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Employing open-source applications to develop a WebGIS for landslide inventory and early warning in Vietnam

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Under the rapid improvement of Web technologies, updating historic events as well as broadcasting urgent information through the Web browsers have been recognized as one of the most efficient and fastest ways in many places. However, developing a simple online spatial database (so-called WebGIS) to serve a systematic inventory and early warning of landslides is still a time-consuming task and requires funding that has been considered as an obstacle for developing countries.

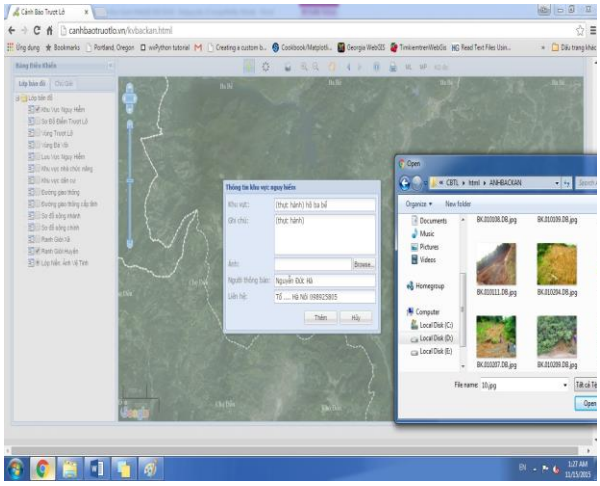

Figure 1: An interface of the developed WebGIS to update urgent landslide events through the participation of local communities

This study aims to employ open-source applications to develop a national WebGIS on landslides, with a special design for users with different backgrounds, especially those involved in activities of landslide inventory and early warning. The system is structured by three layers: (1) A data layer is built by employing the Spatial Database Management System of PostgreSQL-PostGIS, in which PostgreSQL is used as intermediate means of transfering data and runing utilities from and to GeoSever; PostGIS is used to support the visuallization/creation/ manipulation of spatial/geographical objects for high performance of many users; (2) A utility layer consists of a MapServer, which employs GeoServer to connect all available geographical information to GeoWeb for sharing, editing and visualizing them to the users; and a WebServer, which employs Apache to receive and analyse all demands of users and render them with information results; (3) A visualization layer employs OpenLayers as a JavaScript library to provide a set of operating demands to the users for manipulating and visualizing any maps in most of Web browsers.

The developed system can be seen as an uncommercial model since that uses PostgreSQL-PostGIS GeoServer-Apache and OpenLayers as free software. Although they lack some utilities, those applications are simple, fast and least fund-consuming, thus, feasible to employ, especially in many organizations of the developing countries.

The result of this study is an online spatial database, which includes maps of landslide inventory, controlling factors and susceptibility zonation at 1:50 000 scale for all the investigated provinces. The system has been extensively used by the local communities as a tool for landslide inventory and early warning. They have been requested to be involved in the State-funded Landslide Project for updating

the landslide inventory database (especially for enhancing the missing information of historic landslides) and promptly describe the new landslides or warning of the hazards. All provided information will be then utilised to inform the local authorities and communities about real situations, and improve the capacity of scientific research as well as the effectiveness of disaster prevention and mitigation in the mountainous areas of Vietnam.