Master 2 Intership Proposal: Communicating Water Scarcity and Uncertainty for Decision Making

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Context

In the last years, events such as water floods, wildfires, droughts and extreme rainfall, have increased their frequency of appearance [2], impacting the lives of millions of people. Aiming to contribute to the urgency of the climate crisis we are living, a growing number of HCI researchers have focus their attention in doing Sustainable Human-Computer Interaction (SHCI) research. This subfield of HCI focus on "the perspective that sustainability can and should be a central focus of interaction design" [3]. In the 15 years after the two foundational papers of SCHI were published [3, 9], SHCI has grown to become an important subfield of HCI. However, this growth has not been without criticism [4].

One of those critics targeted the big amount of persuasive interventions aimed to change individual's behavior and how they tend to overestimate individuals' capacity for action [5]. Recent work has shown that, over the years, the adoption of this critic has made possible to shift from works focusing on individuals to understanding the importance of community and policy awareness [4].

This internship focuses on addressing this critique for the water availability and quality problems in different areas of Chile. Chile has been declared as the 18th country with highest water stress levels at the present [6], and one of the thirty countries in higher hydrological risk by year 2040. Creating means to organize this information so it is available, accessible and interpretable by all the actors involved in the process of extraction, administration, fiscalization and use of these water sources is key to reach hydrological security [1].

We believe that Information Visualization is a powerful tool to contribute to this goal, as it allow us to design powerful visual representations of data. Designing and evaluating effective representations of climate data for general public becomes a key factor to support communities to take informed decisions about the administration of their water resources. This process needs to consider a set of factors. For example, it needs to consider how people interpret and take decisions with uncertainty data (*e.g.* [11, 7]), the affective responses the visualizations might produce (such as empathy [8]), and how these visualizations might promote altruistic and prosocial behaviours [10].

Internship Goal

The main goal of the internship is to explore and evaluate the impact of visualizations of uncertain data of water availability in decision making processes. For this, we will consider different visualization types to represent drought events varying in their temporal (e.g. next week or next year) and spatial proximity (e.g. same city, same neighborhood) to the audience.

To do so, the internship will be divided in the following four tasks:

- Make a review of the available spatio-temportal uncertainty visualizations to depict water availability and scarcity over time.
- Assess their capabilities and limitations, both based on their use with real data and the review of available perception studies.
- Given the results above, select a set of appropriate visualizations that can be used in our context. If none appears to be sufficient, propose new visualizations that resolve the limitations of the ones currently available.
- Design and conduct a user study to assess the effectiveness of the visualization. In particular, this user study must focus on the impact of their use on decision making.

Requirements for Applicants: Basics of Information Visualization, user evaluation and prototyping methods. Any past experience in web development is a big plus.

We are currently in the process of building a long-term project in collaboration with different entities involved in the administration of water sources in Chile. We aim to develop SHCI processes that supports the collaboration of the local communities to deal better with the current water crisis. As such, we expect this work will continue developing over time. Therefore, depending of the success of the project and the internship, we might be able to continue this work as a PhD.

Duration and period: 5 or 6 months starting in March/April.

Location: Université Paris-Saclay, Bâtiment 660.

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