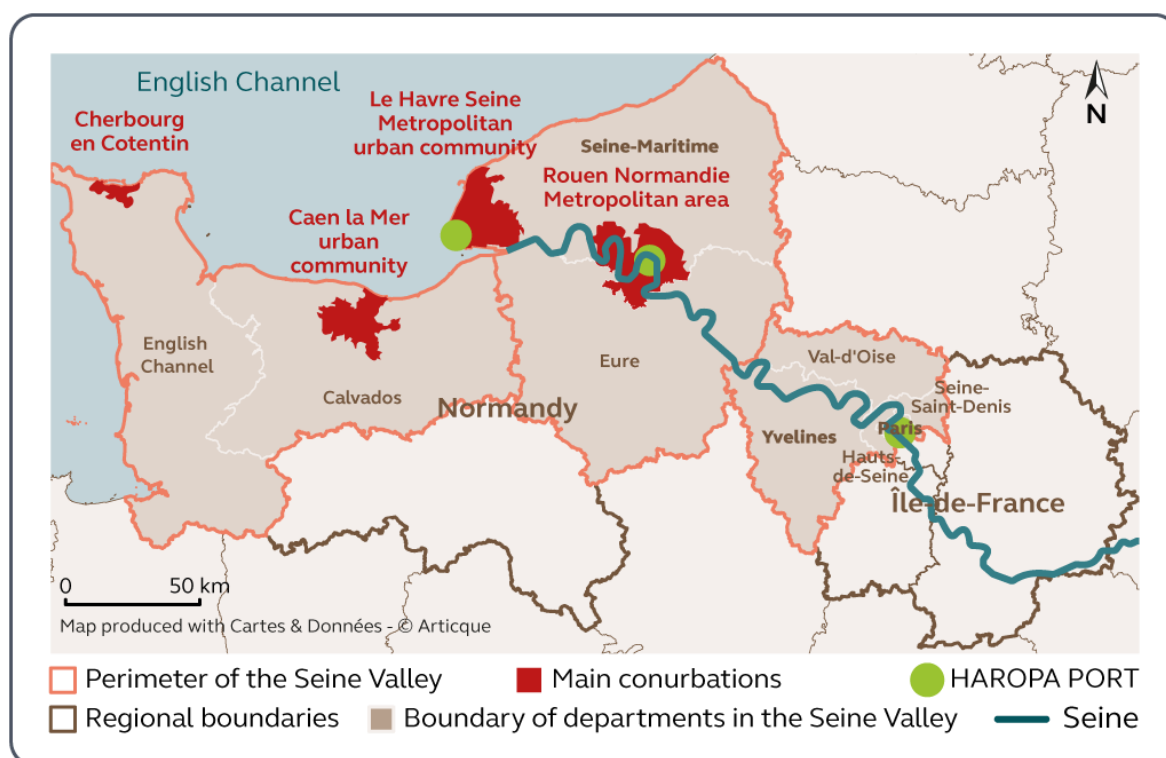
Admittedly, the two strategic documents covering the basin in terms of water quality and flood risk are consistent: the master plan for water development and management and the flood risk management plan. For the sake of simplification, these two documents could be merged.

However, the planning and development strategy for the Seine leaves out the upstream part of the river, including the Paris conurbation. Indeed, the abolition of the Seine plan was concomitant with the appointment in 2013 of an interministerial delegate for the development of the Seine Valley, reporting to the Prime Minister. In 2015, his work led to the conclusion by central government and the Île-de-France and Normandy regions of an interregional State-Region planning contract for the Seine Valley for a total of approximately €1 billion, with three priorities: management of spaces and sustainable development; control of flows and movements; economic development.

It has been followed by the 2022-2027 interregional State-Region planning contract for the Seine Valley, in which the section on "Environmental quality and the ecological transition" should include four priorities: prudent development (reducing land take); virtuous management of water and aquatic environments; the environmental transition and climate change; enhancement of the river space. Flood risk prevention is not one of them.

