Flooding in Navarre, the Basque Country, Aragon and Burgos, 2021

Ricardo Blanco Rodríguez - CCS Territorial Representative in the Basque Country
Daniel Hernández Burriel - CCS Territorial Representative in Aragon, Navarre and La Rioja
José Ángel Renero Arribas - CCS Territorial Representative in Castilla y León

In the territories of Castilla y León, the Basque Country, Navarre and Aragon flooding frequently occurs as a result of the river Ebro and its tributaries breaking their banks or this happening in the various rivers in the Basque Country and Navarre on the Cantabrian side of the watershed.

There are several reasons that might explain the overflowing of rivers, which include thawing or, sometimes, draining activities, although the main culprit can always be traced back to heavy rainfalls.

Thanks to all the warning systems belonging to basin authorities and official weather services, there are even estimates available of the highest river discharges. The cumulative experience acquired over time, enhancement and upgrading of monitoring systems, as well as the use of new technologies and procedures such as big data enable prediction of trends for rivers hours or even days in advance, always from a probability-based perspective, which allows the readings and measurements to be taken which the protection planning establishes.

Over the past 10 years the river Ebro has experienced extraordinary spates in 2013, 2015, 2018, 2019 and 2021, which have significantly affected certain population centres. Among these were, for example, the sudden rises in the water level of the Ebro of 2015 in Miranda de Ebro (Burgos) and along the river banks in Aragon, at a cost to the Consorcio de Compensación de Seguros (hereafter the CCS) of over 34 million euros, or the bursting of the banks of the Arga in the administrative district of Pamplona in 2013, which bore a cost in indemnities for the CCS of 15.5 million euros.

In the Basque Country there was heavy flooding in 2011, which particularly affected Gipuzkoa (the basin of the river Oria), leading to a total of 5,500 claims files and indemnities that topped 60 million euros.

Over November and December 2021 there were frequent rainfalls in the catchment area of basins. To cite a few examples, in Balmaseda (Biscay) 150 mm were recorded between 27 and 28 November; in Pamplona it rained for 15 straight days (from 22 November to 7 December) and more than 215 mm fell; and from 9 to 10 December figures approaching 175 mm were registered in Añarbe (Gipuzkoa) and Gorbea (Araba), and over 200 mm in areas of the Pyrenees and on the Cantabrian side of the watershed.

Over this period the emergency warning systems of the various different departments of the Civil Protection Service issued alert bulletins on successive days warning of heavy rain and snow falls (such as the orange level alerts which the Basque Country regional government issued on 27 and 28 November and from 9 to 11 December), as well as warnings of heavy flows in several different rivers —q.v. the alert issued by CECOPAL (the Municipal Coordination Centre) of the Miranda de Ebro Council (Burgos)– on 29 November on account of the flood risk to its old quarter and the triggering of level 2 flood alerts/emergencies by the regional governments of Navarre and Aragon on 10 December due to overflows on the rivers Arga and Ebro.

