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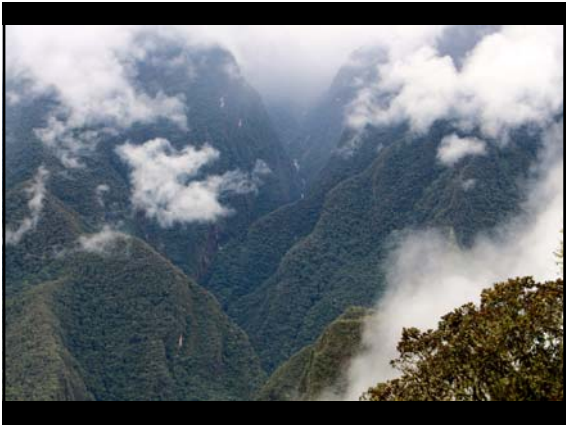
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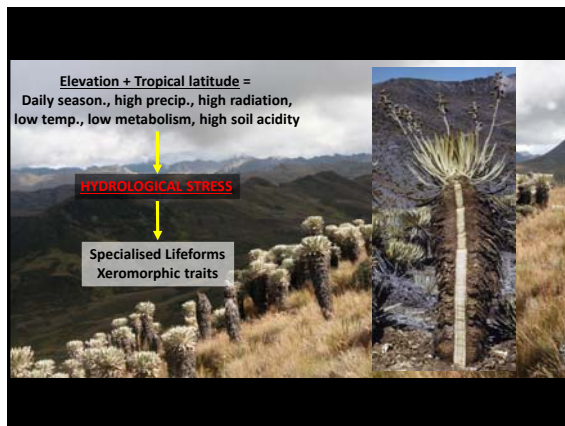
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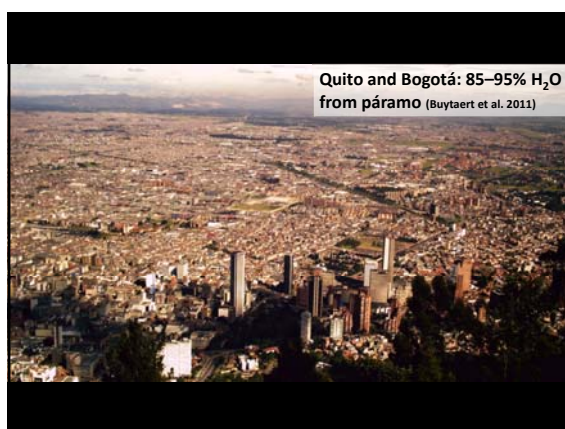
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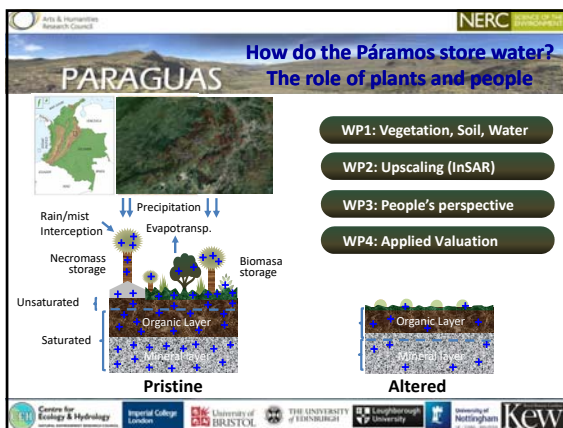
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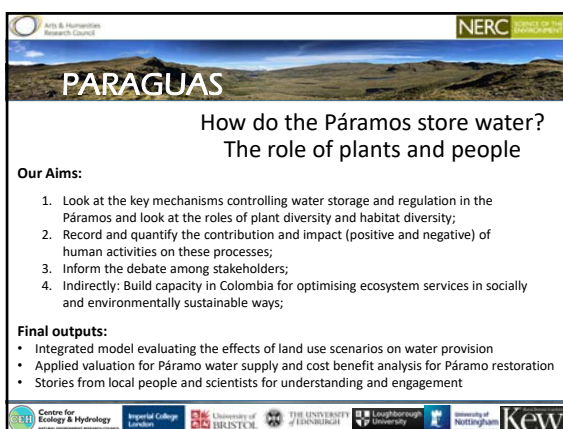
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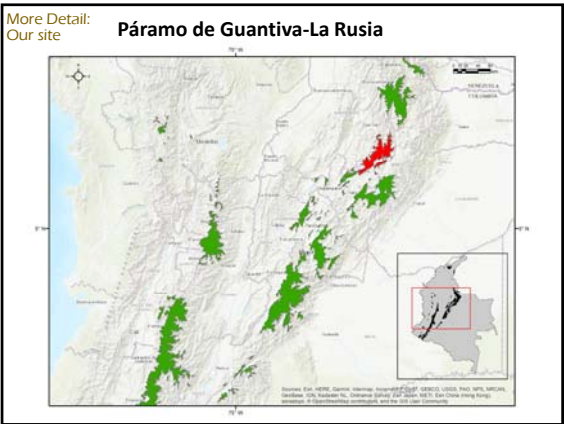


