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**“Living with” flooding:
perceptions and experiences of living
in a flood-resilient neighbourhood in France**

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August 2023

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Abstract

This dissertation aims to offer an insight into what it means to "live with the flood" through the case study of the Matra neighbourhood in Romorantin-Lanthenay. This neighbourhood was built to be resilient to flooding. In 2016, a flood described as a one-in-a-thousand affected the town of Romorantin-Lanthenay. By comparing Matra and another close neighbourhood, this study examines the differences in the experiences of residents during and after the flood.

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Introduction

1. Background and context of the research topic

Flooding is defined quite simply as "the inundation of normally dry land" (Seneviratne, et al. (IPCC), 2021, p. 1567). All over the world, flooding is among the most important natural risks (Verlynde, 2018), as it results in the most frequent, widespread and among the most serious disasters (Hughes & Sharman, 2015; Verlynde, 2018; Martin, 2007). In 2015, the United Nations Global Assessment Report on Disaster Risk Reduction estimated that the hazard that affects the most people worldwide is flooding (UNISDR, 2015). Three main types of floods are often recognised (e.g., by the WHO, the French *Ministère de la Transition écologique*, the IPCC): coastal floods, flash floods - which occur after rapid and excessive rainfall that does not have time to infiltrate the soil - and river floods. River floods occur when a river overflows its banks. This can be the result of two different phenomena: slow-rise flooding – which is often linked to repeated and long-lasting rainfall – and rapid torrential flooding – which occurs for instance after heavy rainfall.

Flooding is not a new phenomenon: cities, particularly in Europe, have been experiencing them for a long time. As rivers are essential to human life and economic development, cities often settled close to them (Verlynde, 2018). This settlement made some parts of the cities prone to river flooding. However, in Europe, the risk of river flooding is likely to increase in the coming decades due to the combined effects of climate change and socio-economic developments (IPCC, 2019). According to the Joint Research Center of the European Union (JRC), over 170,000 people across the EU are already exposed to flooding every year (Feyen et al., 2020). In a scenario where the average global temperature increase is 3°C, average projections estimate that there will be nearly 3 times as many people exposed to river flooding (Feyen et al., 2020). This JRC report highlights the importance of adaptation strategies that could substantially reduce the risk of river flooding. There is therefore a need for such adaptive measures and policies (Danenberga, 2021).

Many cities are trying to remedy their vulnerability to flood risk by designing adaptation strategies and plans. Increasing adaptability would increase resilience and reduce vulnerability (Brunetta & Caldarice, 2019). Urban resilience is defined as the capacity of communities to adapt to or recover from the impacts of major climate changes, such as extreme weather events (Meerow et al., 2019). One of the usual adaptation strategies relies in particular on resilient urban planning, i.e., a mode of urban planning that is globally compatible with the risk of flooding (CEPRI, 2015). Rode and Gralépois (2017) note that many studies have been carried out on these adaptation strategies from a technical point of view. However, these strategies also raise the issue of a territory's habitability: at what point is it no longer acceptable to build in a risk zone? On what condition(s) do we – as a society – wish to live in a flood-prone area? Living in an area is not just about having a house there: it also involves a set of practices and relationships to space. It is not enough for architectural or town-planning solutions to be purely adapted to flooding: if they only take into consideration the adaptation to flooding, there is a risk of transforming territories into uninhabitable spaces, not in terms of risks but in terms of quality of life. Building a neighbourhood solely based on flooding would indeed mean omitting other parameters, such as the ones that can make a neighbourhood a pleasant place to live. Therefore, it seems important to integrate a less technical and more human dimension into the debate on neighbourhoods built in flood-prone areas: it is necessary to not only describe the techniques used to make a flood-resilient neighbourhood but also the relationships that the residents develop with their neighbourhood and its specificities. Is there a specific ontological meaning of living in a flood-resilient neighbourhood?

2. Research problem

A case study about Romorantin-Lanthenay – a town located about 190 km southwest of Paris – can help to address this question. After 2016, the words "Romorantin-Lanthenay" and "flood" were associated in two very different ways in people's minds, in the press and on the Internet. One of these occurrences can be roughly described as a "success story": the story of a neighbourhood that has "resisted" a flood and that is a "model" for

French resilient urban planning. The other is the story of a neighbourhood that, even 7 years after the flood, has still not fully recovered from the event.

Comparing these two neighbourhoods can be interesting because they are both geographically exposed to the risk of flooding but did not have the same experience of the 2016 flood at all. This is due in particular to urban planning reasons. The residential area known as “Matra” or the “Matra neighbourhood”, built on an industrial brownfield, was designed in 2008 by its architect Eric Daniel-Lacombe with the possibility of a 1.2 m flood from the river called Sauldre (to which 30 cm was added as a precaution) (Raymond, 05/09/2021; Daniel-Lacombe & Paquot, 2016). Various techniques found in many so-called "resilient" neighbourhoods have been combined with a singular architectural approach that makes the neighbourhood a "temporary tributary of the river" (i.e., in the event of flooding, the river is supposed to pass through the neighbourhood without causing any damage, and then return to the main riverbed at a lower level) (Lenouvel, 2020). In 2016, these urban planning choices proved to be quite effective. The flood caused little damage to homes and little work was required afterwards. On the other hand, on the other side of the Sauldre, another neighbourhood of Romorantin, called “Le Bourgeau”, was much more severely affected by the flood. The local newspapers described the flood in a more "traumatic" way: residents talked about "surprise" evacuations, lost memories and valuables, lengthy rebuilding and construction work, arguments with insurance companies, etc.

These two neighbourhoods, separated from each other by a single branch of the river, had an almost diametrically opposed experience of flooding, which may still have an impact on the lives of their residents today. Based on the information at hand, no study has investigated the difference in flood stories between these two neighbourhoods. No study has focused on the flood in Le Bourgeau either. The architect of the Matra neighbourhood only refers to the flooding in Le Bourgeau in his writings because it enables him to conclude that the resilience resulting from the urban planning choices made in Matra is efficient. A more in-depth comparison between these two neighbourhoods and their relations to flooding might provide a better understanding of what living in a flood-resilient neighbourhood means, and the unique experience of living it provides, if any.

The comparison between the Matra and Le Bourgeau neighbourhoods will not provide a complete answer to the question of flood-prone areas' habitability. This paper hypothesises that Matra seems to be proof that it is possible to build a resilient neighbourhood in a flood zone in which the quality of life of the residents has not been sacrificed simply for the sake of resilience. However, it can only be considered as food for thought: some of the conditions that enabled Matra to become a resilient neighbourhood cannot be found in Le Bourgeau. In this respect, the comparison between these two neighbourhoods shows that even with the existence of resilient techniques, adaptation to risk cannot follow the same path everywhere.

3. Research question(s)

How can a comparison between the situation 7 years after the 2016 flood in the Matra neighbourhood and the Bourgeau neighbourhood in Romorantin-Lanthenay help to identify the unique characteristics of what living in a flood-resilient neighbourhood means?

Sub-questions:

1. What were the significant differences between the flooding in the Matra neighbourhood and the Bourgeau neighbourhood in 2016?
2. Does living in a so-called "resilient" neighbourhood help to minimise residents' anxiety and their "attachment" to their neighbourhood?
3. How does this difference in resilience still have an impact 7 years after the flood?

To answer these questions, the first chapter consists of a literature review of the main concepts used in this paper. The second chapter presents the methodology employed to gather valuable data on the subject. The third chapter analyses the results and the different experiences and perceptions of the 2016 flood and its aftermaths of both neighbourhoods' residents. The fourth chapter discusses the gathered results and exposes the limitations of this study. The conclusion highlights the main findings and limitations and offers some perspectives for future research.

Chapter 1: Literature Review

1. Flood risk

1.1. Definition of risk

Risk is usually defined as the combination of hazard - "a process, phenomenon, or human activity that may cause loss of life, injury or other health impacts, property damage, social and economic disruption or environmental degradation" - and vulnerability - "the conditions determined by physical, social, economic and environmental factors or processes which increase the susceptibility of an individual, a community, assets or systems to the impacts of hazards" (United Nations Office for Disaster Risk Reduction (2022), p.2). However, there is no real consensus in the scientific literature on the definition of risk, since the term is often described as being polysemous (Verlynde, 2018, Reghezza-Zitt & Rufat, 2015, Rufat, 2011). Some, for example, place particular emphasis on the "hazard" dimension, in which they stress the importance of the human dimension: "a potentially dangerous event, a hazard, is only a risk if it applies to an area where human, economic or environmental issues are at stake" (Ministère de l'Écologie du Développement Durable et de l'Énergie, 2012; Barroca & Pacteau, 2018). Flooding on an uninhabited island would not necessarily be seen as a risk, but only as a hazard. However, the 'vulnerability' part of the definition is also very important, as numerous studies have shown (Meerow, et al., 2019): flooding does not present quite the same risks whether you live in a developed or developing country, whether you are rich or poor, a woman or a man, and so on. The meaning of the word has also evolved over time: in her book *Risk and Blame* (2013), Mary Douglas points out that risk used to be perceived as the probability of an event occurring, whereas today it is seen above all as a danger that could arise." This shift in definition might be linked to the idea that the current Western society sees risk as something that must be reduced: in the "Risk Society", security is increasingly seen as a matter of concern (Beck, 1992).

'Disaster', on the other hand, refers to the realisation of the risk, which can lead to major damage that may have different temporal consequences (short-, medium- or long-term) (Du et al., 2010). This damage can be of different kinds: in the case of flooding, direct damage refers for example to damage caused to buildings or communication networks, and indirect damage refers for instance to disruption to health and education services. Damage can be material (e.g., loss of property) or immaterial (e.g., death, increased stress, increased inequality, loss of well-being) (Vinet, 2010; Verlynde, 2018). Both flood damage and the risk of flooding have increased in recent years (Vinet, 2010). Several factors are behind these increases, and it is difficult to talk about flooding as a natural or man-made disaster in a binary way.

1.2. River flooding, a risk of natural and human disaster

1.2.1. Flooding and urbanisation

Certain human actions have contributed to an increase in the risk of flooding throughout the world. Firstly, settling close to rivers increases the likelihood of being affected by flooding (Cutter, et al. (IPCC), 2012). This urbanisation and the establishment of activities in flood-prone areas play a major role in increasing the risk of flooding for many people around the world (Mendez, 2014). This has often resulted in a reduction in the flow of rivers, by installing dikes or embankments close to watercourses. These installations obstruct the passage of water and therefore exacerbate the phenomenon and the consequences of flooding. Urbanisation, often accompanied by the use of impermeable surfaces such as asphalt, reduces the amount of stormwater that can infiltrate into the ground (Verlynde, 2018). Many other examples of human alterations of the landscape (e.g., soil moisture, deforestation, river management practices) explain the increases in flooding (Mendez, 2014).

1.2.2. Climate change

Climate change is also contributing to an increase in the occurrence of more intense floods (Seneviratne, et al. (IPCC), 2021), and is another factor that tends to blur the boundaries between natural and man-made disasters, human activities being the main driver of climate change since the late 1800s. However, according to the IPCC (2021), floods are a complex interplay of hydrology, climate, and human management. Climate change

does not affect all types of floods in the same way. As far as river flooding is concerned, climate change may have different consequences, particularly due to changes in precipitation (Seneviratne, et al. (IPCC), 2021). As the climate warms, the atmosphere can hold more moisture, leading to increased evaporation and more intense rainfall events, which result in an increase in river overflow and river flooding (IPCC 2014, Seneviratne, et al. (IPCC), 2021; United States Environmental Protection Agency, 2021). However, many other factors can cause river floods, so there is not always a perfect match between an extreme precipitation event and a flood event (IPCC, 2019). Furthermore, since the average temperature in all regions of the world will not increase equally, the risk of extreme flooding will likely decrease in some regions (IPCC, 2019; Seneviratne, et al. (IPCC), 2021). Overall, "there will be more droughts and more floods, but this balance will serve to highlight the differences between regions" (UNISDR, 2019, p. 99).

1.3. River flooding in France

In France, flooding is a major risk: 17.1 million people live in the approximate envelope for potential floods and are exposed to the various consequences of river overflows, including 16.8 million in metropolitan France (Barroca & Pacteau, 2018, MEDD, 2012). It corresponds to roughly one inhabitant in four.

In the course of its history, France has been exposed to numerous floods, but never on the scale of the 1953 flood in the Netherlands, for example. Certain episodes such as the flooding of the Seine in Paris in 1910 or the one of the Tarn in 1930 - the deadliest of the 20th century for the country (200 deaths) - are part of the French collective memory (Verlynde, 2018). However, for a long time, the country believed itself to be relatively protected from flooding (Bidault, 2017). Since the 1980s, several floods have helped to remind the country of its vulnerability to this risk, now presented by the *Ministère de la Transition écologique* (MTE) as the leading natural risk in France. The events of June 2016 and October 2018 showed that flooding could have significant effects in France (albeit less so than in other parts of the world): 15 people died in the Aude in 2018 and the Seine flood of May-June 2016 cost one billion euros (Verlynde, 2018). Given the high level of exposure, which is the result of the country's history of urbanisation, France is now increasingly concerned about flood prevention and management.

However, flood risk prevention in France began as early as the 12th century with the construction of the first dikes on the Loire (Daluzéau & Oger, 2011). Such dikes were still rare, as people tended to see flooding as a divine punishment in front of which they adopted a fatalistic attitude. In the 18th century, the phenomenon was studied in greater detail and the developments of science and technology helped to better protect some regions against flooding. At the end of the 19th century, numerous dikes were built along French rivers and laws were enacted to correct river run-off by maintaining and restoring mountain forest areas (Daluzéau & Oger, 2011). For a long time, the intention was not to curb urban growth, even if it took place in flood-prone areas (Daluzéau & Oger, 2011; Rode et al., 2022). The State, which was - and still is - responsible for granting planning permission, allowed urban development to take place in these areas. In France, the risk of flooding has therefore increased in tandem with urbanisation. This is even truer for floods linked to river overflow since the development of catchment areas (e.g., modification of watercourses, sealing of soil) has accelerated their occurrence (Clément & Jaurand, 2005).

In the 1980s, the government regulations on building in these flood-prone areas finally changed, and urban development and flood risk prevention became linked issues (Daluzéau & Oger, 2011). Flood risk management is based primarily on reducing the stakes involved. This is achieved through several techniques: for instance, paying particular attention to urbanisation in flood-prone areas or demolishing certain built flood-prone areas to increase flood expansion areas (Verlynde, 2018; Rode et al., 2022). The risk of flooding has thus become a factor in land-use planning that can call into question the development strategies of local authorities. Conflicts are thus developing between the State - responsible for preventing flooding and ensuring the safety of people and property - and local authorities, which have to manage a possible disaster while ensuring the best possible development of their municipalities (Verlynde, 2018, Beucher & Rode, 2009). However, the opposition between the State and local authorities must not be depicted in a too simplistic manner, given that urban renewal in flood-prone areas remains possible and legal in many areas (CEPRI, 2015).

Today, flood risk is considered before a project (Rode & Gralepois, 2017). Flood risk prevention in France is based on mapping the flood-prone areas, controlling urbanisation, implementing measures to reduce vulnerability, forecasting floods, and preserving the memory of past floods (MTE, n.d.). Various types of documents map the hazards and risks of flooding (MTE, n.d.). One of the most important maps can be found in the PPRI – “*Plan de Prévention des Inondations*” – created by the 1995 Barnier law (MTE, n.d.; Rode et al., 2022). This document prohibits urban development in the areas most at risk or necessary for flood expansion and subjects other less exposed areas to certain restrictions (Rode et al., 2022). PPRI produces regulations for risk zones ranging from low to very high (Rode & Gralepois, 2017). The regulations are drawn up taking into account a "reference flood", which corresponds to the highest historical flood known and documented, or a 100-year flood model (i.e., a flood which has a "chance" of being reached one in 100, if the highest known historical flood is lower) (MTE, n.d.).

With the implementation of the PPRI, the challenge is often to build the city within certain constraints through resilient urban planning, which is characterised by two main approaches: elevation and *transparence hydraulique* (Rode & Gralepois, 2017). The development of resilient urban planning adapted to flooding is a major challenge for flood-prone areas. The aim is no longer to combat flooding through structural protection, such as dikes, but to accept the possibility of flooding and therefore to develop flood-prone areas by incorporating the risk as a fully-fledged parameter of architectural and urban design.

2. Adapting to the risk of river flooding

2.1. Resilience and paradigm shift?

These reflections on the adaptation of territories to the risk of flooding are linked to the more general consideration of resilience. The origins of the concept of resilience are mainly linked to physics, psychology, and ecology (Pigeon, 2014). It can be defined as the capacity of a system to absorb the disadvantages of a disturbance and to integrate modifications without changing its fundamental structures (Rufat, 2011; Pigeon, 2014; Verlynde, 2018).

