

| STAR2CS INTERREG PROJECT |

# THE OISE VALLEY :

## WHAT FORMS OF RESILIENCE TO ADDRESS FLOODING?

Oise-les-Vallées Urban Planning Agency  
November 2019

PART

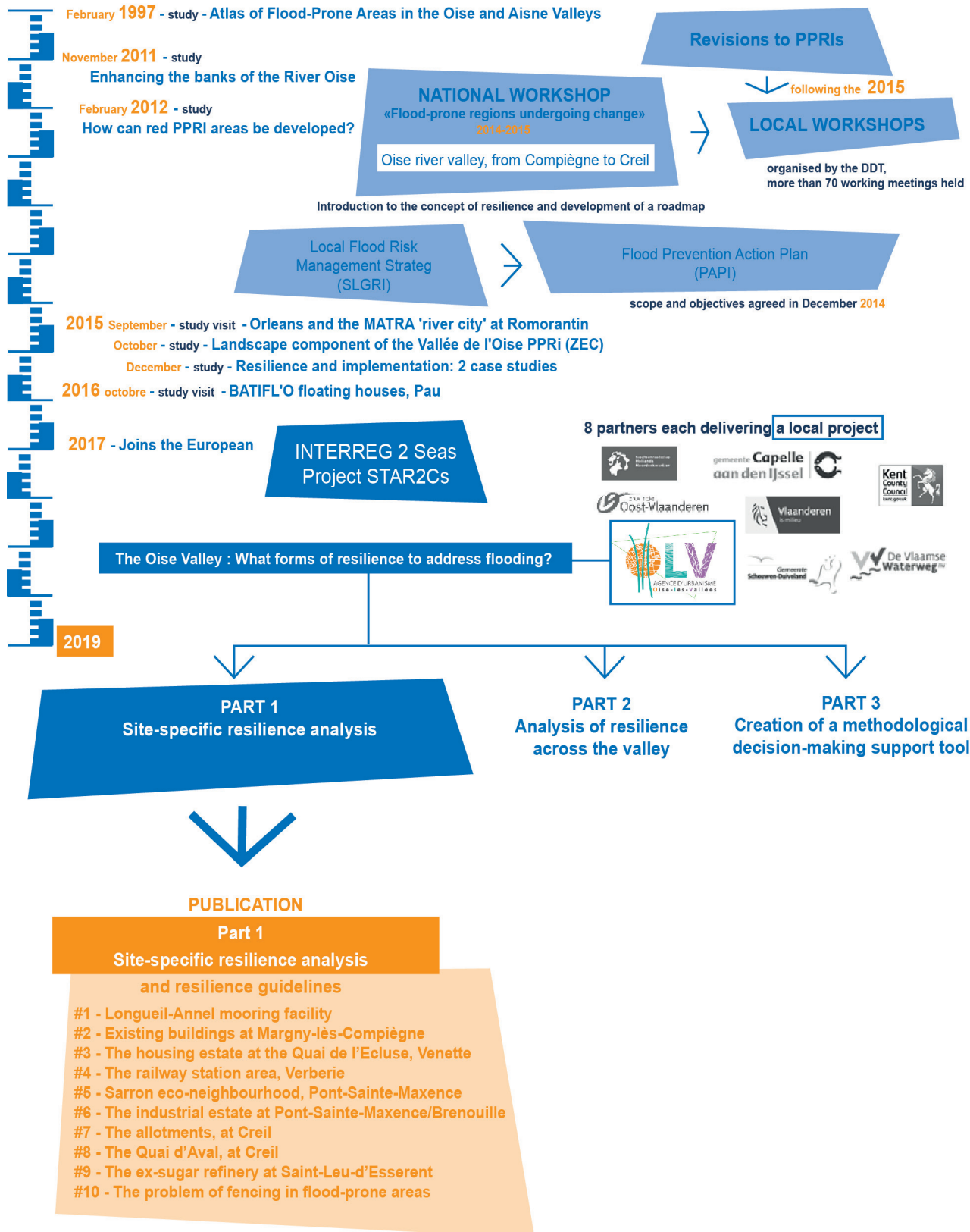
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SITE-SPECIFIC RESILIENCE  
ANALYSIS

BACKGROUND  
APPROACH  
SUMMARY



## Timeline of the Oise les Vallées Urban Planning Agency actions for resilience to flood risk





# [ P R E A M B L E ]



The Oise-les-Vallées Urban Planning Agency began assessing the valley's resilience to flood risk for the European Interreg STAR2Cs Project. This experience is the next stage after considering resilience and adapting to flood risks at the National "*Flood-prone regions undergoing change*" workshop" and local workshops to review the Flood Risk Prevention Plans (PPRi). Indeed, the joint-working process<sup>1</sup> undertaken during these workshops from 2014 to 2017 enabled local stakeholders to familiarise themselves with water risks that could affect their local area, to measure their impacts and to consider the way flood-prone areas are developed. Among the strategies studied, that of resilience forms an approach that can reconcile development and risk prevention.

To proactively address this issue and better prepare the local area, government services launched a review of the current PPRi to add new knowledge about flooding and adapt planning regulations in flood-prone areas by including the principle of resilience. Nevertheless, after stakeholder discussions it transpired that the area in its current state did not have the necessary components to accommodate resilience (vulnerable electricity supply systems, ill-adapted access, etc.). The purpose of the planning agency's involvement in this European project was to give further consideration and attempt to explore development and planning options in the area to prepare it to deal with flood risks. To achieve this, three steps are currently being researched:

- 1 **Town planning resilience:** How can sites in flood-prone areas, subject to additional restrictions from differing stakeholder opinions, be planned and developed.
- 2 As individual flood resilience plans do not cover that of an entire region, step two focuses on a larger scale, especially **the resilience of roads and utilities** that keep the region up and running.
- 3 Finally, the planning agency wanted to introduce a **methodological decision-making tool to support the local development and planning process. The tool is designed for various planning stakeholders** (elected members, technical staff, developers and private individuals, etc.).

This summary forms the first part of the process to get to grips with planning for urban development in flood-prone areas. With this in mind, an initial task was undertaken on flood-prone sites to study the challenges for urban development. The sites featured challenges given that they were flood-prone and subject to differing interests, so the goal was to find common ground between contradictory positions. This included studying legitimate safety aspects, intentions behind developments, job creation, building new homes, regenerating towns and to operate public amenities.

To achieve this, the planning agency was supported by Architect, Éric Daniel-Lacombe, to jointly organise a series of *workshops* in the valley for urban development stakeholders and specialists. These *workshops* helped discuss the situation at the different sites, coupled with the willingness of the participants to devise planning solutions that would accommodate individual aspirations.

This document concludes a consultation and co-construction exercise to find resilient solutions for the Oise Valley. It firstly gives a brief insight into existing or planned waterway developments in the valley. Next, it presents approaches to flood risk which the Oise Valley contributed to, especially through the national "*Flood-prone regions undergoing change*" workshop" and follow-up actions to review the PPRi for the valley. This also gave rise to the creation of a Flood Prevention Action Plan (PAPI) for the F and its local counterparts (SLGRI). Finally, the document features chosen solutions to best develop flood-prone areas.



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## SITE-SPECIFIC RESILIENCE ANALYSIS

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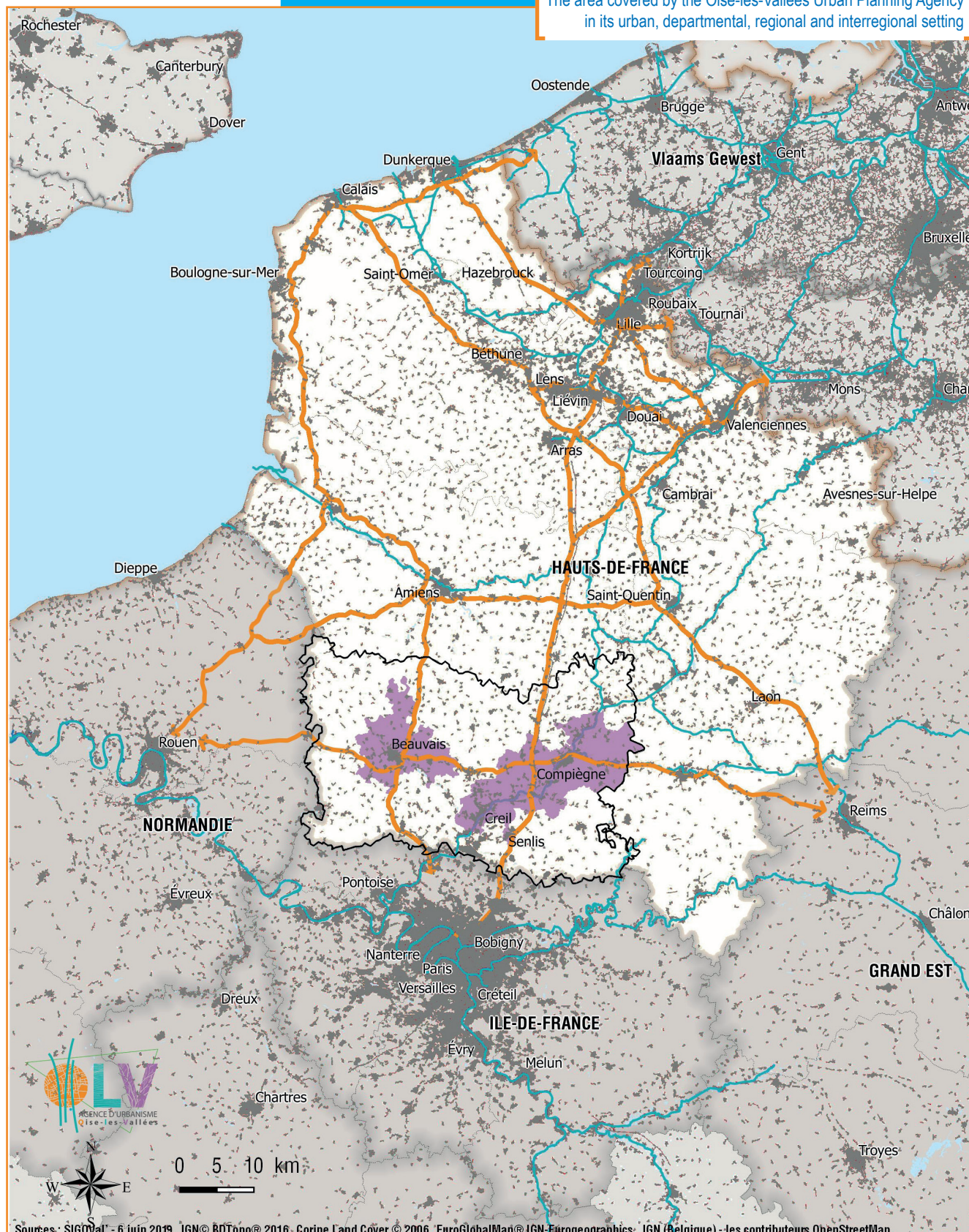
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# 1. Setting the scene in the Oise Valley

The area covered by the Oise-les-Vallées Urban Planning Agency in its urban, departmental, regional and interregional setting

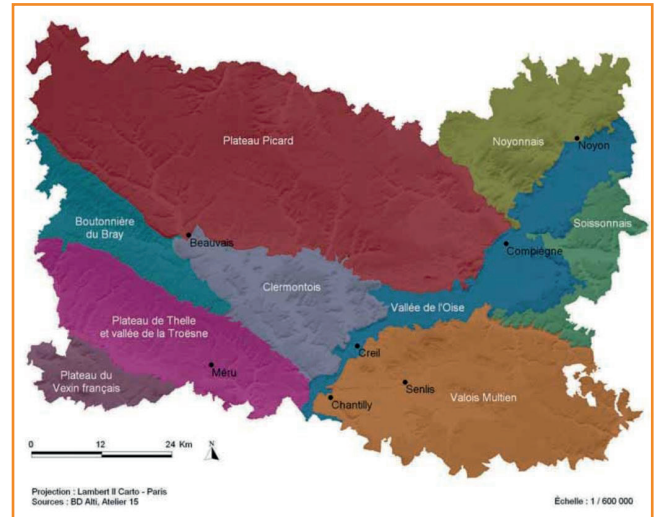




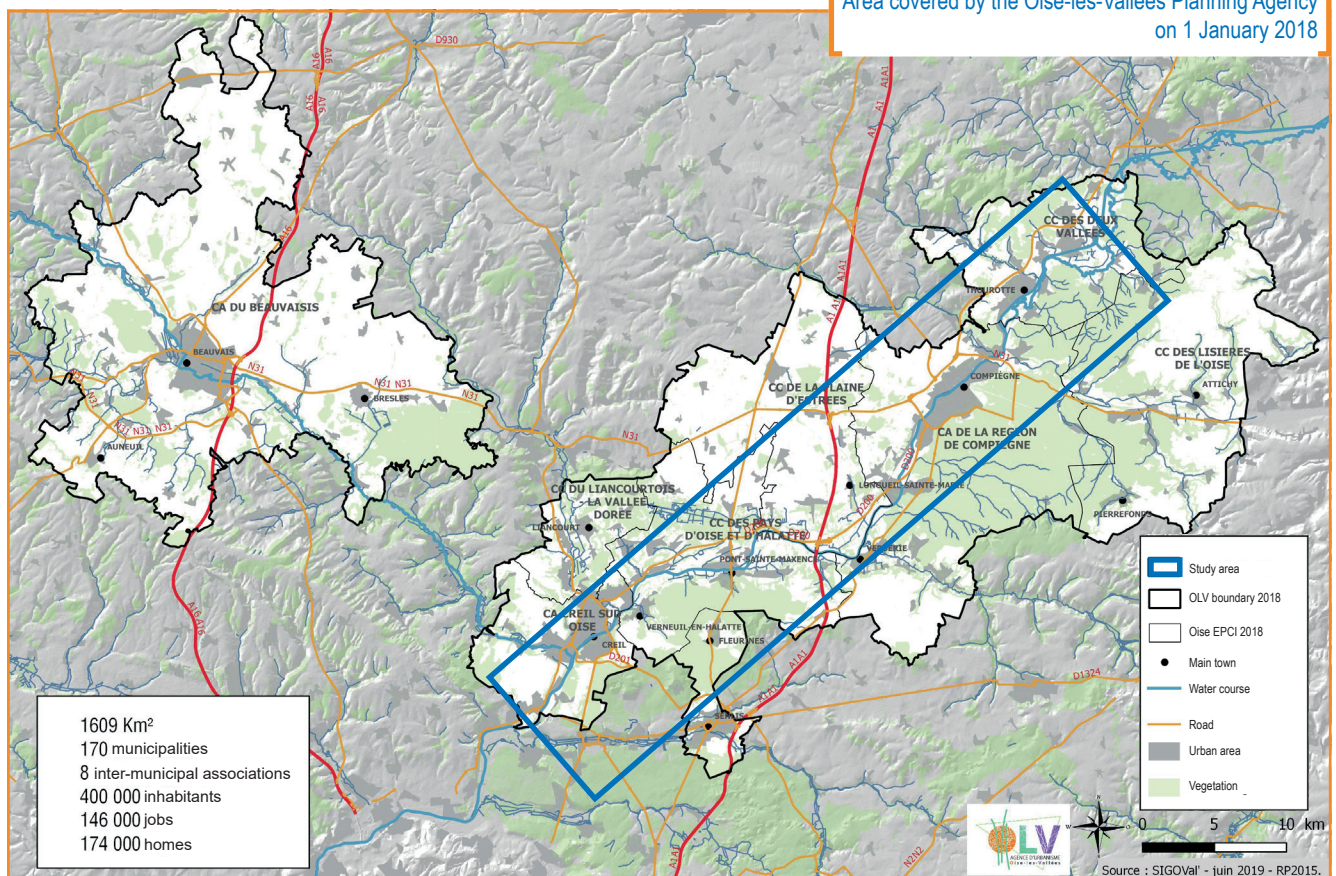
## 1.1 Presentation of the local area

From its source near Chimay in Belgium, the River Oise flows 340 km before joining the Seine downstream of Paris, at Conflans Sainte Honorine. Its alluvial floodplain forms the outline for the Oise Valley, which crosses the 'Isarien' Department from north-east to south-west. The middle section of the Oise valley is split into three sub-sections:

- The **Oise Noyonnaise**, with its side canal that ends at the confluence between the Oise and Aisne rivers. This sub-section is predominantly rural to the north, with forests and industry to the south.
- The **Oise Compiénoise** begins at the confluence where two rocky outcrops narrow the valley before it regains its wide plain downstream. In contrast to the previous sub-section, the Compiénoise Valley is built-up, with industrial activity along the river banks, while forest landscapes prevail on the left bank.
- The **Oise Creilloise**, including the town of Pont Sainte Maxence, marks the start of the third sub-section of the valley. This last part is narrower as it cuts a path between the Clermontois and Valois Multien plateaus. The river banks are also heavily industrialised along this sub-section.

