Restoration of channel meandering using current deflectors

Yuan Pi, Chia-Chun Wu , Yen-An Cho , Chao-Wei Zhang

*National Pingtung University of Science and Technology,*

*Pingtung, China*

**Abstract：**

After intervening by means of control measures for either disaster mitigation or waterway management purposes, the migration of aquatic organisms is often hindered, which deteriorates aquatic habitats. Therefore the objective of this research is to restore meandering in straight channels using series of current deflectors with least environment disturbance.1:50 scaled models of current deflector groups consisting of three deflectors per group, with different axial lengths and submerge inclinations, were implemented in a hydraulic flume at mobile-bed settings. Twenty-seven experiments were carried out with the combinations of three water levels (low, medium, high), three channel slopes (2%, 1.3%, 0.5%), and three distinct current deflector group spacings. Digital elevations of the channel bed before and after each experiment were scanned using high resolution laser range finder. Flow depths at selected cross sections as well as Particle Image Velocimetry were deployed to log the depth variations and that of the surface flow velocities.Sinuosity indices at different experiment settings were analyzed afterwards.As results we reach the conclusion that current deflectors are capable of creating passive meandering in a straight channel within the scope of hydraulic experiments, which help restores the channel morphology. Spacing of the current deflector groups alters not only the flow regime but also the flow inertia, whereas the flow inertias are affected by flow discharges and channel slopes. We found that channel slope dominates morphology restoration over current deflector group spacing and flow discharge. Sinuosity index is negatively correlated to deflector group spacing and flow discharge when slope is set at 1.3% and 2.0%, but is positively correlated when channel slope is at 0.5%. By altering the current deflector group spacing we are able to create passive meandering in a straight channel reach with the maximum sinuosity index of 1.073