

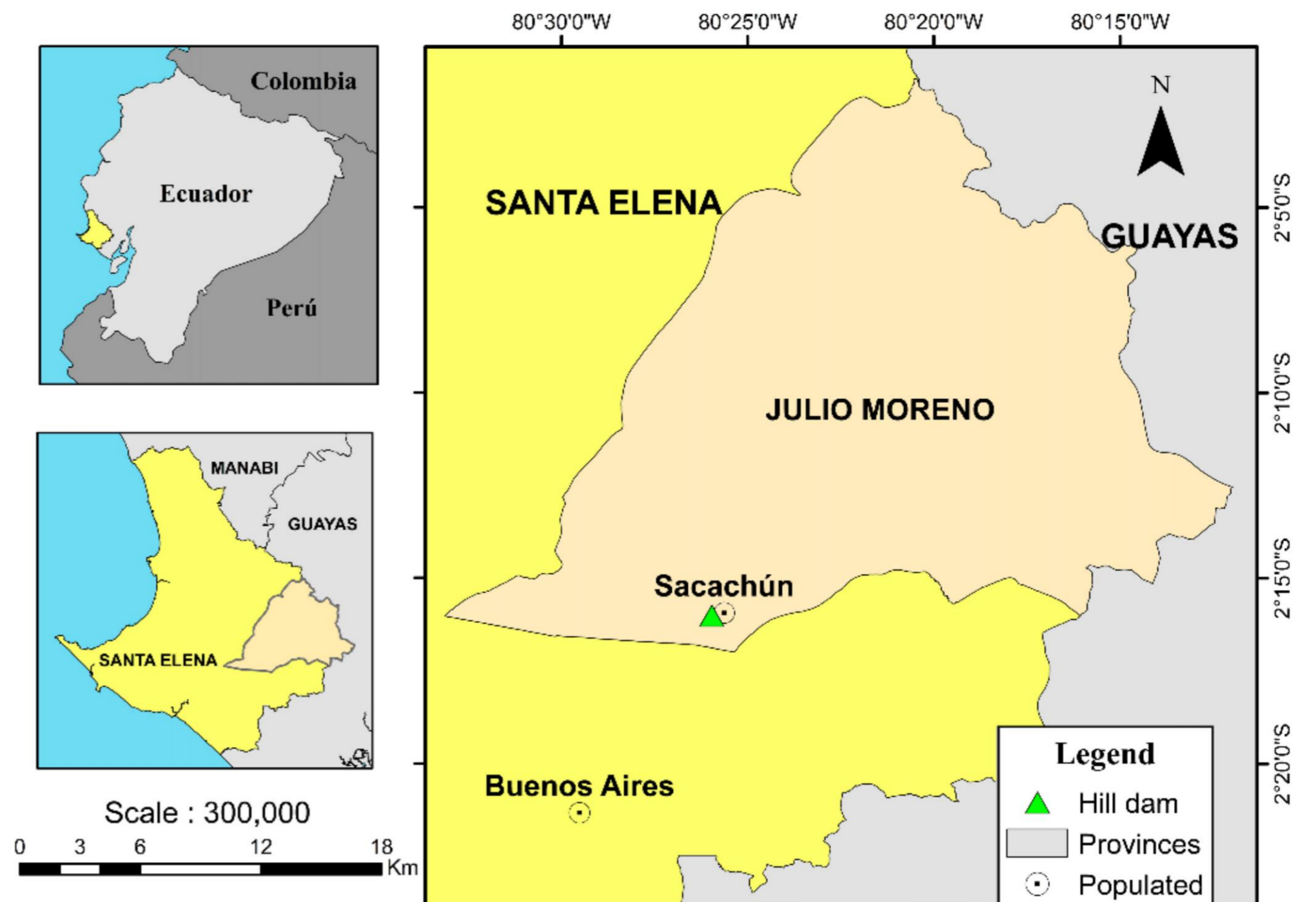
HILL DAM DESIGN TO IMPROVE WATER USE IN RURAL AREAS-CASE STUDY: SACACHÚN, SANTA ELENA

PROBLEM

The Sacachún commune in Ecuador currently faces a lack of water for its agricultural development; this reduces its possibilities of socio-economic development and causes migration to urban areas.

