



A Hydrological Risk Transfer Assessment under Changing Conditions in Brazilian Watersheds Context

Diego Alejandro Guzman Arias (1), Guilherme Samprogna Mohor (2), and Eduardo Mario Mendiondo (3)

(1) Faculty of Civil Engineering, Pontificia Bolivariana University, Bucaramanga, Colombia (diego.guzman@upb.edu.co), (2) Institute of Environmental Science and Geography, University of Potsdam, Potsdam, Germany (guisamor@gmail.com), (3) São Carlos School of Engineering, the University of São Paulo, Department of Hydraulic and Sanitary Engineering, São Carlos - SP, Brazil (e.mario.mendiondo@gmail.com)

Both global changes and the growing vulnerability of urban areas to hydrological risks, show the need for implementing additional strategies for the integral management of water insecurity. Even though different objects may be differently affected by the same hazard, more than one hazard may hit objects in the same watershed and bring damage to the overall community. Risk transfer tools, such as insurance, have emerged as an effective strategy to ensure economic resilience at diverse socio-economic levels and productive sectors. Through the coupling of a risk-based insurance fund model, the Hydrological Risk-Transfer Model (HRTM-SHS), with socio-natural driver's projections, one can evaluate the actuarially fair premium value against either urban floods or hydrological droughts. The insurance mechanism in this model is based on a multi-year contract scheme (MYI) where the damage cost evaluation uses a "what if" approach at the watershed scale. The framework has been applied for both a real case with changing conditions of flooding and a scenarization of water scarcity in Southeast Brazil. With the risk-based model, we could assess the impact in the optimized premium of both climate and land use changes, as well as socio-economic scenarios of water demand. This approach is useful to evaluating the financial recovery mechanisms solvency post-disaster limited to insurance markets with low penetration and limited information. It is expected that a diversification of risk coverage and MYI would lead to more stable insurance funds. Additionally, it supports the planning of financially resilient environments to face of water hazards impacts under susceptibility scenarios.