Geography and climate

The Hérault is part of the region of Languedoc-Roussillon and is surrounded by the départements of Aude, Tarn, Aveyron and Gard, as well as the Mediterranean sea (Gulf of Lion) on the south. This département has 87 km of coasts, which concentrate numerous coastal river mouths; Aude, Orb, Hérault, Libron, Mosson, Lez, Vidourle.

Brief and important precipitation is typical for the Mediterranean climate. They particularly occur during the inter-seasons, with sometimes violent storms. For example, in Montpellier, rainfall amounts to about 760 mm/year, which is more than Paris. However, this precipitation occurs only within a 90 days period. The volume of rainfall can reach 1200 mm/year.

The region is regularly subject to what is called "épisodes cévenols", from "Cévennes", the mountain range shared by the Hérault, the Ardèche, the Gard, and the Lozère.

Most of these "épisodes" occur on early autumn, when the Mediterranean sea is still warm. The combination of an accumulation of clouds in the Gulf of Lion with wet southern winds entails violent rainfalls. These torrential rainfalls and violent thunderstorms can cause water swells in few minutes. An épisode cévenol often lasts from 24 to 76 hours with exceptional cases of 4 days.

This particularity shaped rivers with a special hydrological regime (the "rivières cévenoles"), whom ratio between flooding flow and average flow is very high compared with other rivers.

History of floods

- September 1976: torrential rains made the Lez flood, which ravaged about 20 cities. This was one of the most severe flooding in Hérault;

- January 1996: torrential rains provoked floods in the region of Béziers. Four persons died. The European Parliaments adopted a resolution to demand that the Commission takes action in terms of prevention of floods

- December 2002: the rainfalls entailed the Mosson dam failure, and the Lez flooded;

- December 2003: the combination of a marine storm with strong rainfalls made the Vidourle flood Sommières for the third time in two years. The Lez (6 meters higher than its average level), the Mosson and other coastal rivers isolated the cities of Mauguio and the Lattes county. The Lez reached the level of the dams in Montpellier and Lattes, threatening an area where tens of thousands of people live. In addition, the Hérault, Orb and Aude flooded several villages;

- September 2005: the Lez flooded Montpellier;

- September - October 2014: three floodings occured in three weeks. This was the most violent épisode cévenol registered in the Hérault, with 1933 and 1976. L'épisode cévenol du 29 septembre 2014 a été l'un des plus violents jamais perçus dans l'Hérault. In three hours, Montpellier received the equivalent of six months of rainfalls. 73 areas were affected and four persons died in Lamalou-les-Bains. This catastropha entails thousands of homeless, as well as huge costs of reconstruction and territorial planning. In the Hérault, about 2500 ha of agricultural lands, most of them used for wine growing, were flooded.

Risk factors

- **Unbridled construction and soil-sealing**: risk areas have been intensively constructed. Past floods caused less important damages because precisely these areas used to be not inhabited. The soil-sealing resulting from construction also favours the floods and make them last longer. For example, soil-sealed surfaces were multiplied by three in 20 years in the area of Montpellier;

- **Lack of maintenance dredging**: the rivers used to be dredged way more often than they are now. This can be explained by the important costs of such works and by the fact that the shoreline residents do not use anymore the products (wood and sediment) it generates. This abandon entails the obstruction of river beds, which are thus more likely to flood. In addition, the pollution concentrates in the sediment without being extracted. This pollution also partly explains why dredging is not frequent: the environmental rules to run such operations are now very strict, and the costs they generate are very important. For example, large portions of the rivers used to be dredged by farmers, but they are no longer to do it anymore;

- **Multiplication of dams and modification of river flows**: dams were intensively built in the region, to master the river flows and facilitate navigation as well as construction. However, most of them block the sediment that should normally be rejected in the sea and cement the barrier beaches. For example, the Pont Rouge dam in Béziers artificially maintains a constant water level of 7.65 meters (whereas there should be at least one variation of level during the year), which is too high and prevents the sediment from joining the sea. This dam was built before the law on solid flows, and has not been modified. The dams and thresholds favour floodings (as we can see, since the mid-90s, it is a repeated phenomenon, whereas it used to be vigesimal before), and multiply their detrimental effects: indeed, a dam failure, due to the containment of sediment, can generate polluted mudslides;

- **Global warming**: the rise of temperatures increases the risks of storms. Consequently, the épisodes cévenols are more violent and regular.

Planning and prevention at national and local level

- **Prevention plans on flooding risks**: these plans are set up by the French state. They are supposed to take into account global warming, and include rules on construction and maintenance planning. They allow a mapping of risks and the issue of adapted urbanism regulations. In Béziers, this plan was approved on 16 June 2010.

- **Programmes of prevention actions against floods**: these programmes were launched in 2002 to foster an integrated approach to tackle flooding risks. They are founded on the partnership principle, through a contract between the state, the regions and third parties (through call for tenders). They are supposed to help implement the Floods Directive. For example, these programmes allowed for increasing the flowing capacity of the Orb, through reshaping and dredging. These 3 million euros operations were funded at 80% by the EU, the French state, the region and the département. However, works in this region are particularly harsh to undertake on administrative and patrimonial grounds: indeed, most of Paul Riquet’s works, such as the Canalet, are classified as a World Heritage sites by the Unesco;

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2 “Plans de Prévention des Risques d’Inondation” ("PPRI")
3 “Programmes d’Actions de Prévention contre les Inondations” ("PAPI")
4 Founder of the Canal du Midi (1609-1680)
- Programme of research HiMeX3 (2010-2020): this programme, carried out by Météo-France and the national centre of scientific research, aims at understanding better the "épisodes cévenols".

The European legal framework

Directive 2007/60/EC\(^5\) on the assessment and management of flood risks aims to establish a common framework for assessing and reducing the risk that floods within the European Union pose to human health, the environment, property and economic activity. It covers all types of floods, both along rivers and in coastal areas.

The prevention and management measures are organised by river basin districts (which may cover several river basins), as established by the Water Framework Directive.\(^6\) The measures include the preliminary assessment of risks and the establishment of maps of areas at risk and flood management plans.

Recommendations

- Considering the increasing number of petitions received on inaccurate floods management and prevention;
- Considering that these last years, the recurrence of floods in Europe has become worrying and caused billions of economic losses (supported by public funding);
- Considering that, as it has been observed in Vendée (coastal floods) and the South of France, human activity is contributing to increasing the likelihood and impact of flooding;
- Considering that, as it has been underlined in some petitions, Directive 2007/60/EC mainly focuses on prevention and risk management, but not enough on the follow up after the floods, which would require investigations on the responsibility of the authorities, as well as a thorough analyse of the causes in order to implement anti-recurrence plans;
- Considering that most of the river basins in Europe are shared, and that the pollution initiated by the floods (in particular through mud slides) has a wide impact in Europe;

A study should be launched in order to assess the impact of human activity on flooding risks, as well as the economic and environmental effect of floods in Europe these last years. This study could serve as a basis to amend Directive 2007/60/EC and to make it more adapted to the recurrence and impact of floods.