

The impact of Typhoon Morakot on the southern Taiwan coast

By

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Taiwan is a relatively small island but with an extremely steep topography. On the east coast, the mountains rise straight out of the ocean, but for three main coastal plains in Taitung, Hualien and Ilan (Fig. 1). In August 2009, the east coast and southern parts of Taiwan were severely affected by Typhoon Morakot, in particular some areas the author visited a number of times between 1995 and 2008 (Chanson 2007, 2008, 2009). Typhoon Morakot was the deadliest typhoon that impacted Taiwan in recorded history. It bore down on the island on 7 August 2009 as a Category 2 storm with winds of about 160 kilometres per hour (or 85 knots) and moved slowly northwest across Taiwan. The storm produced an enormous amount of rainfall, with 2,855 mm recorded at Alishan between the early morning of 6 August and 5 a.m. on 10 August (Li and Chang 2009). The large runoff volumes together with the steep topography led to numerous landslides, debris flows, and floods, with devastating consequences. The storm continued and reached the shoreline of southern China on 9 August 2009. Typhoon Morakot produced some catastrophic damage in Taiwan, with more than 675 people dead and 24 others missing (Executive Yuan 2009) and roughly US \$3.3 billion in damages (source: United Nations' Office for the Coordination of Humanitarian Affairs UNOCHA).

One of the worst affected areas was the Taimali River valley and the Taimali township in Taitung County (Fig. 1). About 12 km long, the river has a steep gradient until it reaches the Pacific Ocean next to the Taimali township. In dry periods, the river mouth may be intermittently closed, as with many small rivers on the east coast (Chanson 2009, Fig. 5). During the Typhoon Morakot flood, the river broke its banks in the lower reaches

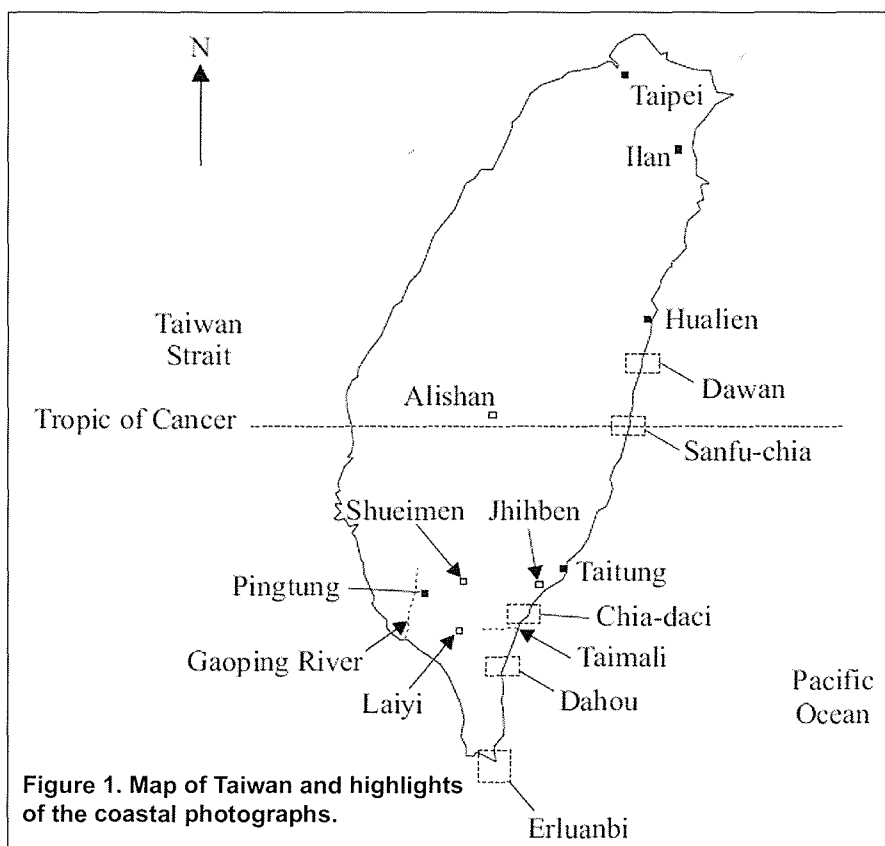


Figure 1. Map of Taiwan and highlights of the coastal photographs.

and widened considerably its river bed, covering townships and farmland. Figure 2 presents an aerial view of the river mouth shortly after the typhoon. It shows the damaged bridges (top) and the nearly 2 km wide river mouth.

