

The aim of this project is to study the anthropogenic seismicity induced by the filling of water reservoirs and the assessment of the risks related to this activity.

This anthropogenic seismicity explores the phenomenon of seismicity induced or triggered by human industrial activity. Thus, induced seismicity release seismic energy introduced by human activities, into the rock formation; while triggered seismicity are those events, where tectonic energy release is triggered by human activity. This is a special situation when the seismicity is shown to be associated with water reservoirs. Among all earthquakes accompanied by human activities, this type of seismicity causes the strongest earthquakes. In contrast to the natural seismic activity, which is practically static, anthropogenic seismicity varies with time and there are dependencies between the seismicity and human development activities. The anthropogenic seismic activity also depends on the tectonics of the area and the natural seismic processes existing there before humans came there with development. Unfortunately, very often a complete seismic survey begins when noticeable earthquakes appears, which occurs after the seismic processes have reached a maximum.

In Vietnam, such measurements had started before the reservoir in Lai Chau was filled up. It will allow exploration of the natural seismicity, which exists in the area of the future dam, and then determine the development of anthropogenic seismic activity associated with the impoundment of water in the reservoir. Measurements will be conducted by a dense seismic network consisting of 10 seismic stations located within 20 km from the reservoir. This area is characterized by tectonic seismic activity, therefore there is a high probability to collect appropriate material to study the anthropogenic seismic activity. Further measurements will continue in the region of Song Tranh 2, where joint Vietnamese-Polish seismic network recorded more than 5000 seismic events. The improving of the location of events and more accurately determination of the focal mechanisms are the main goals for this region research. This will be possible due to the development of the velocity distribution of seismic waves in the region.

The cooperation with local seismic team will allow us to implement modern seismological methods, such as investigation of seismic source mechanisms, correlation of events with tectonic faults, or changes of static stress. Time dependent results of measurement in Lai Chau and Song Tranh 2 will be correlated with geological data and technological data related to changes in the reservoir level. We will test the new concept of a reservoir impoundment corresponding to an aseismic (slow earthquake style) main shock. In such case, the anthropogenic seismicity is treated as the aftershock sequence. The study of stationary and time-dependent seismic hazards associated with the reservoir will explore the possibilities of assessment and mitigation of seismic hazard.