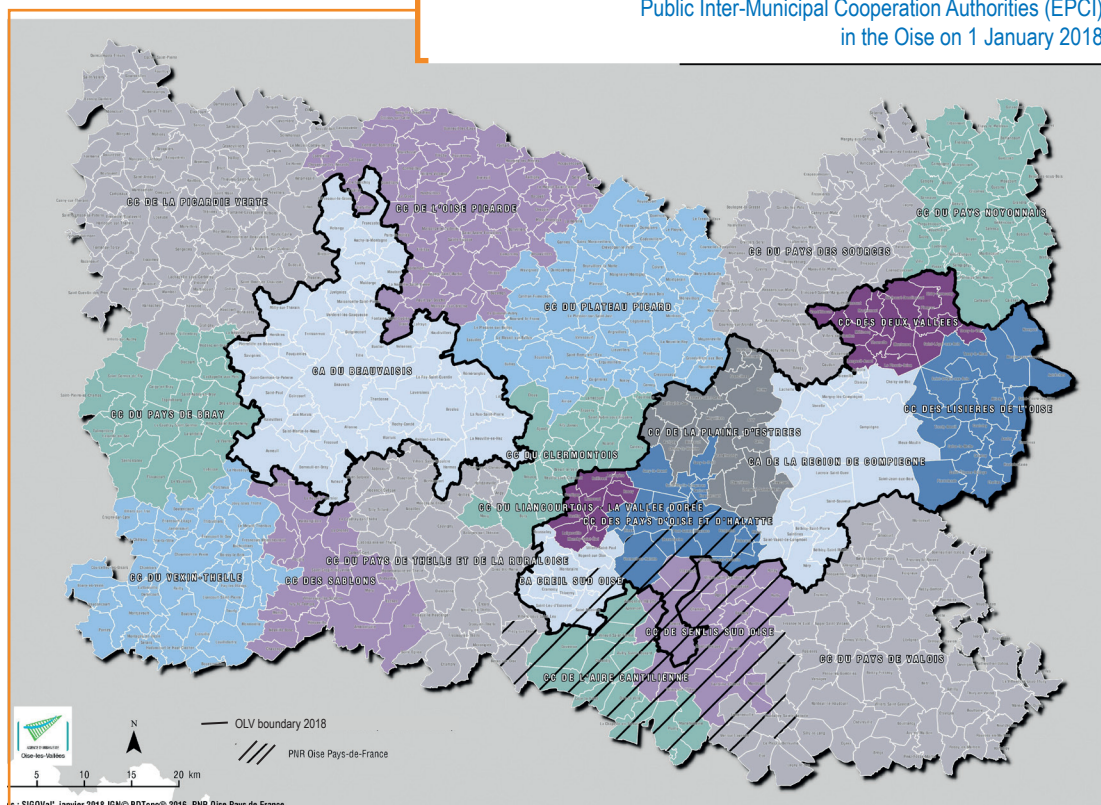


© Atlas des paysages de l'Oise





Public Inter-Municipal Cooperation Authorities (EPCI)  
in the Oise on 1 January 2018



This study focuses on the Oise, Compiègnoise and Creilloise valleys. 5 inter-municipal authorities cover the area:

- CC2V  
(Deux Vallées Inter-Municipal association)
- ARC  
(Greater Compiègne Regional Authority)
- CCPE  
(Plaine d'Estrées Inter-Municipal Association)
- CCPOH  
(Pays d'Oise et d'Halatte Inter-Municipal Association)
- ACSO (Creil Sud Oise Conurbation)

EPCI	number of residential premises in flood areas	estimated household population in flood areas (2013)
CC2V	1 240	2 550
ARC	7 040	13 630
CCPE	70	170
CCPOH	1 290	2 820
ACSO	3 140	7 920

Sources (excl. CC2V): 2017 land register, 2015 census, urban sprawl monitoring 2013, building records 2019  
CC2V sources: IGOVal' 23 November 2016, INSEE 2013 census, GIS ARC - DGFIP, CEREMA DGFIP 2013

Figures produced from the statutory guidelines (PAC)  
accompanying the one-hundred year flood hazard map in the  
2015 PPRI

Surface area of business parks in flood-prone zones (hectares)	844
Built-up surface area in flood-prone zones (hectares)	1,700
Number of 'hard' buildings affected by flooding	12,900
Total estimated households in flood-prone zones in the 5 EPCI areas (rounded up)	27,000



## 1.2 General details about flood events

**Flooding** occurs when a normally dry area of land is temporarily submerged by water. Floods can be explained by several factors, such as slow or flash floods from water courses, coastal flooding, rushing mountain streams, accumulation and surface flow of rainwater and rising ground water levels, etc.

**Flood risk** occurs when natural events comprising **hazards** come into contact with human assets in their way (communities, homes, economic activities, etc.). Aside from the damage that they can incur, these assets can constitute human factors that exacerbate the intensity and power of natural hazards.

This concept of risk is also closely linked to another, called **vulnerability**. This determines the local area's ability to cope with the hazard and the level and extent of the damage caused.

Natural hazards arise from the clash of three parameters in a given area<sup>2</sup>:

- **The hazard**, which can be defined as a natural phenomenon.
- **The assets at risk**, which can be the local community, property or economic activities, etc.
- **Vulnerability**, i.e. the likelihood of the asset to experience damage.

**HAZARD**  
- natural phenomenon  
(flood, earthquake)



**ASSETS AT RISK**  
- communities  
- economic activities



**NATURAL HAZARD**



**VULNERABILITY**  
- ability of the local area to cope,  
to varying degrees, with the hazard

In France, flood risk is the most common natural hazard. **One third of French towns and villages** are affected by it (including 300 conurbations), while **1 in 4 French people** live in flood-prone areas. Based on an estimate that accounts for major flood events, the average annual cost of flooding may be **1.4 billion euros**<sup>3</sup>.







In France, there are four types of floods that affect the country to different degrees. They are based on geographical location and exposure to climate issues. These are:

- **(1) Floods from a slow and gradual rise in water levels** that mainly affects roughly flat plains. This type of flooding is common in the north and regions in the centre and west of France.
- **(2) Flash floods** that are commonly associated with "Cevenol Episodes". This type of flooding mainly occurs in the South of France, especially along the Mediterranean coastline.
- **(3) Coastal flooding**, which occurs when powerful storms generate sea winds that drive sea water inland. This phenomenon especially affects coastal areas.
- **(4) Floods from rising ground water** that occur when aquifers become saturated after a prolonged period of rain.

**(3) by coastal flooding**

**definition**

Temporary floods from the sea on coastlines during severe weather and sea conditions (deep depressions and offshore winds) that generate storm waves.

**visible effects**

Coastal flooding generally affects land below the highest sea-level but can sometimes also reach higher land if sea spray breaches flood defences and/or passes over the tops of sea walls. Coastal flooding also occurs when there is:

- a split in the sedimentary belt (beaches, dunes, shingle banks) after heavy erosion;
- overtopping or collapse of a sea wall or flood defences\*;
- sea defences being overwhelmed by sea water on a one-off basis.

**Types of flooding**

**by overflowing**

**by runoff**

**Definition:**

Dispersed or concentrated drainage of rainwater into a water catchment that continues until it encounters a river system, drainage network or a low-lying point where it collects.

**Visible effects:**

Floods that mainly occur in built-up areas when impermeable surfaces prevent rainwater from draining away, or when drainage or discharge system capacities are inadequate.

**direct**

**definition**

An overflow of water that floods the land. This is due to rising water levels that cause the flow of water to spread out from the riverbed to flood the surrounding land.

**visible effects**

The water course overtops its streambed to occupy its floodplain. The water level rises and the river spills over the banks which normally contain it. Towns built on floodplains bear the brunt of this type of flooding.

**indirect**

**definition**

This phenomenon occurs when water rises due to pressure differences, i.e. from groundwater, sewerage systems and rainwater collection systems.

**visible effects**

Water rises to the surface due to pressure differences, stopping water from draining into the ground and this causes floods.



The level of severity from flooding, based on water level and duration

As with natural hazards, exposure to flood risks and the degree of damage depends largely on the intensity of the flood, which differs according to the following criteria:

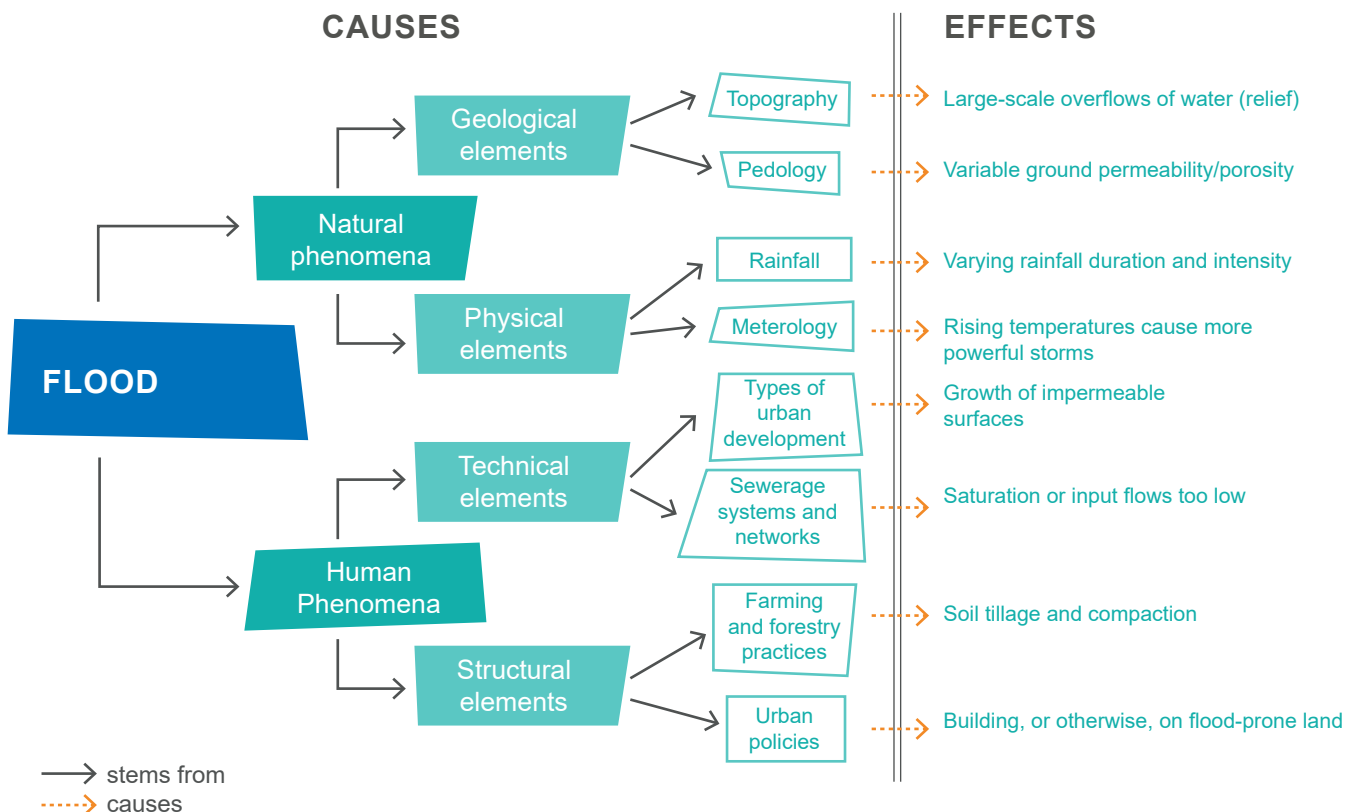
- **frequency**, defining various flood extension areas based on their return period;
- **speed**, whereby levels depend on knock-on effects from riverbank undercutting, bridge footings and the destruction of homes by flood debris;
- **duration** of the flood which also influences the degree of damage, both physical (to crops, personal possessions and homes) and psychological;
- **height**, as this is one of the factors that determines the degree of damage.



When combined with other human factors, the level of flooding can be exacerbated and result in greater negative consequences. Indeed, soil sealing, the saturation of specific sewerage networks, together with some farming practices can all worsen, or even create, flooding in places that are normally flood-free.

Duration/height	less than 0.5 m	0.5 to 1 m	1 to 1.5 m	over 1.5 m
less than 48 hours	low	low if speed is less than 1.5 m/s moderate if speed is greater than 1.5 m/s	moderate	high
for 2 to 8 days	low	moderate	moderate if speed is greater than 1.5 m/s high if speed is greater than 1.5 m/s	high is speed is less than 1.5 m/s very high if speed is greater than 1.25 m/s
for 8 to 15 days	low if speed is less than 1.5 m/s moderate if speed is greater than 1.5 m/s	moderate	high	very high
more than 15 days	moderate	moderate if speed is greater than 1.5 m/s high if speed is greater than 1.5 m/s	high is speed is less than 1.5 m/s very high if speed is greater than 1.25 m/s	very high

Source: <https://books.openedition.org/septentrion/docannexe/image/15682/img-4.jpg>





## 1.3 Flood risk in the Oise Valley

As in the rest of mainland France, flood risk is the biggest natural hazard in the Department of the Oise. Flooding affects 140 towns and villages along water courses, mainly along the Oise and Aisne rivers, where business and manufacturing is concentrated, thereby accentuating the risk. These sites and premises were built long ago without consideration for flooding but now they must address this risk and better adapt to the consequences.

The Oise Valley is mainly affected by flooding that stems from rivers slowly breaching their banks. Since the early 20th century, the major floods recorded by the measuring station at Venette date from 1993 and 1995, with flood return periods estimated to be 25 and 30 years, respectively. While they constitute reference flood events used to devise PPRIs in the 1990s, they are not the biggest flood events experienced in the valley. Indeed, in 1784 the Oise Valley was hit by a 50-year flood event which reached a flow rate of 720 m<sup>3</sup>/s and a height of 6.80 m at the Venette measuring station. However, due to old documenting techniques, this flood was never taken as a reference flood, even though it was closer to a 100-year flood event than that of 1995.

In terms of damage, both the 1993 and 1995 floods affected more than 21,000 people, causing 5 deaths and 5,500 people to be evacuated. The damage sustained was estimated at more than 1 billion euros.

Broadly speaking, based on new flood hazard modelling, the cost of damage caused by a 100-year flood event in the Oise and Aisne river catchment could be up to 2 billion euros. The extent of this damage is mainly restricted to the banks of the Oise downstream of the confluence.



The town of Choisy au Bac during the flood of 1993 © Entente Oise-Aisne

Larger floods have been recorded at Venette since the start of the 20<sup>th</sup> century

Date	Local reading (flood level marker)	NGF reading
February 1995	6.50 m	33.61 m
December 1993	6.41 m	33.52 m
January 1926	6.23 m	33,34 m
January 1920	6.10 m	33.21 m
March 2001	6.07 m	33.18 m
March 1958	5.91 m	33.02 m
December 1966	5.87 m	32.98 m
March 1970	5.83 m	32.94 m
November 1924	5.76 m	32.87 m
January 2003	5.68 m	32.79 m

© RIC (flood monitoring and communication regulations) from the SPC Oise-Aisne  
(flood forecasting unit)

### 1993 & 1995 FLOODS

Cost of damage estimated at

**1 billion euros**  
(2006 figures - ISIEE study)

**21,000 residents** affected  
in both valleys

**5,650 people evacuated**  
in the Oise

**5 fatalities**



## Regional vulnerability

The River Oise is the main axis for development in the valley, which has seen towns and their business districts develop, forming a concentration of sites and premises in flood-prone areas. The offices and factories were not built with flooding in mind and now present a significant risk. Consideration must therefore be given to the existing buildings to adapt these assets to the flood hazards that threaten the local area.

