



## **Time Sequence on the Flash Flood Disaster in the Tsurugi River, Hofu City, in Japan**

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A rainstorm that hit Hofu city in Yamaguchi Prefecture, Japan on July 21st, 2009 caused flash floods or debris flows in many mountain streams around Hofu, claiming many lives and devastating downstream communities and the national highway. The authors investigated high water marks of the flash flood or debris flow after the devastating rainstorm and interviewed the eyewitnesses that were present during the disaster in order to determine the time sequence of the phenomenon that occurred in one mountainous torrent, the Tsurugi River. The results of the survey conducted so far suggest the following; 1) The peak discharge estimated from the high water marks is around 30 to 69 m<sup>3</sup>/s at the investigated cross section just downstream of the sediment control dam. It was consistent with a peak discharge value obtained by simple runoff analysis. 2) On the other hand, the estimated peak discharge was much larger than that obtained through the runoff analysis. This is probably because of the influence of the debris flow or hyper-concentrated flow from the tributaries downstream of the sediment control dams. 3) The flood discharge from the Tsurugi River to the national highway suddenly increased at the last moment of the rainstorm at 12:30. At the same time, the ponding behind the bridge of the highway seemed to occur. 4) Blocking of the river flow at the bridge hadn't occurred until around 12:00. However, it probably occurred at around 12:30 due to the occurrences of the debris flow or hyper-concentrated flow from the tributaries. These findings infer that the river channel of the Tsurugi River had succeeded in draining flood runoff until nearly the end of the rainstorm. At the last moment, however, occurrences of the debris flow or hyper-concentrated flow from the tributaries might result in the clogging of the bridge and the inundation.