AvH8-66
8th Alexander von Humboldt International Conference
Cusco, Peru, 12 – 16 November 2012

Disaster prevention in Saphy Street and Main Square of Cusco

C. Fernandez-Baca-Vidal
Universidad Nacional San Antonio Abad del Cusco, Perú (cfbv77@yahoo.es)

The Saphy creek is the output of a sub basin that flows into the valley of Cusco city, capital of the Inca culture. It is 1.5 Kilometers long and leads directly to the Main Square of the city; its slopes are very steep and have a history of frequent landslides. In normal conditions water and drag materials pass naturally by the river and the closed channel that crosses the entire city. The growth of the city has changed the nature of the creek, vegetation of the upper fields of the basin has been lost by the urbanization processes, the runoff ratio has increased due to the covering of the soil with flooring and ceilings, concentration time has been reduced by straightening natural water courses building ditches, canals and pipelines, great part of the river has been channeled at the final stretch. The risk of landslides has increased with this intervention and the likelihood of damage in the city has grown. The worst case scenario is a landslide that may dam the river Saphy resulting in to a violent flood of mud and stones that would affect a large segment of the city, with buildings of high historical value of stone and adobe that are currently housing and commercial dwellings and important public buildings.
This presentation shows various stages of the study and intervention of the Saphy creek. It also shows the cultural heritage that is threatened in this sector, including the University Auditorium where this conference develops. It presents evidence of works of stabilization of Inca culture, the changes in republican period and the recent interventions to the creek. Regarding this, some are found to be harmful to the security sector, like the construction of the municipal camp. In recent years some actions were taken to improve the security of the creek by Works of stabilization and mitigation of disasters. This works, consists in dykes for solid drag materials in the river, hydraulic speed bumps, protective walls at the foot of the slopes and shape modification of them.
In reference to the stability of slopes, a simple methodology of analysis with progressive failure called step by step is described. This method allows the estimation of the consequences of the combined phenomenon of Lad Slide-damming –flood. The results of this analysis are discussed in relation to the kind of Works to be recommended.
This paper also describes the design of some work of stabilization that are already carried out and the monitoring process undertaken. The current state of the structure is also discussed and the works that are still necessary to achieve an acceptable security state in the gorge are discussed.