The Oise Valley experiences slow flooding when water courses overflow, as well as rising groundwater in specific areas, such as Margny lès Compiègne and Montataire. Given flood water levels, these flood events can vary in their effects on the TRI in Compiègne and Creil.

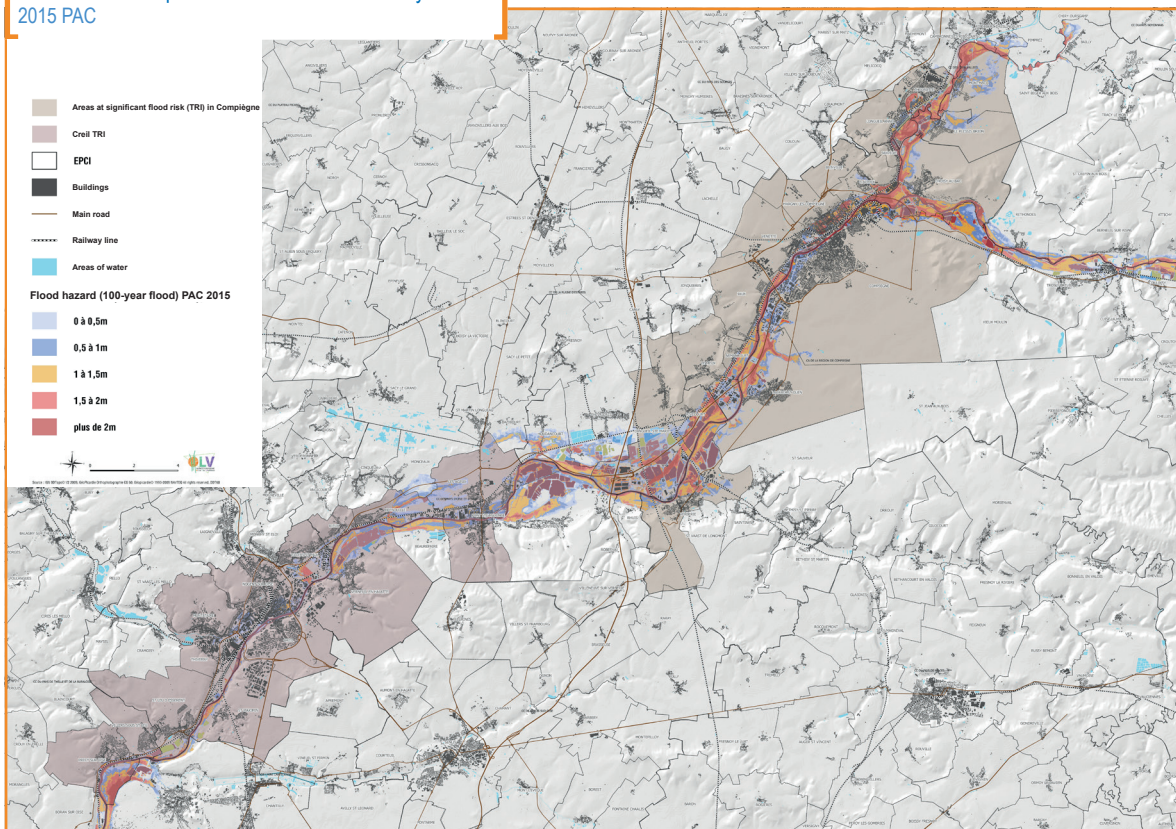
During the 20<sup>th</sup> century, the Oise Valley experienced several floods, the first being recorded in 1910, linked to when the Seine flooded. Another larger flood hit the area in 1926 but those that caused the most damage during the century were the floods of 1993 and 1995. Given the magnitude of these two flood events, they were adopted as reference flood events for the valley's first two PPRs (PPR Compiègne-Pont junction and the PPR Brenouille-Boran junction) and also feature in the 'Flood-Prone Areas Atlas' for the section of river upstream of Compiègne.

With a return period of 25 and 30 years, the data from these floods required the PPRs to be updated with a statutory provision for a 100-year flood event. As such, a digital model was produced by the DDT60 in 2014-2015. This used geographical data gathered (Lidar digital terrain model) and was supplemented by water system models with soil surveys and rainfall data. The new flood hazard generated by the modelling stands out by its severity due the level of detail (availability of data for specific plots of land) and because it is greater than previous known flood events.

By considering new flood water levels that can reach more than 2.5 m in places, the local area is more vulnerable, especially as existing flood defences (flood banks, embankments, storage ponds, etc.) were designed for 30-year flood events. The aim is to benefit from this new knowledge about flooding to work on:

- improving existing infrastructure (buildings, various networks and systems) using vulnerability assessment data and construction work to adapt facilities;
- including resilience in new development projects.

Flood hazard map of the Oise and Aisne valleys  
2015 PAC





## 1.4 Major hydraulic and waterway projects in the valley

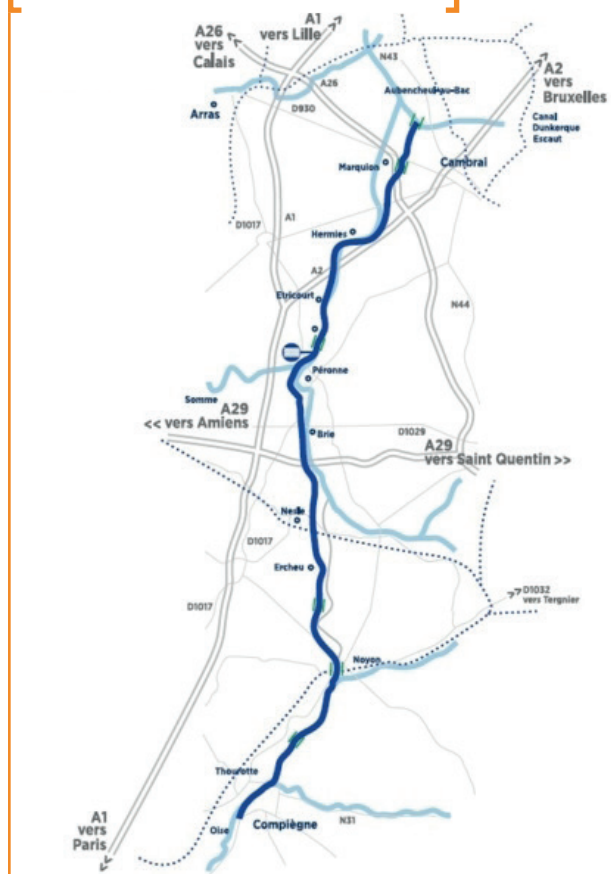
Currently, there are plans for three flagship projects in the valley:

- **The Seine-Nord-Europe Canal (CSNE):** Building the CSNE will link the River Oise to the Dunkerque-Escaut Canal, and connect the town of Compiègne to Aubencheul au Bac by waterway. As with the MAGEO Project, the CSNE will be built to European Vb.<sup>4</sup> specifications. Work on the canal is scheduled to start in 2020 ready to be commissioned in 2028. At almost 106 km long, the CSNE should cost 5 billion euros, with funding from Europe (up to 40%), the French government and local authorities.

- **Project to upgrade the Oise to European gauge (MAGEO):** This project is lead by the French Waterways Authority (Voies Navigables de France) and involves re-profiling the River Oise between Compiègne and Creil to take European Vb. gauge size, i.e. 180-m long and 11.40 m wide vessels that can carry up to 4,400 tonnes of freight<sup>5</sup>.

Both projects will eventually affect flood levels. Some studies and publications claim that the two projects may have positive impacts by cutting flood risk in the areas concerned. The table below shows the number of centimetres gained from the CSNE Canal between the Venette dam and Bailly (on the RD40 road). Compared to a flood such as that of 1993, the lower water levels in these areas range from 20 cm at the confluence to 106 cm at Montmacq locks.

Course of the Seine-Nord Europe Canal (CSNE)



© www.canal-seine-nord-europe.fr

Table estimating the effects of the CSNE Project on historical flood events of the River Oise

	Venette Dam	Compiègne Solférino	Confluence	Clairox Bridge	Thourotte Plessis	Montmacq	Ribécourt (RD 66)	Bailly (RD40)
Flood of 1993	- 13 cm	- 19 cm	- 20 cm	- 33 cm	- 74 cm	- 108 cm	- 56 cm	- 21 cm
Flood of 1995	- 11 cm	- 18 cm	- 21 cm	- 32 cm	- 71 cm	- 99 cm	- 58 cm	- 24 cm
Flood of 2001	-19 cm	- 25 cm	- 27 cm	- 38 cm	- 69 cm	- 79 cm	- 41 cm	- 18 cm

source: www.canal-seine-nord-europe.fr

project map to upgrade the Oise to European gauge (MAGEO)

The 42-km section of the River Oise connected to the CSNE Project flows through 22 municipalities in the Department of the Oise, from the railway bridge at Compiègne to Creil locks



© www.mageo-concertation.fr

▪ **The Entente Oise-Aisne catchments:**

The role of Entente Oise-Aisne is to build and manage flood control facilities to reduce flood risks in the Oise river catchment. Two facilities are currently operating (at Longueil-Sainte-Marie and Proisy), while another is being built (Montigny-sous-Marle).<sup>6</sup>

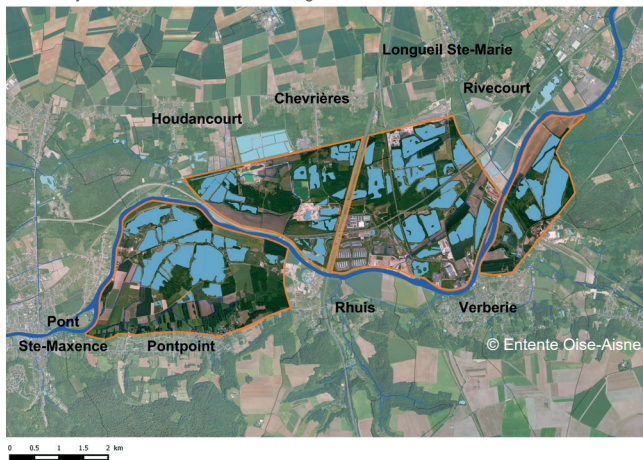
In addition to these two waterway projects, it would be useful to identify how these catchments can influence flooding.



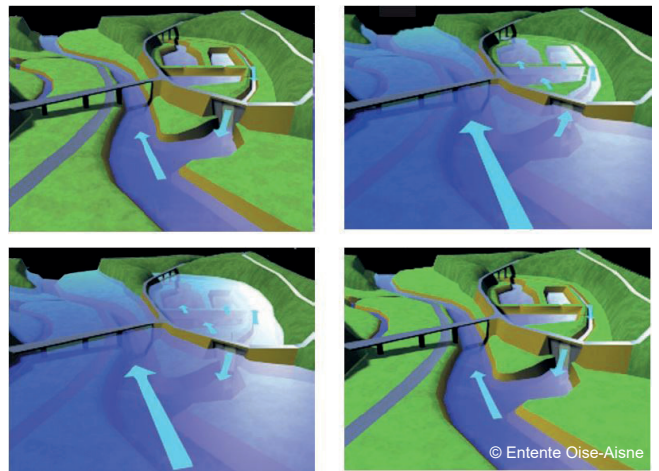
© Entente Oise-Aisne

Flap gates at the Proisy site in operation in 2011

Map and computer-generated images of water systems in the catchments at Longueil-Sainte-Marie



© Entente Oise-Aisne



© Entente Oise-Aisne

An aerial view of the Longueil-Sainte-Marie catchments at the river locks





## 2. Approaches to best adapt to flood risks

### 2.1 National "Flood-prone regions undergoing change" workshop

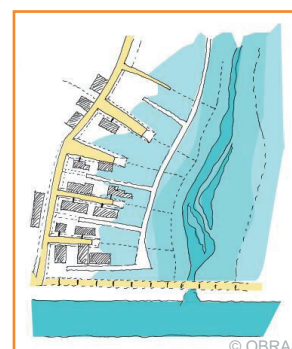
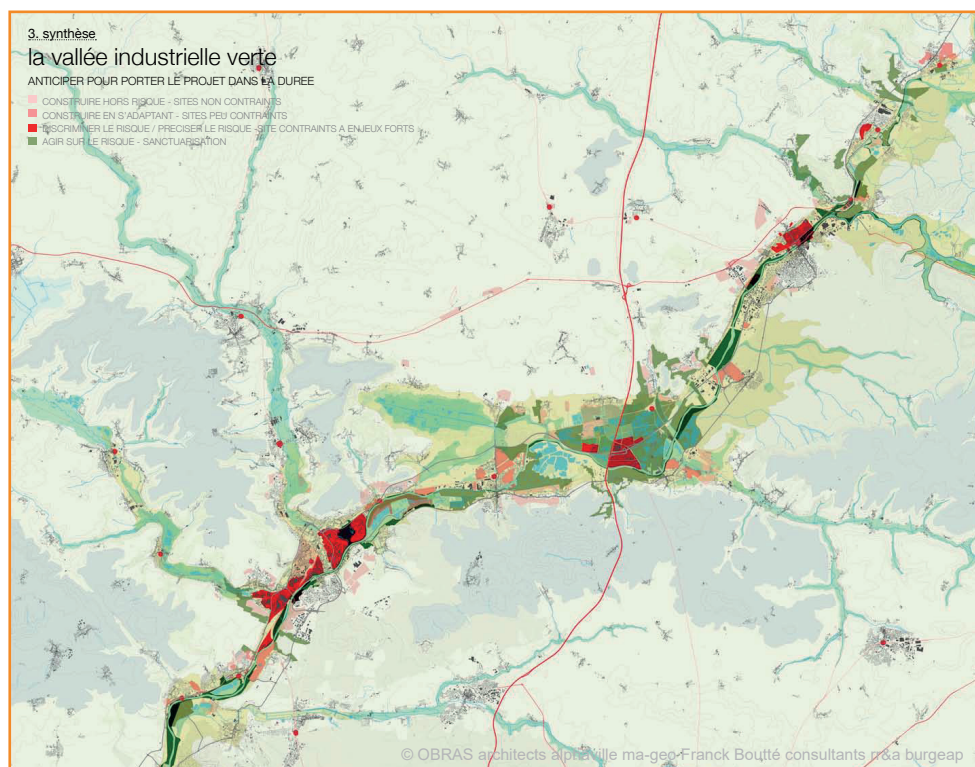
The National "Flood-prone regions undergoing change" workshop<sup>6</sup> took place in 2014 to 2015. Its purpose was to foster the emergence of a strategy for the area and to engage local stakeholders in a project process. Local elected members and government services were *provided with a top-level team of designers, supported by multi-disciplinary specialists,<sup>7</sup>* to co-construct a coherent development project for the local area by:

- devising a strategy for the area focused on local considerations at a geographical scale in keeping with the territorial challenges of sustainable development, free of institutional limitations and at a "large territorial" scale to which local elected members often find themselves powerless;
- facilitation using a project-based approach, cross-cutting fields and remits of government services, such as municipalities;
- promoting a government position focused on supporting and advising municipalities in the initial stages of a development project. The aim is to foster partnership working between municipalities and government by a dialogue centred on the strategic plan.

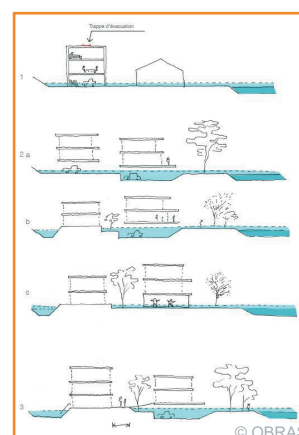
The Oise Valley was one of the pilot sites for this workshop<sup>8</sup>, which involved 5 inter-municipal associations: the Greater Compiègne Regional Authority, the Basse Automne and Plaine d'Estrées inter-municipal associations, the Pays d'Oise et d'Halatte inter-municipal association, the Creilloise Metropolitan Council and the Pierre-Sud-Oise inter-municipal association. By the end of the workshop, three challenges had been set<sup>9</sup> for the valley:

- reclaim the riverbanks;
- influence development in densely built-up urban areas with housing that takes risk into account;
- innovate to redevelop railway and industrial brownfield sites, localised strategically in the centre or on the outskirts of metropolitan area and the river and enable them to be sustained.