A better understanding of risks, their drivers and their consequences in urban areas has revealed flaws in flood risk management approaches. Numerous articles have therefore pointed to a "paradigm shift" (Cutter, et al. (IPCC), 2012; Rözer, et al., 2022; Reghezza-Zitt, et al., 2015). According to Rözer et al. (2022), the concept of flood resilience has changed over the last 2 decades: previously understood as an engineering concept that aimed to produce a built environment capable of withstanding floods, the concept now denotes an adaptive process in which the aim is for the urban system to “live with” the flood and learn from previous shocks. This new meaning of resilience goes hand in hand with the idea that it is impossible to eliminate all damage, but that it is possible to reduce it and thereby reduce vulnerability. So, for example, large-scale structures such as dikes should be removed from town planning: they will ultimately prove unsuited to the reality of the area, particularly given climate change. Climate change can indeed render these structures ineffective when their design thresholds are exceeded (Guevara Viquez et al., 2017). In a study on flood solutions in the Netherlands, Al (2022) points out that most of the current flood defence infrastructures must be seen as 'temporary'. The concept of resilience thus becomes associated with a multi-dimensional framework that includes a variety of data such as financial, human, social and environmental aspects (Rözer et al., 2022). This ‘paradigm shift’ in the way cities are protected against flooding has taken on several names in different countries: “rainproof cities” in the Netherlands, “low impact development” in the United States, “water sensitive cities” in Australia, “sponge cities” in China...

The concept of resilience offers an opportunity to design methods and approaches for managing urban risks (Barroca & Pacteau, 2018). It began to be used in particular after Hurricane Katrina in 2005, being invested by researchers in very diverse fields (Barroca & Pacteau, 2018, Reghezza-Zitt & Rufat, 2015). Many authors note that it is now widely used and that its meaning has shifted importantly, which makes it a carrier of various connotations and a vague concept subject to theoretical debate (De Bruijn, 2004; Fisher, 2015; Rözer, et al., 2022; Barroca & Pacteau, 2018; Reghezza-Zitt & Rufat, 2015; Lenouvel, 2020). Sometimes referred to as a ‘buzzword’, an ‘umbrella concept’ or a ‘boundary object’, it has been criticised for its weak conceptualisation (Barroca et al., 2013; Rufat, 2011).

The concept of resilience is also used for a variety of purposes. According to Rufat (2011), resilience is often responsible for political discourses that impose what a 'good' city is. Rufat (2011) highlights the tendency to make a binary distinction between the vulnerability of the urban system and urban resilience: urban resilience is said to be positive, while vulnerability – reduced to the idea of fragility - is said to be negative. However, if resilience is necessarily 'good' and vulnerability 'bad', it becomes an injunction that imposes strategies, which, moreover, are often based on a scientific legitimacy that makes it possible to close the debate (Rufat, 2011).

2.2. Adaptation

The concept of adaptation often accompanies that of resilience. Some prefer it, but both are widely used in the press and scientific papers.

To act in the face of climate change, two types of actions in cities are possible: adaptation or mitigation (Grafakos et al. (IPCC), 2018.). Mitigation corresponds to the implementation of policies and practices to reduce greenhouse gas emissions and is considered a global-scale issue. Adaptation aims to respond to the negative impacts of slow-onset and extreme events linked to climate change by adjusting the built, social, and ecological environment and is considered a more local issue (Grafakos et al. (IPCC), 2018.). The idea behind adaptation is also to move from a policy of "building against" to an approach of "living with" flooding (Rode et al., 2022). This notion challenges the paradigm of human control over nature and is an opportunity for humans to rethink their dependence on nature (Rode et al., 2022). However, adaptation remains a considerable challenge since a measure applied to an area will not necessarily be suitable for another one. Adaptation means proposing innovative urban planning projects and requires changing the way decision-makers look at risks when planning a city: risk can sometimes be an opportunity and not only a constraint (CEPRI, 2015).

2.3. Resilience through urban design: a typology

It is easiest to implement adaptive measures in projects located in new neighbourhoods (e.g., former brownfield sites), rather than in already built-up neighbourhoods in flood-prone areas that need renewal (Grafakos et al. (IPCC), 2018). CEPRI (2015) notes that the facilities planned for flash floods are fairly well taken into account by French urban planning professionals. However, the same is not completely true for the facilities planned for river floods (CEPRI, 2015). When a river overflows, it spreads over larger areas than its usual bed. When these areas are not built, they allow water to flow and be stored temporarily, which helps to reduce the risk of flooding. In France, the government has for some years been encouraging local authorities and planning practitioners to innovate in terms of resilient urban planning for these areas. It can be seen, for example, in the *Grand prix d'aménagement* held in 2015 and 2016 entitled "*Comment mieux bâtir en terrains inondables constructibles*"¹ (Rode et al., 2022, MEED & MLHD, 2016). France's desire to move towards an adaptation approach is also part of a wider trend of reflection taking place in various countries.

Various typologies exist for these facilities (Rode & Gralepois, 2017; Gilsoul, 2014; CEPRI, 2015). This section will only focus on a typology of two categories: elevation and *transparence hydraulique* (Rode & Gralepois, 2017).

2.3.1. Elevation

“Elevation” can have different proportions (from the scale of a raised house to that of a floating city). Raising buildings place them out of the water to protect them, their inhabitants, and the functions they house. It is a classic response to building in flood-prone areas. When considered on a neighbourhood or city scale, elevation can consider the differences in vulnerability of the functions of a building or its users (e.g., a retirement home) (CEPRI, 2015, Rode & Gralepois, 2017, Levasseur, 2021).

- Stilts: one of the most emblematic features of construction in flood-prone areas.
- Embankments
- Relocation of living spaces upstairs / abandonment of the ground floor and basement
- Amphibious houses (which can float up during flooding, not widely used in France)

¹ The Matra neighbourhood was a winner of this prize in 2015.

2.3.1. la transparence hydraulique / flow-through building

The principle of “*transparence hydraulique*” is quite difficult to translate literally into English, which has similar concepts, but whose definition is not completely the same. This principle stems from a specifically French law (article 4 of the decree of 27 July 2006) (CEPRI, 2015). It aims at preserving natural water flows in urban renewal or construction zones. It considers methods such as the implementation of structures that are voluntarily flooded (e.g., car parks). The aim is to put in place developments that will impede water flow as little as possible. PPRIs often specify a percentage of land use that can be at ground level, which corresponds to the percentage of “*transparence hydraulique*” to be respected. This principle may overlap with the concept of elevation since it involves leaving as much room as possible for the water. For example, building on stilts frees up space for the river (CEPRI, 2015; Rode & Gralepois, 2017; Levasseur, 2021). “*Transparence hydraulique*” also includes providing permeable surfaces to ensure the storage of part of the flood flow, which therefore often results in the creation of spaces that are not built on (e.g., parks, small ponds). Those spaces allow the chances of flood absorption, or at least rainwater (Grafakos et al. (IPCC), 2018). “*Transparence hydraulique*” also takes into account the logic of channelling floodwater to give it a direction within a neighbourhood and evacuate it, if possible, more gradually and without doing too much damage in its path. To reduce obstacles to water and channel it, it may also be useful to orient buildings in the direction of flood flow (Rode & Gralepois, 2017).

Most of the world's so-called "resilient" neighbourhoods through urban planning use these two traditional principles of elevation and “*transparence hydraulique*”. There is no real innovation, apart from different ways of combining them (Rode & Gralepois, 2017). These principles of resilient urban planning have consequences for how a town or neighbourhood is designed and for the liveability of the neighbourhood or town in question. To assess the extent to which resilient urban planning can change the perception of flooding while changing (or not) how residents feel attached to their neighbourhood, the concept of “perception of risk” first needs to be explained.

3. Perceptions and experiences of adaptation and flood risk

3.1. Flood experiences

Like any risk, flooding reveals a unique relationship between people and their locality and space. “Flooding” is a phenomenon and therefore includes a succession of moments (before, during and after). Each phase corresponds to different events that are likely to have impacts on people's lives afterwards (e.g., evacuation, returning home, rehousing, bank loans, waiting for insurance responses) (Verlynde, 2018, Levasseur, 2010; Carroll et al., 2009). For example, several studies have highlighted the difficulties that evacuation orders can cause for residents, especially when they come as a surprise (Carroll et al, 2009; Langumier, 2008). People tend to describe their experiences of flooding in strong emotional terms (e.g., ‘petrified’, ‘traumatic’, ‘panic-stricken’) (Carroll et al., 2009). Psychological reverberations can continue for several years, even after the physical traces of the flood have disappeared (IPCC (Cutter et al, 2012), Tapsell and Tunstall, 2008). The experience of flooding remains with the victims (Levasseur, 2010).

The 'home' especially no longer seems able to provide a sense of security because it is associated with feelings of fear and danger. Following the disaster, the house is perceived as vulnerable (Levasseur, 2010). Some residents might choose to move (sometimes within the same community, sometimes further away): "Home as a place of privacy, comfort and security had been breached" (Carroll, et al., 2009, p.542). A study by Tapsell and Tunstall (2008) shows that people's perceptions and relationship to their locality and home as a safe environment change after a flood. Residents who do not move often continue to question whether to leave or stay, even several years after the disaster (Langumier, 2008; Tapsell and Tunstall, 2008). However, the stability of the place of residence often represents the continuity and unity of the family: residents often speak of a "familiar place" or an "anchorage" (Langumier, 2008). The disappearance of memorabilia often has a strong impact on residents: when these objects are lost, it often reflects the erasure of memories. This is particularly the case for photos whose losses are often mentioned by people who have suffered damage (Langumier, 2008).

After a flood, daily life remains marked by the disaster, and the risk of a return flood scares residents, even when, according to authorities and the media, there has been a "return to normal" (Langumier, 2008). Certain mechanisms enable some residents to 'forget' the floods that have occurred, while others remain vigilant, even years after the flood they have experienced (Langumier, 2008; Levasseur, 2010). This vigilance is often a discreet, individual, and continuous practice: disaster victims watch the level of the river closely and often talk about the stress caused by rain that falls a little too long (Levasseur 2010; Langumier, 2008; Tapsell and Tunstall, 2008).

It is important to understand the information that circulates about floods to have an insight into the residents' points of view. This information can take different forms: anecdotes told to a neighbour, regulatory information distributed by leaflets, flood statistics visible on a website, flood markers on walls, etc. (Durand & Richard-Ferroudji, 2016). The memory of a flood is a social and collective construction of remembrance. It is seen as a material heritage to be passed on (David, 2018) and a visual analysis can enable geographers to understand how the memory of the flood is preserved, neglected, or purposely destroyed. In the aftermath of a flood, re-establishing a peaceful relationship between residents and the river is often necessary (David, 2018). The treatment of the riverbed and embankments helps to make the proximity of the water soothing. The aim is to take away the immediate memory of the area after the flood, which often appears desolate to residents. However, for prevention reasons, it may be preferable for the memory of the flood to not disappear fully. For example, the installation of a flood marker inscribes the flood in the memory by also inscribing it discreetly physically in space (David, 2018).

3.2. Risk perception and feeling of safety

Lechowska (2018) highlights that certain regularities exist between three poles (i.e., worry, awareness and preparedness) which can help to understand risk perception. Empirically, worry and awareness are often linked to a stronger perception of flood risk, whereas preparedness is not really correlated to it in the same way as these first two concepts (Lechowska, 2018). Many authors note that it is difficult to draw firm conclusions about risk perception that are valid in all cases, as many factors influence it (Lechowska, 2018; Verlynde, 2018). Furthermore, a fundamental question regarding this issue is "how safe is safe enough?": Starr (1969) shows that the acceptance of risk by individuals is not based solely on technical factors but also very largely on subjective elements. It is not the actual objectivity of the hazard as such that explains why an area is perceived to be at risk or not, but rather social, cultural, and individual factors, which can lead to a lack of awareness or knowledge of the risk, for example. Risk perception has an impact on people's vulnerability since a population's resilience depends in part on its perception of risk (Agrawal et al., 2020). Studying people's perceptions of risk is a central element of human geography. These are people's realities: therefore, they are all legitimate and of interest to geographers since they explain people's preferences, fears, and choices (Verlynde, 2018). To analyse them, geographers must start from the present and the field but can also look to the past to better understand the importance of phenomena that may have had an impact on the lives of certain populations.

For example, personal experience of risk is one of the factors that have a major influence on the perception of risk and on the behaviours that an individual may subsequently adopt (Verlynde, 2018). Siegrist & Gutscher (2006) show that the main factor in perceived flood risk is linked to personal experience of a disaster. Individuals who are victims of a natural disaster are less likely to consider themselves to be less vulnerable than others (Verlynde, 2018). The greater the personal experience, the greater the perceived risk afterwards (Siegrist & Gutscher, 2006, Verlynde, 2018). Personal experience can take several forms (e.g., voluntary or involuntary experiences, experience of damage, direct or indirect). A strong involuntary direct experience usually induces the perception of risk as uncontrollable and unfamiliar, for example. Studies indicate that experiences that are both direct (i.e., the individual has been personally affected by a hazard) and indirect (i.e., the flood has been experienced by a close relative, friend, or neighbour) are positively correlated with risk perception (Verlynde, 2018, Weinstein, 1989). The extent of the damage suffered also plays a role in risk perception: the more intense the personal experience of risk, the greater the perceptions of risk (Weinstein, 1989). The variable of time can be a determining factor: the longer it has been since a flood, the lower the perception of risk. The memory of a hazard tends to fade over time, and this happens even more quickly if the memory is not maintained. However,

empirical results concerning the influence of flood experiences on the perception of flood risk are not entirely consistent (Verlynde, 2018): for example, Bernardo (2014) shows that having experienced a disaster can reduce the perception of the risk of the occurrence of other events. Having experienced a disaster would lead people to believe that there is less chance of experiencing a second one. It is therefore not necessarily obvious to conclude that the experience of a flood necessarily leads to an increase in the perception of risk.

Many other factors influence the perception of risk and the feeling of safety. For example, a resident's feeling of safety must be correlated with his or her attachment to the place. However, this correlation is not entirely clear either: an individual's attachment to a place gives him a feeling of safety, but this attachment can also result from the fact that this individual feels safe in that place (Bernardo, 2014). This correlation remains relatively complex. Gender also influences risk perception, although the results are not always consistent either: women tend to perceive risks as greater. Women also report being more traumatised by flooding than men and are more likely to have a lower feeling of safety because of this perceived trauma (Akerkar & Fordham, 2017; Haney & Gray-Scholz, 2020). Therefore, not everyone reacts in the same way to flooding and there are different manifestations of behavioural responses. Besides gender, personal experiences and place attachment, other factors influence the risk perception and level of anxiety (e.g., the accumulation of stressors, the perceived and received social support) (Carroll et al., 2009).

3.3. Liveability in a flood-resilient neighbourhood

Flooding alters how a neighbourhood operates for varying lengths of time. In a flood-resilient neighbourhood, this period is anticipated when the neighbourhood is designed. But it is sometimes difficult to articulate these two very different moments - life with and without flooding - in the design of the neighbourhood (Rode & Gralepois, 2017). However, adaptive resilience elements can offer opportunities to link climate change adaptation strategies with other urban needs, such as improving urban liveability (Danenberg, 2021). Resilient urban planning often leads to the presence of many green spaces or recreational areas (e.g., parks). These green spaces can improve the quality of life of the neighbourhood's residents, the aesthetic quality of urban spaces, and provide meeting places for city dwellers, which are essential for the societal well-being of a city (Silva & Costa, 2018, Gómez-Baggethun et al., 2013). Some cities, such as Malmö, Portland, and Copenhagen, are often held up as examples in the face of this issue, as they are said to combine the hydraulic constraint with quality public spaces (Mendez, 2014).

Rode and Gralepois (2017) note that urban resilience is often approached in studies from a socio-technical angle. A whole range of hydrographic studies focus on the techniques that best enable cities and people to withstand flooding. Technical resilience is studied quantitatively, with the need to assess its performance and often by putting aside the urban character of the site or its day-to-day qualities. Therefore, more studies should consider a neighbourhood both from the point of view of flood prevention and in terms of quality of life. There is a risk in thinking only in terms of a technical response at the building level. For instance, Rode and Gralepois (2017) highlighted that a disconnection between the buildings and the streets is a difficulty faced in several flood-resilient neighbourhoods: flood-resilient design sometimes results in less accessible streets, since ramps, staircases and raised walkways do not allow access for everyone daily. Streets are also less lively with fewer shops since ground floors are often not occupied. Cars are also more prevalent (Rode & Gralepois, 2017).

CEPRI (2015) notes that the fact that a dwelling is visibly adapted to the risk of flooding induces a certain psychological pressure on some residents, by constantly reminding them of the presence of the risk. This psychological pressure created by the presence of risk inscribed in the resilient design could therefore have a counterproductive effect on the psychological health of residents, if one of the aims of this type of urban planning is to reduce the psychological vulnerability of people living in flood-prone areas. However, it is also necessary for resilience to include a strong emphasis on informing and educating people (Odiase, et al., 2020). A multi-dimensional resilience is hardly achieved if the population does not know what to do in the event of flooding and is not prepared. There are reasons to wonder whether urban planning can play a role in providing information about the risk or not: special flood-resilient design could lead the residents to question the risk they might face and encourage them to seek information (Dournel et al., 2015). Therefore, resilient urban planning could increase the psychological pressure felt by some residents but also enable them to be better informed,

better prepared, and therefore more resilient. Thus, this could even lead to reassure themselves about the risk. However, as stated in 3.A. and B., the relationships between awareness, worry and preparedness are complex. It is therefore not easy to predict the links between them. Furthermore, Dournel, et al. (2015) show that urban development in flood-prone areas tends to ignore the importance of innovative communication about risks.

4. Relevance and significance

River floods are likely to increase in France as a result of climate change and cause severe damage to many French towns since a lot of them are located in flood-prone areas. However, studies must not consider resilient neighbourhoods solely from a technical perspective. The notions of habitability and liveability need to be considered. According to French geographer Magali Reghezza-Zitt, they are both too often neglected when it comes to so-called "resilient" French neighbourhoods². One question often asked in papers is why people stay when they know they are at risk (e.g., Gren & Helander, 2017).

