

## 1. TITLE OF PROJECT

RESEARCH ON POTENTIAL GEOHAZARDS RELATING TO THE PROCESS OF URBANIZATION IN THE WEST AREA OF HANOI CITY

## 2. AUTHOR

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## 3. RESEARCH RESULTS

### 3.1. *The goal of the research*

Identify potential geological hazards (land subsidence, sinkholes) related to the process of urbanization in the Western area of Hanoi (Quoc Oai district and region adjacent) and proposed prevention measures.

### 3.2. *Methods:*

Synthesize, succeed method; specialist; survey in fields and model method.

### 3.3 *The main result:*

Geotechnical conditions in this area included many old rock and Quaternary sediment, they are different about origins, characteristic, limit of deformation, the distribution and relationship is very complex. Especially, there is a soft soils layer, very high deformation and non-continuously distributed. Most of bedrock are limestone with high fractures, there are many underground karst.

- The potential geological hazards associated with the process of urbanization in the area as the sinkholes with rapid pace creating sinkholes destroying, damaging buildings and slowly sinking and creating cracks on buildings.

- Results of research had forecast to areas with high risk, and calculating the subsidence under various scenarios. Calculation results have shown that where distribution the soft soil layers has been and will be sunk, high sinking if excessive exploitation of underground water which is not limit and control. The results observed in satellite imagery with SAR interferometry technology also gave similar results. The main causes leading to the formation of hazard due to urbanization rate increased, the demand for groundwater extraction has increased rapidly.

The prevention measures to minimize damages were based on the principle of minimizing the direct causes and indirect causes of hazards include:

#### **1. Prevention of subsidence due to groundwater extraction**

- Using surface water instead of groundwater and save water,
- Investment sync of fresh water system,
- Propagandize, advocacy to raise awareness of water saving.

#### **2. Prevention of subsidence associated to collapsed cavity**

- Improving the quality of the geotechnical investigations
- Closely supervise in geotechnical investigations and in the constructions process.

### **3. Prevention of ground subsidence due to construction**

Using rational foundation solutions for the constructions, compliance of survey processes before design, alerts of geohazards potential and encourage people apply science and technology to the construction.

### **4. The ability and the application results**

- Products of project contributing to making scientific foundations forecast and prevention of potencial geological hazards in the process of urbanization.
- Raise awareness of the communities people, where were ocured damage in the process of urbanization.
- The results of project will help agencies manage state suitable solutions to manage human activities, rational exploitation of the territory.