Excerpts of work undertaken  
as part of this workshop



source: Task sheet 7  
Adapt the roads network in a neighbourhood on the banks of a tributary to be more resilient



source: Task sheet 8  
Adapting urban morphology for greater resilience

## 2.2 Local risk workshops

Following on from the work undertaken by the national workshop, local thematic workshops were organised in the valley by the Departmental Directorate of the Oise. The aim was to pursue the project approach based on a review of the PPRIs. The purpose of this was to build a proper plan for the area by instilling a truly inclusive approach both up and downstream for the whole valley. Furthermore, various specialists carried out painstaking work to model a 100-year flood scenario, which resulted in the publication of flood hazard maps disseminated to local councillors in 2014 and 2015.



Illustration of an alluvial forest

## 2.3 Guidance tools for flood risk management

In France, the main purpose of flood risk prevention and management is to ensure people and property are safe and secure. There is a wide array of tools and legal and statutory procedures that govern this process. They can be split into two main components: (1) risk prevention and management and (2) land-use planning. Legally-speaking, these two components are governed by several Acts:

- **French Parliamentary Act of 13 July 1982**, concerning compensation for victims of natural disasters. This Act allows for, among other things, Risk Exposure Plans (PER) to be developed that set guidelines for compensating victims after a natural disaster has been declared.
- **French Parliamentary Act of 22 July 1987**, concerning civil security arrangements, protection against forest fires and the prevention of major hazards. This Act seeks to ensure civil security in the crisis management process.
- **French Parliamentary Act of 2 July 1995** (the "Barnier Act"), pertaining to heightened levels of environmental protection. This Act introduced Risk Prevention Plans (PPR) to replace PERs. It also led to the creation of a fund, called the "Barnier Fund" which is financed by insurance policy contributions. Finally, the Act provided for expropriation measures to safeguard people and property when the cost of protecting them exceeds the level of compensation.
- **French Parliamentary Act of 13 May 1996**, on criminal liability for negligent or reckless acts. The Act also provides oversight for the criminal liability of local councillors.
- **French Parliamentary Act of 30 July 2003**, on the prevention of technological and natural hazards and compensation for damage.
- **French Parliamentary Act of 13 August 2004**, on modernising civil security system. This Act introduced Local Contingency Plans (PCS) and confirmed the role of Mayors in informing the public.

(1) The crisis prevention and management component is underpinned by principles such as flood forecasting, to have in-depth knowledge about floods to better prepare and plan for major events. The government set up several Flood Forecasting Services (SPC) to fulfil this task, which cover virtually the whole of France. Informing the public is another vital principle to ensure better crisis management. The French government provides the regions with various tools such as the Departmental Guidelines on Major Risks (DDRM) and also communicates the PAC on a regular basis. Mayors can use these tools to produce, for instance, Municipal Guidelines on Major Risks (DICRIM) for the local community.

DICRIMs must be accompanied by a protection strategy involving the various relevant authorities, ranging from the French government to individual municipalities. This strategy seeks, in particular, to reduce the impacts of hazards while aiding crisis management preparations to assist other procedures, such as the Civil Security Emergency Response Organisation Plan (ORSEC) and Local Contingency Plans (PCS).

(2) In addition to crisis prevention and management measures, land-use planning forms a key part of flood risk prevention. Indeed, in planning, regulations on flood risks are stipulated in the PPRi. As a planning document for natural hazards introduced in 1987, its purpose is to define and regulate a group of flood-prone localities in a given area. By cross-referencing a hazard with a category corresponding to amenities affected, government services can then produce legislation specific to zones at risk, rating them from "low" to "very high". Based on the level of risk, the PPRi recommends restrictions ranging from a ban on construction to the possibility of building under specific conditions.



In addition to this document, new strategies have been introduced, particularly European Directive 2007/60/EC, otherwise known as the "**Floods Directive**<sup>10</sup>". This sets out the general framework in which European Union Member States must organise their flood risk management policy to mitigate the adverse effects of flooding on human health, economic activities, the environment and cultural heritage<sup>11</sup>. As such, the directive is intended to become part of national law in each Member State.

The "Floods Directive" was **transposed into French law in the Grenelle II Act** of 13 July 2010<sup>12</sup> and in the Decree No. 2011-227 of 2 March 2011 pertaining to flood risk assessment and management.

As part of the Grenelle II Act, the French government has adopted the first **national flood risk management strategy** (SNGRI). The strategy has three key objectives:

- greater security for vulnerable communities;
- stabilise the cost of flood-related damage in the short-term and reduce it in the medium-term;
- significantly shorten the time to return to normal in flood-hit areas.

The actual delivery of these objectives is focused on river basin districts in 6-year cycles. Each cycle, the first of which began in 2011, comprises three stages<sup>13</sup>:

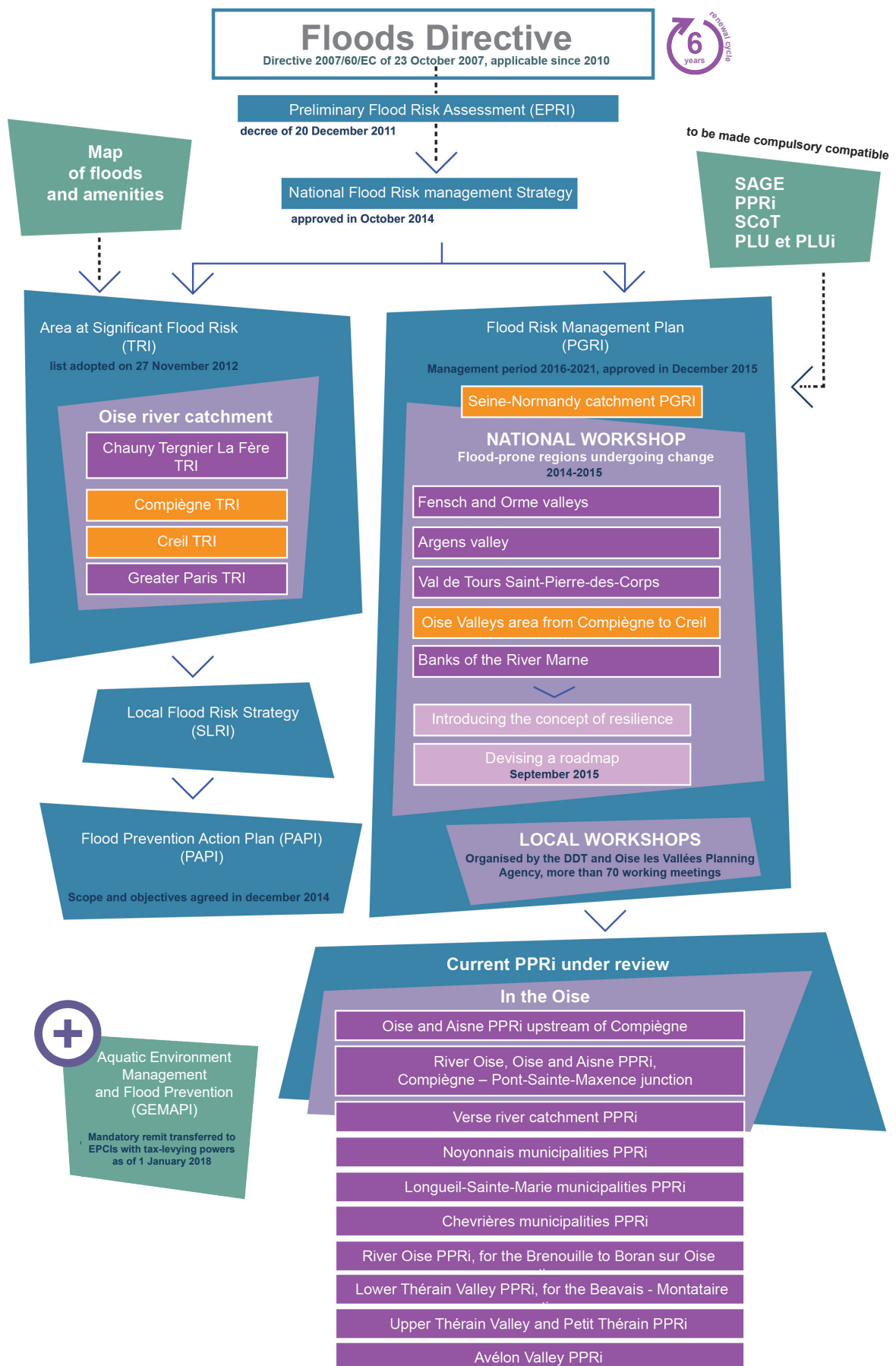
- **Preliminary Flood Risk Assessments** (EPRI) provide a snapshot of flood risks for each of the 14 river basin districts in continental and overseas France, based, in particular, on indicators related to vulnerable amenities located in the Potential Flood Emergency Envelope (EAIP). This corresponds to the potential area occupied by major floods. **The EPRI must also help identify areas at significant flood risk** (TRI). A national EPRI has also been undertaken to assess major flood risks with potentially significant impacts on a national or even European scale.
- **Based on the EPRI, TRI are drafted for the entire country, with detailed maps.** 122 TRI were identified in France during the first cycle of the Floods Directive. These were based on the number of vulnerable inhabitants and jobs, with 16 of them being nationally significant (our major urban areas bordering the Seine, the Rhine, the Rhône and the Loire).

- **The Flood Risk Management Plans (PGRI)** for each river basin district, define their flood risk management policy targets together with procedures to achieve them. **These plans provide the scope for the SNGRI covering major river basins, while the TRI and PGRI are also broken down into Local Flood Risk Management Strategies (SLGRI).**

Since the government decree of December 2014, SLGRI can themselves be broken down into **Flood Prevention Action Programmes** (PAPI). A PAPI is an implementation tool for a flood management strategy covering a consistent area at risk. As such, it is a tool to establish contracts between individual, or groups of, local authorities and the French government. A PAPI is an implementation tool for a flood management strategy covering a consistent area at risk. PAPIs are also designed to cater for the new local authority remit of **aquatic environment management and flood prevention** (GEMAP)<sup>14</sup>. This allows for the implementation of policies that combine flood risk management and fully functioning aquatic environments<sup>15</sup>.



Front cover of the SLGRI from the TRI for Compiègne.





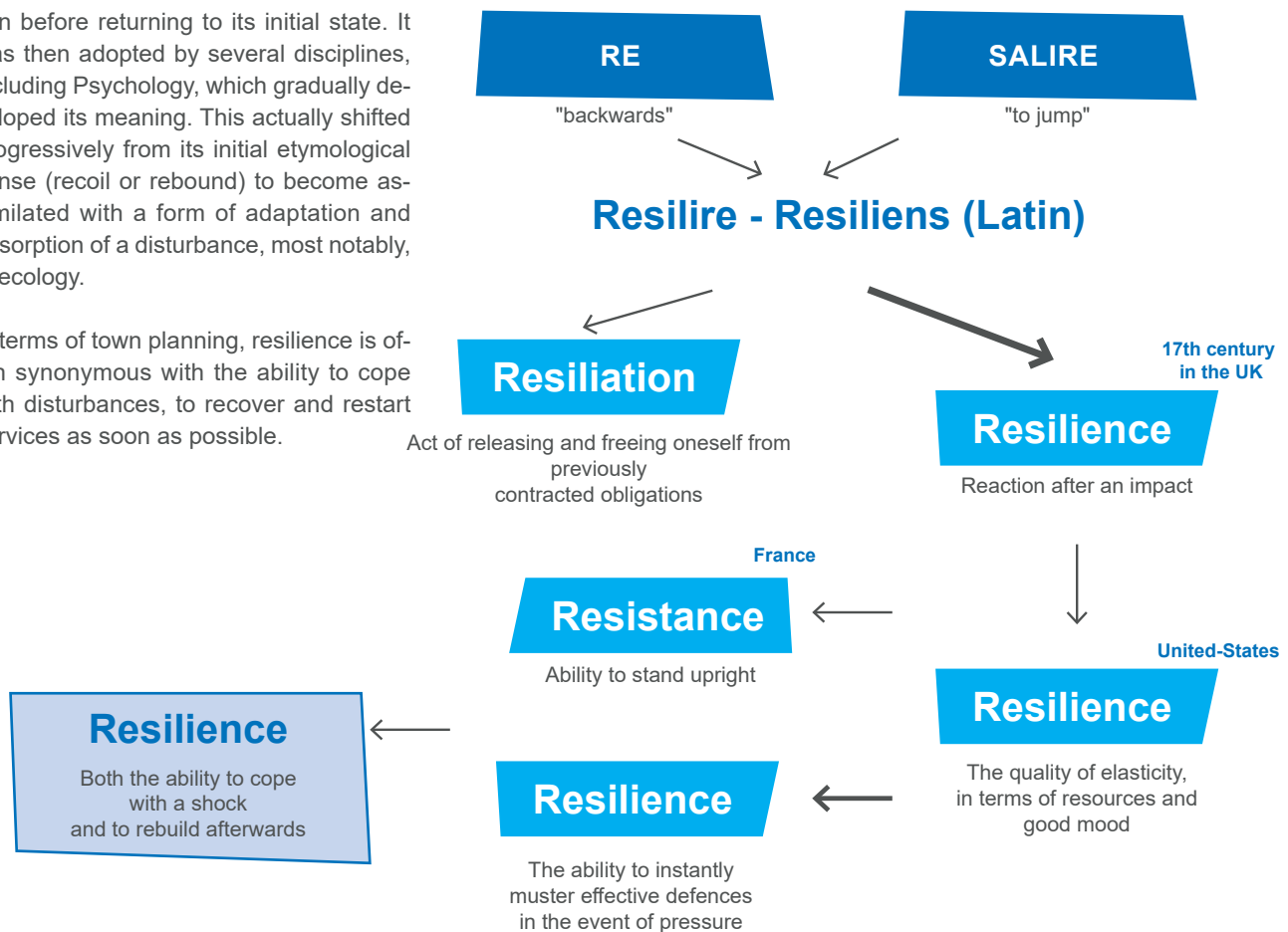
## 2.4 The concept of resilience

### Definition

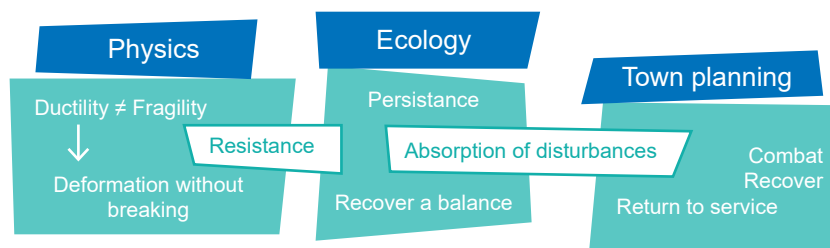
The concept of resilience was used for the first time in Physics to measure the ability of a material to absorb a blow or a distortion before returning to its initial state. It was then adopted by several disciplines, including Psychology, which gradually developed its meaning. This actually shifted progressively from its initial etymological sense (recoil or rebound) to become assimilated with a form of adaptation and absorption of a disturbance, most notably, in ecology.

In terms of town planning, resilience is often synonymous with the ability to cope with disturbances, to recover and restart services as soon as possible.

[ Origin of the term resilience ]



In an etymological sense, the word **resilience** means **rebound** or **recoil**. An **open** concept used by **several disciplines**.