This thesis will question whether the fact that the neighbourhood is said to be 'resilient' makes people feel safer, or whether this adaptation, on the contrary, frightens them. It will also seek to discover whether the special characteristics of the neighbourhood that come from its resilience allow people to become attached to it. Research findings about risk perception are not unanimous. However, it would be interesting to know what residents think and feel about living in a flood-resilient neighbourhood, where urban design can remind them of risk daily. This thesis will therefore explore the links between resilience through urban design and liveability. This seems more important given that many people in France live in flood-prone areas. Local authorities are often under pressure to build more without doing so in flood-prone areas (and so this often means densifying the various neighbourhoods): being able to develop urbanisation in flood-prone areas is an issue for many French towns. Comparing two neighbourhoods built in flood-prone areas – one with flood-resilient design, the other without – will help to assess what flood resilience through urban design can mean for people. As those two neighbourhoods were flooded in 2016, this thesis will be able to have an insight into what “living with flooding” can mean, both during and after a flood. According to the IPCC (Grafakos et al., 2018), there is a lack of empirical studies on the question of neighbourhoods adapted to the risk of flooding. Most research is rather theoretical. Hanna & Comin (2021) highlight that various studies on urban green infrastructures and sustainable development often employ a quantitative approach, which enables them to provide data on measured variables more convincingly. However, this may also mean that certain aspects are not necessarily studied in-depth about these subjects, and the article notes that "it is also recommended to increase research relating to UGI characteristics and people's perception" (p.9).

² Magali Reghezza-Zitt, in the conference “*Architecture, climat et paysage. Le climat change... comment changer nos villes*” of the Académie des Beaux-Arts on the 22nd of June 2022. <https://www.youtube.com/watch?v=LecDS9dTCJc>

Chapter 2: Methodology

The subject of this study focuses on the experiences and perceptions about living in a neighbourhood built to be resilient to flooding and yet exposed to it. "Resilience" refers to this new approach of planning based on the idea of 'living with flooding'. Several case studies could be used to analyse this subject. However, the specificity of Romorantin's case study lies in the fact that the Matra resilient neighbourhood experienced a major flood in 2016. Therefore, it is possible to assess what 'living with flooding' might have meant, and the consequences it had for the neighbourhood's residents. To get a clearer idea of the specifics of a 'living with flooding' design approach, it is necessary to compare this neighbourhood with one that was also exposed to the flood, but which did not have an adapted design. The methodology of this study is therefore based on a case study that requires a comparative analysis.

1. A case study methodology

A case study is indeed a research methodology (Taylor & Healy, 2023). Generally, the case study methods focus on a relatively small geographical area, with a limited number of individuals, and enable the researcher to understand behavioural conditions through the perspective of the actors (Zainal, 2007). It therefore relies heavily on access to residents' perceptions, which is at the heart of this study's research question. Case studies can provide an answer to a 'how' question (Baxter & Jack, 2008). "How" questions are exploratory in nature (Teegavarapu, et al., 2008; Schell, 1992), and the aim here is indeed to investigate the consequences of the 2016 flooding on Romorantin's neighbourhoods. Case study methodology enables in-depth and multi-faceted explorations of complex issues, events, or contemporary phenomena through contextual analysis (Zainal, 2007; Yin, 2014; Crowe et al., 2011; Creswell, 2003; Schell, 1992). Since case studies are in-depth, they make it possible to observe details (Teegavarapu, et al., 2008).

Different classifications of case studies exist (Crowe et al., 2011). The case study presented in this thesis could be described as "selective", which "focus on a particular issue [...] with the objective of refining knowledge in a particular area, to provide a better understanding of causal processes" (Schell, 1992). This case study could also be considered as a single case study since it concerns how the 2016 flood affected the town of Romorantin-Lanthenay. A single case study is a relevant method when the case deserves to be thoroughly documented and analysed. However, this case study is also based on the tool of comparison, since it involves asking how the 2016 flood was experienced in two different neighbourhoods of Romorantin. The assumption is that the specific characteristics of these neighbourhoods meant different experiences of the 2016 flood. This comparison should help to make hypotheses about the characteristics specific to life in a resilient neighbourhood. Pierre (2005, p.449) explains that comparison is the "most rewarding research strategy [...] for uncovering causal patterns of explanations" (also quoted in Krehl & Weck, 2020).

2. Data collection and analysis

The case study allows the researcher to gain a deep insight into a case because it requires gathering data from a wide variety of sources (Crowe et al., 2011; Schell, 1992; Yin 2014; Taylor & Healy, 2023). Data triangulation is important to make a case study more reliable and consistent and strengthens the validity of the research findings (Taylor & Healy, 2023). Data triangulation involves comparing data gathered from different methods and comparing them (Taylor & Healy, 2023).

For this research, qualitative methods were used for data collection, as they are the primary choice when conducting a case study (Ridder, 2017). Qualitative research enables access to a high level of detail about a place and its individuals through the analysis of participants' experiences (Creswell, 2003). Data triangulation is used to ensure greater reliability of this study. The data comes from a combination of semi-structured

interviews, a small survey, field observation, literature review, and analysis of media, official documents, and archives.

2.1. Semi-structured interviews: Semi-structured interviews make it possible to obtain primary data that responds to the main points that the researcher wants to study, but also leave room for the interviewees to speak more freely about what they feel is important (Taylor & Healy, 2023). This seems particularly important in the case of research about flood memories: the gaps in the residents' stories, the order in which the information appears, and the emphasis placed on one subject rather than another could be open to interpretation.

For this research, 21 semi-structured interviews have been conducted, of various lengths and interests. The interviewees were interviewed in or near their neighbourhoods. 10 were Matra residents (or relatives of Matra residents in one case). 9 were residents of Le Bourgeau. The remaining interviews were conducted with 3 residents of other areas of Romorantin-Lanthenay, the President of the '*Syndicat de la Sauldre*'³, the *Communauté de Commune's France Rénov* advisor⁴, the tourist office, the town planning department, and the secretariat of the Conservatoire of Romorantin-Lanthenay. Interviewees were notified of the research aims and goals. Except for a few cases, the testimonies were completely anonymised. The residents will therefore be referred to by codes (e.g., MI1 or BI2): "MI" means "Matra interviewee" and "BI" means "Le Bourgeau interviewee". One of the interviewees (BI4) agreed to be identified as Le Saint Jean restaurant's owner in Le Bourgeau. An overview of the residents' main characteristics can be found in Table 1. The interviews were audio-recorded and, in some cases, simply noted down. When audio-recorded, they were transcribed and analysed in French. The transcripts were thematically coded by hand, using themes and colours. Only the parts selected as significant for the results were translated. Furthermore, these semi-structured interviews sometimes allowed more questions to be asked than answered: the residents offered sometimes inconsistent or conflicting accounts, which is often the case in qualitative research (Schell, 1992). However, these can deliver elements deserving further questioning (Taylor & Healy, 2023).

2.2. Small survey: A small questionnaire was used to assess the relationship between residents' self-proclaimed feeling of security and their subscriptions to a certain type of insurance. The questionnaire was produced using Google Forms and sent to residents of Romorantin-Lanthenay via a Facebook group ("Tu sais que tu viens de Romorantin quand"), ensuring the complete anonymity of the responses obtained. A limited number of questions have been chosen to ensure a greater number of responses. Residents were asked 3 compulsory questions and one optional question. The first question was of single choice type: "I am: renting a flat in Le Bourgeau (LB) / owning a flat in LB / a shopkeeper in LB / renting a flat in Matra / owning a flat in Matra / living elsewhere in Romorantin". Participants were asked to tick one of these options. Residents who answered "I am living elsewhere in Romorantin" were thanked for their participation at this stage. The second question was also of single-choice type: "I have insured my accommodation with: assurance habitation simple / assurance habitation multirisques / other". In France, tenants are obliged to take out a minimum home insurance policy, but landlords are not. Multi-risk home insurance provides additional cover for the home, including furniture, clothing, valuables, etc. However, if the government recognises a natural disaster, home insurance policies are obliged to cover the damage caused by this event, even if the insurance policies did not specifically provide this cover - and were not multi-risk, for example (article L 125-1 of the French Code des Assurances). The third question was of the "linear scale" type: "On a scale from 1 to 5, I am scared about flooding...". Finally, an optional open question asked residents about the reasons for their anxiety or lack of anxiety. Respondents were then thanked for their answers. 31 people took part in the questionnaire, including 10 who lived elsewhere in Romorantin and therefore did not answer questions 2, 3 and 4. The full results of the questionnaire can be found in the annexe.

2.3. Field observation: Field observation in a case study is an essential part of the methods (Taylor & Healy, 2023). As this study is about a contemporary situation and was not significantly documented, it relies

³ The *Syndicat d'Aménagement du Bassin de la Sauldre* is a key actor for the management of the river. It leads several projects which aim to improving the river management and the ecosystem protection.

⁴ A *communauté de communes* is a federation of municipalities. *France Rénov* is the public service for housing renovation.

heavily on observation in the study area. This field observation was carried out during the week of the 1st of May 2023. Notes were taken about both neighbourhoods and their amenities and specific features. Taking photographs enabled a more visual comparison of both neighbourhoods, as well as a comparison of changes over time, thanks to the analysis of older photos of the neighbourhoods using Google Maps and its "street view" function.

2.4. Documents analysis: Various documents were analysed throughout the writing of this research: official documents from the government (e.g., PPRI), from local authorities (e.g., OPAH RU agreement), archive documents, the press, social media, etc. The archive documents were obtained by contacting the archives of the town. The press analysed were mainly local newspapers (e.g., La Nouvelle République, Le Petit Solognot, Le Berry républicain, Magcentre.fr). In particular, La Nouvelle République gave extensive coverage of the events regarding the flooding and the post-flood situation. Other national newspapers were also quoted (e.g., L'Express, Libération). National and local television programmes were also viewed (e.g., France 3 Centre-Val de Loire, TF1).

Table 1 – Interviewees’ main characteristics

Interviewees Matra	Age	Gender	Relationship to the neighbourhood	Additional information
MI1	30s	Woman	Moved to the <i>Bateau-lavoir</i> 4 years ago	Has a husband and two children (one is a baby).
MI2 & MI3	70s	Women	Moved to the <i>Bateau-lavoir</i> in 2018.	They are neighbours but were interviewed together. MI2 was more talkative. MI2 had a mother who was living in Le Bourgeau during the flood. Locals. Lives alone.
MI4	30s	Man	Lives at his brother’s place (multi-unit building). Arrived 4 months ago.	Doesn’t really speak French Not local, just arrived in the region.
MI5	80s	Man	Domitys resident.	Local.
MI6	40s	Woman	Work at Domitys. Arrived in September 2016.	
MI7	40s	Woman	Not a resident. Personal care assistant of an old woman who lives at Domitys	Local. Had a mother who lived in Le Bourgeau in her childhood.
MI8	30s	Woman	Lives in the individual houses. Moved in 2017.	
MI9	20s	Man	Moved 2 years ago in the <i>Bateau-Lavoir</i> .	Lives with his mother. Local.
MI10	30s	Woman	Lives in the <i>Bateau-Lavoir</i> . Moved a few years ago.	Not local. Has two children. Interviewed with BI9.

Interviewees Bourgeau	Age	Gender	Relationship to the neighbourhood	Additional information
BI1	80s	Man	Former resident but moved after the flood. Did not return to Le Bourgeau. Was there during the flood.	Went to the hospital during the flood. Lives at a friend’s place in Romorantin.
BI2	50s	Woman	Friend of several people that lived / are still living in Le Bourgeau.	Council representative.
BI3	40s	Woman	Lives in Le Bourgeau. Family house in the neighbourhood since before the flood. But was not there during the flood.	Local.
BI4	50s	Man	Le Saint-Jean Restaurant’s owner. Was there during the flood.	Also council representative.

BI5 & BI6	60s	Man and woman (couple)	Owner of a house in Le Bourgeau. Were there during the flood.	
BI7	70s	Woman	Was there during the flood. Social housing rent.	
BI8	60s	Woman	Was there during the flood. Owner of a flat in Le Bourgeau.	Lives on the first floor.
BI9	30s	Man	Lives in Le Bourgeau and was there during the flood.	Lives on the first floor. Interviewed with MI10

Other interviewees:

- President of the Syndicat de la Sauldre, Cédric Sabourdy (also council representative).
- Couple (man and woman) that lives in Les Favignolles (another neighbourhood of Romorantin), 40s. They were living in Romorantin during the flood and were trying to move to Le Bourgeau before the flood (in the end, they did not, and are still living in Les Favignolles now).
- France Renov advisor of the CCRM. He has had this job since 2022 but knew the area very well before.
- Urban planning department of the town hall.
- Tourist office
- Conservatory of Romorantin's secretariat.

3. Limitations

A recurrent criticism of case studies is the difficulty of generalising the findings to other cases (Schell, 1992). The limitation of case studies and qualitative comparative analyses is often that their fundamentally heuristic rather than definitive character (Knight, 2011), as they are irremediably linked to a context. Yin (2014) writes that a case study is "an empirical inquiry that investigates a contemporary phenomenon [the case] in depth and within its real-world context, especially when the boundaries between phenomenon and context may not be clearly evident" (quoted in Bartlett & Vavrus, 2017). This is even truer in human geography, since space is shaped by people and people are shaped by space: it is difficult to determine clear boundaries between an observed phenomenon (for example, a relatively low level of anxiety about the risk of flooding felt by an individual) and its context (the neighbourhood of this individual, his idiosyncrasy, etc.) (Yin, 2014; Schell, 1992). This criticism applies to this study but can also be considered in a different light: this thesis can be seen as a part of a broader field of research that could be integrated into a wider study on the questions of the habitability of flood-prone areas and the concrete consequences of living in a flood-resilient neighbourhood.

As stated in the literature (Teegavarapu, et al., 2008), case studies provide a high level of detail. The researcher realised this personally during the course of this research: when analysing the documents, it was often no longer necessary to look up the names of the streets mentioned in interviews and papers, as they were already situated on a mental map. Similarly, various articles mentioned shopkeepers in Le Bourgeau who were met during the fieldwork (for example, BI4).

However, as in all research, and especially in case studies (Schell, 1992), the researcher's position can influence the results obtained, when both conducting and analysing the interviews. For instance, the desire not to ask too direct questions in the case of trauma and to find differences between the two neighbourhoods in their relationship to the floods could have hampered the objectivity and reliability of the study. To address these biases and try to minimise their impact, the researcher first tried to reflect on the impact these biases might have on the results through recurrent self-criticism and discussion with other people. Furthermore, the semi-structured interviews may also have surprised the researcher at times (e.g., the striking accounts of BI5 & BI6 and BI7). Chapter 4 (Discussion of the results) tries to put the results obtained into perspective. Data triangulation also brings greater reliability to the research.

Other limitations may have arisen during the course of the research. For example, Matra's interviewees had never experienced the 2016 flood directly in the Matra neighbourhood, whereas most of the Bourgeau's residents had experienced the 2016 flood in the Bourgeau neighbourhood. This inevitably had an impact on the results obtained, as it implied that Matra residents knew less about what happened in 2016. Furthermore,

residents who left Matra after 2016 could not be contacted, although it would be interesting to know why they chose to leave and what their accounts of the floods are. When asked about this, the tourist office’s interviewee said that it did not know the reasons for these departures, but that they were not uncommon in the region (“things move around quite a lot”). There are probably reasons for these departures that could be described as almost structural. However, a study (Reinert, 2018) found in the town archives links some of these departures from Matra to the flooding. This suggests that a bias may be inherent in this study: the interviewees who have returned or arrived may also be the least likely to be afraid. Consequently, assessing the feeling of safety in the Matra and Le Bourgeau neighbourhoods would be biased from the outset.

To remedy this, data on the number of people living in the neighbourhoods and the rate of inward and outward migration is required. Unfortunately, the town hall indicated that the census was done only at the town level. Therefore, this study relies on other data sources (mentioned above). It must be noted that Romorantin-Lanthenay is the *sous-préfecture* of the Loir-et-Cher department, located in the administrative region of Centre-Val-de-Loire, and the capital city of the natural region of Sologne. Therefore, it is relatively powerful in the region. However, it is still a town which only has a population of 18 395 inhabitants (INSEE 2019). On the French scale, it is a rather small town, which partly explains why it might be difficult to have access to more data.

