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Hydromorphological characterization, assessment and monitoring in ephemeral streams: a case study in NE Iberian Peninsula.

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Ephemeral streams are an important reality in the Mediterranean area, constituting more than 50% of the channel network in the eastern region of the Iberian Peninsula. The northernmost cases are located in the semi-arid areas of the Ebro basin. Among the 592 cases registered (under the CCAMICEM project) in the Ebro basin, the Rambla de Cariñena stands out for its representativeness and dimensions.

With a basin area of 330 km², it drains the northern piedmont of Sierra de Algairén (Iberian Mountain Range). It is a temporary river in its headwaters and upper course (Frasno River), which becomes ephemeral (Rambla) in its middle and lower courses, where it forms a large gravel bed river morphology, until it disappears without flowing into any river. In the past, there are references, as well as geomorphological evidence, that it had surface flow, but intensive vineyard agriculture and the global change recorded in the last 50 years have transformed it in ephemeral.

Recent years have showed relevant flash-floods, such as in the springs of 2008, 2015 and 2018. Its geomorphological dynamics is very interesting, with a highly sinuous meander, formation and destruction of gravel bars in each flood, and some incipient signs of incision. The Rambla de Cariñena constitutes a remarkable case for analyzing climate and global change in this type of fluvial course, as it has been worked on in the CCAMICEM project.

In this project, different characterization, assessment and monitoring works have been carried out in recent years, applying river survey techniques such as field reconnaissance, analysis and geomorphological mapping using drone flights, and radioelectric tomography to observe the depth of the alluvium. The evolutionary dynamics of the Rambla de Cariñena has also been explained through a multi-temporal analysis using aerial images and LiDAR PNOA data with a density of 0.5-4 points/m² to model the current channel. And the IHG hydrogeomorphological index has been applied to observe its impacts and assess its ecological status.

All this work has result in a database which is a base to follow the evolution of these streams in the future, as well as a pilot research for these river typologies in the Ebro basin and the identification of symptoms linked to climate change.

Key words: river survey techniques, flash flood, channel dynamics, IHG index, Rambla de Cariñena