



ICG2022-492, updated on 08 Jun 2023

<https://doi.org/10.5194/icg2022-492>

10th International Conference on Geomorphology

© Author(s) 2023. This work is distributed under the Creative Commons Attribution 4.0 License.



Gully erosion monitoring in Rio Claro Municipality, Rio de Janeiro State, using - unmanned aerial vehicle (UAV)

Fabrizio Garritano¹ and Antonio Guerra²

¹Federal University of Rio de Janeiro, Geoscience, Geography, Rio de Janeiro, Brazil (fkgarritano@hotmail.com)

²Federal University of Rio de Janeiro, Geoscience, Geography, Rio de Janeiro, Brazil (antoniotguerra@gmail.com)

The objective of this paper is to use an unmanned aerial vehicle (UAV), to perform planialtimetric mapping of an erosive feature (gully) located in Rio Claro Municipality, Rio de Janeiro State. The study area is located within Pirai drainage basin, a tributary of Paraíba do Sul River, which presents a history of use and occupation strongly linked to the economic cycles of Brazil, where the native Atlantic Forest biome was cleared, in order to use the soil in a profitable way, making the exploration of sugar cane, coffee growing and opening of areas for pasture. The use of UAVs in geomorphological research effectively enabled a complete assessment of the erosion feature, where it was possible to make cross sections and longitudinal profiles, calculation of length, width and total area. In addition to being an equipment that facilitates the understanding and monitoring of areas of interest, the use of UAVs allows the capture of images of high resolution and precision, which are subsequently processed, giving rise to new ways of assessing the feature. In this way, it was observed in the two profiles, that there is a deep concentration in the soil, originated by the concentration of surface runoff in the area, where the soil is provided with vegetation cover, that is, it is possible to establish a relationship in the morphology of the interior of the cover feature red, where the blue and red profiles indicate that it remains with a preferential path of water, deeper, on the left bank, while the right bank changed the shape of the position of the sediments, since the most exposed area of this bank was due to sediments coming from the higher areas of the slope. To complement this research, soil samples were collected, to determine its physical and chemical properties (the bulk density results indicate that the soil has a high content of silt and fine sand and low aggregate stability, explaining the high susceptibility to erosion. Such properties, together with land use and inadequate management, generate highly impacted areas. Based on the results presented, it was possible to observe that the complementary use between the UAV and the analysis of soil properties allow a better understanding of the erosive processes, by providing a detailed visualization of the feature and better characterization of the soil. While the soil physical and chemical analyzes allow an understanding of the determining factors of its susceptibility to erosion, by the action of rain, such as its granulometric composition, porosity and aggregability. The use of the UAV brings a new way of understanding how the processes act and model the slopes. In the specific case of these gullies, the UAV made it possible to understand the differentiation of the evolution of the erosive process inside them, for the future elaboration of a diagnosis of the area, with a view to its possible recovery.