Hydro-meteorological hazard analysis for new settlements framed in the Colombian peace process

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THE COLOMBIAN CONFLICT

The 52-year armed conflict between the Revolutionary Armed Forces of Colombia (FARC) and the Colombian Government, officially ended with a peace agreement in 2016. This military conflict has caused a significant loss of life and weakened the country.

The FARC guerrillas who signed the peace agreement with the Colombian Government decided to lay down his arms and to start a reintegration into Colombian law. One important element of the peace agreement was the definition of areas within the Colombia territory, where they started to concentrate in order to guarantee the full incorporation into civilian life. The FARC members were located temporarily in some specific and small territories along the entire country. The Colombian government is implementing the conversion of the those into permanent settlements following the current regulation related to land use planning in Colombia.

There are 24 locations prioritised where FARC members are living. Those locations show different topographic, climes, culture and hazard characteristics. For the building of the permanent settlements is needed a complete hazard and risk assessment study to establish the adequate place where those settlement will be located. The current study correspond to the hazard, vulnerability and risk assessment for 5 out of the 24 locations.

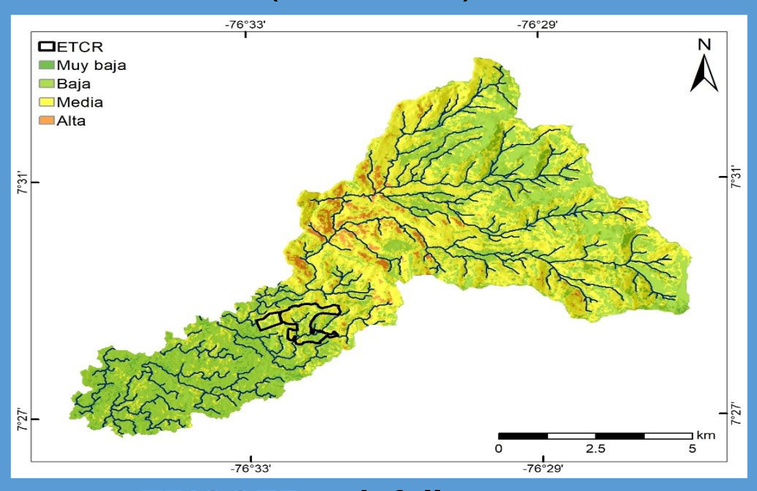
ETCR Llano Grande – Dabeiba – Antioquia - Colombia

DATA & METHODOLOGY

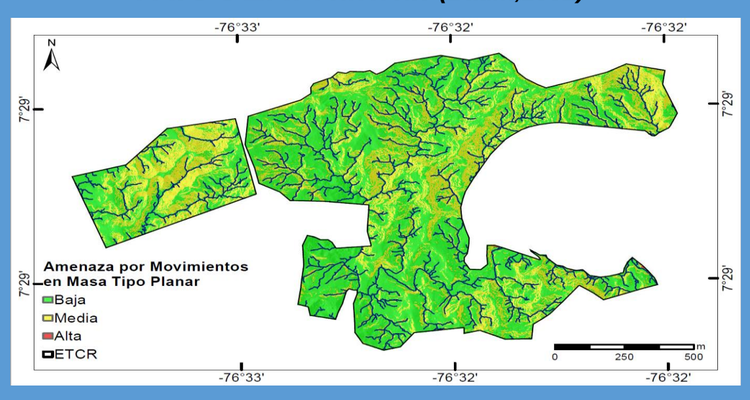
The multi-hazard and risk assessment was carried out using a regional (10-m resolution) and detailed (0.5-m resolution) area. Different methods were implemented for hazard mapping at a regional (1:25,000) and local (1:2,000) scales. For the regional scale statistic and heuristic methods were carried out, whilst for the local scale physically-based models were applied. The methodologies described focused on the evaluation of the probabilities of occurrence of different hydro-meteorological hazards triggered by rainfall and earthquakes.