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[illegible]

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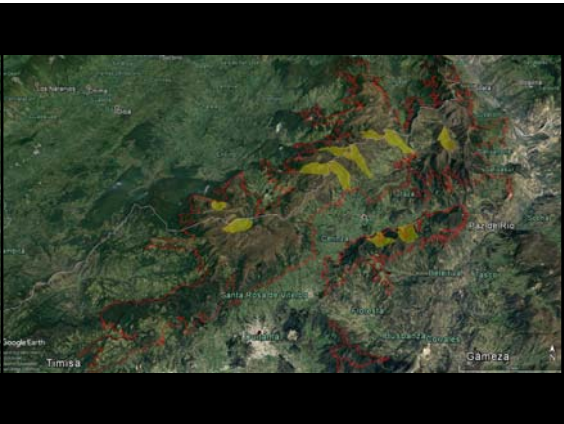
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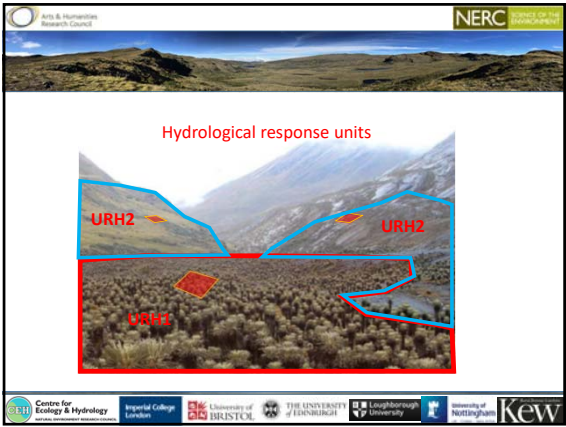
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More detail: Sampling strategy

➤ 12 small catchments (~1km²)
pairs of pristine versus intensively used

➤ 3 areas covered by drone (9 ha) to represent 3 soil types

within the central 1 ha:

➤ 5 survey plots (1m²)
In dry and in wet season
Botany, PFT, biomass & reflectance

➤ 1 survey plot (1m²)
In dry and in wet season
Soil hydrology, organic-matter & aeration

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Loughborough University
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Observations

a) Hydrological characteristics (per HRU)

- Biomass, Necromass, Organic soil
- Water release characteristics

b) Water capture map (within each HRU and catchment area)

- Drones and satellites
- Relations: HRUs ↔ Plant Functional Types ↔ Diversity

c) Water Flow

d) Climate characteristics

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Variables vegetación

Vegetation (in each plot)

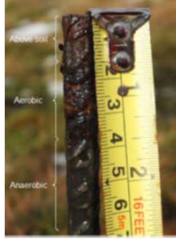
- Biomass
- Necromass
- Species diversity
- Functional types diversity
- Water interception
- Water storage capacity and release

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Observaciones: Cambio del suelo y plantas

- Organic matter density and content
- Oxygen penetration depths (by measuring oxidation)
- Age: Carbon-14 in bogs (different depths), and dissolved organic carbon (DOC)



Williamson, Rowe et al. (2017) J Env Management 188: 278-286.

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Flujos de agua (por las Cuencas)
Monitoreo hidrológico

Monitoreo participativo. Boris Ochoa Tocachi, abril 2012.

