

# Case Study: The Bridge of Sustainability

Category: Galvanizing, Sustainability

Source: Galvanizers Association



For years, children in a Chinese community divided by the River Po – a tributary of the Yellow River – had to cross the river on a precarious single-log bridge: built on pillars of straw, rock and earth. Among the many accidents, a mother and child were swept to their deaths on the journey to the school on the other side of the waterway from their homes.

Nearly 400 primary students in Maosi village, Gansu province, attend four cave schools on both sides of the Po River, which freezes in winter and can be a raging torrent during summer monsoons, according to Professor Edward Ng Yan-ynug of the Department of Architecture at CUHK, who came across the community and their problem during field work to study the thermal properties of cave dwellings in the area.

This means students do not go to school from November to February for fear of falling into the freezing water and between May and August because the river is flooded.

To make life easier and safer for children and parents, a group headed by professor Edward Ng have designed a special floating footbridge, the project – “A Bridge Too Far” – is part of a campaign to improve education facilities for the local population. Professor Ng said the original plan was to build a submersible bridge, but the forces of nature proved to be a stumbling block. “We are trying to build a cheap and simple bridge for the villagers that can be easily maintained”, Professor Ng said.

Students and professionals came up with the solution – the 80-metre Wu Zhi Qiao (bridge of sustainability). The structure, which cost just \$300,000 to build, was designed to use mainly natural local materials, to be maintained by the villagers and copied for other bridges.

The UK engineers Anthony Hunt, famed for the Eden Project, helped with the initial conception of the design. The bridge needed to be cheap, simple to construct, not be swept away by annual floods and be easily repairable by the villagers.

The solution was to construct piers without foundations but fastening pins to attach them to the riverbed. The piers are shaped to minimise resistance and form gabions with sufficient weight so as not to be swept away. The bridge deck consists of a galvanized steel frame, which is in-filled with bamboo planks to form the deck. The bridge is designed in small sections with handles so that each section, if detached, can be easily put back by six villagers. The other intriguing feature of the Zig-Zag design of the deck is to conform to the traditional Chinese belief that evil spirits cannot turn corners but conveniently adds structural integrity to the design.

About 50 students from Hong Kong and 30 from Xian, took five days to build the bridge, working alongside villagers. The galvanized steel bridge has already withstood a flood that submerged the whole structure.