Utilization of computational intelligence approaches to estimate the flow coefficient of labyrinth weir

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Contemporary hydrological studies noted a significant increase in floods' peak flows intensity compared to those originally-predicted. This increase is due to several factors, including the human factor, soil urbanization, and the impact of climate change. One of the consequences of increased flood flows on existing dams is the flooding of the spillway, which directly affects flood evacuation. The search for solutions to increase the capacity of these spillways has revealed that non-straight spillways provide effective solutions. Several experimental studies and numerical simulations have been conducted to better understand the flow phenomenon on the non-rectilinear labyrinth-type weir, and to validate the effect of different geometric parameters on the weir's performance, as well as to improve its geometric configuration and the development of empirical relations for the discharge coefficient calculation. However, only a few studies on the labyrinth spillway under submerged flow conditions have been conducted using artificial intelligence techniques. The objective of this study is to develop a model based on neural networks that can predict the flow coefficient of the labyrinth weir. To accomplish this, we used the results of Belaabed and Ouamane's (2011) experimental study as a database for both learning and validation of the neural model. The neural model produced satisfactory results with tolerable errors.