## What kind of resilience do we mean?

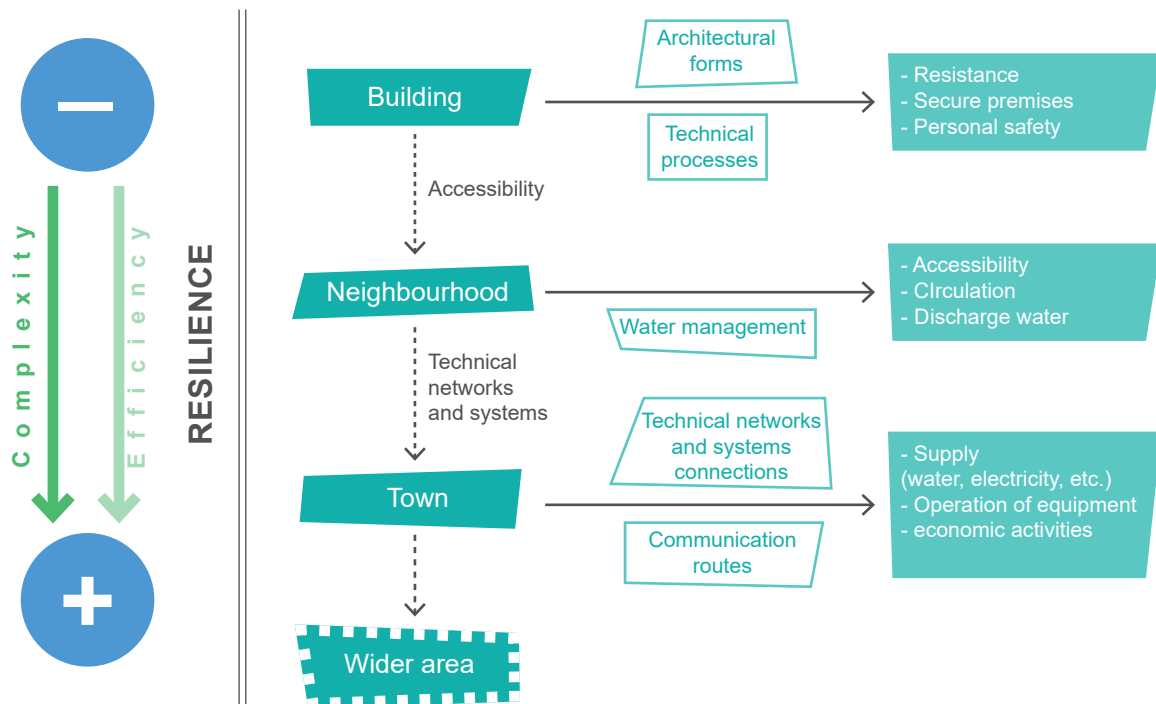
In town planning, resilience can be used at several scales, from an individual building to an entire area. -In theory, this multi-scale use helps generalise a certain amount of consistency with respect to risk but it becomes complex when it is applied on a large-scale.

In fact, making a building resilient is possible using shapes and techniques that render it able to resist flooding on its own and provide its occupants with safe and secure premises when flood waters rise.

These units (or buildings) cannot function in isolation, so considering resilience for the entire neighbourhood is vital to ensure local residents live a normal life.

While including all the component parts of a neighbourhood in a resilience process raises the complexity to implement and link the scheme together, it does significantly improve just how efficiently the neighbourhood functions. This is what we mean by the resilience of an urban 'unit'.

When referring to 'urban' resilience, the process must be applied to the whole town or city. This is a challenging task to achieve as it requires consideration to be given to all its component parts. This involves technical networks and systems, in particular. These are interconnected, highly dependent on each other and remotely operated, which means resilience is complex to introduce.

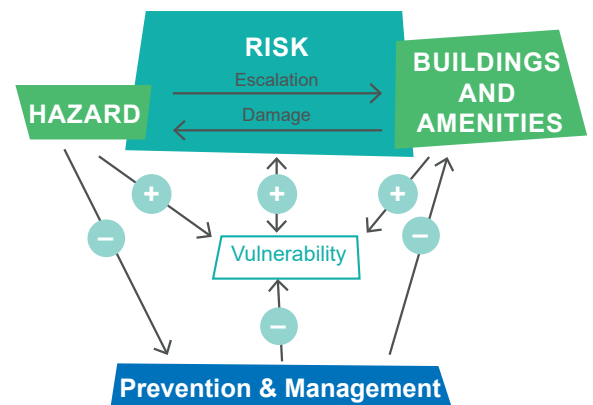


## Resilience: Flood risk prevention and management tool

Broadly speaking, risk is defined as the combination of a hazard (the manifestation of a destructive natural phenomenon) with human and material resources present in the area that experience damage.

The concept of vulnerability is closely linked to amenities as the level of risk is highly dependent on them. The more vulnerable sites and buildings are, the higher the risk and vice-versa. This relationship puts vulnerability at the heart of the risk prevention and management process (see diagram, opposite).

The action on the component parts forming the risk subsequently determines how it is managed based on three stances: resistance, withdrawal, resilience.



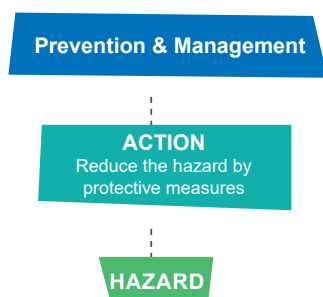


## Conventional vision of risk management

### Resistance to flooding

In this scenario, the aim is to reduce the hazard by building flood defences, such as dykes and dams to diminish the power of impact made by the flood hazard in a given area. In essence, this method can be effective but with climate change and the growth of built-up area, it quickly becomes obsolete, or even dangerous in some cases.

Hazard: This is a variable and largely uncontrollable phenomenon  
Ineffective protection measures



### The withdrawal method

This second scenario involves getting away from area at risk by developing urban areas in flood-free locations. The method clearly reduces flood risks but only at a given moment and only in the short-term. This is partly due to the excessive take-up of agricultural land and partly from the rise in artificial surfaces, which can heighten risks elsewhere.

Effective strategy at a given moment and in the short-term  
When mainstreamed, this method becomes an aggravating factor



## The shift to a vision and new way to manage risk: Resilience

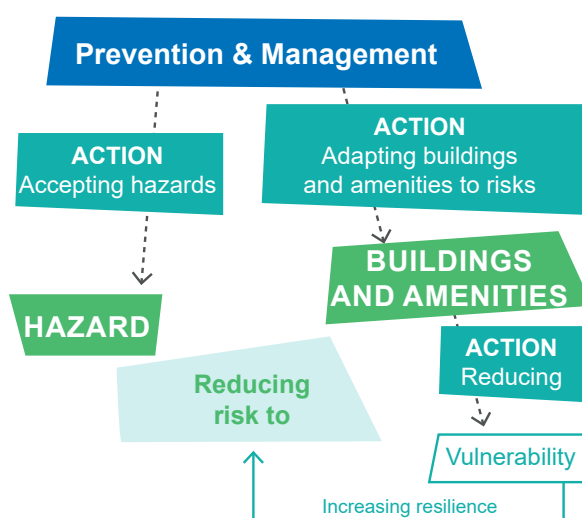
The concept of resilience applies to the various component parts that constitute a risk, so it forms a more integrated approach to managing that risk.

In practice, this approach works by its reliance on action at 3 levels:

- **action on the hazard:** In contrast to resistance and withdrawal strategies that render the hazard a repulsive entity, resilience advocates for its acceptance. This can be seen in development projects by processes and systems that leave water the space it needs, when rivers flood, for example;
- **action on amenities:** Following the same logic, resilience acts on infrastructure and buildings differently compared to other strategies. Indeed, instead of adding lots of new amenities and having to protect them, resilience means that they adapt to the risk. As such, developments that claim to be resilient and projects designed to co-exist with flooding through the use of forms and techniques that give buildings and amenities greater "resistance";
- **action on vulnerability:** Adapting buildings and amenities to flood risk is an action that results in reducing the vulnerability of urban units. This results in lower risks.

The European Commission adopted the Floods Directive in 2007 to address flood risks. In France, the same Directive introduced new requirements in flood risk prevention, in particular, to "mitigate the adverse effects of all types of flooding

**RESILIENCE**  
Capacity building for regional adaptation and organisation, including a temporal dimension of before, during and after a crisis



on human health, the environment economic activities and cultural heritage" These requirements are expressed in the concept of resilience.

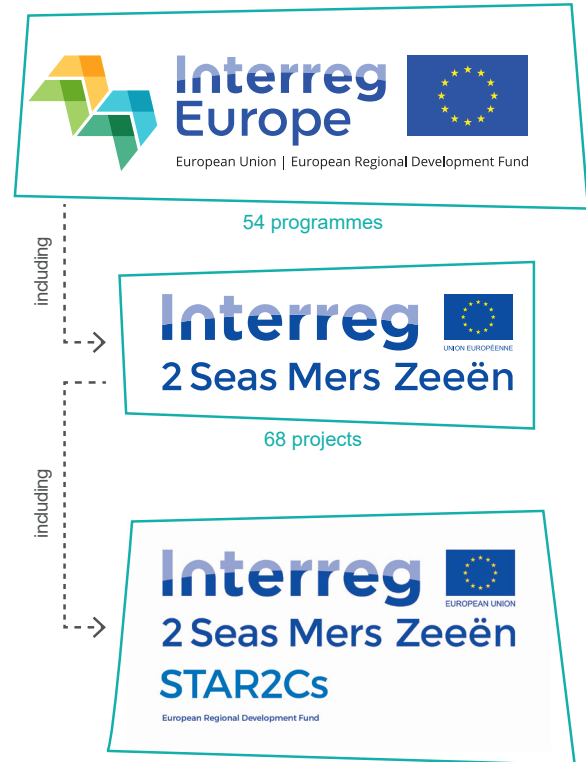
## 3. The European Interreg Programme

### 3.1 The European Interreg Programme

Interreg is a large European programme to strengthen territorial cohesion in Europe, while reducing social, economic and environmental disparities that exist between European regions. It seeks to promote cooperation between cross-border regions to develop common, cross-cutting solutions.

To take part in the programme, willing cross-border regions must identify a common interest then work together on a project for 6 years. The current programme, called Interreg V, covers the period 2014-2020. Interreg is funded by the European Regional Development Fund (ERDF) at a cost of 7.75 billion euros<sup>16</sup>.

Within the Interreg Programme there are 54 cross-border cooperation programmes, such as Interreg Spain-Portugal, Interreg France-Switzerland, Interreg Flanders - Netherlands, etc.



### 3.2 The Interreg 2 Seas Programme

The programme that the Urban Planning Agency is involved in, is Interreg 2 Seas. This comprises cross-border areas around the North Sea and the Channel. The programme is funded by ERDF with a total budget of 241 million euros, to co-finance projects during the period 2014-2020.

Covering England, France, the Netherlands and Belgium, the programme seeks to develop an *"innovative knowledge and research-based sustainable and inclusive 2 Seas area where natural resources are protected and the green economy is promoted"*<sup>17</sup>

To achieve these objectives, the Interreg 2 Seas Programme funds various projects, up to 60% of the costs. There are currently 68 different projects in the Interreg 2 Seas Programme. The project that the Oise-les-Vallées Urban Planning Agency is working on is STAR2Cs, or Short Term Adaptation for Long Term Resilience to Climate Change.

With a total budget of €4, 380,191, the project began on 13 July 2017 and will finish on 28 February 2021.



Regions involved in the European Interreg 2 Seas Programme



## 4. The STAR2Cs Interreg project

### 4.1 A collective challenge

*"With climate change, flooding will likely become more frequent and severe with damages in Europe reaching €23.5bn by 2050. Given floods are already costly to 2 Seas area, there is clear need to take proactive action to reduce the impacts of future flooding on our region<sup>18</sup>."*

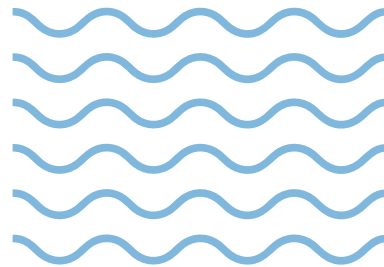
These are the words that describe the common challenge which all partners involved in the STAR2Cs Project must address. Accordingly, STAR2Cs is putting all the various cross-border partners to work to help set up resilient solutions in the project area.

### 4.2 Overall project goals

Since the "Floods Directive" was introduced on 23 October 2007<sup>19</sup>, the Member States have developed their own national strategies for adaptation to flooding. However, the local authorities and regional agencies tasked with implementing them often find it challenging to introduce tangible adaptation measures.

The aim of the STAR2Cs Project is to *"overcome the gap that exists between State directives and the practical implementation of local actions to make regions more resilient. This is based on devising innovative solutions that help, among other things, to:*

- *increase co-construction and joint participation;*
- *secure a 15% cut in future costs from flooding;*
- *achieve a 15% rise in the delivery of local adaptation measures."*<sup>20</sup>



## 4.3 The project partners

As part of the project, the Oise-les-Vallées Urban Planning Agency is jointly working with 7 European partners:

### Kent County Council (KCC)

KCC is a public authority, or council, that governs the English County of Kent. The County Council is a higher level of elected local governance that sits above 12 District Councils and about 300 *Parish Councils*<sup>21</sup>. KCC is the lead partner in the project and is the contact authority for all communications with the EU.

### The Province of Eastern Flanders (POV)

POV is a Belgian Province in Flanders, with a population of roughly 1.5 million. As a regional authority, it is responsible for managing a specific number of water courses in the area that it covers, as well as related spatial and environmental planning.

### Flanders Environment Agency (VMM)

The VMM agency has a wide-ranging environmental role and reports to the Flemish Government Minister for the Environment, Nature and Agriculture. Its main purpose is to assist the implementation of environmental policies adopted by the government. Its tasks are defined by decree and undertaken by a management agreement with the Flemish Government. This sets strategic and operational goals but also allows for considerable autonomy as to how the agency performs its duties.

### Noorderkwartier Water Board (HHNK)

HHNK is a Dutch regional *waterschap*<sup>22</sup> responsible for managing water in Noorderkwartier, in the Dutch Province of South Holland, north of the North Sea Canal. It is also tasked with flood defences, waste water treatment and clean surface water. As part of these duties, HHNK also participates in the National Delta Programme<sup>23</sup>.

### Municipality of Schouwen-Duiveland (GSD)

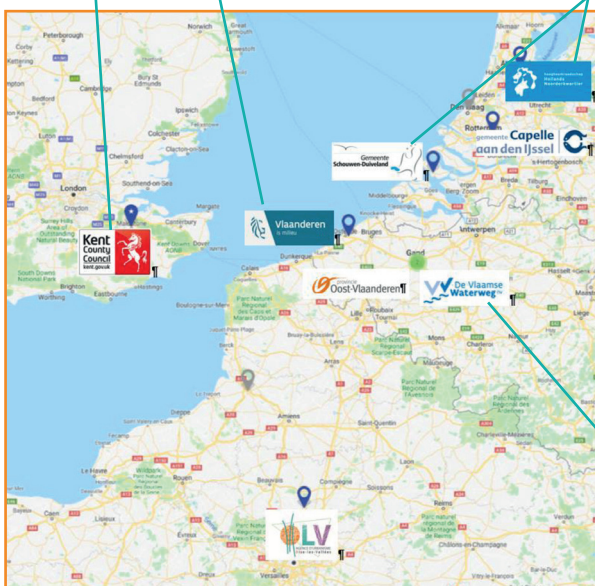
The municipality of Schouwen-Duiveland is in the Dutch Province of Zeeland and has a population of 40,000 people. It is responsible for coastal zone planning, sustainable coastal regeneration and the promotion of natural infrastructure.

### Municipality of Capelle aan den IJssel (GCIJ)

Capelle aan den IJssel is a town in the Netherlands. It has a population of about 70,000 people and lies 7 metres below sea-level in the Province of South Holland. As a result, it is extremely vulnerable to water-related risks, mainly flooding. The municipality has considerable expertise on subjects such as building adapted to flooding, water management in towns or strengthening flood banks. It is also responsible for local policy on urban water management, climate change adaptation and land-use planning.