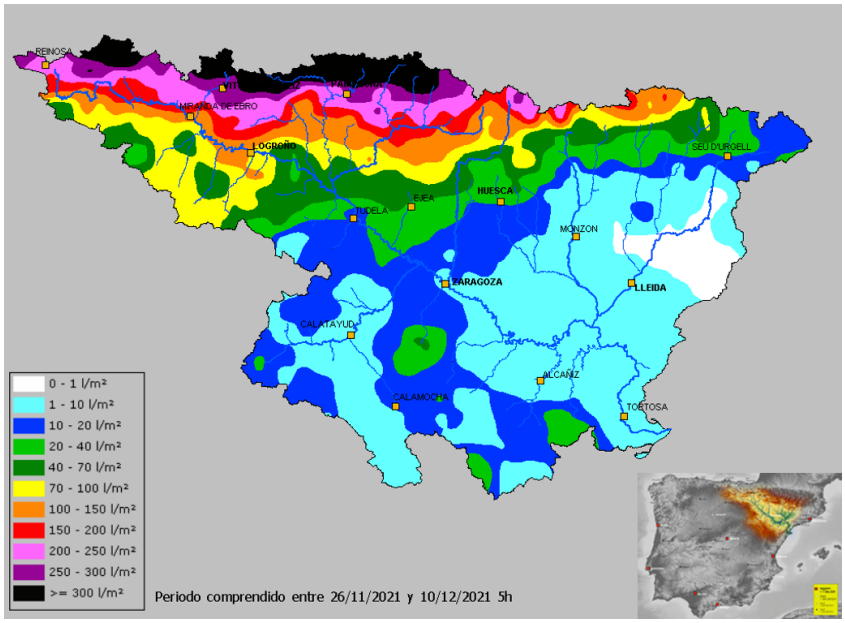

Figure 1. Rainfall recorded in the Ebro basin between 21 November 2021 and 10 December 2021. Source: Ebro Hydrographic Confederation.

27 Noviembre 2021

ALERTA NARANJA. RIESGO: NIEVE

Riesgo: Debajo de 1000. desde las 03:00 hasta las 24:00 hora local. La cota de nieve irá bajando, situándose en torno a 900-700 m de madrugada, en torno a 700-500 m por la mañana y 500-400 m durante la tarde-noche, ocasionalmente pudiendo estar más baja. Precipitaciones débiles a moderadas; en la vertiente cantábrica muy abundantes y persistentes, y las precipitaciones ocasionalmente serán tormentosas y vendrán acompañadas de granizo. Espesores previstos: 20-50 cm a 1000 m, 5-25 cm a 600 m, 0 cm a 200 m.

AVISO AMARILLO. RIESGO: PRECIPITACIONES

Riesgo: Persistentes. desde las 00:00 hasta las 24:00 hora local. Se pueden acumular más de 60-80 l/m² en 24 horas en la vertiente cantábrica. En la vertiente cantábrica precipitaciones moderadas, muy abundantes y persistentes, y ocasionalmente serán tormentosas y vendrán acompañadas de granizo, con posibilidad de que localmente sean fuertes.

AVISO AMARILLO. RIESGO: MARÍTIMO-COSTERO

Riesgo: Navegación. desde las 00:00 hasta las 24:00 hora local. La altura de ola significante rondará los 3.5 m de madrugada e irá subiendo hasta los 4-5 m durante la mañana. La mar de fondo del noroeste levantará olas en torno a 3 m. Periodo 10-12 s. Viento del noroeste con fuerza 6 a 7. Originará mar gruesa a mar muy gruesa.

28 DOMINGO
Noviembre 2021

AVISO AMARILLO. RIESGO: PRECIPITACIONES

Riesgo: Persistentes. desde las 00:00 hasta las 15:00 hora local. Se pueden acumular más de 60-80 l/m² en 24 horas en la vertiente cantábrica. En la vertiente cantábrica precipitaciones moderadas, muy abundantes y persistentes, y ocasionalmente serán tormentosas y vendrán acompañadas de granizo, con posibilidad de que localmente sean fuertes.

ALERTA NARANJA. RIESGO: PRECIPITACIONES

Riesgo: Persistentes. desde las 15:00 hasta las 24:00 hora local. Se pueden acumular más de 60-80 l/m² en 24 horas en la vertiente cantábrica. En la vertiente cantábrica precipitaciones moderadas, muy abundantes y persistentes. Durante la tarde-noche las precipitaciones seguirán siendo presistentes y abundantes, a la vez que va subiendo la cota de nieve, favoreciendo el deshielo y aumentando el riesgo de inundaciones.

Figure 2. Summary of weather alerts in the Basque Country. Source: Basque Country regional government.

Ayuntamiento de Miranda de Ebro
Alcaldía

vivirmiranda

CECOPAL

RIESGO DE INUNDACIONES (ALERTA O EMERGENCIA)

FECHA: 29/11/2021 **HORA:** 22:30

En aplicación del Plan de Protección de Miranda de Ebro, la Directora del PEMME en virtud de las competencias que tiene establecidas, declara el **NIVEL DE GRAVEDAD 1** con las siguientes características:

Descripción del riesgo:

Inundación derivada al incremento de caudal del Rió Ebro y afluentes próximos a Miranda de Ebro.