Another affected area was the Jhihben (or Zhiben) township on the Jhihben River, just 5 km upstream of the river mouth, south of Taitung city. The area is a touristic region well known for its hot-springs. The collapse of the Jinshuai (or King Shai) Hotel into the Jhihben River was shown on television worldwide (Fig. 3). The hotel was located in the outer bend of the river behind the river bank levee, the main road, several stores and a parking (Fig. 4A). All were washed away when the river scoured its outer

bank and, later, the building foundations. The hotel building fell like a monolith on 9 August 2009 (Fig. 3, bottom). Figure 4 shows some photographs of the river taken in 2006 and showing the hotel building. The author drove in front of the Jinshuai Hotel in December 2008 and little had changed since 2006.

In December 2008, the author visited a number of other affected areas, including the Gaoping River bridge linking the Linyuan to Xinyuan townships at the boundary between the Kaohsiung and Pingtung counties, and several catchments in Pingtung County where the rivers flow into the Taiwan Strait. For example, he visited the areas of Sandimen and Laiyi, both of which were severely affected by the Typhoon Morakot. Fig-



Figure 2. Photograph of the Taimali River mouth on 12 August 2009 (courtesy of Satellite Imaging Corporation). Note the devastated Taimali township on the right and the damaged railway bridge (top), and road <42> bridge (just beneath), as well as the airfield on the bottom left. From left to right, the distance is about 2.3 km.

ures 5 and 6 present some photographs highlighting the large amount of sediment materials transported during the previous floods. Figures 5A and 6 illustrate also the steep slopes of the catchments.

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Figure 3. Photographs of the collapse of Jinshuai Hotel in the Jihben River (Taitung county) (courtesy of <http://www.boston.com/bigpicture>). Top: Shortly before the collapse; bottom: building collapse on Sunday, 9 August 2009.