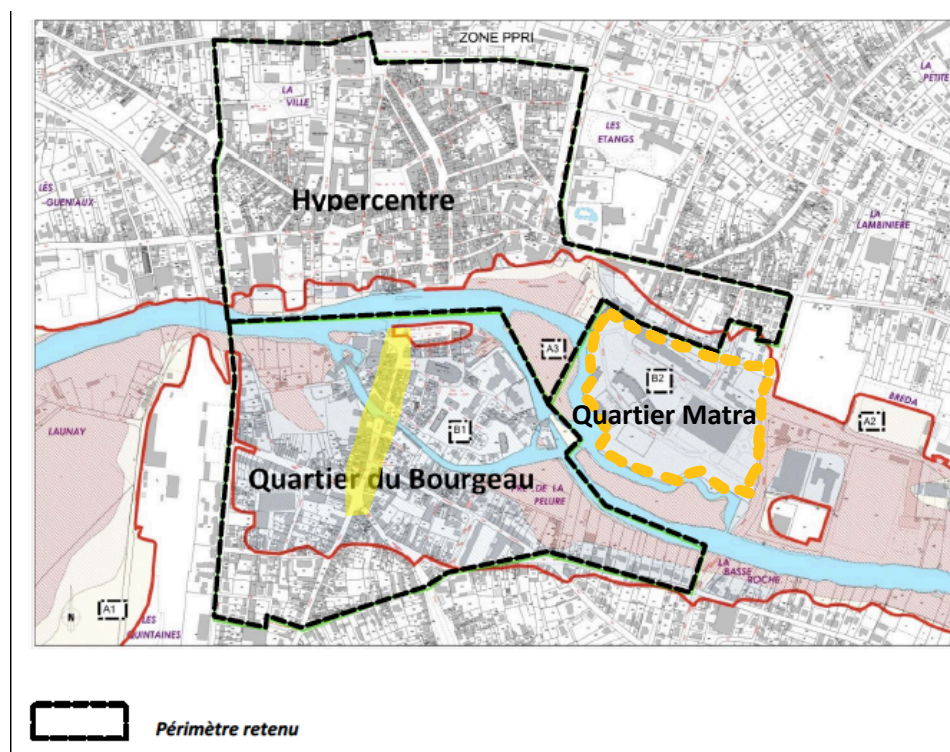


Figure 1 (source: CCRM-Ville de Romorantin, 2020): risk of flooding in *Quartier du Bourgeau* and *Quartier Matra*.

Moreover, comparing Matra and Le Bourgeau also involves certain limitations due to other differences than the resilient amenities (e.g., the neighbourhoods’ size). Furthermore, as Figure 1 shows, the two neighbourhoods do not have quite the same exposure to flood risk. They are both circled in red, which means that they are well exposed to the risk of flooding, but Matra is described as “zone B2”, whereas Le Bourgeau is mainly located in “zone B1”. This means that in the PPRI, Matra is said to be subject to more planning conditions and restrictions due to its exposure to the river.

To understand the following chapters - and since the case study method involves precise details of the neighbourhoods - it is important to know the names of two streets in Le Bourgeau, namely *Rue des Trois Rois* and *Rue du Président Wilson*, where most of the shops are located (in yellow on Figure 1). It is also useful to have a rough idea of what makes up the Matra neighbourhood (Figure 2).

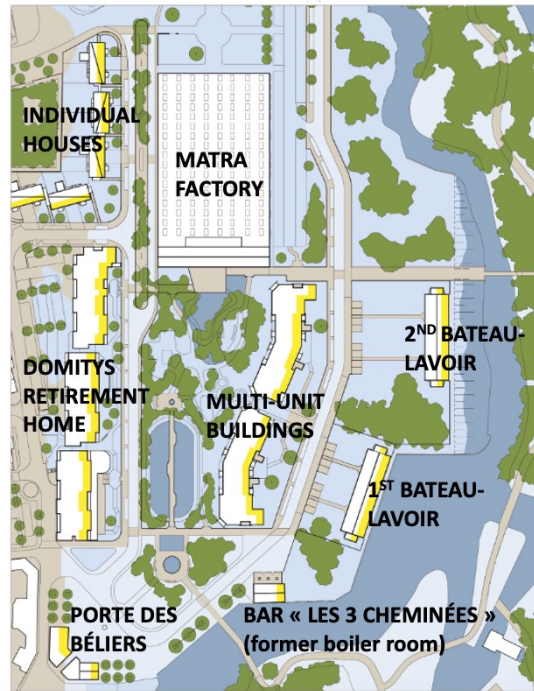


Figure 2 (source: Bonnefond, 2018): the Matra's neighbourhood. Captioned by me.

The entrance to the neighbourhood is symbolised by the "Porte des Béliers", an ancient building that forms a sort of triumphal arch. On the right is the former boiler room of the Matra factories, a building with three chimneys, which now houses a bar ("*Les Trois Cheminées*"). Also along the river are the houses known as "Bateau-Lavoir". To the left of the door is the Domitys retirement home, and further along are several individual houses. At the heart of the neighbourhood, framed by the *Bateau-Lavoir* and Domitys, are the park, a multi-unit building and the former Matra factory, which now houses an exhibition space and the Conservatoire of Romorantin.

Chapter 3: Results

1. Significant differences between the flooding in Matra and Le Bourgeau: facts and memories

Both neighbourhoods experienced the 2016 flood with significant differences in terms of damage and impact on residents. This is reflected in the facts themselves, as set out in various documents (newspaper articles, scientific papers, official town reports, etc.), but also in the memories of the flood that remain 7 years on.

1.1. How the flooding unfolded in both neighbourhoods

The flooding began on the night of the 31st of May 2016. In Matra, it was 45 cm higher than the flood of 1910, which was the reference flood (Daniel-Lacombe, 2023a; Vincendon, 27/06/2016). In retrospect, the 2016 flood has been described as a 1000-year flood (Daniel-Lacombe, 2019) and exceeded all forecasts (Barroca & Pacteau, 2018).

"In the Matra's neighbourhood, the water stayed for twenty-four hours, then receded, and caused zero damage. In the neighbourhood opposite [namely Le Bourgeau], the water stayed for three weeks. That's why I prefer to talk about "high tides" rather than disasters. [...] We must learn to live with this phenomenon" (Matra's architect Eric Daniel-Lacombe in Raymond (05/09/2021)).

Eric Daniel-Lacombe highlights the fundamental human dimension of a flood, which can be simply a "high tide" if people either learn not to settle in flood-prone areas or to build resilient cities. Building resilience in Matra is based on two essential elements: residents must be able to see the water rising and decide whether they want to stay or leave their homes (calm evacuation), and residential interiors must not be flooded (little damage). In this respect, Matra was supposedly more resilient than Le Bourgeau. However, based on the information at hand, no studies have deeply compared the flood in both neighbourhoods.

In Le Bourgeau on the 31st of May, some residents evacuated, while others took measures to reduce the impact of a potential flood on the interior of their buildings: laying breezeblocks, trying to shelter equipment, etc. (Veillé, 08/06/2021). No one had yet foreseen the extent of the flooding to come. Most of the evacuations took place during the night and on the morning of the 1st of June 2016 (Veillé, 08/06/2021). More than 500 residents were evacuated by the fire brigade and gendarmes in Romorantin, mainly in Le Bourgeau (Capitaine, 01/06/2016). Many residents were accommodated in hotels reserved by the town hall or in gymnasiums requisitioned to take in disaster victims (Veillé, 08/06/2021; Simon, 03/06/2016; Mairie de Romorantin, 2016). Several articles highlight the solidarity that developed during and after the flooding, between residents of Le Bourgeau and other Romorantin residents, and between Le Bourgeau residents themselves and Le Bourgeau shopkeepers⁵ (Texier, 07/07/2017; Couturier, 23/10/2016; Texier, 01/06/2017; Capitaine, 01/06/2016).



Figures 3-5 (source: Facebook of the Boulangerie Contrepois, 05/06/2016): on the left, reddish water because of fuel oil spillage. In Figure 4 (middle), the bags of flour that the bakers and firefighters had tried to protect spilled into the water (Veillé, 08/06/2021). In Figure 5, the force of the water toppled everything inside the bakery.

⁵ For example, several shopkeepers are inviting the residents to visit the shops of their colleagues who have reopened. A Facebook post from the Boulangerie Contrepois on the 23rd of June 2017, for instance, states: "It will soon be a week since "Le Saint Jean" - a hotel-bar-restaurant in Le Bourgeau - reopened its doors... The place is really amazing. [...] »

An example of an almost day-by-day account of the flooding can be found on the Facebook profile of Le Bourgeau's Boulangerie Contrepois. Numerous photos accompany the bakery's posts, providing an insight into the extent of the flooding and its impact on the interior of the buildings (a "carnage"). All their equipment was unusable, and they had to redo all the walls and ceilings. In July, September and October, new Facebook posts continued to provide news of the progress of the work at the bakery, which will have cost them €240,000. They said in a press article "of course, we've been partly supported by insurance, but we're still restarting on a new 7-year loan" (Rencien, 04/01/2017). The reopening of the bakery was announced for 2 January 2017, more than 7 months after the flood.

Le Bourgeau has been described as the area of Romorantin worst affected by flooding (*La Nouvelle République* (LNR), 11/10/2016; Monhoven, 2016). When the 2016 President of the French Republic, François Hollande, visited Romorantin on the 4th of June, he visited the town hall and Le Bourgeau, a gesture described as symbolic (Pavillon & Oger, 05/06/2016; Monhoven, 04/06/2016; Oger, 05/06/2016; AFP, 04/06/2016). Le Bourgeau was an obvious choice for the President to appreciate the extent of the damage (Monhoven, 04/06/2016). The President announced that the French Council of Ministers would recognise the state of natural disaster, so that those affected could be compensated (Monhoven, 04/06/2016). In Le Bourgeau, many articles highlight that getting back into the homes seemed to be a difficult step, as it meant discovering the damage caused by the water, and often living in a house in poor condition while the work was being carried out (Texier, 01/06/2017, 14/06/2016, 12/01/2017). For many, the electricity, walls, and floors had to be redone (Couturier, 28/06/2016).

On the other hand, in Matra, the waters receded without causing any major damage to pavements, electricity networks or trees and bushes. Overall, residential floors were not damaged and living areas were not flooded. On Saturday morning, residents, firefighters, town services and caretakers cleaned up the muddy areas of the neighbourhood, repaired some fences and removed fragments that had accumulated there (Daniel-Lacombe, 2023a; Daniel-Lacombe & Paquot, 2016; Renard, 01/03/2021; Rode & Gralepois, 2017; Vincendon, 27/06/2016). Five days after the flood started, the neighbourhood had almost regained its usual landscape (Rode & Gralepois, 2017).

Therefore, it seems that accepting flooding and integrating risk as a key parameter of urban design could help to make real progress in the capacity of cities and towns and their inhabitants to cope with a flood, minimising damage and recovery time, and maybe trauma for inhabitants (Rode & Gralepois, 2017). Is the "living with flooding" approach still helping Matra today, 7 years later, to avoid the repercussions of the 2016 flood?

1.2. Residents' memories seven years after

All the people interviewed in Matra did not experience the 2016 flood directly as residents of Matra. Some have heard about it through acquaintances of various levels of proximity (friends, neighbours, etc.), or have been able to partly follow how the flooding had unfolded in 2016 as residents of the town - and not of the neighbourhood. For the most part, they have a good knowledge of the events of the flood. The memories that they carry can take various forms depending on what may have marked them in the stories they heard, the situations they witnessed or the photos they saw. Most of the residents also carry a more general memory of the 2016 floods that includes the rest of the town. They are particularly inclined to talk rather lengthily about the events that took place in Le Bourgeau. On the contrary, the residents of Le Bourgeau, whether they experienced the flood or not, do not talk much about the events that took place in Matra (Table 2).

1.2.1 Residents tend to talk more about Le Bourgeau, less about Matra

One of the Matra's residents (MI2), for example, briefly described what she knew about the flooding in Matra: "I know that they were forced to leave during the flood", but "on the other hand, the flats weren't wrecked, they weren't damaged". By contrast, she spoke at length about what the flood had done to Le Bourgeau and struggled to find adjectives to describe the flooding in that neighbourhood ("Oh no, but it was uh... And to see such an amount of water it's uh..."). She tried to express the difference between seeing images and experiencing the flood directly: "so when you see it on TV and then experience it, it's two different things...". She finally

described as "demoralising" the fact that "people [...] lost everything" and "had to get their things out onto the pavement". She also recalled the surprise of the flood's arrival in Le Bourgeau. The differences between the two neighbourhoods are apparent in her account: in Matra, there were relatively calm evacuations, whereas in Le Bourgeau they were often carried out in haste. The inside of houses remained intact in Matra, whereas many residents of Le Bourgeau lost personal belongings since the water reached the interior of their homes.



Figures 6-7 (source: Facebook of the Contrepois Boulangerie, 05/06/2016): Le Bourgeau's streets "Rue des Trois Rois" (on the left) and "Rue du Président Wilson" (on the right) underwater.

1.2.2 Calm evacuations in Matra, flooded homes in Le Bourgeau



Figure 8 (source: LNR, Jérôme Dutac): Evacuation on boats in Le Bourgeau with the emergency services.



Figure 9 (source: Daniel-Lacombe, 2019): on the left, a resident did not evacuate from his home in Matra.

Tables 2 – Memory of the flood for Matra and Le Bourgeau residents

MI1 Living in Bateau-lavoir.	MI2&MI3 Living in Bateau-lavoir. MI2 had her mother in LB.	MI4 Living in multi-unit building	MI5 Domitys resident	MI6 Domitys employee	MI7 Personal care assistant	MI8 Living in the individual houses	MI9 Living in Bateau-lavoir.	MI10 Living in Bateau-lavoir.
Heard quite precisely from her neighbour who was (and still is) living in the Bateau-lavoir. Water stopped “a centimeter from his window”.	<ul style="list-style-type: none"> • “It was a big one” “I was ten years old when we came here, and even the oldest people have never seen the Church flooded... they’ve never seen anything like it” • “It was traumatic” • About Matra: “I know that they were forced to leave during the flood”; at Domitys too. • Talks a lot about the flooding in Le Bourgeau: “Oh no, but it was uh... And to see such an amount of water it’s uh...” 	“I don’t know the flood” but based on his knowledge of French, it is impossible to say if it means he does not know about the flood, or he did not experience it.	<ul style="list-style-type: none"> • “The [Domitys Residents] were evacuated to other Domitys because the water was reaching [...] the stairs there” (in front of the building). • “All the garages were flooded. And some people had their car flooded!” 	<ul style="list-style-type: none"> • Evacuation “as a precaution” “if there are medical issues”, because the water “did not come inside”, “it was at the stairs” 	About Le Bourgeau: Memory of previous floods. Recalled that her mother was going to school helped by the firefighters.	Has heard from friends who lived in the individual houses in Matra. “We came to see it because we have acquaintances who lived there. It was horrible.” The houses were “elevated but they had water in their living room, kitchen...”	Does not say much about the flood but knows it happened.	Has heard about the flooding in Romorain, but B19 talked about it more, since he had lived it.

BI1 Lived in LB before the flood. Present.	BI2 Council representative Not living in LB	BI3 Family house in LB. Not present but came to help her mother.	BI4 Saint-Jean owner. Present.	BI5&BI6 Living in LB. Present.	BI7 Living in LB social housing. Present.	BI8 Living in LB. Present. 1 st floor.	BI9 Lived in LB. Present. 1 st floor.
“I was living in Le Bourgeau, Rue des Trois rois. The stairs were completely [...] flooded”. “The firefighters came. Some went to a hotel; I went to the hospital”.	Someone who had to “hold her drowning car”. “Exceptional” event “it had never been that high”.	<ul style="list-style-type: none"> • Im80 of water in her family house. • “My mother, when she got up at night because the water had risen during the night of 31 May to 1 June, she had water up to here... she got out of bed, and bam, she was completely ... because she’s an elderly person, so... and she was disorientated, but it really shocked people.” • About previous floods: Went to school walking on floorboards. 	Im70 of water in his restaurant. “traumatic” “striking”	<ul style="list-style-type: none"> • Woken up at 2 am by the police “I started chopping wood to put a plank there” (BI5) • About the date of the flood in a mental calendar: “it will always be there” (BI5) • About previous flood: “I had known it [the river Sauldre] reaching behind the Church”. (BI5) 	<ul style="list-style-type: none"> • Im20 of water in her house. • “We’ve never had anything like this” • Firefighters came to wake her up at night. “And fortunately, because otherwise they would have found me drowned the next day”. 	Im80 of water in the house she had a flat in. Emergency services came to rescue her by boat.	<ul style="list-style-type: none"> • “like COVID, it was unexpected” • “it was really huge, to say the least”

MI5 & MI6 explained that the residents of the retirement home had to move to other Domitys in the region “as a precaution” (i.e., in the event of medical problems). The water reached up to the steps in front of the building. MI5 pointed out that all the garages were flooded but he did not report any other damage.

In Le Bourgeau, the evacuations were a particularly memorable event, even more because they took the residents by surprise (“like COVID, it was unexpected” said BI9). BI7 said that firefighters came to wake her up during the night: if they had not, “they would have found me drowned the next day”. The couple BI5 & BI6 said they were woken up at 2 am by the police (see also BI8 and BI2). BI3 said:

"My mother, when she got up at night because the water had risen during the night of 31 May to 1 June, she had water up to here... she got out of bed, and bam, she was completely ... because she's an elderly person, so... and she was disorientated, but it really shocked people."

Strong words were used to describe this event in Le Bourgeau: “traumatic”, “striking” (BI4), “we've never had anything like this” (BI7). Floods have been part of residents' memories for a long time because they are a regular occurrence: some, for example, recount going to school (MI7 or BI3) by boat or walking on floorboards, helped by the fire brigade. This long-term memory can be mobilised to show the importance of the 2016 flood in particular:

"I was ten years old when we came here, and even the oldest people have never seen the Church flooded... they've never seen anything like it". (MI2).

The Saint-Etienne Church is often used as a benchmark to quantify the extent of flooding (BI5 & BI6, MI7, BI7, MI2). On the national collaborative platform entitled “Repères de Crue” (“Flood Markers”), three markers (Figures 10-12) have been placed in the Church to keep track of the height of the flood in 2016:



Figure 10-12 (Source: Repères de Crue): High-water marks located at + 1.13 m on a pillar of the Church (on the left) and at + 1.07 m on the pulpit (on the right), and at + 0;85m in the Chapel (down).