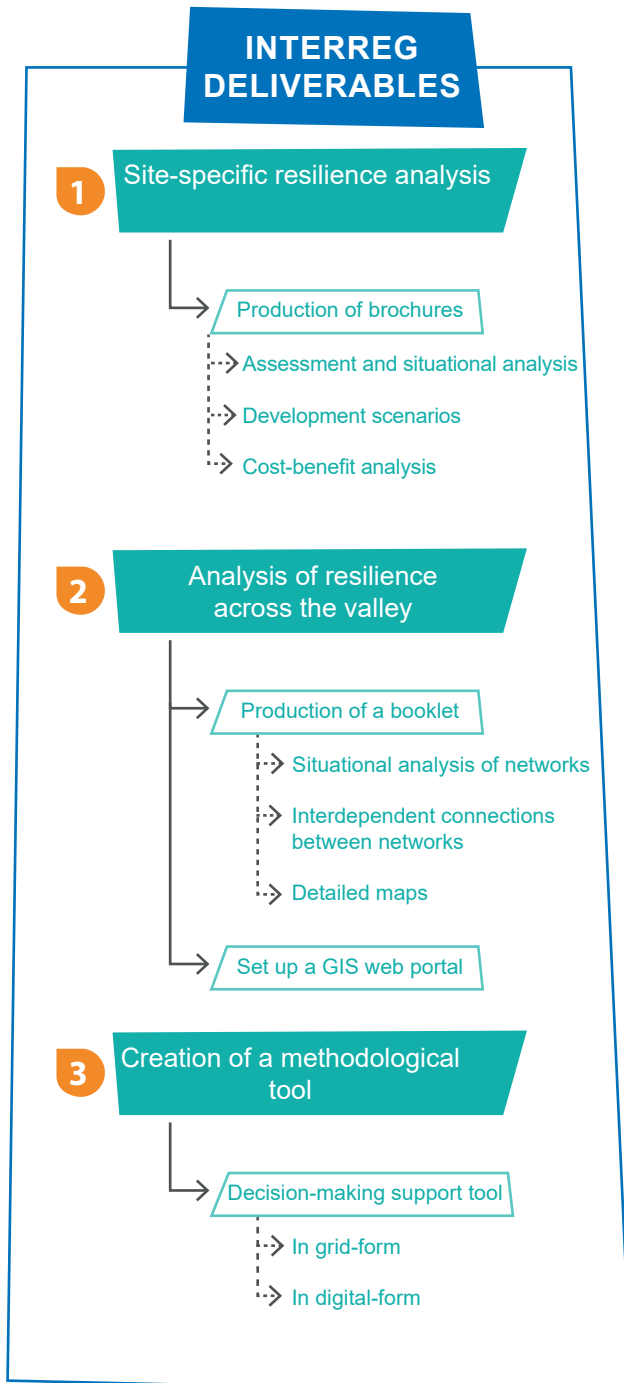
### Flanders Authority for Navigable Inland Waterways (VW)

VW is an authority that manages and operates the navigable inland waterway network in Flanders. It is responsible for water management and inland waterway transport in the region.





## 4.4 Goals and deliverables for the Oise-les-Vallées Urban Planning Agency



The Interreg STAR2Cs Project runs for 4 years and enables the Oise-les-Vallées Urban Planning Agency to:

- formulate the best recommendations to make landscaping or urban development projects more resilient and draft them in planning and urban development guidance documents;
- make use of knowledge held by British, Dutch and Belgian partners throughout the project and share acquired knowledge with its partners in the national urban planning agency network;
- undertake more in-depth analyses about the effects of flooding on public utilities networks (gas, electricity, drinking water, sewerage) and on towns and villages in the Oise Valley.

These specific objectives set for the area covered by the Planning Agency are backed up with deliverables expected upon the completion of each stage of the project. Three main topics will be studied:

### 1/ Site-specific resilience analysis

- Analysis and resilient development proposals in conjunction with the Architect, Éric Daniel-Lacombe (EDL) for the 9 sites in the valley + addressing a cross-cutting topic of fences in flood-prone areas
- Production of resilience guidelines: Assessment & resilient development scenarios.

### 2/ Analysis of resilience across the valley

- Analysis of the valley's resilience in the area covered by the Urban Planning Agency, with a focus on urban networks and systems, river catchments, etc.
- Production of a summary report of the resilience analysis for the valley.

### 3/ Assessment and analytical tool

- Creation of a decision-making support tool to deliver resilient projects.
- Production of a methodological report for use by stakeholders affected by flood risks.
- (Format of the tool to be defined at a later date)



## 4.5 Project schedule

The project will be delivered in four parts over four years, from September 2017 to February 2021:

### Part 1

Kick-off: the Interreg STAR2Cs Project began in September 2017. The Oise-les-Vallées Urban Planning Agency began work on the project by an initial preparation task: (1) firstly administrative duties related to European funding requirements, (2) then preliminary work to set local targets specific to the Urban Planning Agency. This task involved gathering information and holding discussions with European and local partners.

### Part 2 (November 2018 to November 2019)

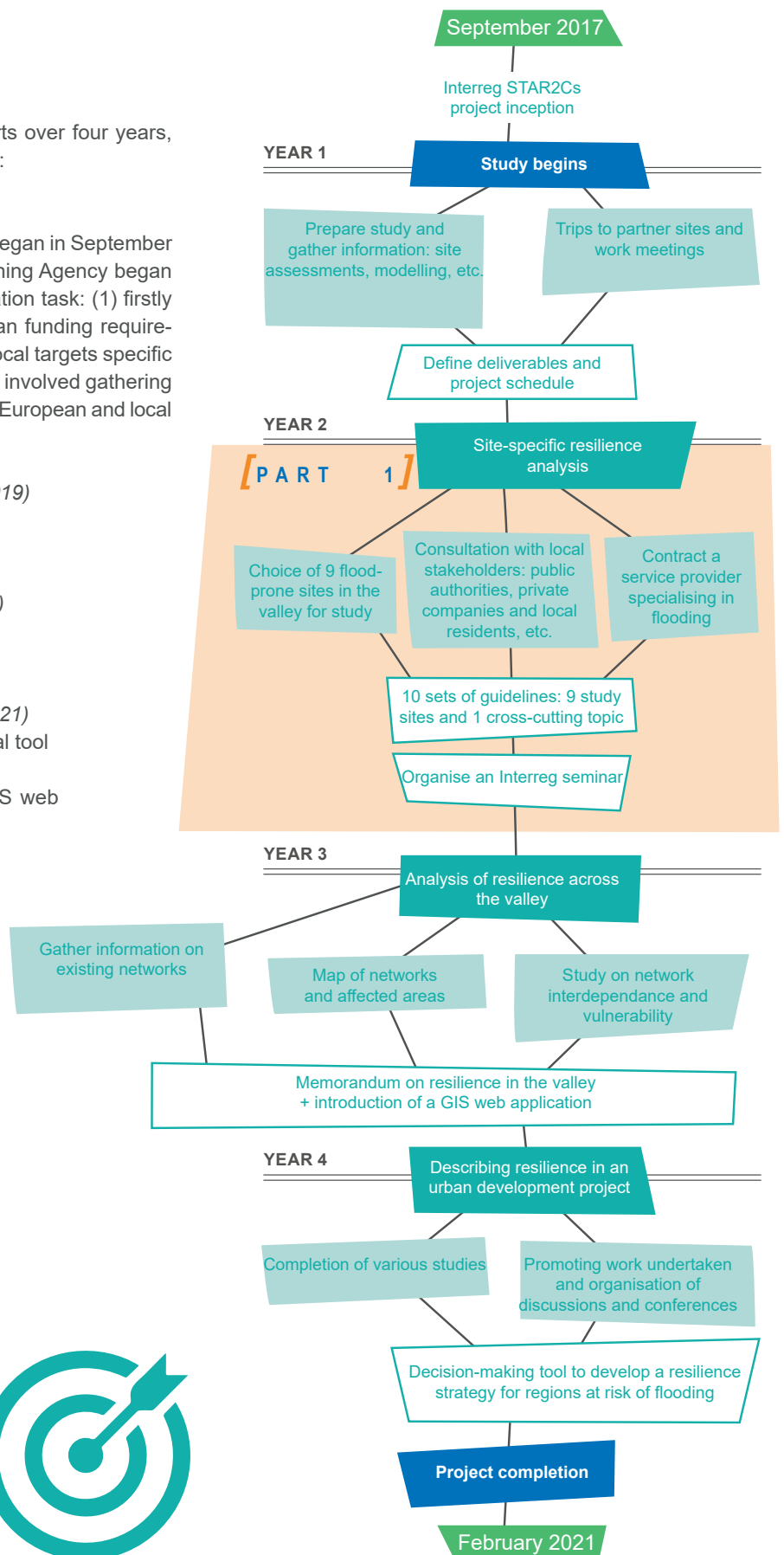
work on site-specific resilience and delivery of part 1 of the study.

### Part 3 (December 2019 to August 2020)

analysis of resilience across the valley and delivery of part 2 of the study.

### Part 4 (September 2020 to February 2021)

creation of an assessment and analytical tool and delivery of knowledge for part 3 of the study in conjunction with the GIS web portal





## 5. Summary

PART  
1

### SITE-SPECIFIC RESILIENCE ANALYSIS

#### 5.1 A collective challenge

##### Launch a call for tenders and selection of the Architect, Éric Daniel-Lacombe.

The Oise-les-Vallées Urban Planning Agency took part in the Interreg STAR2Cs Project to build its capacity. The purpose of the project is to enable the Planning Agency to boost its knowledge on the subject of resilience involving flood risks. As such, tender guidelines were published to select an architects firm to work of the subject. The tender was awarded to Eric Daniel-Lacombe (EDL).

##### Choice of flood-prone site and site visits

Oise-les-Vallées Urban Planning Agency shortlisted a number of sites in periodic consultation with the municipalities. 10 sites were selected and visited together with the Architect.

##### First workshops with local partners

The local partners were asked for their opinions on the initial selection at the "exchange workshops". These workshops were intended to get all the various land-use planning stakeholders around the same table. They provided the opportunity to identify and validate various challenges and issues linked to the sites. Following these 2 workshops, 9 sites and a cross-cutting topic were finally selected.

##### Considerations and initial proposals (Version 1)

Following the workshops, there was a period of reflection and EDL produced and proposed a series of resilient development proposals.

##### Report of findings from the workshops

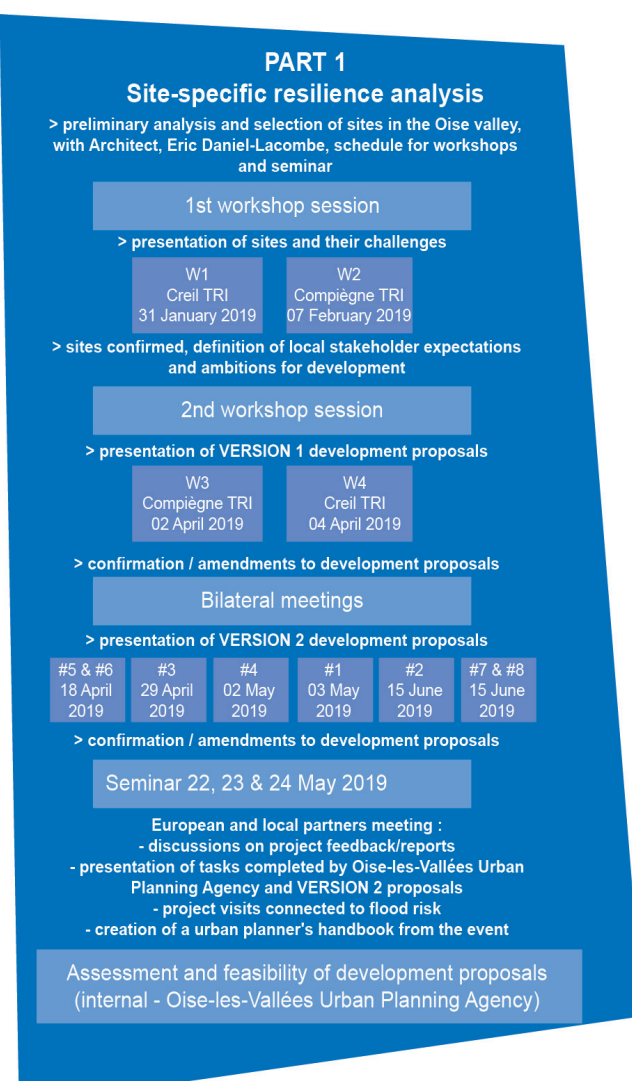
Once the development scenarios were proposed, they were presented to stakeholders at a new set of workshops, with issues subsequently arising.

##### Bilateral meetings and proposals (Version 2)

Bilateral meetings were held with each partner. They marked the opportunity to bring a clearer focus to the issues at each site, to make changes to the initial proposals.

##### Report of project activities to the partners at a European seminar in May 2019

An update on the work undertaken by EDL was given at a European seminar organised by Oise-les-Vallées Urban Planning Agency for both European and local partners.

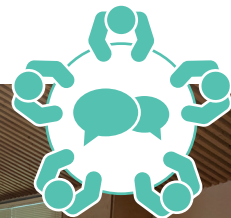


## 5.2 Exchange workshops

As part of the project, two "exchange workshops" were held:

- one in the area at significant flood risk (TRI), in Compiègne
- and the other in the TRI at Creil.

Their combined aim was to get all the local stakeholders around the same table to foster an effective dialogue and consider development plans for flood-prone areas by taking local realities into account.

