

STUDENT PROJECT (45 or 60 hp):

**“Impact of mobile cross-sections in highly dynamic tropical streams on discharge measurements”**

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Supervisor in Costa Rica: Christian Birkel (UCR)

This student project forms part of a cutting edge research effort at the interface of hydrology and fluvial geomorphology undertaken by the IVL Swedish Environmental Research Institute, Stockholm University and the University of Costa Rica. The aim is to improve discharge estimation by characterizing a mobile cross-section in a natural and dynamic montane rainforest stream under different flow conditions (higher and lower flows) in terms of high-resolution topography, riparian vegetation and riverbed materials. The cross-section characterization will be used to investigate the cross-section mobility and its impact on discharge estimation. Based on the surveys, high flow discharge will be estimated using Manning’s equation to be able to improve the current rating curve where the high-flow part is currently ungauged.

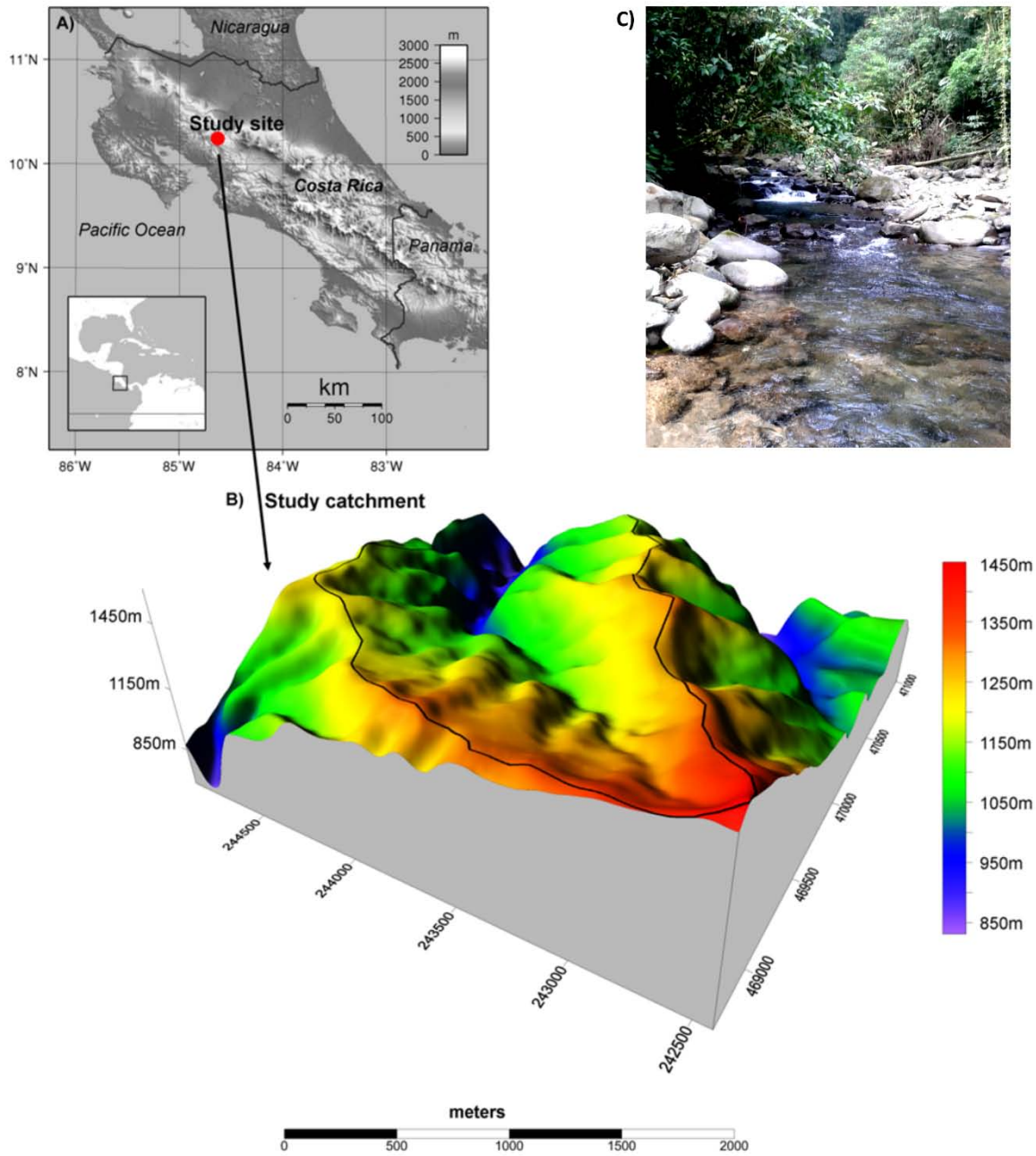
The study site is representative of the region where around 70% of the water resource is generated in montane headwater catchments for downstream users such as agriculture, drinking water supply and hydropower generation. However, robust discharge measurements are currently lacking to be able to assist water managers with applied water resources management. Therefore, this project requires an extended stay (up to two months) at the research facilities in Costa Rica to be able to collect the necessary data in the field, which are needed to assess the uncertainty of discharge measurements at this site. This requires that the student searches for Minor Field Study funds (with supervisor help).

The San Lorencito headwater (3.2 km<sup>2</sup>) catchment is located in the Central Volcanic Cordillera in Costa Rica, Central America (Figure 1A) and forms part of a biological reserve (Reserva Biologica Alberto Manuel Brenes – RBAMB) managed by the University of Costa Rica. The reserve is equipped with a staffed research station and access is restricted to researchers. This protected and pristine montane rainforest catchment is typical for tropical volcanic (tertiary: 5 to 9 Mio years old) regions and is characterized by deeply incised V-form valleys and highly dynamic streams. The elevation ranges from 890m to 1450m with a mean slope of 30°. The main channel of the San Lorencito stream has a length of 3.2km and a mean river slope of 6.3°. The catchment drains towards the Atlantic slope and is characterized by an annual average rainfall of around 4m/year with little seasonality.

If you are interested get in touch with Steve and/or Ida:

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**Figure 1:** A) The study site location in a regional context, B) the topography and C) the gauged cross-section looking upstream.