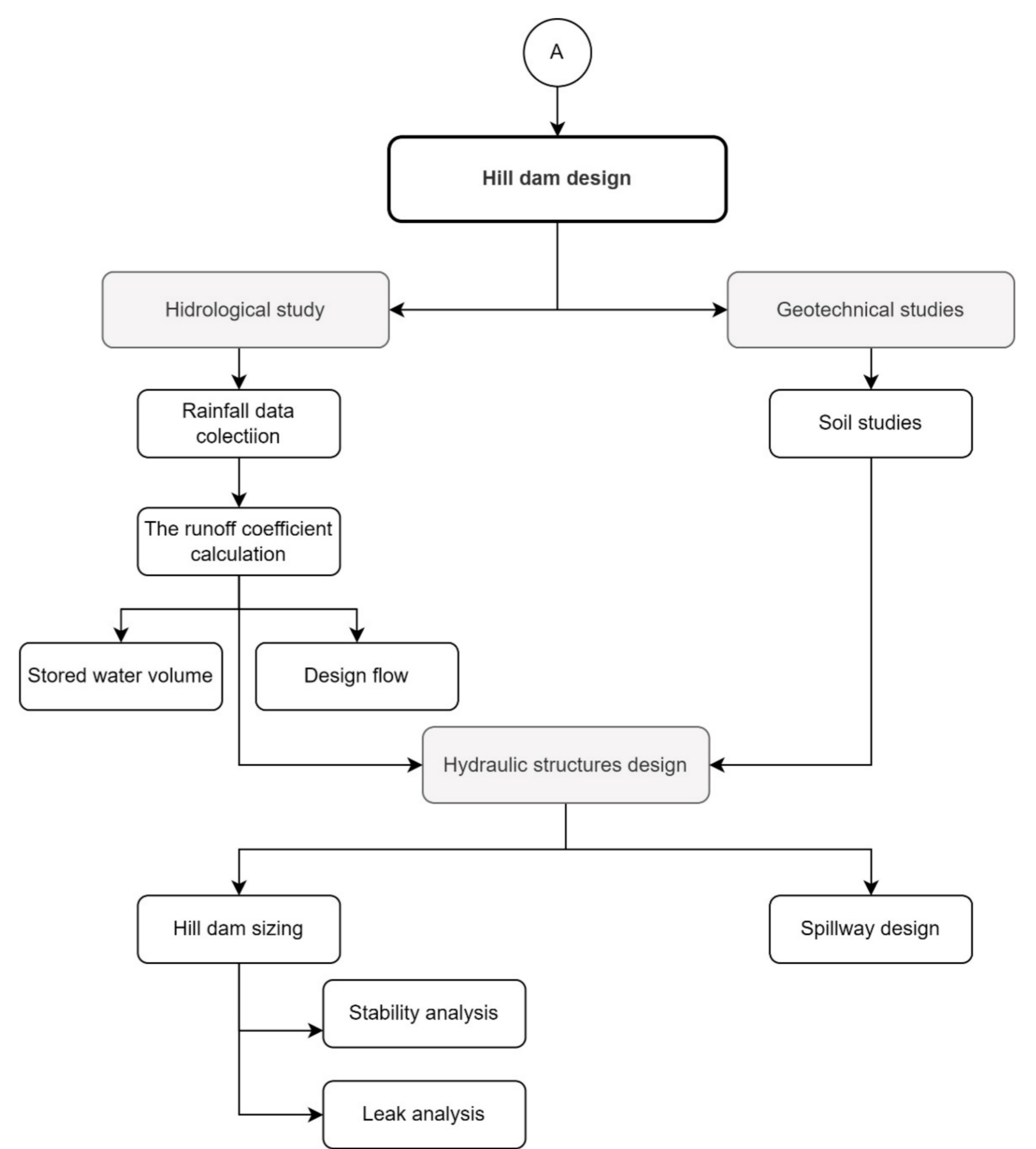
