Fostering Urban Water Literacy through Active and Emotionally Engaging, Transdisciplinary Science Mediation: Insights from the Balad'UM Initiative

Valérie Borrell Estupina*[1], Vanessa Vigano[2], Frédérique Carcaillet[3], Flavie Cernesson[4], Clémentine Colomer[2], Angèle Delannoit[2], Véronique De Montety[5], Lou Deny[2], Marianne Dupre-Gabirot[2], Yuanfei Huang[2], Isabelle Parrot-Smietana[6], Marinela Pataccini[7], Joachim Rivallain-Vadon[2], and Marine Rousseau[2]

[1]University of Montpellier/G-EAU – Geosciences Montpellier, University of Montpellier – Université de Montpellier, 163 rue Auguste Broussonnet, 34090 Montpellier, France/UMR G-EAU (INRAE, CIRAD, IRD, AgroParisTech, Institut Agro Montpellier, BRGM, Université de Montpellier) 361 rue Jean-François Breton, BP 5095, 34196 Montpellier Cedex 5, France, France

[2]Université de Montpellier – Université de Montpellier, Université de Montpellier – France

[3]Université de Montpellier – MARBEC, Univ Montpellier, IRD, IFREMER, CNRS, Montpellier, France. – France

[4]AgroParisTech – TETIS, Université de Montpellier, AgroParisTech, CIRAD, CNRS, Inrae – France

[5]Université de Montpellier – MONTPELLIER MEDITERRANEE METROPOLE – France

[6]Université de Montpellier – IBMM, Universite de Montpellier, CNRS, ENSCM, Montpellier 34095, France – France

[7]AgroParisTech – Université de Montpellier, AgroParisTech – France

Résumé

Montpellier's water system is subject to intense and overlapping pressures: flash floods, severe heatwaves, pollution peaks, and increasing competition for water use. These phenomena, exacerbating by climate change, generate eco-anxiety, socio-environmental controversies and raise urgent questions of sustainability. However, the local public often has only partial or distorted knowledge, shaped by misinformation and low scientific literacy. This undermines civic engagement in the necessary sustainability transitions.
Academic narratives often fail to mobilize emotionally distant or disengaged audiences. How can scientists share complex knowledge on urban water issues in a way that is scientifically sound, emotionally resonant, and socially empowering, without inducing fear or discouragement?

By combining experiential learning, emotional engagement, and digital tools, science communication can foster motivation, understanding, and empathy. The Balad'UM project, powered by CHARM-EU (ERASMUS+ European universities alliance), the DSIN (UM Digital and Information Systems Department), and the UM UNESCO water center ICIREWARD, was co-designed by students and researchers to create a geolocated mobile app targeting students, initially, with the possibility of later expanding to tourists and local residents,

*Intervenant

and offering self-guided urban walks, following the educational principles of CHARM-EU. Through iconic sites, users explore stories of water from multiple angles-natural, cultural, urban, scientific-via interactive content, challenges, and anecdotes.

To prepare emotionally and cognitively, students, walking by small groups, receive targeted support (role-playing, concepts, storytelling), gradually gaining confidence and legitimacy to teach peers. The experience emphasizes collaboration: every voice is valued, errors become learning moments, and peer interaction strengthens understanding.

This method has been deployed in two initiatives:

- Balad'UM "Water & the City", under the *Science avec et pour la société* label and *UM VIA des sciences project, in partnership with the City and the Montpellier Metropolitan Area,* aims to foster sustainability literacy through immersive urban exploration.

- Balad'UM "a step into the Ecological Transition for Sustainable Development", a national mediation program aimed at training all undergraduate students, supported by the UM Faculty of Science.
By linking scientific knowledge, urban heritage, and emotional engagement, Balad'UM provides a replicable model for transdisciplinary, empowering science outreach, supporting active, resilient, informed citizenship in the face of climate-related water challenges.

Mots-Clés: • CHARM, EU, Balad'UM, geolocated mobile app, water, science outreach, transitions, sustainability, education, emotion, learning by doing, climate change, Peek app, university of Montpellier, Science avec et pour la société label, TEDS