

**Model of water leakage beneath reservoir and above diversion water tunnel;  
Mae Prachum reservoir area, Mae Taeng, Chiang Mai Province**

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**Keywords**—model of water leakage, geological observation, geophysical modeling, analysis of discontinuity

**ABSTRACT**

Intuitively, climate change causes Mae Kuang reservoir facing a drought problem for decades. To address the issue, a diversion tunnel project of twenty-three kilometers in length is being built for conveying forty-seven million cubic meters of water per year from Mae Ngad to Mae Kuang reservoir. While a tunnel was being constructed beneath a small-scale reservoir, Huai Mae Prachum, the storage water level in the reservoir rapidly drew down and a large amount of water flowed into the tunnel conduit in the meantime. In order to develop a leakage model, three main methods are performed in this account, geological observation, electrical resistivity imaging (ERI), and orientation analysis of discontinuities.

According to geological observations along Huai Khun Mi, an intermittent stream located near the eastern rim of the reservoir and nearly above the tunnel route, many rock exposures show evidence of opened joint, fracture, cavity, and associated fold structure. They are interpreted as the channel that water flowing out of reservoir (Fig. 1). Result of ERI modeling (Fig. 2), covering reservoir floor, clearly reveals anomalous bodies of low resistivity, interpreted as a channel of water from the reservoir above, which leaked down to the tunnel conduit below. In subsequent, combination of stereo plots of plane of bedding, joint, and fault, clearly shows the average direction of north 27 degree to west and dipping angle of 63 degree to west, which is interpreted as the opening channels that water flowing into tunnel conduit under the reservoir area.

As results, the treatment of tunnel is preliminary conducted. After grouting intact rock around the conduit with suitable method, the problem of water inflowing is solved. The treatment of the reservoir floor will be the next step to make a remediation. To the present day, it is under designing work by a design engineer.

**SUMMARY**

1. Water leaks out from Huai Mae Prachum reservoir and flow down to subsurface.
2. Geophysical model reveals pathway of water from reservoir above to tunnel conduit below.
3. The combination of geological observation, geophysical modeling, and discontinuity analysis efficiently creates the model of water leakage at the reservoir area.

**REFERENCES**

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Fig. 1. Rock exposures at Huai Khun Mi, showing opened joint, fracture, and cavity (white), associated with fold structure (red) as channels that water outflowing from reservoir.

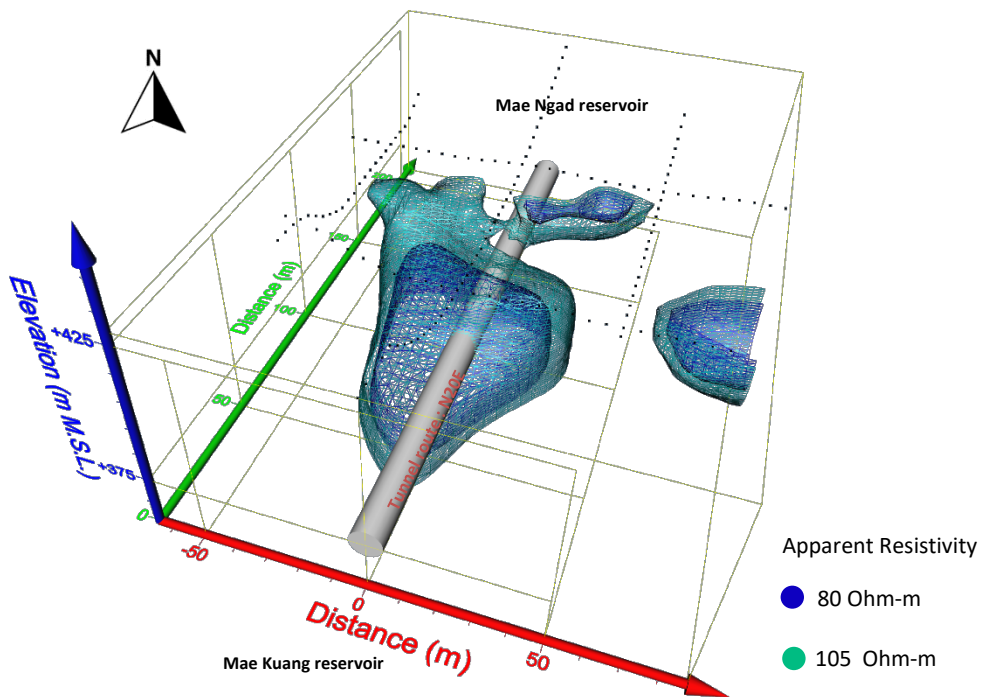


Fig. 2. Model of water leakage by using electrical resistivity imaging data.  
 Note : Tunnel direction = N20°E, scale X:Y:Z = 1:1:1