Ámbito afectado:

Casco urbano de Miranda de Ebro.

Texto complementario:

En el día de hoy, 29 de noviembre de 2021, se ha producido un incremento exponencial del caudal del río Ebro a su paso por Miranda de Ebro así como de sus afluentes, principalmente el río Bayas y el río Zadorra.

Este hecho ha producido que zonas del casco urbano de Miranda de Ebro se hayan visto afectadas por el agua.

Se ruega permanezca en contacto con el CECOPAL a través del número de teléfono 648 00 47 49 donde se irá facilitando nueva información.

En Miranda de Ebro, a las 22:30 horas del día 29 de noviembre de 2021.

Figure 3. Flood risk alert bulletin.
Source: Miranda de Ebro Council.

Two events can be distinguished for the period under review. Heavy rainfalls in late November which caused several floods and then another event in mid-December featuring the combined effects of a sudden thaw due to sharply rising temperatures and persistent rainfalls in the northern part of the Ebro basin. All of this led to flows moving to river basins, which initially affected the Ebro at the point where it passes through Miranda de Ebro (Burgos), with alerts for extraordinary surging of the rivers Trueba and Nela in Burgos, and the Arga and Ega in Navarre, with the flooding ultimately arriving at the mid-section of the Ebro. The basins of the Bidasoa, Oria, Deva and Urumea, running into the Bay of Biscay, were also affected. Against this backdrop the river Arga recorded one of the highest figures in its historical dataset with a flow of up to 524 m^3/s where it runs through Pamplona.

Figure 4. Overflowing of the river Arga in Burlada near Pamplona.
Source: CCS.

This situation produced miscellaneous significant adverse effects: on agriculture and livestock as a result of flooding of fields and farms, industrial and urban areas, transport and communications networks, and finally two deaths among the communities in Sunbilla and Elizondo (Navarre).

Figure 5. Flooding at the Water Park in Zaragoza.
Source: CCS.

The municipal districts hardest hit by these river overflows were:

- **The Arga basin:** Pamplona and Burlada (Navarre), from where 2,700 compensation claims were received at a cost to the CCS of 30.2 million euros.
- **The Bidasoa basin:** Lesaka (Navarre), with 50 compensation claims costing 6.4 million euros.
- **The Ega basin:** San Adrián (Navarre), with 925 compensation claims files costing 7.7 million euros.
- **The Ebro basin:** Miranda de Ebro (Burgos) (261 compensation claims at a cost of over a million euros) and Zaragoza (438 compensation claims with a value of 5 million euros).

Handling these claims was characterised by being a new episode of the river Ebro and its tributaries bursting their banks, which was yet another among those that have taken place in the past 10 years. Moreover, two types of situations arose simultaneously: on the one hand, communities in Navarre experienced a high number of losses due to the extraordinary volume of flows along the rivers Arga and Ega (among these, we might cite Burlada, Pamplona or San Adrián as examples), and on the other hand there was a broad scattering of losses in other municipalities where, although serious damage occurred to housing developments or facilities close to the Ebro, generally speaking the losses were relatively smaller and very widely spread out along the basins. The time of year when these floods happened was also an influential factor. The drawing to a close of the irrigation and watering season and the fact that this took place in the first quarter of the hydrological year meant that the reservoirs had substantial available storage capacity, which brought about very significant diminishment of the effects of the rises in water levels. On this occasion, for example, according to figures from the Ebro Basin Authority the Yesa and Itoiz reservoirs (on the rivers Aragón and Irati) each at certain times held up peak flows of over 700 m^3/s (more than the highest volume of flow running through Pamplona for the Arga during this episode). Furthermore, it is relevant here that the soil's drainage capacity was still below the level of aquifers, such as in the middle Ebro valley.