Participative hydrological monitoring:

- Regional Initiative of Hydrological Monitoring of Andean Ecosystems (iMHEA)
- PARAGUAS project, Colombia



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Monitoreo hidrológico

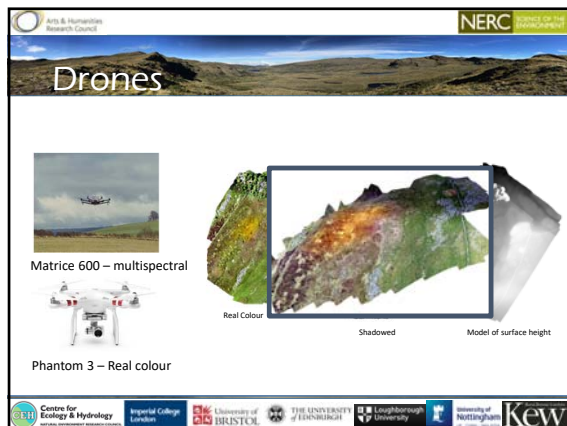
iMHEA:
Includes also Temperature & Potential Evapotranspiration



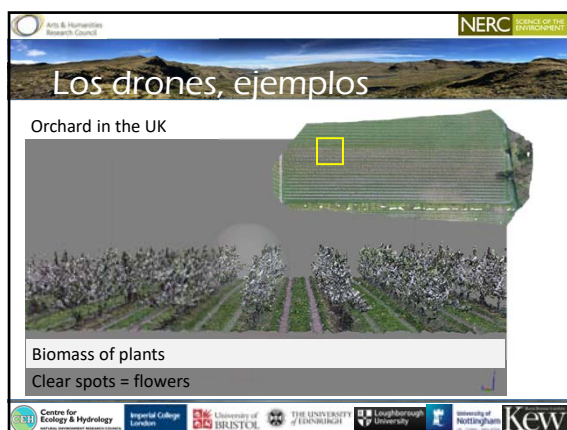
barometric pressure

hydrostatic pressure

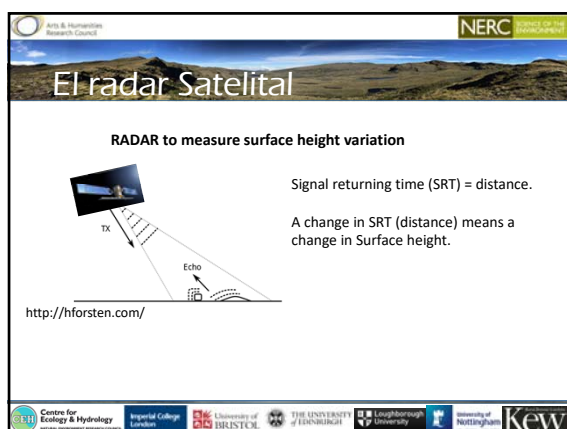
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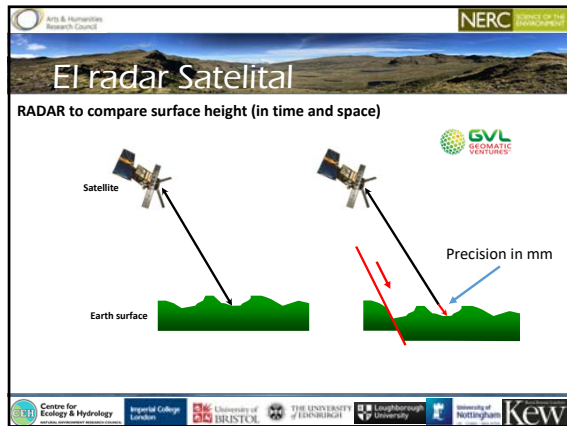
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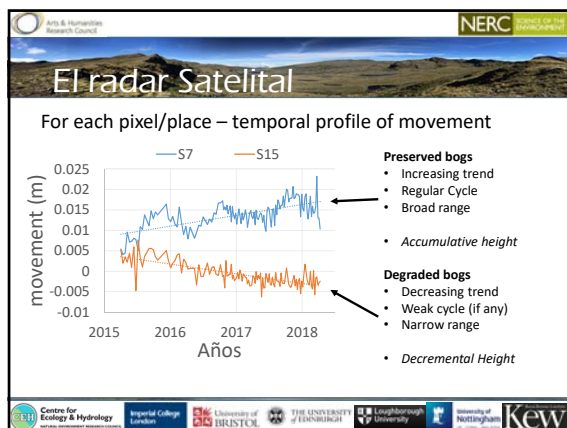
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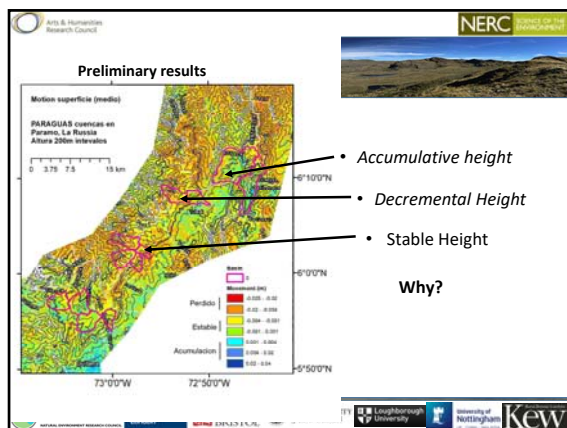
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Preliminary results

