VRIJE UNIVERSITEIT BRUSSEL

The faculty of Engineering of the Vrije Universiteit Brussel invites you to attend the public defense leading to the degree of

DOCTOR OF ENGINEERING SCIENCES

of **Mónica Ximena Guzmán Rojo**

The public defense will take place on **Monday 24th June 2024 at 4:00 pm** in the room **D.2.01** (Building D, VUB Main Campus)

To join the digital defense, please click here
Meeting ID: 325 245 981 104
Passcode: mWRd2i

FIRE AND WATER: ASSESSING VULNERABILITY AND HYDROLOGICAL ALTERATIONS IN GROUNDWATER RECHARGE POST-WILDFIRE IN THE CHIQUITANO DRY FOREST, BOLIVIA

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Abstract of the PhD research

The study focuses on the El Sutó spring area in San José de Chiquitos, within the Chiquitano dry forest of Bolivia. It examines the considerable effects of wildfires on groundwater recharge, starting with a comprehensive review of existing literature to establish a foundation for understanding hydrological shifts caused by wildfires. In a context of limited hydrogeological information, frequent forest fires, and increasing worries about water shortages, the research moves forward by using both conceptual and numerical models to examine the complex connections between climate, vegetation, and groundwater recharge after wildfires. The study adopts a comprehensive approach, incorporating geology, geochemistry, statistical analysis, and remote sensing. This approach not only facilitates an accurate assessment of the current state of groundwater systems but also assists in developing models that predict future scenarios. The use of various numerical models goes beyond traditional applications; they serve as tools for learning and understanding how different elements interact within the hydrological system. A key finding is the marked vulnerability of the El Sutó spring area's groundwater recharge to wildfires, with an immediate reduction in recharge rates of up to 39.5% and a persistent long-term decrease of about 10%. These results highlight the significant and sustained impacts of wildfires on groundwater resources. The study proposes an initial version of the Fire-Related Forest Recharge Impact Score (FRIS) as a preliminary step toward assessing the vulnerability of groundwater systems to wildfires. Overall, this research not only elucidates the dynamic interplay between wildfires and groundwater recharge in the specific context of San José de Chiquitos but also provides a methodological framework that is applicable to similar ecosystems globally. The study emphasizes the importance of employing diverse modeling approaches and embracing them as learning tools, which is crucial for developing comprehensive water management strategies. These strategies are essential for addressing both the immediate and long-term effects of wildfires, ensuring the sustainability of groundwater resources in regions facing such environmental challenges.