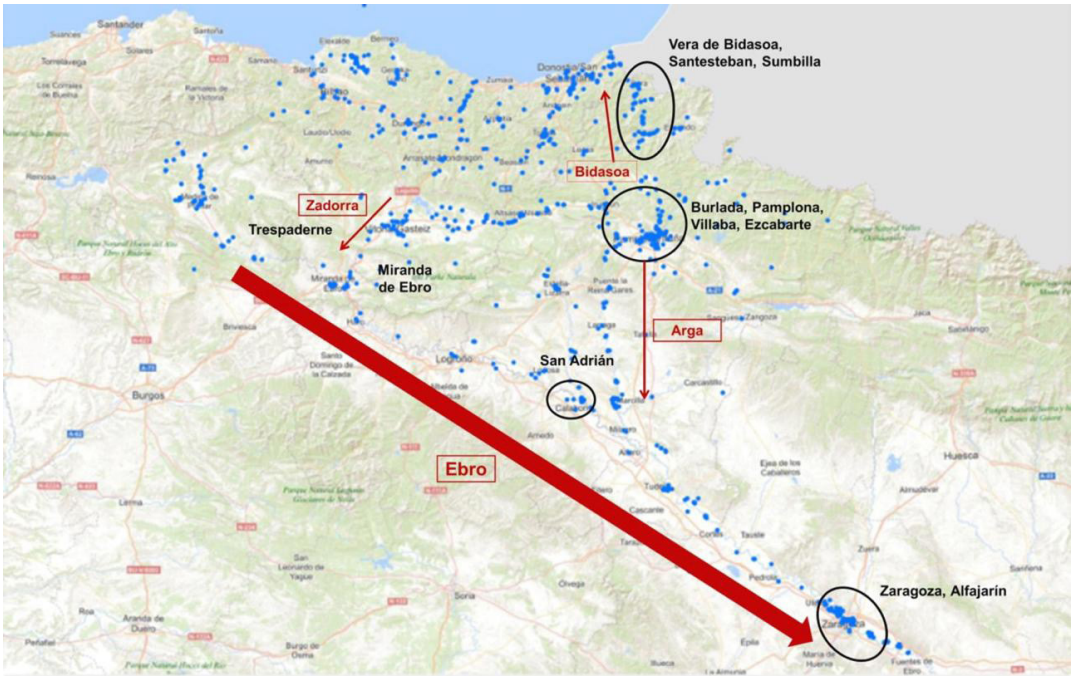

Figure 6. Geographical distribution of claims files and direction of river courses.
Source: CCS.

Fluvial flooding caused by rivers overflowing (with the exception of flash floods) are characterised by their progress being visible from the riverbanks. We can observe how rivers steadily rise above their banks and flood fields and roads until many of them end up flooding population centres or industrial estates.

Thanks to all the warning systems belonging to basin authorities and official weather services, there are even estimates available of the highest river discharges. The cumulative experience acquired over time, enhancement and upgrading of monitoring systems, as well as the use of new technologies and procedures such as big data enable prediction of trends for rivers hours or even days in advance, always from a probability-based perspective, which allows the readings and measurements to be taken which the protection planning establishes.

Figure 7. Factory premises in Vitoria.
Source: CCS.

This is what happened this time. For example, in Pamplona or Miranda de Ebro, where, thanks to arrangements which Civil Protection Service departments made, any damage capable of being scaled down was considerably reduced. In these areas (as well as in several others) there have been cases where owners of vehicles that are parked in the most vulnerable areas have received messages on their mobiles so they can remove them in anticipation of possible river overflows, which allows a major reduction of property damage to be achieved and lives saved by raising awareness among the population and taking self-protection measures.

These systems also enable corrective or preventive structural measures to be taken, such as, for example, the actions which the URA (Basque Water Agency) has implemented at problematic points in the various different basins within the Basque Country (Cadagua, Oria or Ibaizábal, to name a few), which have had a positive impact on diminishing the effects of these recent surge-based flooding incidents.

Figure 8. Civil hydraulic projects.
Source: URA (Basque Water Agency).

This also enables active reservoir management, the holding up of flows and substantially lowers the level which the water reaches and, by extension, water damage below reservoirs.

While it is not easy to control how rivers act, preventive measures help mitigate the impact of such surge flooding in terms of reducing both the risk to people themselves and property damage.