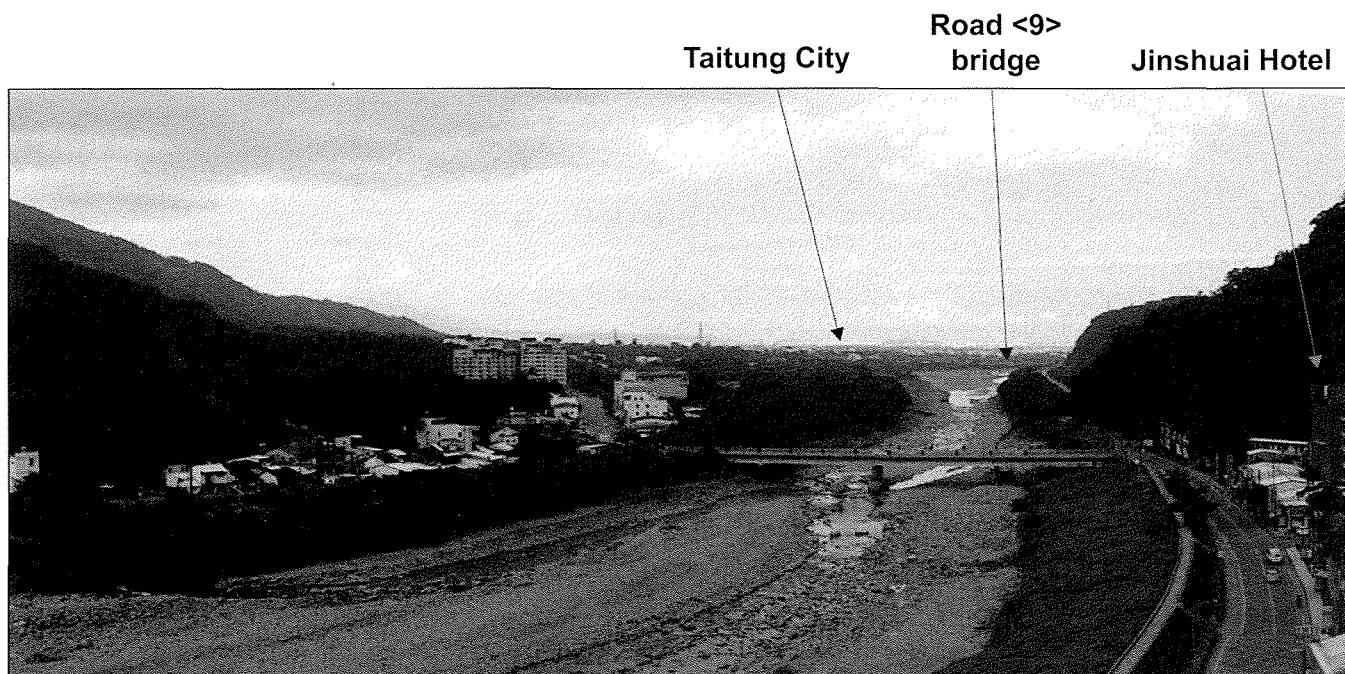


Figure 4. Photographs of the Jhihben River (Taitung county) prior to the Morakot Typhoon. (A, above) Jhihben River at Jhihben township looking downstream on 21 November 2006. The Jinshuai Hotel is the dark red building on the far right. (B, below) Jhihben River, looking upstream with Jhihben township in the background on 22 November 2006. The photograph was taken on the Road <9> bridge located 2 km downstream of Jhihben township.

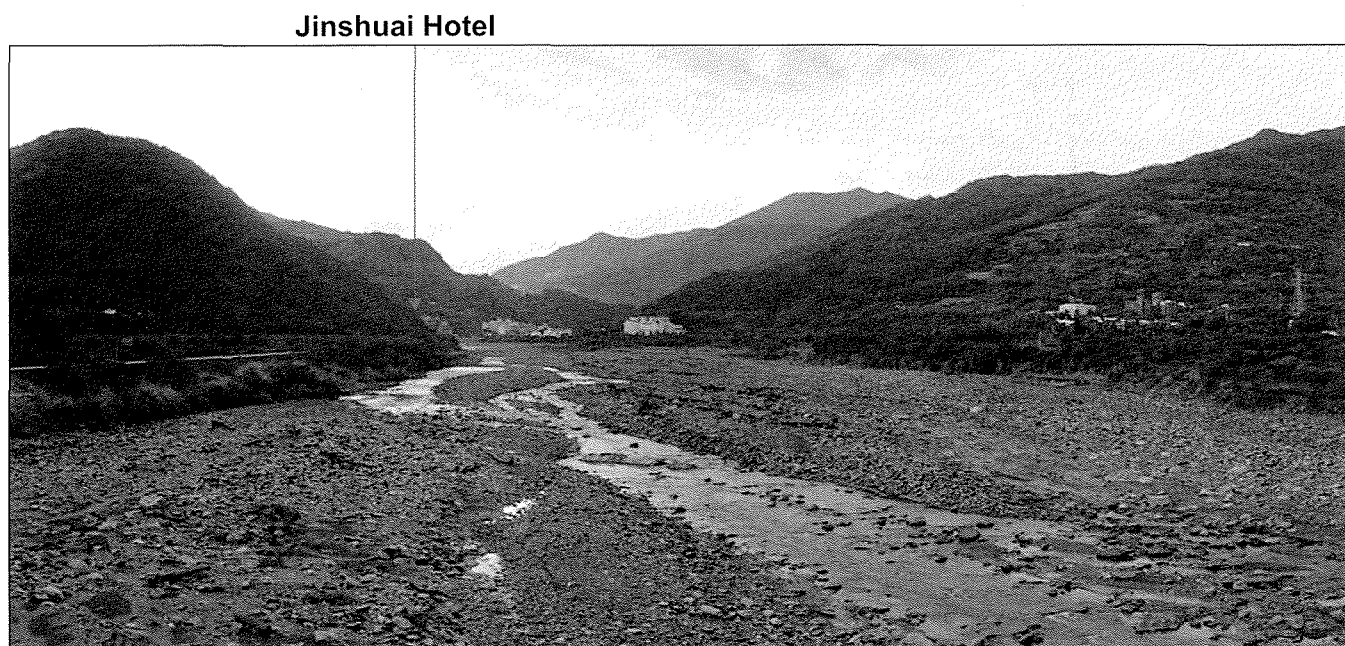


Figure 5 (opposite page, top). Photographs of the Ai-lia-ci River at Shueimen township (Sandimen, Pingtung county). (A, top) Looking upstream on 16 December 2008 with Shueimen township (on the right) and the two road bridges (in the middle). Note the huge amount of bed load material in the river bed and the recent landslide in the mountain in the background. (B, middle) Looking downstream on 22 December 2008 at Shueimen, with the township on the left and the bridges in the background. The children in the foreground give the scale of the sediment load and debris left after the last flood.

Figure 6 (opposite page, bottom). Photograph of the Lai-sheu River at Lai-yi and Danlin (Pingtung county) on 16 December 2008, close to the intersection of roads <185>, <112> & <110> - Looking upstream, note the sediment materials on the river bed; some river bed rocks were more than 2-3 m high.