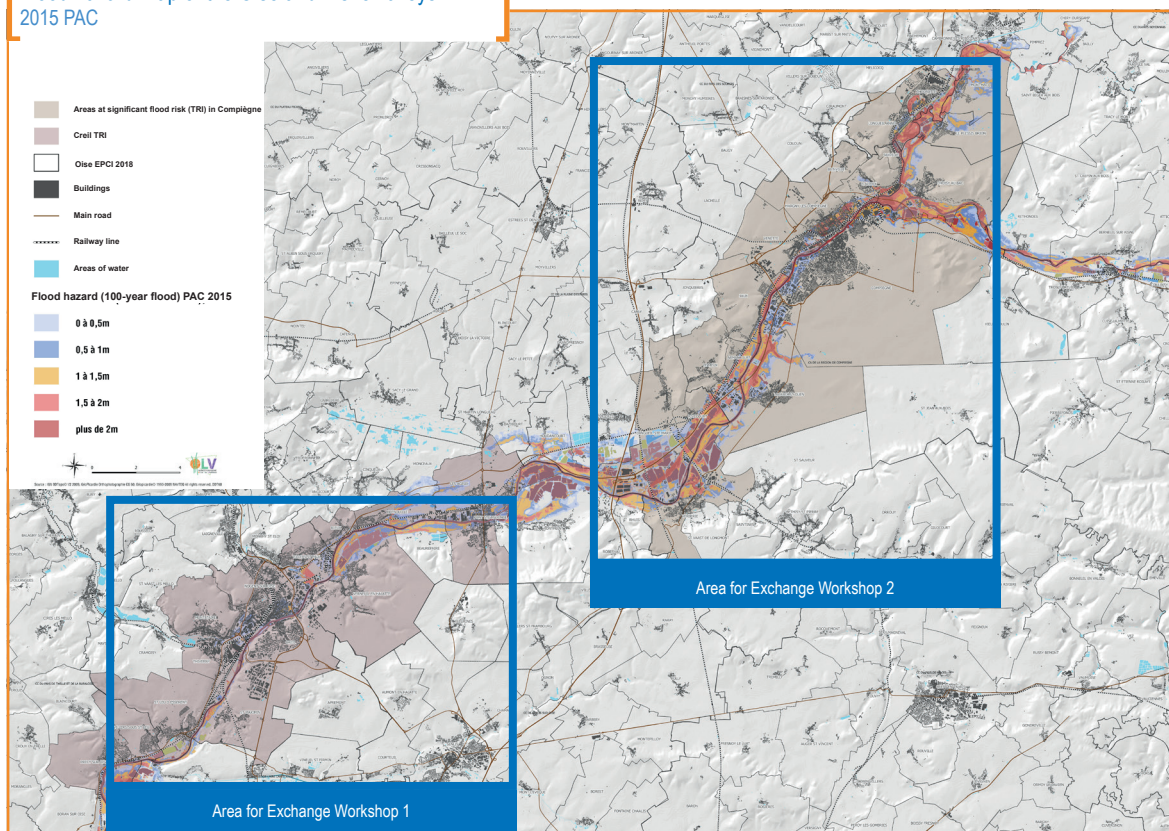


Workshop 1 - 31 January 2019



Workshop 2 on 2 February 2019

### Flood hazard map of the Oise and Aisne valleys 2015 PAC

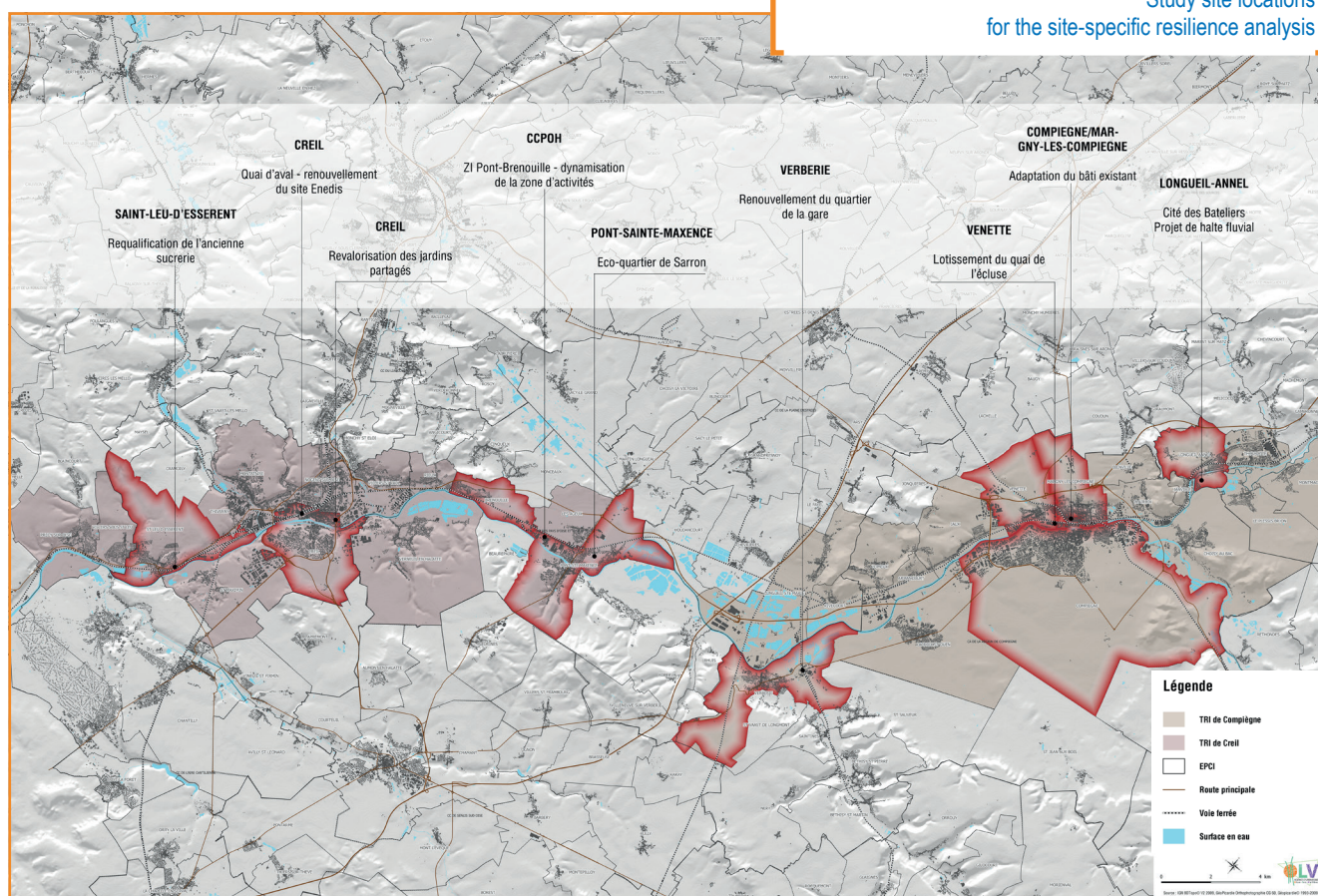




## 5.3 Selecting study sites

For this work task, we selected 9 sites and the cross-cutting topic of fencing in flood-prone areas. Among the sites selected, 5 are in the Creil area and 4 in Compiègne.

Study site locations  
for the site-specific resilience analysis







View of the study site in the town of Longueil-Annel



View of the study site in the town of Venette



View of the study site at the Pont-Brenouille industrial estate  
in the town of Pont Sainte Maxence



View of the site studied in the town of Saint Leu d'Esserent



View of the study site in the eco-neighbourhood of Sarron, at Pont Sainte Maxence



PART

1

SITE-SPECIFIC  
RESILIENCE ANALYSISTHE ARCHITECT'S  
OPINION

Eric Daniel-Lacombe



© Eric Daniel-Lacombe

## Enhance the flood vulnerability reduction of future architectural, urban and landscape changes in the Oise Valleys area.

**T**he success of the Oise Valleys area, close to Paris and the Ile de France region puts them in a paradoxical situation. The old towns, rebuilt after the Second World War, just like the industrial estates developed since the 19<sup>th</sup> century, are mostly in flood-prone areas. The addition of the railway line on an embankment altered rainwater drainage patterns while the River Oise has always been used and seen as a 'simple' transport route for merchandise. More recent soil sealing, coupled with behavioural changes has contributed to a rise in flooding, with the reference flood event being 1993 (even if historians are also aware of the flood of 1784) as it is well-documented. Revisions to water management systems have been, or will be, made (the most recent to tackle 30-year flood events) but they are all very costly and produce adverse effects. These include the sometimes illusory sense of protection behind flood dykes and forgetting about floods due to the visible disconnection between homes and the river.

How should this situation be addressed? This is the question that the stakeholders who commissioned me are asking. As an architect, my job was to assess and reinvent a series of locations by proposing new, potential architectural, urban and landscape changes.

Clearly, the local stakeholders are fairly familiar with flood-related hazards in their valleys but the logic of economic development pushes them to minimise these risks which are, in fact, constantly growing. To clarify the two approaches that clash at each of the nine sites selected for this experiment, we organised consultation meetings in conjunction with the Oise-les-Vallées Urban Planning Agency. The aim was to gain a clearer insight into these extreme rainfall events in residential and development areas. Each planning case study provided the opportunity for open debates on potential development trends, how to introduce them to the site, their surrounding urban environment and especially their exposure to flood risks.

However, before addressing the observations made on this small number of trial plots (nine in total), we must explain the level of the challenge. Buildings in flood-prone areas identified for development which the general public does not always grasp the economic, ecological and cultural significance. The subject of the assessment and survey needs to be reframed. Homes in the future must provide airtight and watertight shelter including protection from the highest recorded floods. Yet, if this shelter is designed to be completely watertight, the sensory connection between local residents and their surroundings will be weakened and they won't be able to understand when natural forces occur.

The ecological transition process involves a step-change in the way societies function and behave. It is equivalent to those that occurred in the Renaissance, towards the end of the Ancien Régime (old rule) and at the outset of the Modern Age. Each of these periods of history generated a new concept of humanity, politics and working life. Each was also symbolised by changes in architecture. Palladio and Philibert Delorme, Claude Nicolas Ledoux and Etienne Louis Boul-





lée, then Auguste Perret and Le Corbusier are examples of this. If we returned to 1851, on the cusp of the modern world, when the first International Exhibition was held in London, we can make two observations:

- The culture, political arrangements or social movements of the modern world were simply unimaginable.
- Architecture was rooted in the aesthetic qualities of the Fine Arts and it was engineers, not architects, that oversaw construction techniques (Paxton, in 1850 in London, Eiffel in 1880 and Hennebique in 1890, in France) and who paved the way for the modern movement in architecture, 30 years later.

Indeed, for many years, Architects remained loyal to the Fine Arts school of thought, which underpinned the success of French architecture. It embodied the idea of composition and aesthetic qualities from the revolution, that subsequently triumphed in the first half of the industrial age (Haussmann's Paris, International Exhibitions, its railway stations, etc.), rather than focusing on contriving programmes, social goals and aesthetic qualities that belonged to industrial society, in anticipation of the modern world.

The revolution was one of public opinion, the establishment of the State and a neo-classic style of architecture that embodied institutional power. The industrial age, by contrast, was a period marked by the transformation of human labour. Introducing instruments to technical rationality generated mass labour, political forms of categorised representation and machine-derived architectural aesthetics geared to economic rationality. We are still experiencing the consequences, marked by advances in technology, from steam to electricity and oil, from electronics to information technology and genetics. Ecological transition requires more far-reaching change. The aim is to change forms of behaviour focused on reason and human interests since the Renaissance into those centred on protecting life, replacing humanity in a subordinate relationship with changes in the biosphere and care for all forms of life.

As a result, ecological transition will be a long and slow process. Barely underway, it is already attracting strong resistance from various interests established in all societies. Indeed, it will shake up social, economic and political systems and take even longer to put in place given these changes driven by climate change coupled with the civilian populations that endure the consequences. This leads me to highlight three points:

- ecological transition will be a slow process and its development unpredictable;
- it will only happen with the long-term commitment of civilian populations, mostly in their respective countries;
- it will challenge technical forms, symbolic functions and the aesthetic qualities of today's architecture.



## Les Vallées de l'Oise: a changing economic area

**T**he process will have significant consequences for the architectural invention. Indeed, we must acknowledge that no one today knows what the effects of climate change and deterioration of the biosphere will be on housing in fifteen, thirty or forty-five years' time. That said, we know that residents will be exposed to the same uncertainties throughout their lives. As a result, I consider it my duty to help them tackle these unknown situations and rely on others working on our relationship with nature to get to grips and continually come up with the right solutions for the foreseeable risks.

This led me to develop inventive analytical methods that have three main features:

- they share the analysis of local situations with those stakeholders directly concerned by a development plan, to devise and disclose options for architectural procedures;
- these are based on stakeholder reactions (often contradictory) to help guide further inventive analysis;
- they seek to generate effects that engage new stakeholders and especially future residents that prioritises collective attention to the health of living things.

## Site development proposals

mean architecture to be a practice to transform human settlements for the common good. In the context of the ecological transition process, architecture is a political activity. The choices for future development will be debated even more than they are now. This will involve all those already involved in the building industry, safety professionals, environmental specialists, as well as representatives from ecological and residents' associations. Contracting authorities should therefore be prepared to devise development proposals that consider the intentions and fears held by these new stakeholders.



This requires the architect to take great pains so that residents feel sheltered by the building architecture and that the project clearly depicts the due care and attention given to their lives. This dimension is needed so the community is not only receptive to each other but also to feel the architects, contracting and public authorities value them and are attentive to their needs. This "projection" outlook (the architectural process and the question of place) also seeks to produce symbolic effects that gradually engage the largest number of residents with subject of natural hazards. Architecture has the task of encouraging residents to familiarise themselves with natural hazards. It's just like I had to learn about avalanches when I was an alpine infantryman. I had to know enough about their existence to foresee and eventually deal with them, while operating freely in the mountain without fear.

The main principles that I use consist of:

- anticipating the risk development process and to retard its effects (for flooding, this means transforming the onset of turbulent waters into laminar flows);
- replace as far as possible mechanical or artificial control mechanisms with natural counterparts (replace dykes with linear flow discharge channels and energy-absorbant infrastructure);
- organise the flow of local residents' movements before, during and after a flood (which did not happen in Houston, last year);
- make arrangements for life to return to normal as soon as the flood is over.

These principles are necessary but not sufficient to produce the architecture. To this end, we must return to the contradiction between withdrawal and openness, between protective isolation and engaging with nature which is key to architecture that must cope with natural hazards. New symbolic forms must be invented together with an openness to new creativity among the residents.

This also encourages us to think of current and future flood victims as the number of unexpected floods and subsequent number of victims (to varying degrees) will undoubtedly rise. The reason for this is climate change which fuels more frequent and intense rainfall events and generates more powerful storms. Urban development, meanwhile, reduces the soil's ability to absorb water and accentuates storm water volumes in urban areas. There are also limits to public spending to tackle floods in rural areas quickly and effectively. So, we must prepare ourselves for new floods by organising emergency services, help the communities affected and anticipate damage.

This foresight study on resilience in the Vallées de l'Oise area has helped a large number of stakeholders understand that:

- architecture provides a way to co-produce housing;
- while the architect creates forms that meet current building requirements and thinks about the future well-being of the various residents.



*This study conducted by the Oise-les-Vallées Urban Planning Agency and, in particular, its Director, Pascale Poupinot, together with Interreg STAR2Cs Project Manager, Imane Fedaili, has helped nurture expertise in architecture, town planning and landscape design at sites exposed to natural hazards.*

*Housing, offices, amenities, roads and parking or gardens and public spaces, etc. can be designed for flood-prone areas but can also be take into account forest fires, noise or wind, with the idea that the weather now can wet and dry, hot or cold in equal measure.*

*This research has taught us that it is not enough to protect local residents from risks. Those exposed to these risks must rein in their distress and feel protected and able to cope with the risk in full knowledge of the facts. As the focus is on natural hazards, these projects for housing, offices and public amenities provide their residents with new conditions for access and interaction with nature in places that combine practical, aesthetic and symbolic aspects. This is why architecture as featured here, offers insights into unusual antinomic perceptions, as they alone can give free rein to our imagination and enable the residents to take ownership of the changes to their daily lives brought about by risk and the reality of climate change.*

*The quest for an architectural symbolism that provides for a dialectic of shelter and engagement with risk or with the future of nature, takes us along the Oise Valley to give further consideration to elementary forms of nature (water, earth, wind and fire) while awareness about the urban development process encourages us to examine connections between the aesthetic qualities of a project and that of the urban and natural environment in which it sits. Architecture can be interpreted as an exchange. The general public and customers expect the architect to provide them with an aesthetic experience that surpasses expectations which they know how to express, whether this applies to intended practicalities or symbolic significance. In exchange, society - the contracting authority, building firm, regulatory authorities - grants the architect the possibility of taking a practical object and turning it into an endeavour. As a result, there were several times during the design process that I saw the opportunity to underpin artistic creation by meeting demands derived from common practice, or based on the contracting authority's expectations. In many cases, I noticed that I could build on meeting the needs expressed by building industry stakeholders or by future users to make the creation of a new aesthetic quality in the public domain.*



*Studying work by modern landscape architects, using reference or corpus images featured in the workshops, paves the way for an architect to create this openness to nature right in the town. Doubtless, it seems difficult in towns to come up with new connections with nature, mostly because we have become detached from its presence in urban areas. Yet, rainwater, draughts and gusts of wind that tug your umbrella from your hands, cobblestones or tarmac on the ground, together with the sun and clouds, are all forms of nature universally present in towns. However, we cannot talk about the aesthetic qualities of rain without buildings and amenities that bring it to our attention and enable us to imbue it with meaning or to appreciate its presence.*

*The emergence of new development plans for the Oise Valley by seeking out this tangible presence coupled with reduced vulnerability is a direction of travel for the next thirty years, so that we can talk together about this concept of resilience.*

*Eric Daniel-Lacombe  
Architect of inventive  
analyses*



## RESILIENCE GUIDELINES

PART  
1

## SITE-SPECIFIC RESILIENCE ANALYSIS



## 10 PUBLICATIONS

- #1 -Longueil-Annel mooring facility
- #2 - Existing buildings at Margny-lès-Compiègne
- #3 - The housing estate at the Quai de l'Ecluse, Venette
- #4 - The railway station area, Verberie
- #5 - Sarron eco-neighbourhood, Pont-Sainte-Maxence
- #6 - The industrial estate at Pont-Sainte-Maxence/Brenouille
- #7 - The allotments, at Creil
- #8 - The Quai d'Aval, at Creil
- #9 - The ex-sugar refinery, at Saint-Leu-d'Esserent
- #10 - The problem of fencing in flood-prone areas



## 6. Resilience across the valley

### 6.1 All the projects in the valley

#### From feasibility

Although EDL's plans seem "*ready-to-build*", one question remains: Are they actually feasible? Indeed, the act of planning and building must adhere to a great many rules and recommendations that will be the focus of the last part of this document. In addition to Local Plans (PLU) and PPRIs, there are a whole host of documents to oversee building in flood-prone areas.