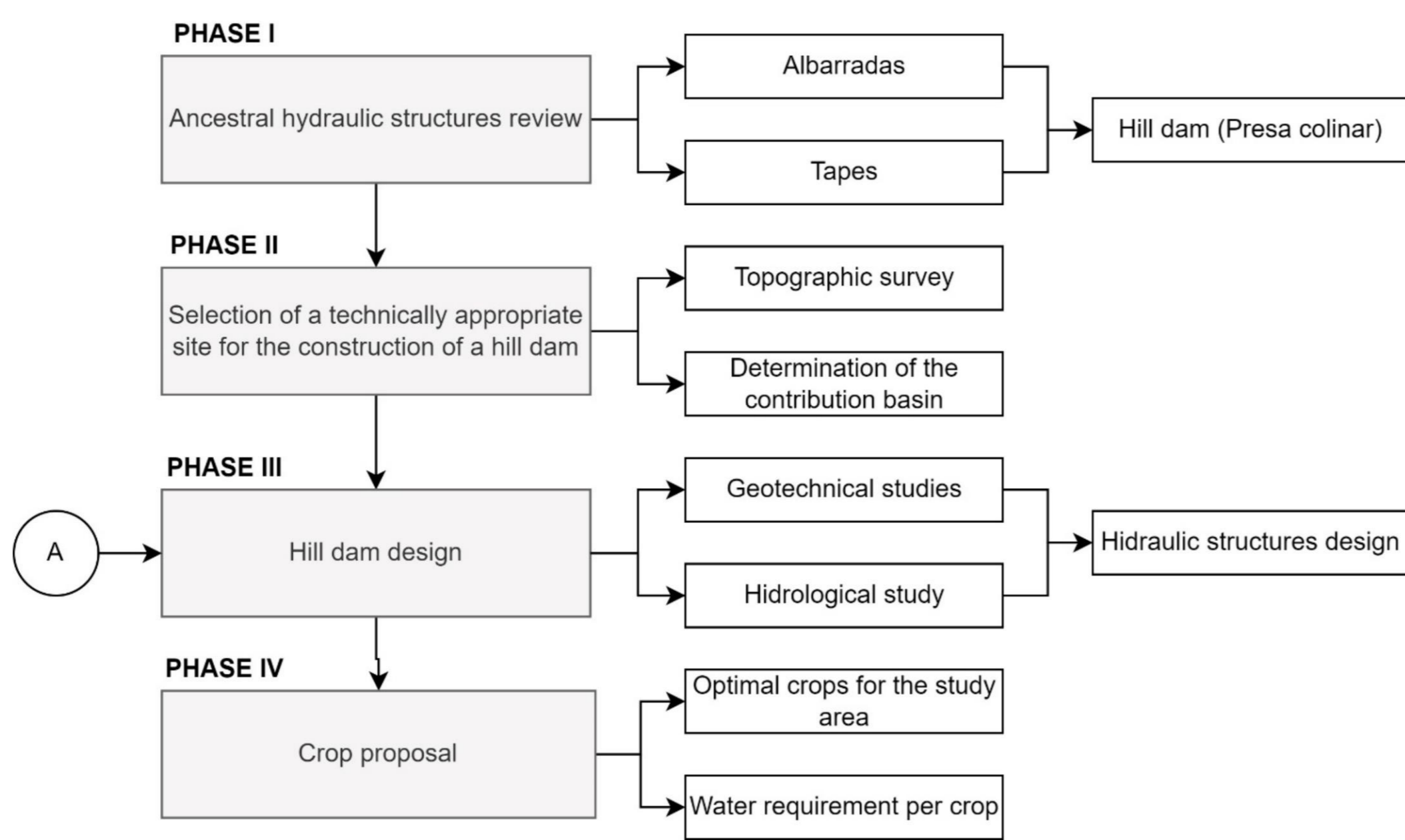
MAIN OBJETIVE