Emergency management entailed the removal of rubbish bins, cutting off streets and roads (such as in Las Merindades in Burgos), and evacuating buildings (for example, "El Vergel" in Pamplona, where there the power supply cut out) and residential homes, in Funes (Navarre) or Monzalbarba (Zaragoza), as well as dependant people, in Boquiñeni, Cabañas and Pradilla (Zaragoza), and housing developments in Martiket (Navarre), as well as Torre Urzáiz and Los Huertos in Zaragoza province. This also helped to enable the evacuation of animals from multiple farms located in the vicinity of rivers.

Figure 9. Bridge over the Ebro where it flows through Gallur (Z).
Source: CCS.

Moreover, on an individual basis, in the context of self-protection measures, many of those affected removed vehicles from garages, moved out of businesses, cleared out lumber rooms or raised the furniture in their homes. The relatively high frequency with which these types of phenomena occur means that garages and homes still have high-water marks that show how far up the water reached in previous floods in the same way as those which can be seen in some squares and on bridges.

During the recovery phase attempts are made to bring a bit of order into this whole chaos. Top priority is work on getting rid of water and removing the sludge and detritus which the spate has left behind, followed by an initial estimate of loss or damage and undertaking the requisite planning to begin the recovery process. In this respect the CCS pays out the first indemnities just a few days after the flooding, being keenly aware of the importance of having some money kept aside to be in a position to restore any activity and return to previous normality as soon as possible.

As a result of these river overflows in late 2021, the CCS received approximately 6,200 claims for loss or damage to housing, 1,900 in relation to motor vehicles and 1,700 for assorted other risks (businesses, factories and civil works) which totalled almost 100 million euros in compensation.

Region	Recorded claim applications	Cost (in euros)
Aragón	795	9,306,066.87 €
Castilla y León	697	3,011,669.73 €
La Rioja	34	351,343.13 €
Navarra	6,184	71,894,309.37 €
País Vasco	1,893	15,324,811.43 €
Total general	9,603	99,888,200.53 €

Table 1. Number of claim files and cost.
Source: Own research.

These figures would have been far higher, above all as regards motor vehicles, had the authorities not issued warnings that enabled removal of them from the vicinity of the watercourses that were ultimately affected.

Handling this major volume of claims for loss or damage required the collaboration of 114 adjusters (who travelled in from across Spain) and 12 CCS territorial offices.

Given that this concerned recurring events, several of those affected had already been previously acquainted with the CCS and how it functions. This helps towards the inflow of claims being much swifter, which expedites their settlement. The downside of this is that such a situation calls for collaborating adjusters to perform a more in-depth study of claims since they have to check that the loss or damage claimed does not actually relate to detriment caused by previous floods.

All of these actions mentioned always leave room for improvement. We need to look into how effective and efficient dissemination of alerts and warnings is, from the point of issue all the way to potential victims. We should also examine potential enhancements to our ability to predict and regulate river spates, and finally we have to review the scope and coverage of insurance for damaged property.

Even though in many river basins there have been more serious floods in the past (Zaragoza or Miranda de Ebro were far worse hit by the water level rise on the Ebro in 2015, or San Sebastián during the floods of the Urumea in 2011 or 2015), the floods in Navarre marked historic records. Many flow volumes surpassed existing reading levels, leading to river discharges with return periods in excess of 40 years.

We have been able to observe how the flood maps for this event have turned out to be very similar to the flood risk mapping drawn up in the context of the associated plans for managing this particular risk. A good example is the map of claim files received by the CCS from across the La Rochapea neighbourhood in Pamplona (Figure 10), where we can note that most cases are in the flood area with a 50-year likelihood.