Carrying the memory of previous floods, some people began to take action to protect themselves from the consequences of the floods: “I started chopping wood to put a plank there” (BI5). In many cases, however, these gestures were not enough. Conversely, one of the Matra residents (MI1) explained that for her neighbour, who had been living in Matra since the end of the redevelopment of the brownfield into a residential area, the water stopped a centimetre from his window: “it didn't flood the houses, they stayed intact”.



Figure 13 (source: Rode and Gralepois, 2017): this building of Matra remained out of the water.

1.2.3. One dissonant testimony

Only one account concerning the Matra's neighbourhood is substantially different: a current resident of Matra (MI8) (who was not a resident of Matra in 2016) states that in Matra, the houses are "elevated but [residents] had water in the living room, kitchen... the whole first floor" and that the flood "was horrible". She said she knew people who lived there at the time. She was talking about the individual houses situated on the North-East part of Matra. No other accounts corroborated this testimony.

1.2.4. Direct consequences of the flooding (Table 3)

For people who have suffered damage, returning home has often been an ordeal. Some residents said that it took them a long time to get back into their homes: one woman (BI7) who lived in social housing in Le Bourgeau had to live in another flat in Les Favignolles for two years before her flat could be rebuilt. Les Favignolles is a neighbourhood with a council housing estate built in the early 1960s, whose buildings, although of moderate height (three- or four-storey buildings), are in stark contrast to the traditional housing in Romorantin. It is further south and, although not very far from Le Bourgeau, it is a little poorer (e.g., an unemployment rate of 20% compared with 10% for the town as a whole (Vanina, 2014)).

Le Bourgeau residents whose homes were not badly affected by the flooding because they were not on the ground floor often brought the discussion back to the greater flood damage that happened to other residents (see BI8, BI9). BI3 recounted that the entire ground floor of her house, where her mother was living, was "destroyed", and that they were quite affected when they came to "collect everything". Shopkeepers on the ground floor were particularly exposed, as many of those interviewed mentioned (see MI2, BI6). BI4, manager of the restaurant Le Saint-Jean, headed up a self-help committee for shopkeepers ("*Comité des commerçants sinistrés du Bourgeau*"). He still appears to be a spokesman for the memory of the flood (BI2 advised people who want to know about the flood to go and talk to him). He explained the creation of the committee to the press as follows: "When I saw the extent of the damage, I thought that we were in a mess, so we had to get together to be stronger, to have information and speed up procedures" (Texier, 07/07/2017). He still has exhibition panels with photos at his restaurant (Figures 14-15), that are rather like the panels of the *Musée de Sologne* (Figure 16).

Table 3 – Flood consequences according to Matra and Le Bourgeau residents

M11 Living in Bateau-lavoir. "It didn't flood the houses, they stayed intact"	M12 Living in Bateau-lavoir. Had her mother in LB. About Matra: "on the other hand, the flats weren't wrecked, they weren't damaged" A TV program about the Bateau-lavoir: "they said it was a very good idea to do that for the floods and that it had been positive, so they made a second one". About LB: "demoralising" to see that "people [...] lost everything" and "had to get their things out onto the pavement" once "the dirty water [...] had receded". Shops were "closed for I don't know how long, they had to break down all the walls and redo everything, the shopkeepers had it rough too...". "It was nice to go there", whereas now "it's a disaster". "it was nice, there were lots of little shops and everything"	M15 Domitys resident "the water was reaching [...] the stairs there. All the garages were flooded. And some people had their car flooded!".	M16 Domitys employee the water "did not come inside", "it was at the stairs"
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B11 Lived in LB before the flood. Present.	B12 Council representative Not living in LB	B13 Family house in LB. Not present but came to help her mother.	B14 Saint-Jean owner. Present.	B15&B16 Living in LB. Present.	B17 Living in LB social housing. Present.	B18 Living in LB. Present. 1 st floor.	B19 Lived in LB. Present. 1 st floor.
Still living to a friend's. Never went back.	<ul style="list-style-type: none"> • "Some people moved out. I know personally people who had a wonderful house and who sold it. They did absolutely not want to stay, you know". • "But I also know a woman who came back...". • Closed shops. • "Difficult to get it [LB] a new lease of life". 	<ul style="list-style-type: none"> • Everything on the ground floor was "destroyed". • "My mother was very attached to her photos, her things, all that [...] all the family furniture, the linen, all the important papers too, except for the family record book. I was surprised because it was in a drawer with other papers and when I opened it, the ink had... I opened it and it was almost a miracle [laugh]. Well, I did put it out to dry, but er... We're in Romorantin, not Lourdes, so miracles...". • Even if housing prices have dropped, "people don't want to... they are scared in fact... they don't want to settle there?". • Closed shops 	<ul style="list-style-type: none"> • Not all shopkeepers have reopened. But some have (new pharmacy). • "it deservied" and "impoverished" the neighbourhood. • Did not reopen the rooms upstairs in his restaurant-hotel because they were too damaged by the water. 	<ul style="list-style-type: none"> • Work being done in the Church. • "the shops are closing, because they had it rough..." (B16) 	<ul style="list-style-type: none"> • Had to live two years in another neighbourhood. All her building had to be rebuilt. • Work being done in the Church. • "People that used to live in those houses there, they almost all moved out. [...] They didn't want to come back". 	<ul style="list-style-type: none"> • Lost furniture but does not include herself in those who "lost practically everything" • Work being done at the Church. "But are we going to have our pews back? God knows. Because that's no mean feat" 	<ul style="list-style-type: none"> • It "destroyed a lot of family, memories and all that" and "for my neighbours, it was a catastrophe".



Figures 14-16 (source: my own): 2 panels of the Saint-Jean restaurant's owner and of the *Musée de Sologne*

The Saint-Jean restaurant's owner explained that he had to argue with the insurance companies and had to close for more than a year because of the renovation work. He said he was insured to restore the building to its original state but did not want to put carpeting back in: the ground under the screed in his restaurant had been destroyed by water, so the screed was only holding up on the sides and would have collapsed if tiling had been laid. It had been therefore difficult to argue with the insurance companies for replacing the carpet with tiles. He also decided to change his business: before the flood, he was an antique dealer, hotelier and ran a bar. Since then, he has reopened as a restaurant and second-hand shop and not a hotel, because the upstairs rooms were too damaged by water capillary action. Therefore, the flood still has an impact on his life today.

From the accounts, it seems that the consequences of the flooding were not the same for the two neighbourhoods, in particular, because of the evacuations - calm and orderly in one case, and rather hasty and took residents by surprise in another - as well as the way in which the interiors were affected. Does this reassure the residents? Does this relatively different memory that residents have of the flood and the particular design of Matra, which is supposed to make the neighbourhood resilient, imply a different feeling of security 7 years after the flood?

2. Feeling of safety in the Matra and Le Bourgeau neighbourhoods

Overall, the design planning in Matra and its link with the memory of the 2016 floods tend to reassure the residents of Matra. M11, who heard her neighbour's account of the flood, said: "We don't think about it too much". In her opinion, the flooding was exceptional, "and it didn't come in. No, really, we feel reassured". She therefore makes a direct link between her sense of security and the fact that the buildings provided sufficient protection during the last flood. This feeling of safety comes from the impossibility of water to enter the buildings. One questionnaire respondent also said: "This is exceptional, and the buildings were effective during the last major flood". Therefore, there is a certain amount of confidence in the planned facilities of Matra, combined with what the residents have heard about how the 2016 flood affected the area.

In contrast, the residents of Le Bourgeau tend to use words that denote greater anxiety about a forthcoming flood. They explain that they think about flooding relatively often: the restaurant owner (BI4) said that thinking about it is more likely to happen around May-June, when there is a bit more rain than usual, and that flooding is still something that worries people in the neighbourhood (see also BI5, BI6, BI7). One survey respondent said, "When it rains, I stay vigilant. I keep an eye on the level of the Sauldre".

However, in the survey, the differences in feelings of safety between both neighbourhoods are not necessarily significant. Of the 7 respondents of Matra, 4 people said they felt completely safe; one person felt a degree of concern that he or she rated at 2/5 and two people at 3/5. It confirms that few people really feel worried. However, in Le Bourgeau, of the 15 people questioned, 7 said they were serene (1/5), 2 felt they were at 2/5, 4 at 3/5 and 1 at 5/5. In terms of proportions, therefore, the two neighbourhoods are not very different. However, the samples are too small to really conclude that the quantification of the feeling of safety is the same between both neighbourhoods. In addition, Le Bourgeau's neighbourhood offers more differences in housing (e.g., many buildings with flats upstairs). Living on the 1st floor has an impact on the feeling of safety (see BI8, BI9 in Table 4 and respondent 16 in Annexe). Similarly, when asked about their insurance, around half of the respondents in

Table 4 - Feeling of security of Matra and Le Bourgeau residents

<p>M11 Living in Bateau-lavoir.</p> <p>"We don't think about it [flooding] too much". "The flood was an exceptional one and it didn't come in. No, really, we feel reassured"</p>	<p>MI2&MI3 Living in Bateau-lavoir. MI2 had her mother in LB.</p> <p>• Asked whether the fact they knew the neighbourhood was prone to floods was causing them anxiety: "For me, personally, no. And you? No." • "I have my neighbour next door, and at first, she told me 'Don't you think there's going to be...?' I don't know if there'll be another one, but I said 'don't stress', because anyway, if it happens, it happens, and that's it... [...]. But it could happen again, why not..." • "everything's designed for water anyway" • In a TV program, "they said it was a very good idea to do that for the floods and that it had been positive, so they made a second one".</p>	<p>MI5 Domitys resident</p> <p>Asked if he is stressed about the flood, he said: "Well, it seems that Romorantin has done what's necessary, but the Sauldre isn't far away"</p>	<p>MI7 Personal care assistant</p> <p>The Domitys resident she takes care of "has no anxiety"</p>	<p>MI8 Living in the individual houses</p> <p>Asked whether she was worried about it, she answered, "For a start, I really hope it won't happen again... It was horrible", and then, "When it rains, it's true that we often talk about it. When it rains a lot, you wonder if it's going to happen again and all that, but... I hope not because it was horrible...".</p>	<p>MI9 Living in Bateau-lavoir</p> <p>"When it rains a lot she [his mother] says 'oh I hope we don't get flooded' and all that. She thinks about it a bit; I don't"</p>	<p>MI10 Living in Bateau-lavoir.</p> <p>"It's fine, because it was built on purpose"</p>
<p>B13 Family house in LB. Not present but came to help her mother.</p> <p>"Psychologically... there were a lot of elderly people in the area too, so it affected them a lot"</p> <p>She decided to come back because: "Ah well, it's a family home anyway, so it's out of the question... you know, people who have been through this sort of thing, they're still attached... [...]. Maybe it's stupid to get attached like that, because materialists, well, but well um... After that there's something other than the material, there's everything to do with memory and all that."</p>	<p>B14 Saint-Jean owner. Present during the flood.</p> <p>Still think about flooding a lot. Especially in May-June and when there is a bit more rain than usual. Flooding still worries people in the neighbourhood.</p>	<p>B15&B16 Living in LB. Present.</p> <p>"And supposedly a 100-year flood, but there will be many more" (B15) Asked about their anxiety: "Me anyway, if it happens to us a second time, we'll get the hell out" (B15) "Well, my husband, no... For me, it's psychologically, when it rains and it's grey, and it rains for several days, then..." (B16).</p>	<p>B17 Living in LB social housing. Present.</p> <p>"In June, we'll think about it, because it was in June". "Well, I heard that the mayor made an opening in something [...]. He arranged something to... and then I think they're going to redo the work, so it doesn't happen again"</p>	<p>B18 Living in LB. Present. 1st floor</p> <p>"Well, had I lived downstairs, I wouldn't have even come back because I would have been so scared".</p>	<p>B19 Lived in LB. Present. 1st floor.</p> <p>"I hope it won't happen again"</p>	

each neighbourhood were covered by simple home insurance (“*assurance habitation simple*”) and the other half by multi-risks home insurance (“*assurance habitation multirisques*”). In Matra, 2/4 of the residents who said they felt 1/5 unsafe chose multi-risks insurance, while the other 2 voted 3/5 to quantify their feeling of safety. In Le Bourgeau, 3/7 of the residents who took out a multi-risks’ insurance voted 1/5 in terms of feeling safe, two others voted 2/5 and the last 2 ones voted 3/5. It is therefore difficult to establish a link between taking out one type of insurance in terms of feelings of security (see Annexe). However, this survey is too small to be representative and does not mean much on its own, because the situations of its respondents are not known.

3. Matra: a “purpose-built” neighbourhood, with various facilities.

Although the two neighbourhoods are located just a few metres apart, both in flood-prone areas on the banks of the Sauldre, they did not experience the floods with the same intensity. If the interiors of the homes in Matra have remained "intact" (MI1), this is largely due to the neighbourhood’s design: the district was built for flooding (MI10, MI7, MI2).

This is indeed true, as the architect of Matra, Eric Daniel-Lacombe, designed the plans for the current Matra’s neighbourhood in accordance with the risk of flooding. According to the PPRI, the French State foresaw a flood of 1.2 metres, to which 30 centimetres had to be added as a precaution (Raymond, 05/09/2021; Daniel-Lacombe, 2023). In 2008, flooding became the common thread of the project and all the urban design was carried out depending on the flood risk parameter (Bonfond, 2018; Rode & Gralepois, 2017). According to Eric Daniel-Lacombe, building a flood-resilient neighbourhood also had to consider visual and sensitive warnings and not simply physical protection: “flooding is also a spectacle of nature”, so it was important to make “the risks visible” in the design as well (Daniel-Lacombe, 2019; Texier, 26/04/2018). This was even truer since the residents were not included in the thinking about the neighbourhood’s design: the architect wanted to integrate the residents differently, by developing a design that would make it possible to think about the risk of flooding. Therefore, observing the neighbourhood should help determine to what extent certain features are evocative of the presence of water and the possibility of flooding.

Table 5 – Matra specificities according to Matra residents.

MI1 Living in <i>Bateau-lavoir</i> .	MI2&MI3 Living in <i>Bateau-lavoir</i> .	MI7 Personal care assistant	MI8 Living in the individual houses	MI9 Living in <i>Bateau-lavoir</i> .	MI10 Living in <i>Bateau-lavoir</i> .
Stilts Access to the garden a bit more difficult (need to “go round”), “so, we know we are a bit different from others”.	Stilts “Height of the pavements” Garden on a downward slope "so that it [water] doesn't go" in the rest of the neighbourhood.	Stilts Everything was designed “for” water.	Stilts	Stilts Asked about the neighbourhood being flood-resilient, he said: “I don’t really know, to be honest. “But for a start, I know that the houses are a bit on stilts, so hum... I think there’s that, for a start”.	Stilts Elevation The street had “been built so that the water flows downwards and doesn't stay there”

3.1. Bateau-Lavoir



Figures 17-18 (source: Daniel-Lacombe, 2019): the *bateau-lavoir* during the flood (on the left) and after the flood (on the right)

The residents questioned on the issue of flood-related facilities specific to their neighbourhoods highlighted various examples, but almost always the use of stilts (MI1, MI2, MI7, MI8, MI9, MI10, see Table 5). The Matra's neighbourhood has indeed several buildings on stilts. For example, the houses closest to the river known as "*bateau-lavoir*" ("floating wash-houses") are built on stilts to allow the water to pass under them (Figures 17-18).



Figure 19 (source: Observatoire CAUE, <https://www.caue-observatoire.fr/ouvrage/le-bateau-lavoir/>)

The gardens are laid out on a downward slope, "so that it [water] doesn't go" in the rest of the neighbourhood (MI2) when flooding is not too severe. As can be seen in Figure 19, there is a raised passageway to access the flat door, but there is no direct access between the building and the garden. The entrance to the garden is at the highest level of the garden slope, where the garden ground rises to meet the street. Part of the garden is therefore relatively flat, but the closer it gets to the street, the steeper the slope becomes. The residents do not mention it, but the shapes of these houses are reminiscent of the buildings they are named after (the "*bateau-lavoir*"). A *bateau-lavoir* (Figure 20) was moored on the quay opposite the Matra's neighbourhood (Lenouvel, 2020). Calling the Matra's building a "*bateau-lavoir*" suggests a house that will float and resist the movements of water. Both the structure and the cladding used for the building are in metal but seem reminiscent of the wooden structure often used to build fishermen's huts (Figure 21) and floating houses (Figure 22).



Figure 20 (source: Cartes Postales in Cercle de recherches généalogiques du Perche-Gouët) : photographic archive of the Romorantin's *bateau-lavoir*



Figures 21-22: examples of fishermen's huts (source: « *Les Cabanes à Carrelet du littoral Charentais* », article of peche.com), with horizontal cladding, similar to the one of the Matra's *bateau-lavoir*, and floating houses (source: Stocklib.)

3.2. Individual houses



Figure 23 (source: my own): the garden of an individual house



Figures 24-25 (source: my own)

As MI8 notes, the five detached houses on the other side of Matra are also elevated. This elevation seems to be appropriated by residents, who installed for instance a swing on the balcony staircase leading to their garden (Figure 23). Access to the entrances is via footbridges, which cross or run alongside the private gardens of each house. As can be seen in Figures 24-25, the garden edging is relatively high. The edging can act to signal the private nature of these gardens and appears as a barrier to prevent passage from the outside. In

places, however, it can also seem as if the edging is used to hold back water, which, in times of flooding, would form a pond in the gardens. Therefore, in a way, they also act as barriers protecting the streets. On observation, this border seems to prove the architect right when he says that: "The rising waters impose themselves on people's imagination" (Eric Daniel-Lacombe in Daniel-Lacombe & Paquot (2016)). The hypothesis that these borders can form a basin seems to be supported by the plan provided by Rode and Gralepois (2017) (Figure 26), even if there is no mention of it in the diverse articles in the bibliography.