This research proposes a presa colinar (hill dam) design that uses ancestral knowledge and classic engineering techniques to promote water use during the dry season in semi-arid regions.



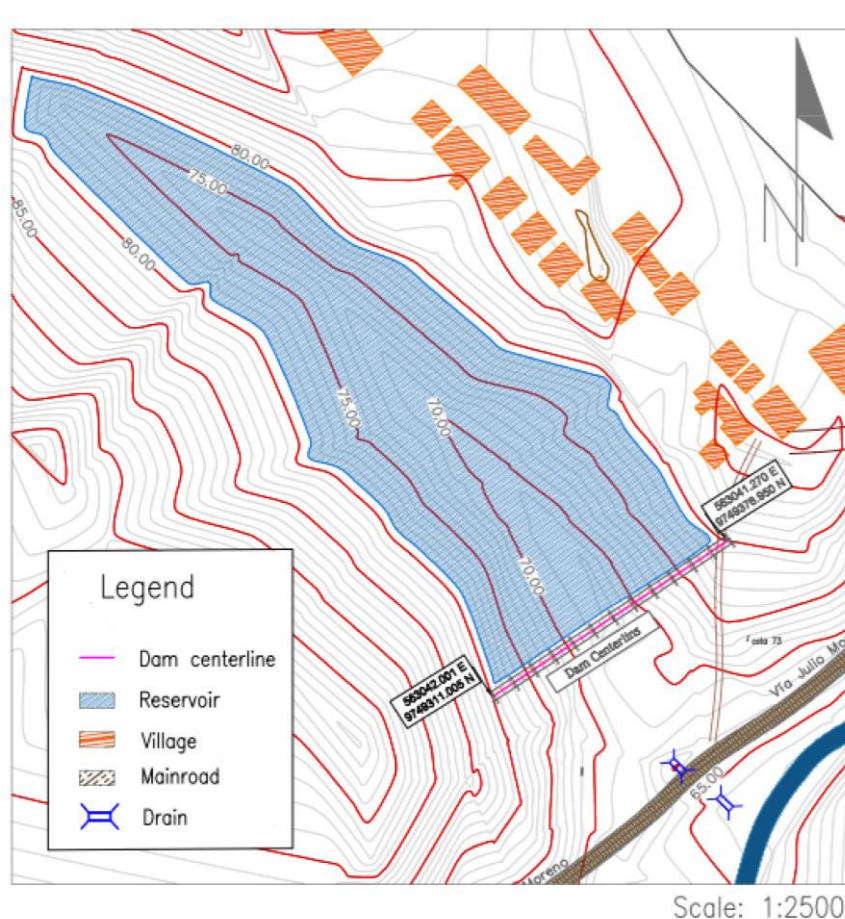
PROPOSAL

The methodology consisted of: (i) a systematic compilation of the ancestral structures used for water planting and harvesting in Ibero-American; (ii) selecting an appropriate place to build the hill dam; (iii) the dam's body design; (iv) and creating a proposal for agricultural water use.