LANDSLIDE

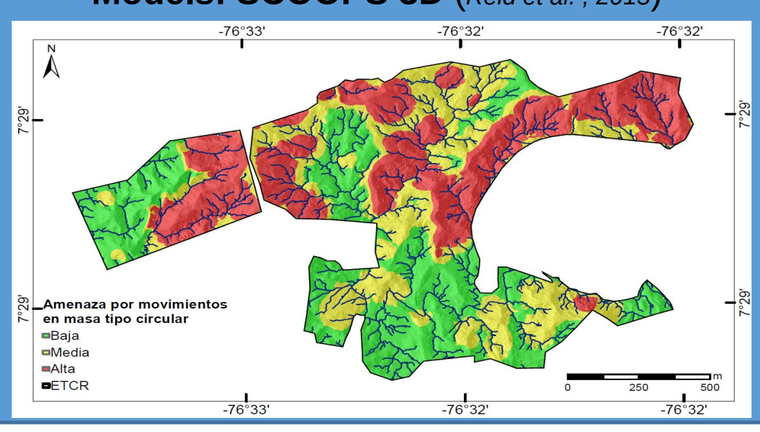
AHP (Saaty, 1980) , **WofE** *(van Westen, 2013),* **LR** (*Atkinson, 1998*)



TRIGGER: rainfall ***(Baum,2002)***



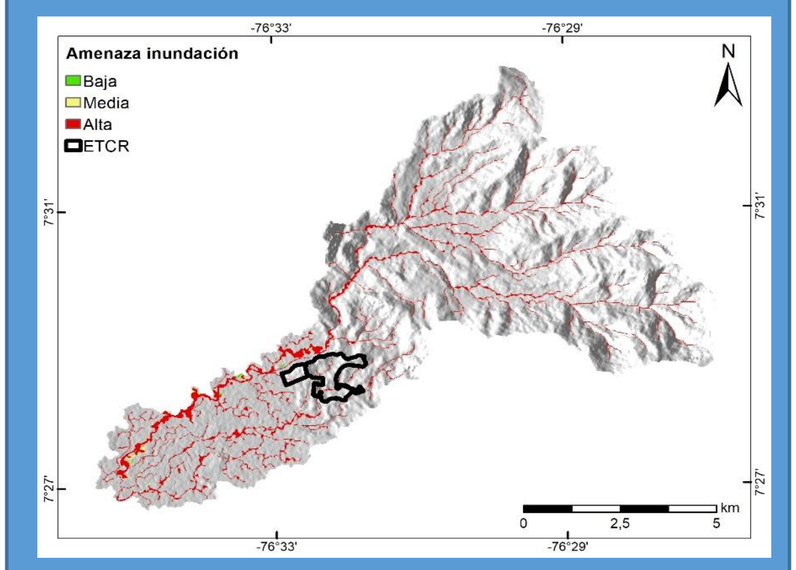
Models: SCOOPS 3D (*Reid et al. , 2015*)



FLOODS

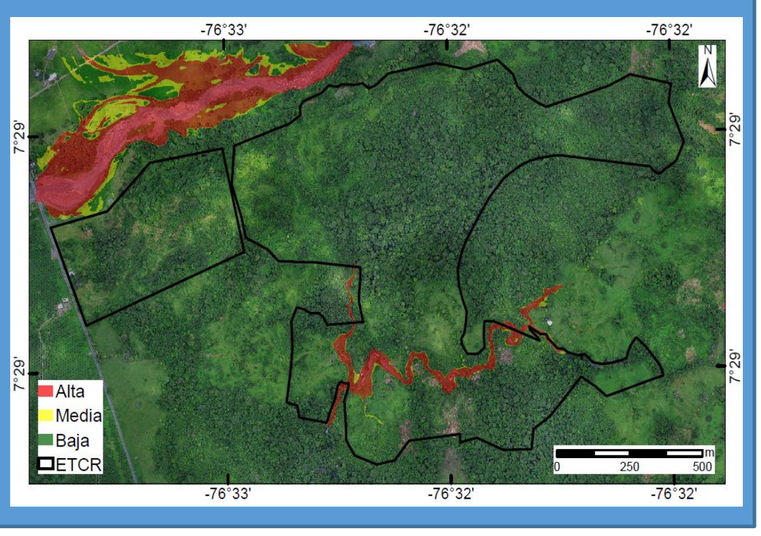
Regional: Hydrologic characterization and morphometric descriptor**.**