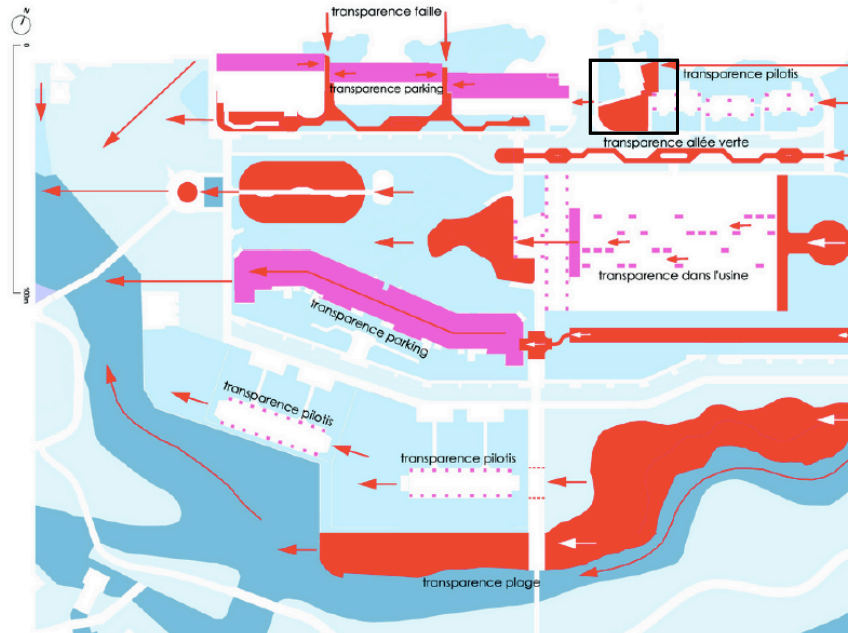


Figure 26 (source: Rode and Gralepois, 2017): *transparence hydraulique*. The arrows show the direction of flood flow. In red, the areas designed to contain water during flooding and slow down the flow of water. The rectangle indicates the pond that might be formed by the edging (added by me).

3.3. Raised walkways everywhere

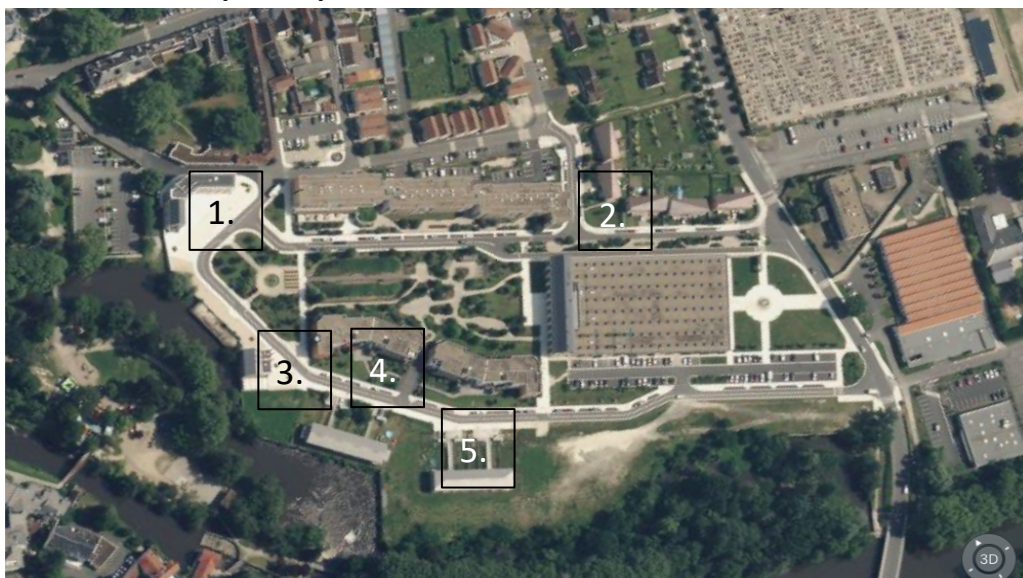


Figure 27 (source: Google Maps): 1. *Porte des Béliers* (Figure 28) ; 2. Individual houses (Figures 24-25) ; 3. the Matra's bar « *Les trois cheminées* » (Figure 29) ; 4. Block of flats (Figure 30) ; 5. *Bateau-lavoir* (Figure 19)



Figures 28-30 (source: my own)

The raised walkways that can be observed in Figures 28-29 can actually be found in all the dwellings and therefore in all parts of the neighbourhood (Figure 30). They are not really mentioned by the interviewees, but they probably contribute to giving the impression that the neighbourhood is laid out in a special, elevated way.

3.4. Pavements



Figures 31-32 (source: my own): difference in the pavement's height between Matra and the neighbourhood on the other side of the road. The Matra's pavements are specific and unify the whole neighbourhood. On the right, detail of the pavement in front of the retirement home

Another element identified by residents is the "height of the pavements" (MI2). They are between 20 and 30 cm high. A councillor noted:

"Sometimes people [...] say 'the pavements are too high', but these pavements are there on purpose because they channel the water. And above all, so that you don't end up like what you see on TF1 videos or whatever, where wooden boards are put up... you can continue to walk on the pavement. [...] It's a real opportunity, people can carry on living [...] despite the flooding".



Figures 33-34: on the left (source: Vincendon, 27/06/2016), the flooded road between the Matra Factory and Domitys, the pavement stays out of the water; on the right (source: Rode and Galepois, 2017), the flooded road between the block of flats and the bateau-lavoir.

The pavement is one of the essential protection factors for residents. In 2016, the pavements remained dry for a long time (Figures 33-34), allowing residents to take their time deciding whether to stay or leave (Lenouvel, 2020; Daniel-Lacombe, 2019; Renard, 01/03/2021; Vincendon, 27/06/2016). At the peak flood stage, the water reached the balconies of the flats in the “bateau-lavoir” and was stopped just 5cm from the floors (Daniel-Lacombe, 2019; Texier, 26/04/2018). The flats remained dry. Only the lowest common areas - car parks - got wet (Daniel-Lacombe, 2019).

3.5. A “temporary river tributary”

One resident (MI10) pointed out that the street had "been built so that the water flows downwards and doesn't stay there" (Table 5). The fundamental idea behind the project is indeed to design Matra as a “temporary river tributary” (Daniel-Lacombe & Paquot, 2016; Raymond, 05/09/2021; Rode & Gralépois, 2017; Texier, 26/04/2018; Vincendon, 27/06/2016). The Sauldre can take a temporary flow bed through the neighbourhood during a flood (Perrin et al., 2017). Rather than building dykes, the neighbourhood is protected from flooding by playing with levels – cut and fill, raised buildings next to hollows –, slopes, natural receptacles, etc.



Figure 35 (source: Rode and Gralépois, 2017)

As can be seen in Figure 35, the road alignments - in parallel with the river flow - allow water to infiltrate the neighbourhood temporarily, and then slowly flow back down to the main riverbed (Barroca & Pacteau, 2018; Rode et al., 2018; Rode & Gralépois, 2017; Vincendon, 27/06/2016; Daniel-Lacombe & Paquot, 2016). It is quite easy for residents to understand that water can - and should - pass under houses on stilts during a flood, but it is probably more difficult to understand how water is supposed to occupy other spaces in the neighbourhood (e.g., car parks). For example, at Domitys, the intersection between the façade and the ground is covered by metal gratings to allow water to seep into the car park (Figures 36-37). The living areas are located slightly above ground level. Likewise, in the two apartment buildings, the car park doors (Figure 38) are designed to allow water to pass through, whether the doors are open or closed. The car park also lets water through on the sides and at the bottom thanks to wire fences (Figure 29).

Tables 6 – Liveability in Matra and Le Bourgeau

<p>M11 Living in <i>Bateau-lavoir</i>.</p>	<p>M12&M13 Living in <i>Bateau-lavoir</i>. M12 had her mother in LB.</p>	<p>M14 Living in multi-unit building</p>	<p>M15 Domitys resident</p>	<p>M16 Domitys employee</p>	<p>M17 Personal care assistant</p>	<p>M19 Living in <i>Bateau-lavoir</i>.</p>
<p>“<i>quiet</i>”, even if a bit “<i>bustier</i>” since the bar opened. “<i>pleasant</i>” Green areas. Expressively said she does not want to leave the neighbourhood even if her house will be soon too small for her family.</p>	<p>About Matra: “<i>Pleasant</i>”. “<i>They’ve done a good job of developing the neighbourhood. There is ‘les Trois cheminées [the bar]...’</i>” Green areas. About Le Bourgeau: “<i>It was nice to go there</i>”, whereas now “<i>it’s a disaster</i>”. “<i>it was nice, there were lots of little shops and everything</i>”</p>	<p>“<i>quiet</i>” “<i>calm</i>” “<i>we’re fine</i>”</p>	<p>“<i>We like it here, there’s a nice view, not a lot of traffic, it’s quiet</i>” “<i>calm</i>” “<i>pleasant</i>” “<i>we’re fine</i>” The “<i>little bar</i>” is “<i>great, with a terrace on the banks of the Sauldre, it’s really nice</i>”.</p>	<p>“<i>the neighbourhood is nice</i>”</p>	<p>“<i>very pleasant</i>”</p>	<p>“<i>one of the best neighbourhoods in Romo</i>” “<i>I like it</i>”</p>
<p>B12 Council representative Not living in LB</p>	<p>B13 Family house in LB. Not present but came to help her mother.</p>	<p>B14 Saint-Jean owner. Present.</p>	<p>B15 B16 Living in LB. Present.</p>	<p>B15&B16</p>	<p>B15&B16</p>	<p>B15 “<i>the shops are closing, because they had it rough...</i>” (B16)</p>
<p>• “<i>Difficult to get it [Le Bourgeau] a new lease of life</i>”. • Closed shops. • “<i>some people moved out</i>”</p>	<p>• “<i>misérable</i>” and “<i>lamentable</i>” • Closed shops. • “<i>I like ‘water cities’... All these cities, like Amsterdam, Bruges, Venice of course, and then lots of other smaller ones that we know less about but which have a lot of charm. And here too, there are some charming places, and on the other side of the Normant Factory, um Matra Factory that was called Normant before</i>”. • Even if housing prices have dropped, “<i>people don’t want to... they are scared in fact... they don’t want to settle there</i>”.</p>	<p>• Closed shops, but there is a pharmacy, a bakery and a butcher’s shop. • “<i>it’s deserted</i>” and “<i>impoverished</i>” the neighbourhood. • But some “<i>interesting perspectives</i>” for the neighbourhood. • Not all shopkeepers have reopened. But some have (new pharmacy).</p>	<p>“<i>the shops are closing, because they had it rough...</i>” (B16)</p>	<p>“<i>the shops are closing, because they had it rough...</i>” (B16)</p>	<p>“<i>the shops are closing, because they had it rough...</i>” (B16)</p>	<p>“<i>the shops are closing, because they had it rough...</i>” (B16)</p>
<p>Tourist office</p> <ul style="list-style-type: none"> • About LB: “<i>People will not come back, because it can happen again, so, this neighbourhood is dead now</i>”. • “<i>When tourists come here, they wonder where they are</i>”. “<i>Did you see near the Church? There are certainly a lot of shops that are closed... so people will never come back</i>”. “<i>The top of the city is growing [...] it is a bit higher so it’s not sensitive to flooding. But so, all the shops are there now</i>”. • “<i>The shops that were there, they closed and they will never open again</i>”. 	<p>Urban planning department</p> <p>About LB: “<i>Not everything has been renovated since the floods</i>” “<i>The fact that there was a flood, it disheartens people</i>”.</p> <ul style="list-style-type: none"> • The buildings in LB were already “<i>dilapidated</i>” before the flood. 	<p>France Rénov advisor</p> <ul style="list-style-type: none"> • “<i>The neighbourhood is a bit empty at the moment. But there will be some things done</i>”. “<i>A lot of shopkeepers left</i>” • Matra is “<i>nice</i>” 	<p>President of the Syndicat de la Sauldre</p> <p>Drop of the housing prices. “<i>When you say to them ‘well I’m sorry but I have to buy your building back from you for €30,000’, they reply ‘no but wait, I uh’, they tell me it’s worth €150,000, that’s a margin to overcome!</i>”</p>	<p>President of the Syndicat de la Sauldre</p>	<p>President of the Syndicat de la Sauldre</p>	<p>President of the Syndicat de la Sauldre</p>



Figure 36-37 (source: my own): metal gratings of the car park at Domitys



Figures 38-39 (source: my own): car park and wire fence at the apartment building

4. Seven years later, the physical traces and signs of the 2016 flood left in both neighbourhoods

The two neighbourhoods were and still are very different: Le Bourgeau has many more shops than Matra, which is smaller and relatively more residential. The residents' discourses about their neighbourhoods are respectively the same (see Table 6): it is difficult for residents of Le Bourgeau to talk about their neighbourhood without mentioning the fact that it suffered the flood of 2016 and is still affected by it (BI3, BI4, BI6). On the contrary, in Matra, residents tend to highlight the "pleasant", "nice", "calm" and "quiet" character of their neighbourhood (MI1, MI2, MI4, MI5, MI6, MI7), "We like it here, there's a nice view, not a lot of traffic, it's quiet" (MI5); "one of the best neighbourhoods in Romo" and "I like it" (MI9)).



Figures 40-41 (source: my own): the retention basin



Figure 42 (source: my own, taken from the Normant Factory): the central park, with pathways and benches

In Matra, many of those interviewed mentioned the green and "calm" aspects of the neighbourhood. These green spaces (Figures 40-41 and Figure 42) can be used for walks and are facilities planned both to deal with flooding and to improve the liveability of the neighbourhood. The Matra neighbourhood is very quiet, with very few cars passing through. It is therefore possible to hear the water flowing at the dam from the street near the river. In the heart of the neighbourhood, the buildings protect the park from the noise of the water: the whistles of the birds attracted by the plants of the parks can reach the ears of residents.

There are also more leisure facilities in the neighbourhood since the opening of a bar in the former boiler house after 2016: MI1 said that it had become a little "busier" since then, but that it was still very quiet. MI5 noted that this "little bar" was "great, with a terrace on the banks of the Sauldre, it's really nice".

Since the flood, work has been carried out at Matra that was not related to the consequences of the flood: the bar has opened, a new *bateau-lavoir* was constructed (Figures 43-44), and the *Porte des Béliers* was renovated (Figures 45-47).



Figures 43-44: above (source: Google Maps, October 2016); down (source: my own).



Figures 45-47: above (source: Google Maps, October 2016); down (source: my own).

Thus, it seems that the physical traces of the flood have been erased in Matra. The *Porte des Béliers* (Figures 45-47), which had not been developed before 2016, still had an element that recalled the floods in 2016: a flood marker (Figures 48-49). Symbolically, it seems that even this flood marker has been erased (Figure 50)



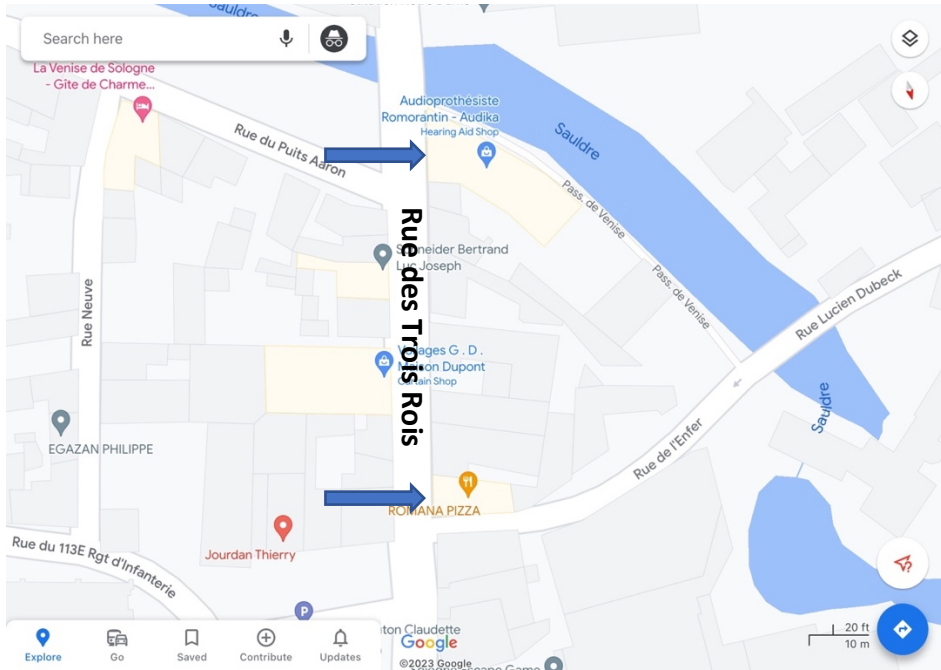
Figures 48-50: above on the left (source: Google Maps, October 2016): flood marker between the two windows on the ground floor; on the right (source: Repères de crue): comparison with previous floods; down (source: my own), the flood marker is not visible anymore.

