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# Visualisation platform demo for experimental catchment data

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**Abstract:** South America has the highest proportion of forest plantations in the world, which also consists almost entirely of introduced species (*Eucalyptus* spp. and *Pinus* spp.). To promote sustainable forest management that follows regulations for establishing new plantations and meets the standards required by international certification, it is essential to generate local knowledge regarding the effects of forest plantations on natural resources. Using the paired catchment approach, Uruguay has implemented and maintains an operational network of small experimental catchments resulting from the partnership between government, academics, forest companies and national research programs, that has lasted for over 20 years. This monitoring program involves collecting and analyzing large amounts of data to understand how land use, rainfall and temperature affect water balance overtime. Even though time series of water quantity and quality can be used to monitor and understand these changes, it can be challenging to analyze and interpret them due to its complexity. The use of visualization tools can improve the understanding of the data, enabling the user to plot relationships between monitored variables and build interactive and custom visualizations. RShiny is a web-based tool that allows users to to create a wide range of visualizations using the R programming. This versatile tool provides a visualization platform adaptable to other monitoring sites when the input data format is consistent. For technical personnel and researchers, this can help identify data trends and evaluate correlations and relationships. Furthermore, visualization tools communicate complex data to a wider audience, offering interactive and visually appealing plots that can help stakeholders and decision-makers understand the significance of the data and make informed decisions. In this work, a prototype of a visualization tool in RShiny was built to plot rainfall, flow and ET data for quality checks and analysis. The user can render dynamic time series plots and flow duration curves (FDC) plots in the experimental catchment pair (treatment and control). In addition, it allows the user to do predefined quick analysis of the data, such as plotting flow differences between treatment and control catchment, displaying QQ-plots and runoff coefficient plots. Challenges and limitations identified were the design of predefined graphics, which may not fully meet the needs of all users, and the management of missing data that might introduce bias to the analysis when not considered. As a result, this platform provides the user with the ability to evaluate the response of a catchment to rainfall events, compare the hydrological behavior of two catchments and identify trends of the data. We have tested this tool using local data from experimental small catchments in Uruguay (Figure 1). Flow in the afforested catchment showed a persistent reduction accompanied by management and age of the plantation, affected by semester where significant ET variations are expected.

This demonstration showcases the potential of these tools for diverse future applications in analyzing experimental catchment data, which can be tailored to meet specific user requirements, leading to more informed decision making and improved management in water resources.

***Keywords:*** *Data visualization, pair catchment study, RShiny*

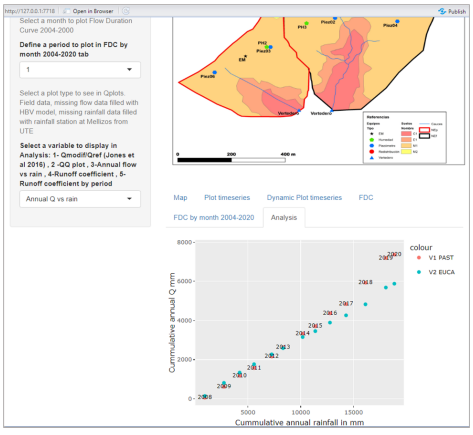


Figure 1. Demo visualization of the tool web-page and analysis tab panel display of QQ-plot in two experimental pasture and forested catchments in Río Negro, Uruguay