

Morphology of the Vaiont Valley: the first clues of the paleolandslide

2 - The north slope of Monte Toc from the north side of Vaiont Valley, with the ancient landslide mass in the middle ground and on-going construction on the dam

Photo Edoardo Semenza, 1 September 1959 | from Le foto della frana del Vajont - GS_27



Bedding layers in the Vaiont Limestone in the foreground dip regularly to the east.

In 1957, the year in which construction of the dam began, Italian engineers were not required to evaluate, based on a geological report, the stability of slopes in relation to future reservoir operations. Rather, the legal constraint that was enshrined in Italian legislation up to 1959 only required that the stability of the dam abutments and the permeability of the reservoir, including the abutments, had to be considered. The geological report on which the Vaiont Dam was based was prepared much earlier, in 1948, based on earlier preliminary reports, by Professor Giorgio Dal Piaz, probably the most important Italian geologist of his era. Over the next decade, this report was revised and augmented. Notably, in 1958 Dal Piaz wrote about the Pian della Pozza area and concluded that it showed no “surficial signs by which one could recognize the presence of ancient landslides”.

3 - The north slope of Monte Toc from Casso

Photo Edoardo Semenza, 1 September 1959 | from Le foto della frana del Vajont - GS_26



The control cabin of the dam can be seen at the lower right. The slope is bisected by the Massalezza Stream. To its right, in the center of the photograph, are the Pian del Toc (smaller) and Pian della Pozza (larger) plateaus.

The two sets of dashed lines indicate the upper margin of the ancient landslide: the lower line shows the hypothesis of Edoardo Semenza in 1959; the higher line was based on the results of drillholes and his surveys in the summer of 1960.

He recognized the ancient Pineda landslide, not dangerous, but he stated the possible occurrence of only small landslides on the slopes above the proposed reservoir; he did not recognise the large ancient landslide and accordingly could not foresee the colossal landslide that would occur five years later. Had it not been for this geological mistake, the project might have been blocked and the dam not constructed.

4 - The depression of Pian della Pozza, seen from the east

Photo Edoardo Semenza, August 1959 | from Le foto della frana del Vajont - GS_50



This feature is a downward fold in sedimentary rocks, which geologists term a syncline. It had long been interpreted as a doline, which is a solution cavity in limestones.

In 1959, Edoardo Semenza hypothesized the presence of the upper margin of the ancient landslide at the height of Pian della Pozza (see figure 3).

On March 22, 1959, a landslide occurred in the nearby hydro-electric basin of Pontesei in the Zoldo Valley, which was also owned by S.A.D.E. (Società Adriatica di Elettricità). This event raised concern about the stability of the Vaiont slopes and convinced Carlo Semenza, the engineer who designed the dam, to entrust Leopold Müller to evaluate the conditions of the future reservoir. In July 1959, they commissioned Edoardo Semenza to undertake a detailed geological study of the Vaiont Valley. The first results of his surveys were presented to the dam designer at the end of August 1959. A colleague, Franco Giudici, worked later alongside Edoardo, and their final report was presented to S.A.D.E. in June 1960. Semenza and Giudici concluded that an ancient landslide mass, 2 km in width and of considerable thickness, was lying on the north slope of Monte Toc. They also argued that this huge mass had blocked the Vaiont Stream in prehistoric times and could move again with the creation of the reservoir.