Height Above Nearest Drainage (HAND) **(**Renn´o y cols., 2008**)**



Local: 2D hydraulic model

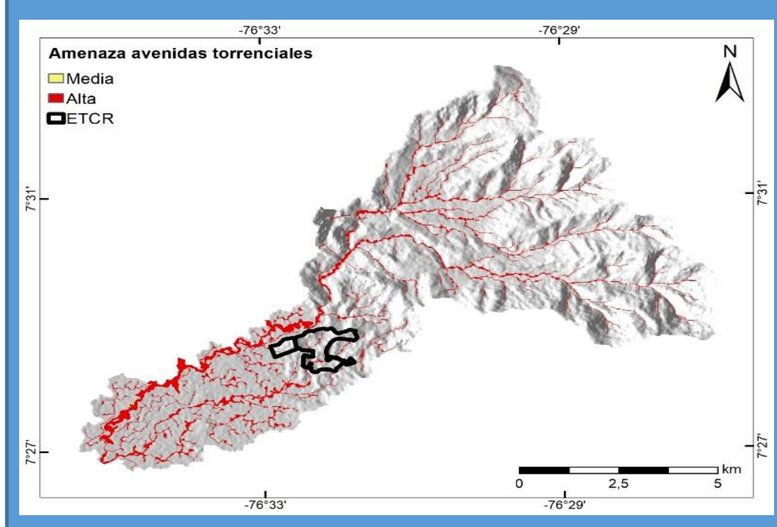
IBER 2D hydraulic model for the simulation of surface flow *(Blade 2014)*



TORRENTIAL FLOWS

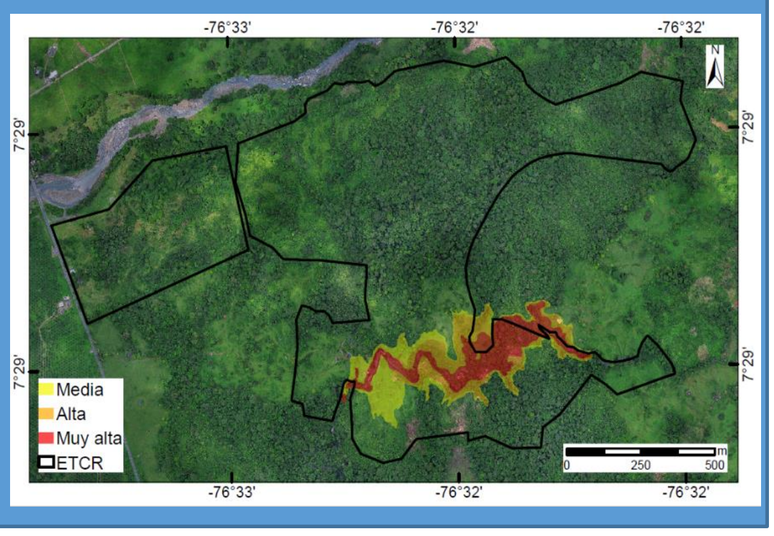
Analyzed from a morphometric evaluation and sediment availability routed with a mass-flow model.

SHALSTAB - Flood methodology using sediment and water volumes to establish the corresponding area of impact**.** (Montgomery, D. R. and Dietrich,1994)



r. avaflow

Simulation of the rheology of the ow using the same discharge rates *(Mergili, 2017)*



CONCLUSIONS

- This is the first and one of the biggest efforts for the Colombian rural housing policy. Following the peace agreement, the Colombian government is fostering adequate housing solutions by establishing a methodology to build safe and resilient housing projects in rural areas where former FARC members were concentrated.
- Therefore, multihazard studies are a fundamental element for the peace process to be consolidated, as these new permanent settlements are planned according to the Colombian land-use planning regulation, and under the complexity of mountainous terrain.
- With the use of different methodologies in the multi-hazard analysis process: statistical, heuristic and physical-based methods, it was possible the classification of the hazard and risk zones of the ETCRs, allowing the definition of suitable zones for the urban and social development of the population. This contributes significantly to the well-being of reintegrated populations.

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