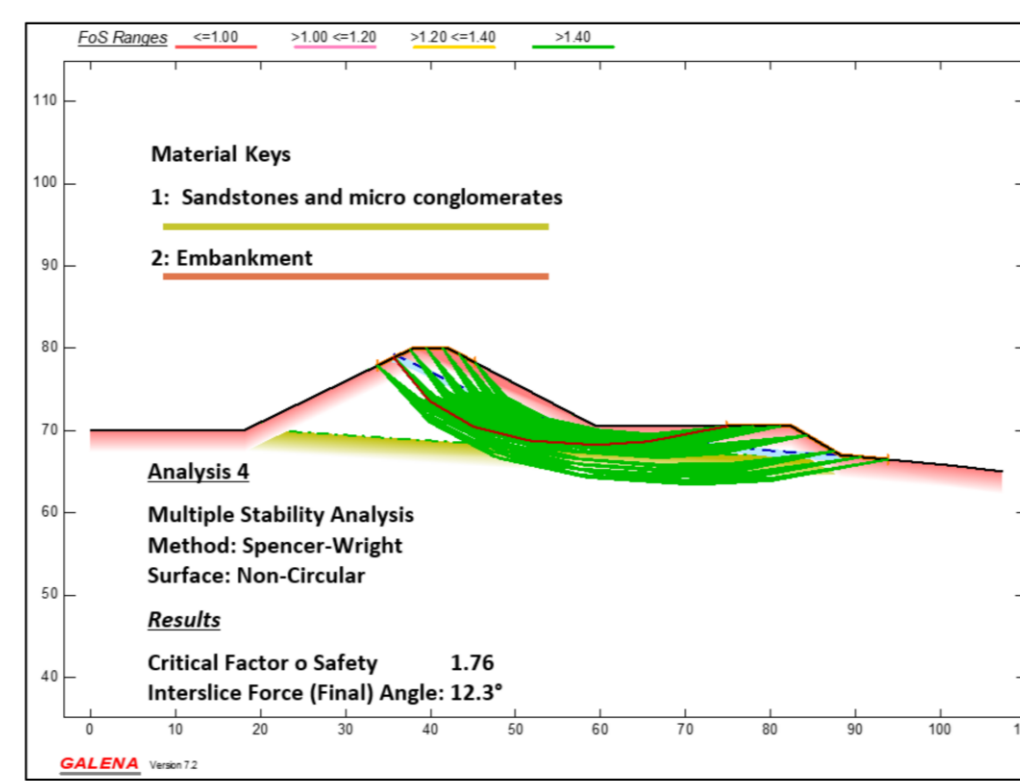


RESULTS

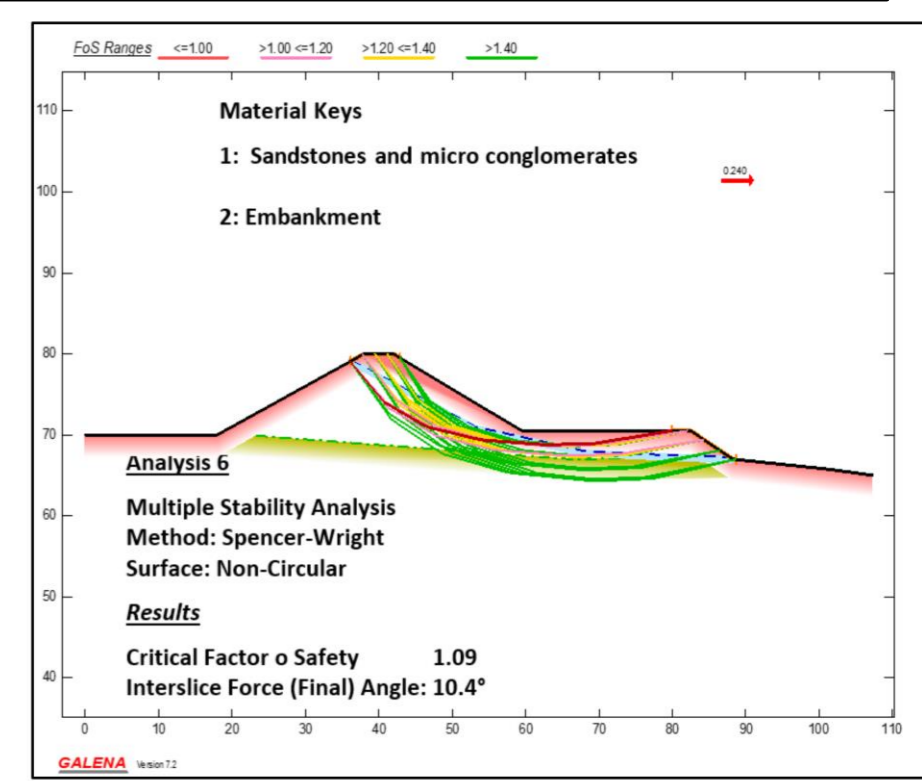
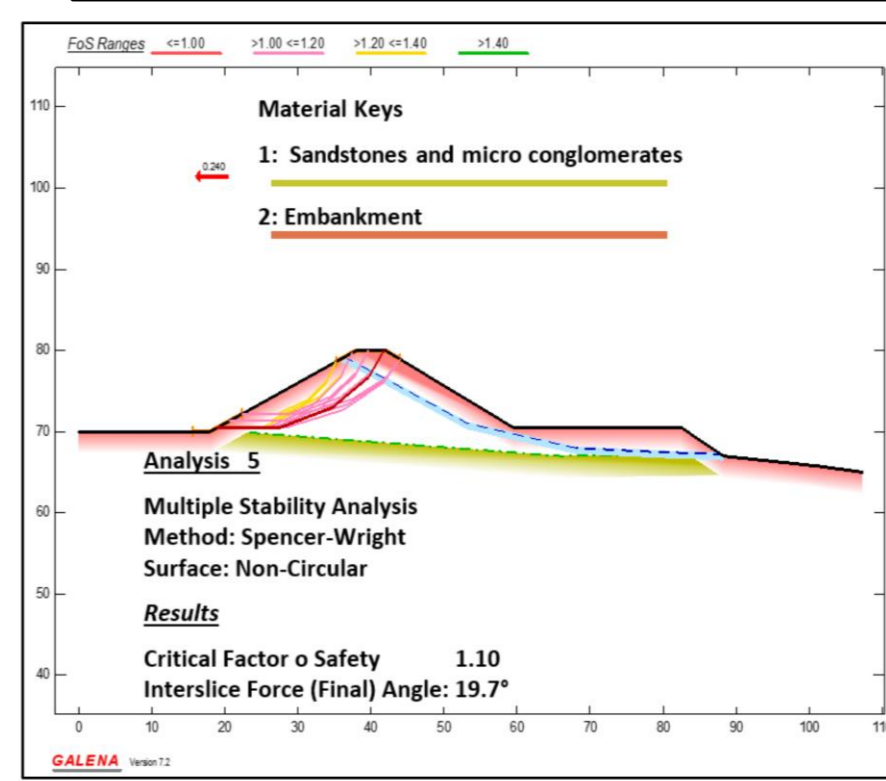
Relief and location of the dam body.