Above all, the geographical scope of this "Seine Valley" planning contract goes from the confluence of the Oise to the Seine estuary. It does not include the upstream part of the basin, which is therefore not covered by an interregional planning contract from 2022.

Perimeter of the Seine Valley defined in April 2013



Source: Court of Accounts based on Normandy Regional Directorate of Environment, Land Planning and Housing / IGN – AdminExpress COG 2022, Seine Valley strategic plan

In this context, the Basin Coordinating Prefect should be allowed to effectively play the role assigned to him by the Environmental Code. Flood risk prevention requires shared and effective governance at the level of the Seine basin. This requires that the Basin Coordinating Prefect fully plays his role of leading and coordinating central government policy on flood risk assessment and management, by giving the necessary impetus to central government departments.

In particular, local government authorities upstream and downstream of the Paris conurbation should be encouraged to work together on the issue of flooding. In this respect, the essential coordination expected of central government would be more successful if it were effectively managed by the Basin Coordinating Prefect as provided for in the texts. The implementation of the central government strategy at the basin level should be placed under his authority. This is why the Court ultimately recommends that the delegate for the development of the Seine Valley be assigned to the Basin Coordinating Prefect.

Summary of audit recommendations

Better define, finance and evaluate territorial strategies to deal with the major risk of a 100-year flood in Île-de-France and provide more information about this risk

1. In accordance with the European Directive on the assessment and management of flood risks, set up a database on the progress of flood prevention action plans, accessible to the public by 2025 at the latest (*Ministry for the Ecological Transition and Territorial Cohesion*).
2. Adapt the financing of flood prevention action programmes (PAPI) to more ambitious objectives in terms of reducing exposure to risk (*Ministry for the Ecological Transition and Territorial Cohesion, EPTB Seine Grands Lacs, EPTB Entente Oise-Aisne, Greater Paris Metropolitan Authority, entities in charge of the PAPI*).
3. Make all available information on flood risks (including those caused by rising groundwater or runoff) accessible to individuals, administrations and businesses, strengthen flood risk awareness actions within the flood prevention action programmes (PAPI) and regularly check the perception of flood risk among the population of the Île-de-France region by means of an indicator included in these programmes (*Ministry for the Ecological Transition and Territorial Cohesion, Ministry of the Interior and Overseas France - Prefect of the Île-de-France region and Prefect of the Paris police force, EPTB Seine Grands Lacs, EPTB Entente Oise-Aisne, entities in charge of the PAPI in Île-de-France*).

Strengthen flood risk reduction initiatives in Île-de-France

4. Continue without delay the inventory of dyke systems in the Greater Paris metropolitan area and adopt in the near future a plan for the financing of their upgrade (*Greater Paris Metropolitan Authority*).
5. Increase flood risk prevention awareness among all Île-de-France inter-municipal authorities, particularly in the context of the new territorial coherence plans (SCoT) and their implementation in inter-municipal urban planning schemes (*Ministry for the Ecological Transition and Territorial Cohesion, Ministry of the Interior and Overseas France - Prefect of the Île-de-France region, Greater Paris Metropolitan Authority*).
6. Set up a support scheme for flood risk vulnerability assessments for very small and medium-sized enterprises and infrastructure network operators to encourage them to make the key investments and implement the necessary organisational measures (*Île-de-France region, Paris Île-de-France Chamber of Commerce and Industry*).

Support these actions with a sustainable strategy and more coherent management for the Seine basin

7. Annually assess the status of the flood risk prevention policy, both at the basin and regional levels, and report on it to stakeholders in a broad format (*Ministry for the Ecological Transition and Territorial Cohesion, Ministry of the Interior and Overseas France - Basin Coordinating Prefect, Seine-Normandie water agency, local authorities and entities in charge of the action programmes*).
8. Place the delegate for the development of the Seine Valley under the authority of the Basin Coordinating Prefect (*Ministry for the Ecological Transition and Territorial Cohesion, Ministry of the Interior and Overseas France*).