We will therefore attempt to compare the feasibility of each development project studied

#### to land art

Let's finish with a short mention about landscape, or more precisely, land art. According to the online Larousse dictionary, land art means "*a contemporary art trend that appeared in the United States around 1967 and features art work in and with nature*".

Water has always inspired poets and artists as it provides unexpected possibilities. From our location, on the banks of the Oise, the river is first and foremost a landscape asset before even being a source of danger.

#### RIVER MOVIE An example of land art



"Les Girouettes à Crues" (flood weather vanes) by Erik Samakh, 3 granite blocks positioned on a mobile steel beam that swivels and turns with the current and river flood waters.



© Lang/Baumann

Beautiful Steps #7 is a staircase leading to a platform that juts out above the river to provide a viewpoint inviting contemplation.

#### Example of a comparative table

		Project 1	Project 2	Project 3
Definition	Project title			
	Main feature			
Technical aspects to consider	Networks			
	Building design			
	...			
Economic aspects to consider	Cost price			
	Sale price			
	Investments			
	Profitability			
	...			
Legal aspects to consider	LP			
	PPRi			
	...			

RIVER MOVIE, a public art initiative on the banks of the River Saône, inaugurated in 2013, providing a trail along the riverbanks interspersed with original and contemporary works of art by 13 artists.



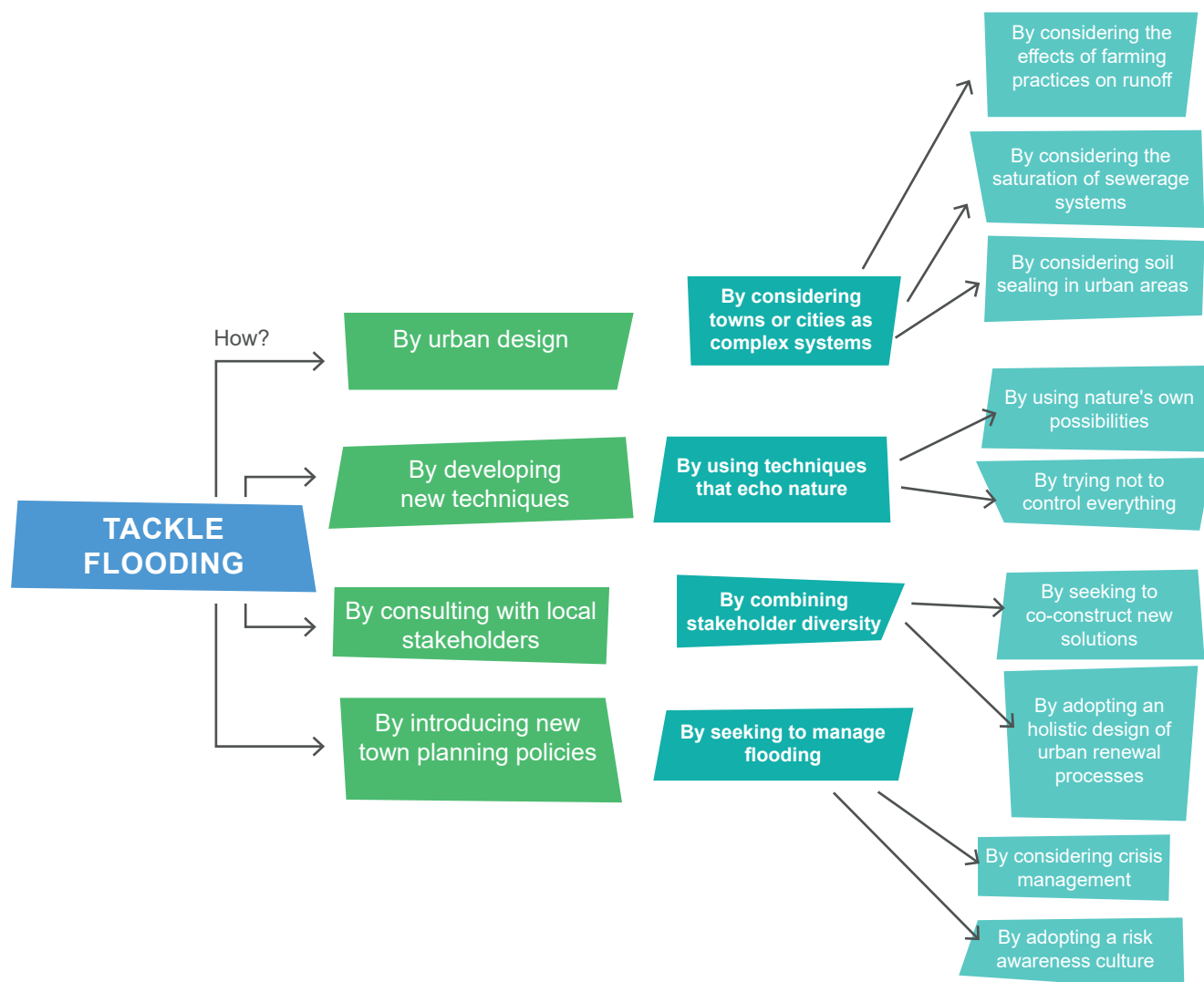
© www.grandlyon.com

## 6.2 Recommendations to address flooding

Although these scenarios proposed by EDL appear to meet the resilience criteria, it should not be forgotten that the aim is to achieve a resilient area as a whole and not just one-off resilience site by site. Because the sum of individual examples of resilience does not provide collective resilience, there is now a real urgency to consider "urban resilience" and not just "resilient urban design". Indeed, "resilient urban projects are not a translation of urban resilience understood in a systemic sense. Resilient urban design is rather to be considered as a local, always negotiated and potentially contradictory translation of urban resilience."<sup>24</sup>

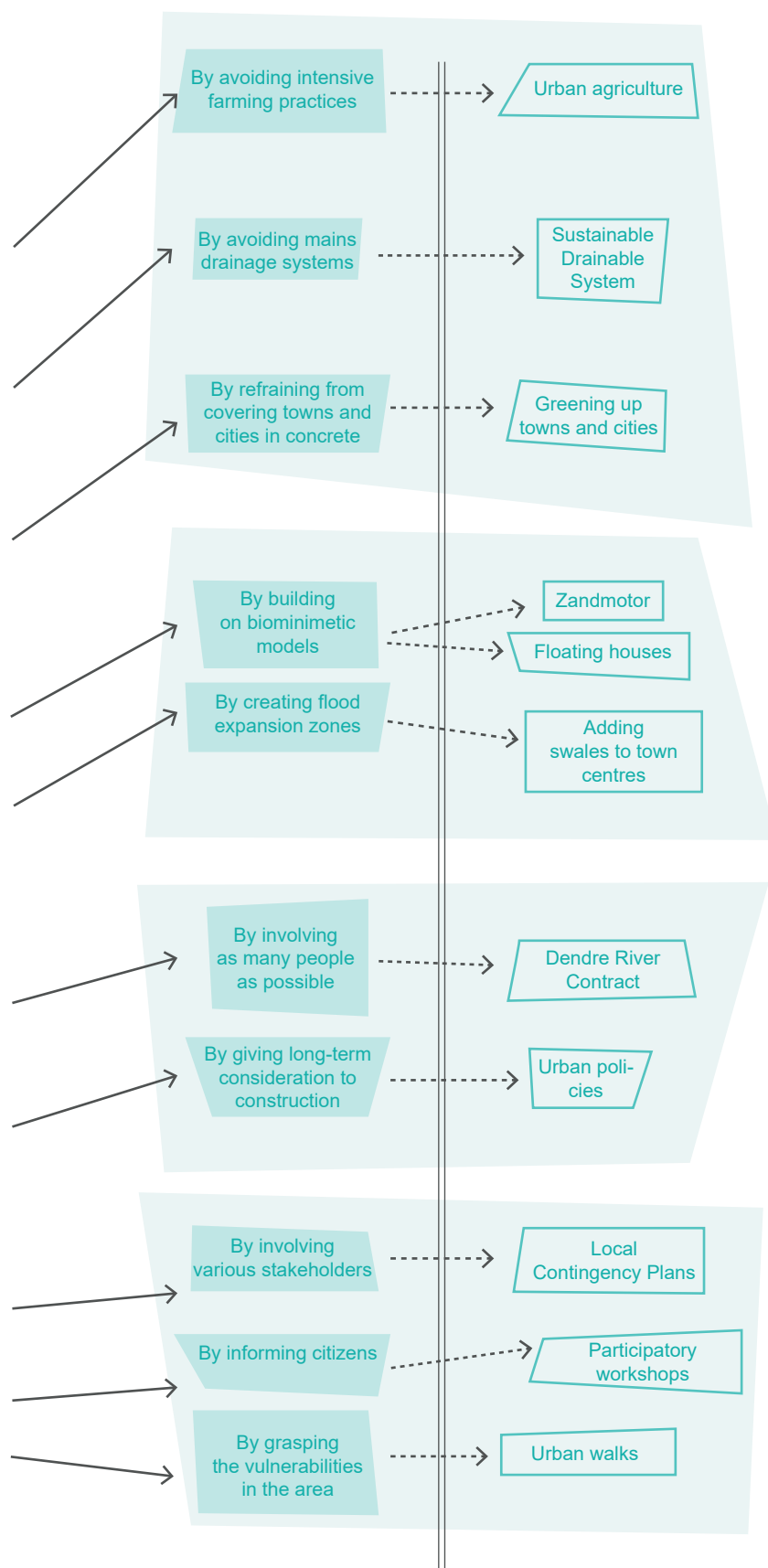
Although urban construction in flood-prone areas constitutes a key development challenge, it must be done considerably using a systemic approach. Clearly, technical solutions already exist to cope with water. The goal is now to piece together scales of construction, housing blocks, the neighbourhood and the town in the same thought process. As such, urban resilience in the future should be put in the context of integrating risk that carefully considers the social and spatial features of different places.

To achieve this, Oise-les-Vallées systemically reviewed the various pillars that need to be developed to build urban resilience:





## EXAMPLES







## [CONCLUSION]



The concept of resilience was adopted for the Oise Valley, following the National "Flood-prone regions undergoing change workshop" in 2014-2015. Since then the Oise-les-Vallées Urban Planning Agency has been supporting local authorities to build this strategy into various development policies.

The planning agency's role in the STAR2Cs Project provides an opportunity for it and its partners to study the options to implement the concept of resilience locally. The involvement of European partners also makes a significant contribution to developing thinking through feedback, solutions and techniques used by other countries affected by flood risks, to tackle flood damage.

To prepare the local area to be resilient and facilitate project delivery, 9 sites were selected for the first part of this study. The study shows how, with help from several tools, to reap and appreciate the benefits of applying resilience principles to urban development projects.

The role of Architect, Eric Daniel-Lacombe, largely contributed to enriching the thought process around this concept of urban resilience. Indeed, based on his experience at the ex-Matra site at Romorantin (a residential neighbourhood project on the banks of the Sauldre river), Eric Daniel-Lacombe tried to explore innovative technical solutions that coincide with the different stakeholder positions. The workshops organised and run by the Urban Planning Agency provided a constructive setting for discussions between those participants and stakeholders attending.

The development proposals produced from this study were devised using current knowledge about risk (the 2015 100-year flood model) and applicable regulations. It should be noted that the projects contained in this document must also be assessed in relation to the Decree of 5 July 2019 for inclusion in the forthcoming PPRI regulations.

Upon completion of this first phase of work, the Urban Planning Agency was then tasked with analysing the valley's resilience, in particular by studying urban networks and their interdependencies. The networks are, in fact, vital amenities, whose vulnerability to flooding can affect how the local area functions as a whole. The aim of the second part of the study is two-fold:

- assess the networks in the Oise Valley to gain a clear picture of how vulnerable they are to flooding;
- work with network operators to minimise damage and reduce as far as possible flood-prone or flood-affected areas.

Clearly, the work undertaken for this European project greatly helps to improve a "risk culture", by raising awareness through a dialogue process. In this sense, the card game produced for the project forms a fun way to approach flood risks and share concerns between the various stakeholders.

Taking this a step further to again foster a risk culture, the Urban Planning Agency expects to expand its awareness-raising activities for the STAR2Cs Project, particularly through cultural events related to water. Land art experiments also constitute an interesting possibility that the agency intends exploring further in its subsequent work.





## [ references/sources ]



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3. source: Mission Risques Naturels
4. For further information on the project, please visit the website:  
[www.canal-seine-nord-europe.fr](http://www.canal-seine-nord-europe.fr)
5. For further information on the project, please visit the website:  
[www.canal-seine-nord-europe.fr](http://www.canal-seine-nord-europe.fr)
6. For further information, please visit the Entente Oise-Aisne website: [www.oise-aisne.net](http://www.oise-aisne.net)
7. source: National workshop website:  
[/www.cohesion-territoires.gouv.fr/l-atelier-national-territoires-en-mutation-exposes-aux-risques?id\\_courant=1450#article](http://www.cohesion-territoires.gouv.fr/l-atelier-national-territoires-en-mutation-exposes-aux-risques?id_courant=1450#article)
8. Also with the Loire, Argens, Fensch and Marne valleys
9. source: report on the outcomes of the national workshop available at: [www.cohesion-territoires.gouv.fr/publication/atelier-national-territoires-en-mutation-exposes-aux-risques\\_5123](http://www.cohesion-territoires.gouv.fr/publication/atelier-national-territoires-en-mutation-exposes-aux-risques_5123)
10. Full text of directive available online at:  
[eur-lex.europa.eu](http://eur-lex.europa.eu)
11. source: [www.cepri.net/directive-inondation.html](http://www.cepri.net/directive-inondation.html)
12. It should also be noted that France had to appear before the European Court of Justice as it failed to inform the Commission about the transposition of this legislation, which should have been in place by November 2009". This explains the 3-year gap between the Directive and its application in France.  
source: [europa.eu/rapid/press-release\\_IP-10-1423\\_fr.htm](http://europa.eu/rapid/press-release_IP-10-1423_fr.htm)
13. source: [www.cepri.net/directive-inondation.html](http://www.cepri.net/directive-inondation.html)
14. Since <sup>1</sup> January 2018, inter-communal authorities are responsible for aquatic environment management and flood prevention (GEMAP). They are also tasked, among other things, with:
  - watershed or partial watershed management planning;
  - maintenance and upkeep of water courses, canals, lakes or water bodies, including access;
  - flood and sea defences;
  - protecting and restoring sites, aquatic ecosystems and wetlands, as well as neighbouring woodlands.
15. For further information on this subject, please visit the Ministry of Ecological and Inclusive Transition website on flood prevention
16. source: [www.interregeurope.eu](http://www.interregeurope.eu)
17. source: [www.interreg2seas.eu/](http://www.interreg2seas.eu/)
18. source: [www.interreg2seas.eu/fr/star2cs](http://www.interreg2seas.eu/fr/star2cs)
19. The so-called European "Floods Directive" 2007/60/EC of 23 October 2007, seeks to provide a framework for assessing and managing flood risks to mitigate the adverse effects on human health, the environment, cultural heritage and economic activities that are connected with floods. It asks all Member States to identify and map areas at risk and establish a flood risk management plan (PGRI) every six years for each large river catchment.  
source: [www.driee.ile-de-france.developpement-durable.gouv.fr/directive-inondation-r556.html](http://www.driee.ile-de-france.developpement-durable.gouv.fr/directive-inondation-r556.html)
20. source: [www.interreg2seas.eu/fr/star2cs](http://www.interreg2seas.eu/fr/star2cs)
21. Territorial administration in the UK is very different from that in France. France has an array of local authorities, individual municipalities, inter-municipal associations, districts (pays), metropolitan councils, Departmental and Regional Councils. By contrast, there are just one or two levels of local authorities in the England. Some minor functions are delegated to Parish Councils, mostly run by volunteers.  
source : [//angleterre.org.uk/civil/gouvernement-local.htm](http://angleterre.org.uk/civil/gouvernement-local.htm)
22. A Waterschapp, or water board, is a public body tasked with regulating water management for each region in the Netherlands.
23. For further details, please visit:  
<https://www.government.nl/topics/delta-programme>
24. source: Mathilde GRALEPOIS and Sylvain RODE. *Flood resilient city and urban distortion*, 2017  
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