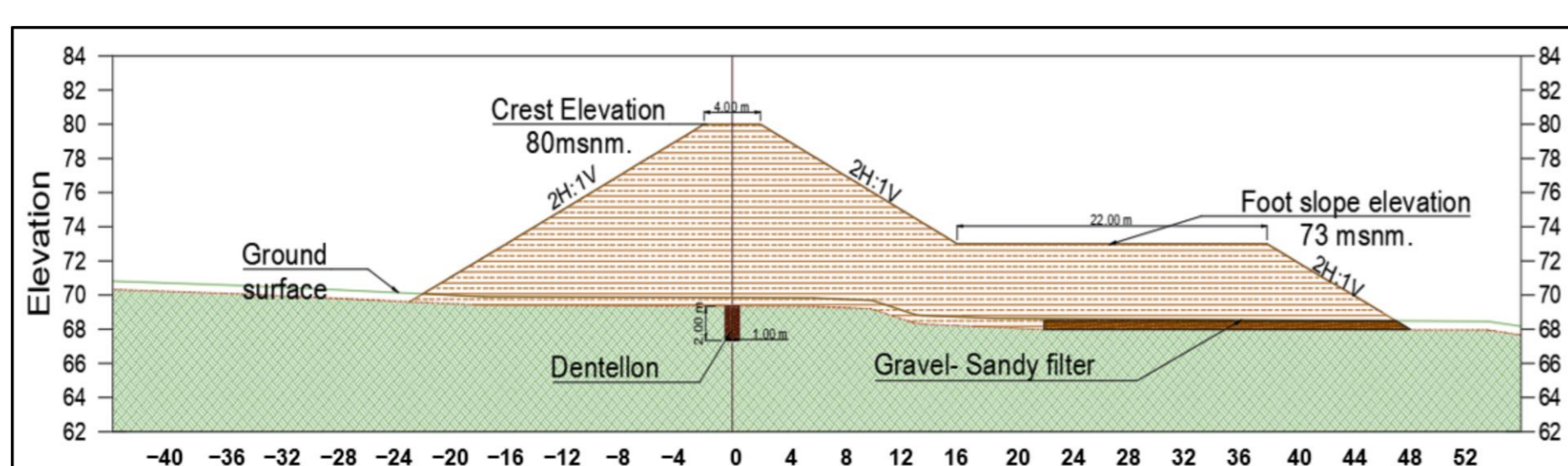
Dam stability analysis under static conditions y un SF = 1.76.



