

# Using dendrogeomorphological evidence for flood magnitude and frequency estimates

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Dendrogeomorphology has been used since the 1970's in flood hazard analysis in fluvial systems worldwide. The response in the wood growth pattern and the botanic signs in riverine trees have it made possible to improve our knowledge of those geomorphologic processes, especially in those streams where there is not enough data regarding either rainfall and flow gauges or documentary sources. Nevertheless, until the present day, there has not been a single classification of the different types of dendrogeomorphological evidences and their potential usefulness to enable us to verify the spatial correlation of results obtained from the studies conducted in different geographic contexts. Because of this, after an exhaustive bibliographical compilation, based on the accumulated experience coming from those papers and our own fieldwork observations, a new classification of the dendrogeomorphological evidence has been proposed. This proposal classifies the evidences according to its spatial scale (from angstroms to kilometres) and the element studied (from cellular items to plant communities). In addition, a justified proposal of the potential usefulness of each piece of evidence (or combination of two of them) has been carried out, in order to estimate the frequency and magnitude of floods, both from a quantitative and a qualitative point of view. With regard to flood frequency, the dendrogeomorphological evidence provides valuable information about single past events (annual dating, even with seasonal precision), and their occurrence periodicity. On the other hand, magnitude estimates comprise the determination of the affected area by flood (extension), water depth, sediment load, flow energy, and event timespan. The proposed classifications and tables will provide beginner researchers with a unified nomenclature and an overview of the real potential of the application of these methods in flood hazard analysis. Keywords: Dendrogeomorphology, floods, riparian trees, flood frequency analysis, tree ring.