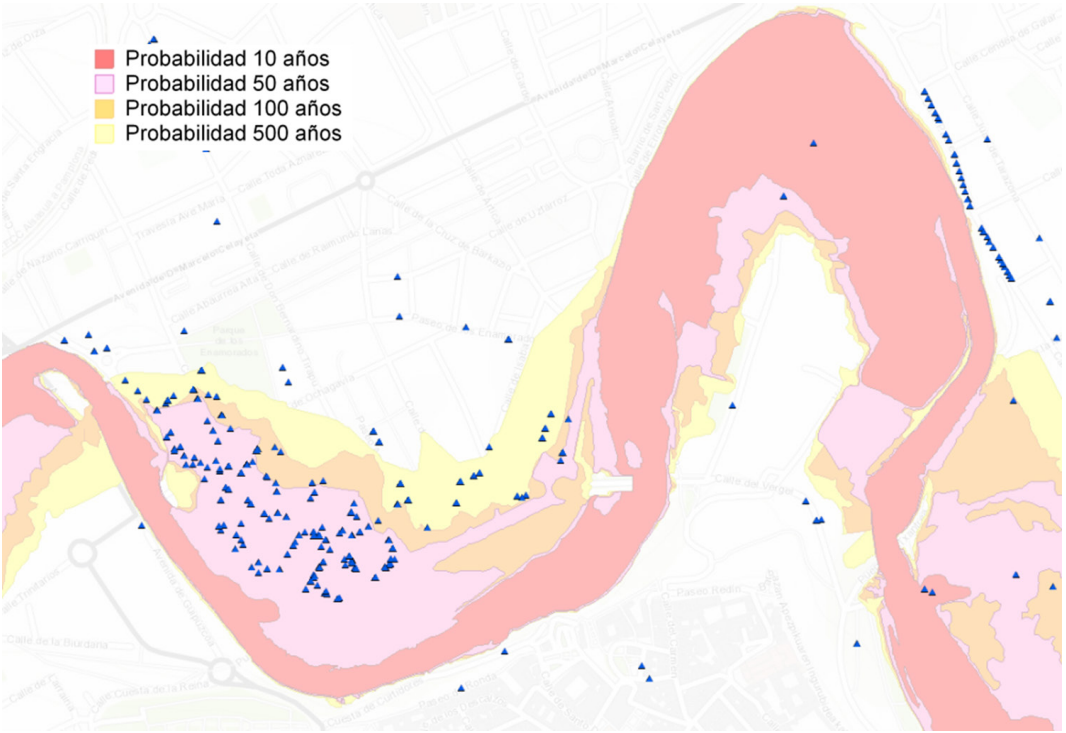

Figure 10. Claim files registered by the CCS and flood risk zones. La Rochapea Quarter, Pamplona.
Source: Own research.

And as a result, despite the efforts of government agencies, citizens and companies to keep damage down, the numbers for claims for loss or damage filed and indemnities paid out have marked a historic high, as the figures given illustrate (Table 2).

	Recorded claim applications	Cost (in euros)
Overflows of the river Ebro, Burgos		
January 2015	1,350	9,042,319.95 €
January 2019	627	3,640,576.32 €
December 2021	702	3,064,342.91 €
Overflows of the river Ebro, Zaragoza		
February 2015	2,802	25,311,413.12 €
April 2018	1,397	11,266,515.58 €
December 2021	799	9,183,269.38 €
Overflows of rivers in Navarre		
The Arga, June 2013	1,557	15,457,430.47 €
The Cidacos, July 2019	2,084	25,311,121.21 €
Arga-Ega-Bidasoa, December 2021	6,237	74,716,505.14 €
Overflows of rivers in the Basque Country		
November 2011	5,488	60,613,386.92 €
January 2015	1,420	7,061,403.87 €
Basque Country 2021	1,903	15,549,194.06 €

Table 2. Recent claims experiences across the Burgos, Navarre, Basque Country and Zaragoza area. Number of claim files and cost.
Source: Own research.

As we previously pointed out, generally speaking the flooding of December 2021 did not produce such a high volume of claims and pay-outs as had occurred previously in the same areas and due to the same causes.

If we compare the events of November and December 2021 with other recent episodes, we can see that, in the 2015 flooding from overflows of the river Ebro in Burgos and Zaragoza, double the claims for loss or damage were received at a cost of three times that incurred last year. In the Basque Country the previous flooding episodes, which were characterised by being located in specific basins and affecting a lot of riverside-based companies, led to almost three times as many claims as in 2021, at a cost of almost four times more.

In Navarre, however, the floods marked a historic high, outstripping those caused by the Arga in 2013 and the Cidacos in 2019 by a considerable distance, at a cost in compensation pay-outs of five times and three times respectively their counterparts on the latter two occasions.