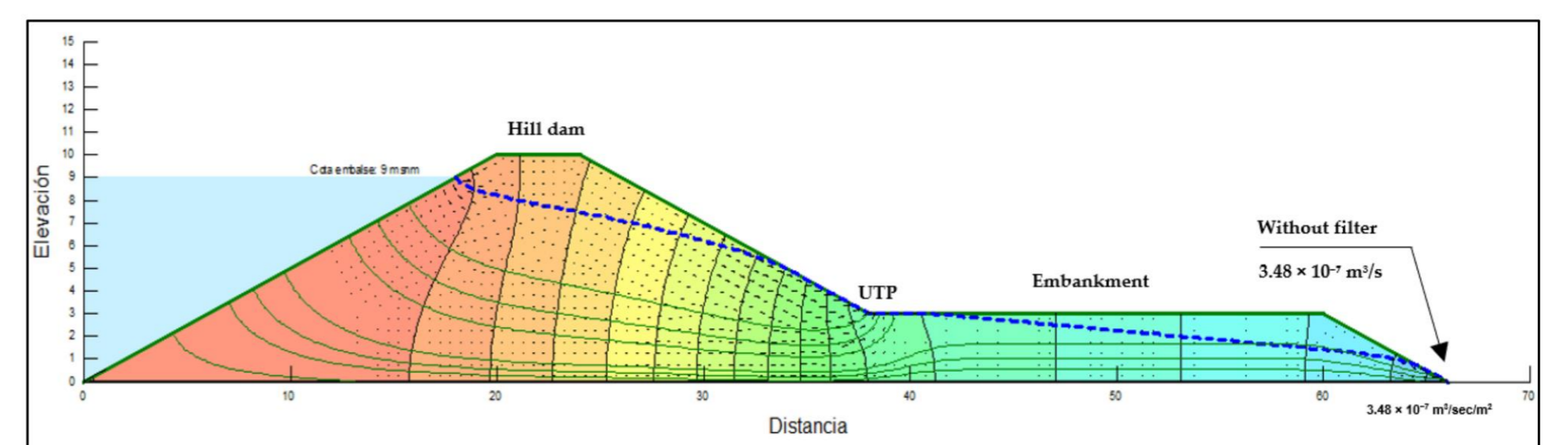
Upstream slope's stability analysis in pseudo-static conditions SF = 1.10 (a), and downstream analysis in pseudo-static conditions SF = 1.09 (b).



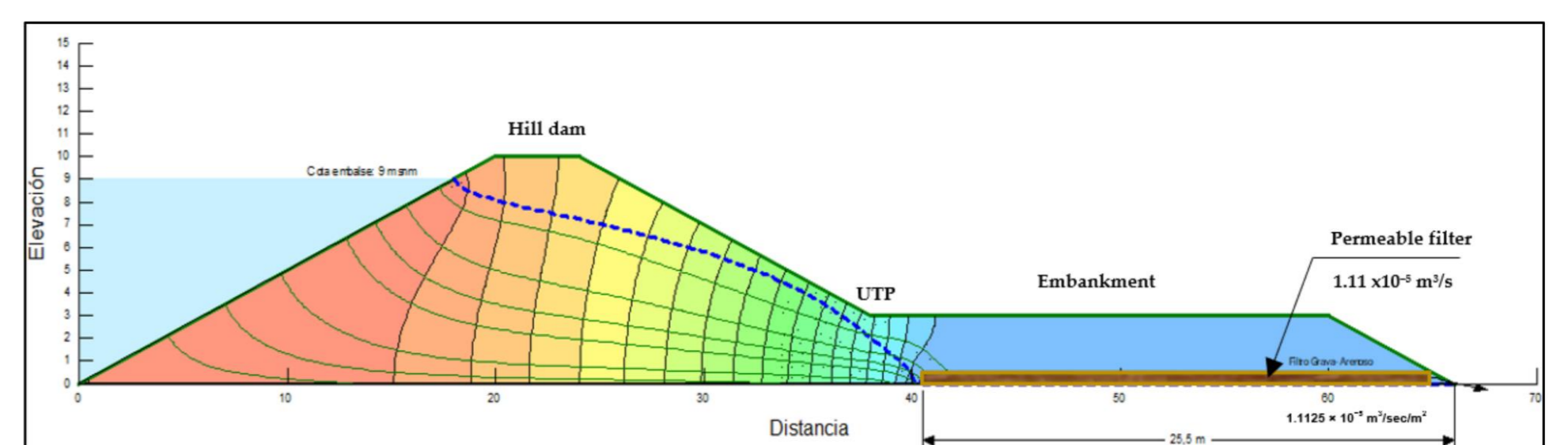
Cross section of the dam body.