145 plots
12 catchment areas
9 URHs

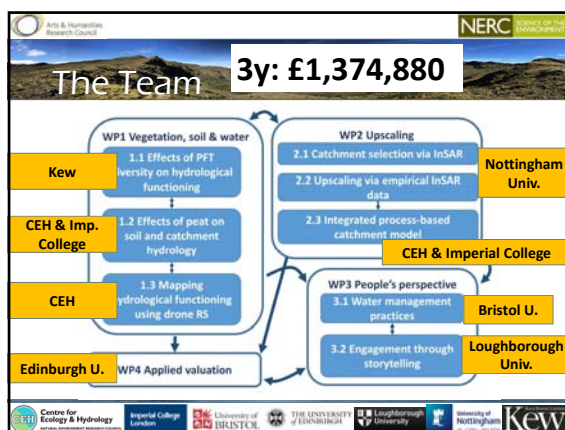
- Bogs (19)
- Agriculture (13)
- Shrubs of *Hypericum* sp. (18)
- Matrix (25)
- Mixed shrubs (10)
- Rocks (4)
- Frailejonal (56)

- Caulirosuletum with necromass (38)
- Caulirosuletum without necromass (5)
- Acaulirosuletum (13)



Logos: Arts & Humanities Research Council, NERC, Centre for Ecology & Hydrology, Imperial College London, University of Bristol, The University of Edinburgh, Loughborough University, University of Nottingham, Kew

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The People in the Team

- France Gerard - CEH
- Ed Rowe - CEH
- Mauricio Diazgranados - KEW
- Martin Baruffol - KEW
- Maria Escobar-Tello - Bristol Univ.
- Wouter Buytaert - Imperial College
- Boris Ochoa Tocachi - Imperial College
- Mike Wilson - Loughborough Univ.
- Dominic Moran - Edinburgh Univ.
- David Large - Nottingham Univ.
- Charles George - CEH
- Craig Pearce - CEH
- Sawicka Kasia - CEH
- Barry Christopher - CEH
- Andrew Bradley - Nottingham Univ.
- Richard Adams - Nottingham Univ.
- Lyndsey Bakewell - Loughborough Univ.
- ... recruiting

Logos: Arts & Humanities Research Council, NERC, Centre for Ecology & Hydrology, Imperial College London, University of Bristol, The University of Edinburgh, Loughborough University, University of Nottingham, Kew


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Colombian Partners

**Universidad Pedagógica Tecnológica de Colombia**
Research group 'Biología para la conservación'








- will look at the role of Páramos bryophytes in the water cycle, and the relationship between the functional diversity of the bryophyte flora and water availability.
- will provide logistical advice and support in connecting with stakeholders.

**Universidad Nacional de Colombia**
Prof. Conrado Tobon expert on Páramo hydrology

In collaboration with Wouter Buytaert (Imperial College) will help implement and maintain the hydrological monitoring planned in the project.

**Instituto de Investigación de Recursos Biológicos – Alexander von Humboldt Humboldt**

- will provide venues for workshops; lab space for processing field samples
- will jointly deliver the drone workshop.



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