



Effectiveness evaluation of flood defence structures in different geomorphological contexts

Stefano Morelli, Veronica Pazzi, and Riccardo Fanti

Department of Earth Sciences, University of Firenze, Firenze, Italy (stefano.morelli@unifi.it)

The flood risk in different geomorphological contexts of two less developed countries are investigated in order to evaluate the efficacy of the existing flood defence structures. In particular, a recent floodplain crossed by a wide meandering river and a narrow mountain valley flowed by creek with a torrential regime have been chosen for such analysis in North Albania and central Mexico, respectively. Both areas have been affected by disastrous floods in past years with considerable damages to properties and people. Some safety countermeasures have been performed over time, even if in a non-systematic way. For this reason, the current inclination to flood risk was assessed by means of a freeware software designed to perform one-dimensional (1D) hydraulic modelling for a full network of natural and anthropic channels (HEC-RAS software by Hydrologic Engineering Center River Analysis System). This new analyses take into account: i) the natural morphological variability along the river path, ii) the anthropic interventions on the fluvial dynamics, iii) the landscape appearance after the soil exploitation in the past years, and iv) all the changes induced by an exceeded informal urbanization. The reconstruction of the river and bordering areas geometric data was carried out according to the physical characteristics of the local environment: a bathymetric survey and near-river DGPS acquisitions for the open spaces of the Albanian floodplain, and traditional topographic methods for the highly vegetated Mexican valley. In both cases, the results show that the existing works are, on their own, poorly efficient in containing the predictable floods. Albanians levees seem underdimensioned, while the channelling works are too narrow to contain large amounts of water and solid transport as typical of the Mexican study area. Evidently, a new territorial planning is required in these areas, and some projects are now in place. However, it would be desirable that local authorities were profitably inspired by the criticalities here mentioned.