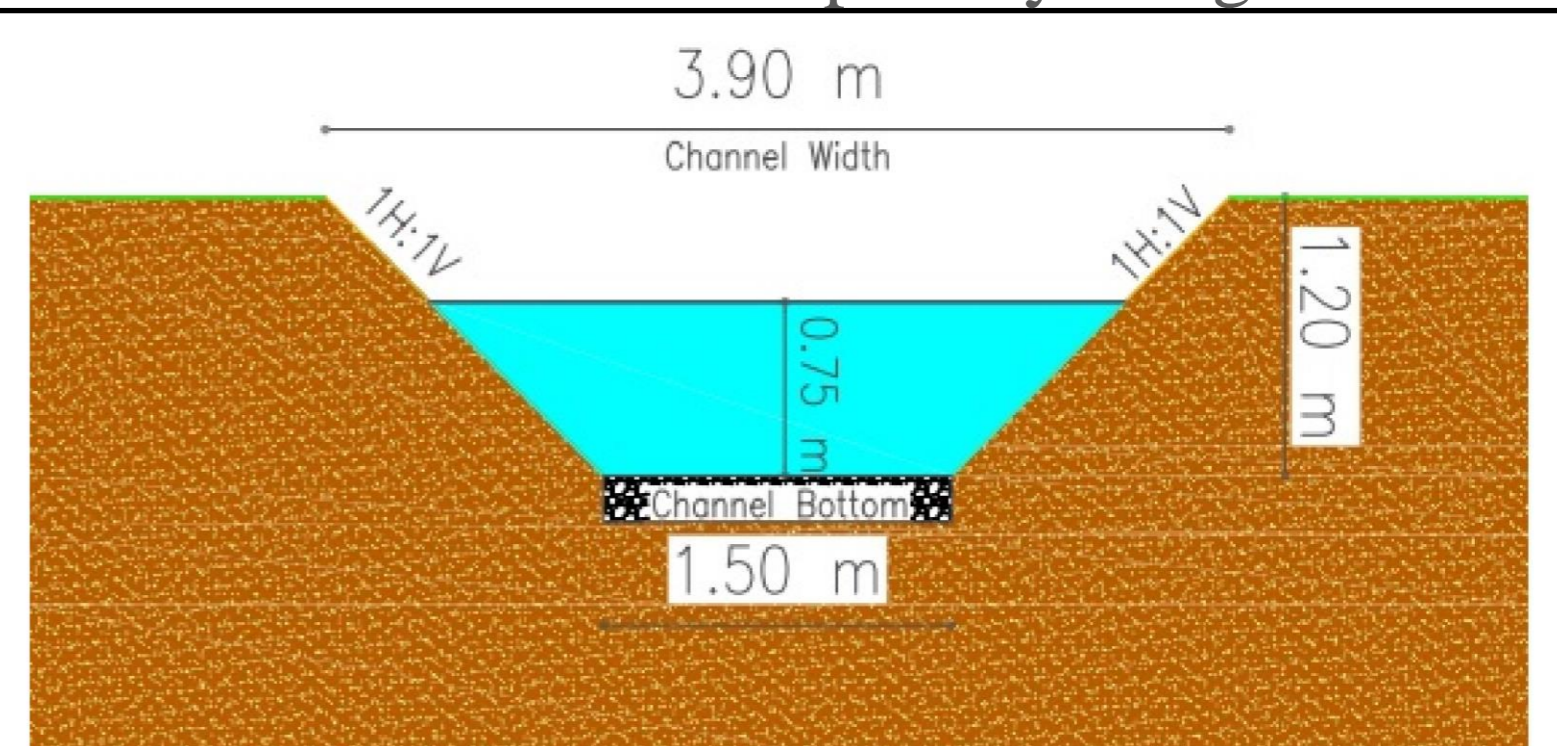
Flow networks in the body of the dam, without filter.



Convergence of the flow lines towards the permeable filter.



Cross section of the spillway design.



CONCLUSIONS

- The proposed hill dam is set to take advantage of the topography of the area, placing the dam at the end of a shallow ravine with stable slopes.
- The presa colinar contributes to: (i) mitigating the water scarcity problem in agricultural use in the Sacachún commune; (ii) maintaining the sector's biodiversity as it is a minimally invasive infrastructure; and (iii) being a natural attraction by maintaining a design similar to the ancestral albarradas used in the commune.