While the physical traces of the flooding seem to have been erased in Matra, this is far from being the case in Le Bourgeau. Several residents note that work is still happening on the Saint-Etienne Church (Figure 51) (BI5, BI6, BI7, BI8). The choir and one of the chapels in the church were badly damaged by the flooding, necessitating relatively expensive work (LNR, 18/02/2017; Giraud, 2018). A council consultation notice published in 2018 stated that the council planned to restore the nave of the Church in 7 years (Mairie de Romorantin-Lanthenay, 2018), with works to be carried out over the period 2020-2024. In March and April 2023, council decisions relating to the restoration of the nave still appear in the council's archives concerning funding ((Decisions No. 79/2023 and No. 93/2023).



Figure 51 (source: my own): façade of the Saint-Etienne Church in April 2023

Thus, while Matra seems to have started a new lease of life, the consequences of the flooding are still visible in Le Bourgeau. The recent openings in Matra – the bar and the second *Bateau-Lavoir* - seem to stand in stark contrast to the numerous shops' shutdowns mentioned by the residents of Le Bourgeau. MI2, who knows the Bourgeau's neighbourhood quite well, said, for example, that for Matra "they've done a good job of developing the neighbourhood", which is "pleasant", whereas "it was nice to go" to the Bourgeau. The use of the past tense here is indicative of the changes since the flood. The neighbourhood has suffered since the flood: now "it's a disaster", whereas before "it was nice, there were lots of little shops and everything". Many residents note that not all the shopkeepers have reopened in Le Bourgeau (BI2, BI3, BI4, BI6) and some were sometimes very critical of this situation (e.g., BI3). The interviewee of the tourist office is relatively pessimistic/defeatist ("it's a disaster area") and talked about a "dead" area. Although this area used to be central to tourism in the city, he explained that "when tourists arrive here, they wonder where they are, it's a bit scary".



Figures 52-53: above (source: my own) and down (source: Google Maps), *Rue des Trois Rois*. Figure 53 is the right side of the *Rue des Trois Rois*.

Only the two shops at the ends of Figure 52 (blue arrows in Figure 53) are open. In this street and the one that extends it (*Rue des Trois Rois* and *Rue du Président Wilson*), many shops are located on the ground floor of buildings. At least 11 closures are dating from after the flood. Of these 11, 5 have reopened with a new manager and a new type of business: 3 are fast food restaurants, although originally only one of the 3 offered fast food (JR Pizza, which became Chicken House (Figures 54-55)); and the other 2, Restaurant “*Les Trois Rois*”, which became Arizona Burger, and the estate agency Transaxia Immobilier, which became Romana Pizzeria), as well as the Boulangerie Contrepois, which became Boulangerie *L'Atelier d'Ange* and Boulangerie *Le Four à Bois*, which had reopened after the floods for a while but is now replaced by a pharmacy.



Figures 54-55: on the left (source: Google Maps, April 2018) and on the right (source: my own).

The other shops that have closed include *La Duchesse d'Anne*, *GR-Coiffure*, *Boucherie du Bourgeau* (which had also reopened after the floods), *Pizza Bonici* (which had also reopened) and *Bati-Design*, a building consultancy and management company. However, several other shops had already closed before the flood and did not reopen: the *Librairie de Sologne* (bookshop), the Fishmonger's, the Lord Pub, and the Sologne Billiard Bar.



Figures 56-57: on the left (source: Google Maps, May 2016), just before the flood, the Lord Pub is already "for sale", whereas LT Coiffure is open; on the right (source: my own), LT Coiffure is now closed, and nothing is open instead of it.

Therefore, the closure dates of all these businesses vary considerably. They may have closed before the flood, as it seems that a process of closure was already underway before the flood, which was not irremediable either. On the other hand, the closures can also be just after the flood (e.g., the closure notice for LT Coiffure (Figures 56-57) dates from 9 September 2016). It can also be a few years later, and still linked to flooding (e.g., *La Duchesse d'Anne*, on their website: "*Unfortunately on the 1st of June 2016, the shop, as well as all the shops and residents in this area, experienced a terrible flood, forcing the temporary closure of the bakery. [...] Wanting to get past this physical and moral disaster, Mr MARTEAU looked for a way to relocate and ensure that this patisserie would remain in the future.*")

It is not certain that all the closures were flood-related. However, a press article by Veillé (06/11/2021) entitled "Romorantin: town centre shops between dynamism and dilapidation" refers to the "striking" contrast between the town centre and Le Bourgeau, where many premises are empty. The mayor blames the 2016 flood: "A lot of landlords didn't do any work, so the tenants left." (Veillé, 06/11/2021). In response to this situation, the town council has bought several buildings (such as the Lord Pub, shown in Figure 56-57), to review the works and the purpose of the premises, some of which will be used for housing (Veillé, 06/11/2021).

According to the planning department, the buildings of Le Bourgeau were already "dilapidated" before the flood, but the flood also had negative consequences for the neighbourhood: it has "disheartened people". Rental market prices and property sales in Le Bourgeau have fallen (Cuenoud, 09/12/2021). Century 21 estate agents explain: "many tenants did not want to return to the area" (Texier, 12/01/2017). In 2017, the head of Ordi et la Sologne Reineau explained that "the floods have reduced the value of the market" by 20% to 50% in some cases and said that "the majority of customers no longer want to go to the Bourgeau" (Texier, 12/01/2017). The president of the *Syndicat de la Sauldre* also spoke of this when he referred to the purchases made by the town hall.

Some remain positive. The Saint-Jean restaurant's owner explained that they decided to rename their committee the "*Comité des commerçants festifs du Bourgeau*"⁶, to give the neighbourhood a fresh start. The change of name reflects the optimistic and dynamic tone they want to give the neighbourhood. He also highlighted the reopenings, such as the pharmacy on the corner, which has replaced a former bakery (Figures 58-59).



Figures 58-59: on the left (source: Google Maps, May 2016), a bakery; on the right (source: my own), a pharmacy, called La Nouvelle Pharmacie du Bourgeau (“the **new** pharmacy of Le Bourgeau”).

⁶ Literally, “Committee of festive shopkeepers of Le Bourgeau”, whereas it was before called “Committee of victim shopkeepers of Le Bourgeau”.

Chapter 4: Discussion

Therefore, it seems that there are differences in flooding experiences between the two neighbourhoods, despite both being located in flood-prone areas. In theory, Matra is even assumed to be more vulnerable than Le Bourgeau.

1. Matra's accounts of the flood are more serene

However, in the accounts, the evacuations seemed more "traumatic" in Le Bourgeau, where residents said they had been taken by surprise. Thus, it is not necessarily surprising that there are more accounts of the evacuations in one case than in the other. As the literature explains (Carroll et al., 2009), the evacuations are often evoked to describe the anguish caused by the flooding. They are therefore a key event in exposure to flooding, likely to be described as 'trauma'. In this respect, the residents of Matra seem to have experienced a less traumatic event.

In general, the memories transmitted by the residents of Le Bourgeau always seemed to resemble more the memories found in many other cases of major flooding than those of Matra, because the accounts seemed to be more complete: evacuations, loss of family property, sentimental possessions or furniture, arguments with insurance companies, etc., all of which are the various stages found in the literature (Verlynde, 2018, Levasseur, 2010; Carroll, et al., 2009; Langumier, 2008). As is usual in post-flood accounts (Langumier, 2008), articles in 2016 recounted the ordeal of losing the photos (Couturier, 28/06/2016; Texier, 14/06/2016). These testimonies are still present 7 years later (e.g., BI3, BI8). This gives the impression that the flooding experience was less "traumatic" in Matra than in Le Bourgeau. However, the limitations stated in Chapter 2 should also be considered.

2. The limits of these memories

However, a study (Reinert, 2018) recounts the account of a couple of residents of the *Bateau-lavoir* who were present during the floods, and their memory of the evacuations is somewhat different from the accounts collected through the interviewees. Reinert (2018) explains that this couple said that the emergency services did come to evacuate the Domitys residents, but that they 'forgot' to come to the *Bateau-Lavoir*. Although the couple were aware that the concept of the *Bateau-Lavoir* was to be surrounded by water during a flood, "they had not premeditated the subconscious effects that it had implied when they were surrounded [by water]. They felt 'trapped' with no way out [...]" and decided to leave when the water was already up to their waists. This account does not contradict the idea that Matra was better protected: the interiors were not flooded and therefore did not force the residents to evacuate. But this account is not reflected in the memories of the current residents of Matra. There may be several reasons for this. Firstly, even though the flood experience may have been traumatic for some of Matra's residents, it was less traumatic than the events in the Bourgeau neighbourhood. The couple noted that their neighbourhood seemed more protected than other neighbourhoods (Reinert, 2018). Thus, the more traumatic experiences may have remained more permanently in people's memories. The memory of a flood fades with time, and this is all the truer if the memory is not maintained (Verlynde, 2018; Weinstein, 1989). Moreover, in the various media or official accounts (from the architect or the town), Matra is always presented as a 'success story' and an exemplary neighbourhood, which probably also plays a part in this loss of memory of the slightly more "traumatic" events. A trace of this hypothesis can be found, for example, in the testimony of MI2, who explains that there was a TV programme about the first *Bateau-lavoir*, which interferes with her memory of flooding in Matra (see Table 4). The interviewees' accounts include traces of documents they may have read, listened to, or viewed, although they are not always mentioned explicitly. It should be noted that most of the articles speak positively of the flood in Matra and negatively in Le Bourgeau. Matra is presented as an example, both on the national stage (national TV reports, official government documents, awards) and locally (Figure 60):



Figure 60 (source: my own): at the entrance of the town hall, a model of the Matra neighbourhood.

This model of Matra stands at the entrance to the main building of the town hall as if to testify to the feat and pride of having built this resilient neighbourhood.

3. Memories, experiences of the flood and feelings of safety

The memory of flooding and the experience of the flood (both direct and indirect) appear to be significant in understanding the residents' feelings of safety. Studies show that indirect personal experience does not necessarily mean that risk is poorly perceived (Verlynde, 2018; Weinstein 1989; Botzen et al., 2008). It explains why many testimonies are indirect personal experiences but are synonymous with a high perception of risk. However, there might be a difference between direct and indirect experiences. For example, MI2 admits that she perhaps looks at flooding from a greater distance than if she had been directly affected by it: "And I didn't experience it... well I did, but I wasn't flooded, so it's not the same thing...".

At the same time, one might wonder to what extent it is not the memory – rather than the experience – that is of greater significance: indeed, the response of MI8 - the dissonant testimony – is different from the others: "when it rains, it's true that we often talk about it. [...] you wonder if it's going to happen again and all that". This memory of the flood seems closer to those normally found when talking to residents of the Le Bourgeau neighbourhood (e.g., the reference to the rain), and more generally to what is found in the accounts of people who have experienced a major flood (Levasseur, 2010; Langumier, 2008). Thus, the memory of how the flood unfolded in Matra could have had a significant impact on residents' feeling of safety. For those who feel that the design has made the neighbourhood more resilient (e.g., by not causing major damage to homes or allowing calm evacuations), the feeling of safety seems to be relatively greater (e.g., respondents 2 in Annexe, MI1, MI2, MI3, MI5, MI10). Therefore, adapting the dwelling to the risk of flooding does not necessarily lead to psychological pressure (one of the issues raised by CEPRI (2015)).

Overall, the stories told in Le Bourgeau are more likely to include the usual accounts that come up when residents feel a strong sense of insecurity (Langumier, 2008; Levasseur, 2010): watching the river closely, being afraid when it rains, etc. These fears of the rain were mentioned both in the residents' interviews and articles (*LNR*, 15/06/2018; Salle, 27/01/2018; Veillé, 08/06/2021). However it is not necessarily easy to establish the causal links between feelings of safety and memories of the floods. Is it because the memory of the floods remains so vivid that they continue to cause concern, or is it because the feeling of insecurity is so great that residents keep such a good memory of the floods? Moreover, the feelings of safety are linked to different factors, which depend on each individual (Carroll et al., 2009; Akerkar & Fordham, 2017; Haney & Gray-Scholz, 2019, Starr, 1969). It is also difficult to quantify. Some of the criteria that influence it are idiosyncratic: while MI9 reports that he does not know much about flooding, he says that he himself has no fears, while his mother thinks a little about flooding, although they probably have the same knowledge of the 2016 floods. Some studies have highlighted the inconsistencies that exist in the links between feelings of safety and risk perceptions (Verlynde, 2018): some interviewees seem to have had strong (indirect, admittedly) experiences and yet are not too afraid.

Others have strong experiences and are afraid. It seems difficult to reach a definitive conclusion, and this is also reflected in the survey (see Chapter 3).

Furthermore, some people also find other arguments to reassure themselves, without always being able to justify them rationally: when asked about her anxiety, BI7 said "well, I heard that the mayor made an opening in something. [...] He arranged something to... and then I think they're going to redo the work so it doesn't happen again". The mayor is often seen as an authority figure, which is partly explained by his specific situation in the town, as he has been in office for more than 35 years (Cariès, 30/06/2016). The reassurance offered by the mayor can also be observed in Matra (see Table 4 MI5). Others, however, are more critical of the mayor's office or the various governments: "The mayor's office didn't clean up after the flood" (respondent 13). According to BI5, the return of the floods is perceived more as anger and irritation than as anxiety. This clearly shows that it is possible to have a wider range of reactions than feelings of insecurity. BI5 felt that a second flood was bound to happen "And supposedly a 100-year flood, but there will be many more": he reversed the argument that many people used to reassure themselves. Unlike some residents, he considers that there are shortcomings in the actions of the public authorities, but he is not extremely clear about whom he directs his anger. For example, he blames the poor maintenance of the river in other towns in the region: "You have to go to Gièvres: there, it's disgusting! It doesn't flow there, so if it's blocked down there, it's bound to rise up here". He goes on to criticise the public authorities at the national level, but he doesn't name them:

"Don't touch anything' eh uh, there's an issue and 'Don't touch anything'. When they wanted to clean it up a bit after the flooding, 'must not use a digger in there', 'must not use anything'. Nothing had to be destroyed. All right, you can't destroy anything, but if there's any damage afterwards, the insurance companies will start being more expensive".

He is also critical of decisions taken more generally in terms of town planning, which are structural decisions taken everywhere ("They put concrete everywhere, so the water can't get through"). It is therefore not necessarily easy to understand whether he is addressing a general and societal criticism or a more direct criticism against some state representatives. The residents displayed a large range of relationships with authority. Criticism of the public authorities is not very recurrent either.

It is therefore difficult to draw definitive conclusions about the propensity of one neighbourhood to be more 'reassuring' than another. However, there may be a slight tendency towards a higher feeling of safety in Matra.

4. The difficult interpretation of returns, departures, and arrivals.

In Le Bourgeau too, there are accounts of difficult returns or even non-returns (BI1, BI2, BI7). For BI5, "Me anyway, if it happens to us a second time, we'll get the hell out" (BI5): as Tapsell and Tunstall (2008) indicated, this testimony contains the idea that the residents are ready to leave again. On the other hand, there is a hint of an overall reassuring situation in Matra, since the neighbourhood is home to many new residents who were not afraid to move there.

In the case of Le Bourgeau, the interviewees and articles linked more the departures or non-returns to the fear of flooding. However, it remains difficult to conclude on the question of new arrivals, departures and returns in Matra (see Limitations in Chapter 2).

Furthermore, it cannot be said that it is necessarily the absence of fear that drives a return (Langumier, 2008). BI3 said she moved to Le Bourgeau after the flood because she had an anchoring there, a family home. She had left the town before that but "came back to her first love, (...) my hometown" (see Table 4, BI3). She is not denying the possibility of another flood, since she says her choice may be "stupid", but her attachment may be more important than fear.

5. The reasons for shops' closures are not solely related to flooding.

Flooding is not the only reason for the closure of shops in Le Bourgeau. A 2019 study funded by the Romoantinois and Monestois intercommunality and carried out by URBAN'ism and SOLIHA paints a picture of Romorantin's town centre and Le Bourgeau pointing out that some of these closures predate the flood. The study serves as a basis for the housing policy of the town (Calmeilles, 15/01/2020). This led to the creation of

an OPAH RU (Programme for Housing Improvement and Urban Renewal) agreement, which covers projects in Le Bourgeau and the town centre for 2020-2025. The agreement does note that the shops to the north of the Sauldre seem to be holding up well, while there is a "high level of vacant shops in Le Bourgeau, particularly along the *rue des Trois Rois* and to the south of the *rue du Président Wilson*".

It is therefore possible to consider that a certain process of shop closures was already underway before the floods. The floods probably reinforced or accelerated this process. The words of the owners of Boulangerie "*La Duchesse d'Anne*" – who moved higher up in the town centre and out of Le Bourgeau – reflect this: "It was a project in the drawer. The floods sped things up" (Couturier, 30/06/2016). The *Voilage GD Maison Dupont* shop in Le Bourgeau resumed trading after the flood and after carrying out some work. However, when the owners retired in 2021, they were unable to find any takers (LNR, 11/05/2019). Conversely, the Boulangerie Contrepois also left in March 2022 but found a buyer. Nevertheless, the neighbourhood is facing relatively complex processes (image of the district, buildings that have not been repaired, fall in prices, etc.), in which the floods may have been more of an indicator than a trigger.

The feeling of safety is only one criterion in the choice of a neighbourhood, whether for housing or for setting up a business and is by no means the only one.

6. Pleasant neighbourhoods?

Attachment to one's neighbourhood depends on a multitude of criteria (e.g., green spaces, good relations with neighbours, feeling of security). Matra residents seem rather attached to their neighbourhood: they mention the peace and quiet of the neighbourhood, the presence of green spaces, and the pleasant feeling of being surrounded by water. One resident (MI1) even confided that she did not want to leave the neighbourhood, even though she and her husband had had a new baby, expanding the family to 4 members, which meant that they would eventually have to move. She said that she and her daughter have been joking about it, saying that they will squeeze into the house to stay there. This reflects the idea that residents do not seem to be sacrificing a great deal of comfort by living in Matra. This neighbourhood is also a counter-example to Rode and Gralepois (2017), who explain that cars are omnipresent in most resilient neighbourhoods, as very few cars drive through the neighbourhood.



Figures 70-71 (source: my own): speed bumps and pavements.

Moreover, Rode and Gralepois (2017) show that streets in resilient neighbourhoods are often defined by their inaccessibility. In Matra, the pavements are certainly high, but at pedestrian crossings, speed bumps always reduce the distance between the roadway and the pavement, which are almost at the same level (Figures 70-71). In the case of the Domitys buildings, the raised crossings are even an alternative to the stairs that must allow wheelchairs to access the entrance.

The presence of water, combined with flood-resilient urban planning, means that there is a strong presence of many green spaces or recreational areas such as parks, which improve the quality of life of residents

(Silva & Costa, 2018). These areas, like the retention basin and the central park, are designed to absorb water (Rode & Gralepois, 2017), compensate for soil sealing and act as a flood expansion zone. Many of those interviewed mentioned the green aspect of the neighbourhood, which can be the setting for short walks or a break on a bench, providing meeting places for city dwellers and residents (Gómez-Baggethun & Barton, 2013). Green spaces are an integral part of the neighbourhood's design, in that they are both designed to enable flood resilience and also to make the neighbourhood a pleasant place to live daily (Daniel-Lacombe, 2019; Rode et al., 2018; Rode & Gralepois, 2017; Vincendon, 27/06/2016).

In Le Bourgeau, some residents also pointed out that water adds a certain charm to the neighbourhood. BI3 mentioned the “water cities” (Amsterdam, Bruges, Venice... "and then lots of other smaller ones that we know less about but which have a lot of charm"), and concluded: that there are also "charming places" here (ex: Figure 72). The OPA RU agreement also noted that:

"The inhabitants of this neighbourhood also express the fact that it is a good place to live, that it is a quiet neighbourhood, in the immediate proximity of the town's services and facilities, and that they would not like to have to move". (p.14).



Figure 72: this canal can be seen from the *Rue des Trois Rois* and can be considered as a “charming” area of Le Bourgeau.

The Matra neighbourhood does not therefore have the exclusive right to be green or pleasant, which are not elements that are specific and unique only to resilient neighbourhoods. On the other hand, it does demonstrate that it is possible to combine resilience and liveability in an area subject to flooding and that residents do not have to sacrifice their quality of life for the sake of resilience.

7. Which resilience? Lack of information and communication

The design has enabled Matra to experience less damage compared to Le Bourgeau, leading to different post-flood recovery situations and experiences. It should be stressed, however, that the term "living with the flood" seems to find a certain limit here: many residents still had to evacuate the neighbourhood (at Domitys and see Reinert, 2018), and were not really able to "live with it". However, this flood was certainly a millennial one, which means that it is probably possible to "live with" smaller floods. But it also showed, in a way, the limits of thinking about resilience only in terms of design. The architect explains that the balconies of the central buildings allow boats to come and collect the residents. However, the emergency services still need to be aware that they might have people to rescue there (Reinert, 2018).

As Dournel, et al. (2015) note, and as is apparent from the testimonies here, urban development in flood-prone areas tends to ignore the importance of innovative communication about risks. However, if resilience is

to be combined with less traumatic experiences of flooding, it must be linked to better information. For Eric Daniel-Lacombe (Lenouvel, 2020), the architecture and design of the neighbourhood can in some way "communicate" about the risks, but care must be taken not to exaggerate this propensity. For example, he mentions the retention basin as an essential element of the neighbourhood's resilience: it would be part of discussions in the neighbourhood and serve as an alarm when the level of the Sauldre is high. None of the residents interviewed mentioned the retention basin. Levels of knowledge and observation of the neighbourhood vary depending on the resident, but some resilient facilities are undoubtedly more understandable than others. Most of the interviewees in our study do not really seem to be aware of certain elements of the neighbourhood's resilience. When asked about the resilient facilities, they often mentioned the stilts, the pavements and sometimes the circulation of water, which is supposed to carry the flood towards the river. However, other elements are more difficult for them to distinguish, in particular, those relating to "*transparence hydraulique*". For instance, the possibility of the car parks being flooded purposely during a flood did not come up in any of the interviews.

MI1, who has a good memory of the 2016 flood thanks to her neighbour, said that "we haven't been informed" about what to do in case of a future flood. Yet, the town hall seems to be aware of the need for information. In 2018, the mayor's office published an information and prevention document in the event of flooding (Salle, 09/03/2018). As the mayor's employee, Tania André, explained: "We want to prevent people from panicking, so we're providing websites where they can obtain all the information they need and avoid false information" (Salle, 09/03/2018). Similarly, a conference entitled "Knowing and understanding the Sauldre to prevent flooding" has been organised free of charge in 2019, so that the residents of Romorantin can allay - or at least understand - their fears (Giraud, 23/05/2019). However, according to the interviews, there does not seem to have been any specific information about flooding in Matra.

Building resilience, particularly when the passage of water through the Matra's neighbourhood is planned to such an extent that it is possible to estimate how the water will flow, should make it possible to provide residents with some information, such as what should happen to their cars, since the architect stressed that Matra had been designed so that residents could have time to move their cars.

Conclusion

• **Sub-question 1: What were the significant differences between the flooding in the Matra neighbourhood and the Bourgeau neighbourhood in 2016?**

The Matra neighbourhood was less affected by the flooding than the Bourgeau neighbourhood. The water did not get inside the homes, even though the flood was higher than all the forecasts. According to Romorantin's mayor, the buildings were "spared. Barely, but spared" (Magcentre.fr, 30/06/2016). Since the water did not enter the homes, the residents of Matra were not evacuated in the same way as some of the residents of Le Bourgeau. In Le Bourgeau, residents were sometimes evacuated after the water had already entered their homes, which was often described as a striking event both in interviews and articles. However, this does not mean that the residents of Matra who experienced the flooding did not experience these evacuations as a significant event at the time (see Steinert, 2018). On the other hand, the major difference between both experiences of the flood can be found in the immediate post-flood situations in the neighbourhoods. This difference is still observable in the testimonies obtained 7 years later: the residents of Matra never mentioned the difficulty of the post-flood situation. According to the architect's report (Daniel-Lacombe & Paquot, 2016; Vincendon, 27/06/2016), the residents had to clean up the neighbourhood for a few days with the emergency services, but they did not have to sort out and throw away some of their personal belongings, for example. In Le Bourgeau, on the other hand, residents lost equipment and personal belongings. They still talk about it 7 years later, when asked about the flood. Because the water came back into their homes, they also had to carry out a lot of work, sometimes for several months and had to camp out in their own houses or be rehoused. The immediate consequences of the flooding were therefore much greater in Le Bourgeau. This explains in part the differences in the testimonies obtained during interviews with residents.

• **Sub-question 2: Does living in a so-called "resilient" neighbourhood help to minimise residents' anxiety and their "attachment" to their neighbourhood?**

It seems that the Matra's residents are, overall, relatively unconcerned about future flooding. They are all aware that the neighbourhood is designed to be resilient to flooding and have some knowledge of the elements that make up the neighbourhood's resilience (e.g., the stilts, the pavements). But it is difficult to conclude that the resilience shown by the Matra neighbourhood - at least in the built environment - makes it possible to minimise residents' anxiety, for reasons intrinsic to this issue and for limitations specific to this study.

Intrinsic limitations: An intrinsic limitation of the subject studied concerns the analysis of the feeling of safety, which is a complex feeling that depends on many parameters. It is undoubtedly linked to the personality of each individual, which means that in two relatively similar situations, with the same level of information, one person may be afraid while the other is not. It is also difficult to find objective criteria for assessing this feeling. For example, attachment to the neighbourhood does not necessarily translate into a feeling of safety. Similarly, the desire to be covered by a multi-risk home insurance policy does not necessarily mean a greater sense of insecurity. On this basis, the only way to try to understand what impact flood-resilient design has on residents is to analyse residents' discourses about their neighbourhood.

Limitations specific to this study: The limitations of this study relate firstly to the composition of the interviewees. None of the interviewees had experienced the flood directly as a Matra resident. In Le Bourgeau, on the other hand, the interviewees had experienced flooding in the neighbourhood (even if not all had experienced the flood directly). It could have certainly been valuable to have more contact with residents who decided to leave Le Bourgeau and Matra after the floods. While some were able to be contacted in Le Bourgeau, this was not the case in Matra. It is possible that these people were even more frightened by the floods, to the extent that they needed to leave. This study is therefore missing an important parameter to evaluate the residents'

feeling of security. Yet, this is not certain either, in so far as returns to flooded neighbourhoods are not explained solely by the feeling of security but are a much more complex choice (Langumier, 2008).

Overall, residents of the Matra district are relatively happy with their neighbourhood and tend to describe it in positive terms. They have no real criticisms to expose. The specific features of the neighbourhood that are inherent to its resilient nature (e.g., the stilts and raised walkways), did not seem to cause any discomfort or annoyance to residents. The inability to access the garden from one's front door was mentioned but not really criticised. The pavements are indeed high, but this does not prevent people from accessing them. In addition to these characteristics specific to resilience, other criteria that can be – but not necessarily - linked to resilience were also noted. For example, residents appreciate the way the neighbourhood has been developed and planned, its green areas and the presence of water. These characteristics can be found in other neighbourhoods: in Le Bourgeau too, for example, the proximity to the water is described as one of the neighbourhood's charms. However, these are features that can be found in many flood-resilient neighbourhoods: the presence of water in a flood-resilient neighbourhood is common, and it often results in the presence of green areas. Observation of the Matra neighbourhood also revealed its calmness, with few passing cars.

Therefore, Matra can be seen as an example of a flood-resilient neighbourhood that has not set aside considerations of liveability, quality of life and habitability. Building resiliently in a floodable area does not necessarily mean sacrificing the quality of life of residents. However, this does not mean that this is the case for all resilient neighbourhoods built in flood-prone areas.

• Sub-question 3: How does this difference in resilience still have an impact 7 years after the flood?

It seems that Matra was more able to move on from the flood than Le Bourgeau. Whether for reasons of residents' departure or not, and all things considered, since resilient is difficult to measure (De Bruijn, 2004) and other factors may have come into play (e.g., the size of the neighbourhoods and their pre-flood situation), Matra proved to be more resilient than Le Bourgeau. This is observable in the physical characteristics of the neighbourhoods and in the composition of their residents.

Physical characteristics of the neighbourhoods: Few traces of the flooding are discernible in Matra, whereas many of them still physically exist in Le Bourgeau (e.g., the Saint-Etienne Church). Some homes and businesses are still vacant, which can be observable from the street. Many of the shops in Le Bourgeau indeed closed after 2016. These closures are not solely due to the flooding, but the latter may nevertheless have played a role. The opening of a bar and a new *bateau-lavoir* in Matra therefore seems to be in complete contrast to the vacant buildings, which in places give the impression that Le Bourgeau is still suffering from the floods. However, this does not mean that Le Bourgeau's residents are not attached to their neighbourhood.

Neighbourhoods' composition: The difference in resilience between the Matra and Le Bourgeau neighbourhoods can also be seen 7 years later in the residents' accounts. Even considering the limitations mentioned above (sub-question n°2), most Matra residents display a certain serenity when a future flood is mentioned. The discourses about the flood are not as complete as in Le Bourgeau's residents' accounts. It therefore seems that, in one way or another, the resilience displayed by the Matra's neighbourhood is still having an impact 7 years after the flood. The memory of the floods in Le Bourgeau seems to remain relatively vivid, as evidenced, for example, by the panels exposed in the Saint-Jean restaurant. This is all the more striking given that the flood took place in France, a developed country where insurance is relatively effective in helping residents recover their pre-flood possessions. Most of the residents of Matra are actually residents who did not really live through the flooding, which probably helped the neighbourhood to make a fresh start. On the other hand, this is not necessarily a consequence of resilience: the link between the resilience of the Matra neighbourhood - and therefore the way in which the floods were experienced in the neighbourhood - and the departures and arrivals of residents in the neighbourhood is difficult to establish.

• Future of the neighbourhoods and future research

These departures and arrivals of residents in Matra and Le Bourgeau appear to be an important element in understanding the influence of resilient design in Matra. It was impossible in this study to gather data on this

aspect more precisely, as Matra residents who were there during the 2016 flood could not be contacted. Similarly, only a few Bourgeau residents who left the neighbourhood after the flood were contacted. It would be interesting to focus on these residents in order to gain a better insight into how the flood was experienced by this group of residents and to be able to make more significant statements about the effects of the 2016 flood in the two neighbourhoods. The relatively less marked memory of the flooding in Matra could be influenced more by departures than by resilience if an analysis of departures shows that the vast majority of Matra residents decided to leave the neighbourhood because of the flooding: there would have been a 'loss' of memory rather than a less 'traumatic' memory of events. It might be interesting to study the number of departures in the two neighbourhoods, as well as their dates, and the reasons that can explain them. However, it is not certain that such a study would be easy to carry out, for reasons of access to data.

It would also be interesting to compare the relationship of Matra and the 2016 flood with other neighbourhoods built to be resilient that have experienced flooding, in France or elsewhere in the world. This would enable a more general assessment of the difference in perception of flooding that resilience implies. In Matra, it seems that the flood-resilient techniques that were used tend to reassure residents, but it cannot be certain. If this is not the case elsewhere, the broader question of the conditions under which building in flood-prone areas makes sense would have to be asked and studied. The techniques used to promote the neighbourhood's resilience also seemed to appeal to residents. It might be interesting to compare this with other neighbourhoods built to be resilient, by looking at the opinions of these neighbourhoods' residents. Given the scale of the urbanisation process throughout the world, which heavily involves building in flood-prone areas, studies about the relationship between residents and their flood-resilient neighbourhood seems crucial. It concerns indeed a large amount of people and spaces.

Additionally, with regard to the town of Romorantin more specifically, it might be interesting to study how the "success" of Matra can have an impact on the renewal of Le Bourgeau. The OPAH RU agreement mentions the fact that work projects should be encouraged by taking "inspiration from experiments that have been carried out" in other areas. For example, the President of the Syndicat de la Sauldre mentioned ground floors that would no longer be used as living areas. However, the specific consequences that led to the creation of Matra (see Lenouvel, 2020) prevent the "Matra model" from being replicated identically in Le Bourgeau. It is also worth noting that many resilient neighbourhoods have recently sprung up on former brownfields (CEPRI, 2015), which allow easier transformation to obtain resilience than already built-up areas. The projects planned to enable better prevention and reduction of flood risks in Le Bourgeau are still in their early stages: the President of the Syndicat de la Sauldre explained that thought is being given to how to forge a new link between residents and the river (which is a usual reflection after a flood, see David, 2018). He also explained that work is being carried out to recreate curves and a smaller bed for the river: it has been done on 5 km since 2021 (but there is a lot more to do, according to him). What can local public authorities do about the risk of flooding in Le Bourgeau? In Romorantin, this question keeps being brought up in the wake of the floods. Studying how resilience to flooding has been improved in other cities' neighbourhoods with similar characteristics to Le Bourgeau could provide clues for the rehabilitation of this neighbourhood of Romorantin.

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Annexe

Survey

Respondents	Matra / Le Bourgeau	Types of insurance	Feeling of insecurity 1 = low, 5 = high	Explanation of their feeling (optional)
1	Matra	Multirisques	1/5	
2	Matra	Simple	1/5	<i>“The floods are exceptional, and the buildings were resilient when the last flood happened”.</i>
3	Le Bourgeau	Multirisques	1/5	
4	Le Bourgeau	Simple	3/5	
5	Le Bourgeau	Simple	1/5	
6	Matra	Multirisques	3/5	
7	Le Bourgeau	Multirisques	2/5	
8	Le Bourgeau	Simple	3/5	
9	Le Bourgeau	Multirisques	2/5	<i>“You can't control water and, in the case of 2016, we experienced it not knowing what was happening. As I was alone at the time, I was even more vulnerable”.</i>
10	Matra	Simple	2/5	
11	Le Bourgeau	Multirisques	1/5	
12	Le Bourgeau	Multirisques	3/5	
13	Le Bourgeau	Multirisques	3/5	<i>“When it rains, I stay vigilant. I keep an eye on the level of the Sauldre. The town hall did not carry out any major clean-up work following the flood”</i>
14	Le Bourgeau	Simple	1/5	
15	Matra	Multirisques	3/5	<i>“To live a traumatic event”</i>
16	Le Bourgeau	Multirisques	1/5	<i>“I'm serene because it's a rare risk and my home is upstairs. It's just a warehouse downstairs, with a risk of material damage, but no emotional or sentimental damage”</i>
17	Matra	Multirisques	1/5	
18	Le Bourgeau	Thelem	5/5	
19	Le Bourgeau	Multirisques	1/5	
20	Matra	Simple	1/5	
21	Le Bourgeau	Simple	1/5	