SUMMARY OF KERIMA-NADA WELLER'S MASTER THESIS ENTITLED

"*RAISING PUBLIC AWARENESS OF WATER SCARCITY THROUGH SCIENCE MEDIATION. AN ANALYSIS OF APRH'S PROJECT ECH2O-ÁGUA*."

Context. This master's thesis is situated in the field of Social Studies of Science integrated by the European Inter-University Association on Society, Science and Technology, ESST. Realised and partly supervised in Lisbon, Portugal, the field of investigation is *water management and water uses: public participation, stakeholders' involvement and the role of science*.

Interest. As an introductory knowledge base, an extensive literature review on water scarcity as a technical fact and a social threat has been conducted throughout the first two months by the author of the thesis. In order to get a complete impression of the project's concept and realization, documents related to *ECH2O-Água* were collected and analysed. For more tangible data and a realistic approach, the here investigating team followed the project's preparatory and public actions throughout the four-month investigation period, which was strictly set by the ESST-programme's agenda. Informal discussions about the research team members' observations and impressions served as inspiration for a more technical analysis of the project's impact on the participating experimental communities' perception of water scarcity and their personal efforts for an efficient use of the resource. This aspect underlines the cooperative and interdisciplinary approach of this research project.
The objects of interest to the analysis are descriptive publications about the project, notably on the internet (the project's web presence), and the informative and communicative material presented to and partly handed out to participants during the actual activity sessions. Other than that, discussions about its conceptual development with project team members and partners, as well as protocols of the attended sessions and transcriptions or summaries of the qualitative interviews with participants complete the underlying sources of analysis.

Study. Field research consisted of following the activities of the non-governmental awareness-raising project about water scarcity and water uses, *ECH2O-Água*, from March to June 2019 in the greater Lisbon area. Seeking to understand the Portuguese independent expert association on water *APRH*'s approach in communicating their knowledge to different groups of lay persons (retired people, school children, people in their workplace, etc.) so as to strengthen their sense of responsibility towards the environment and society, leading to more efficient and conscious use of the resource. The study of this science mediation project consisted of an ethnographic observational approach completed by qualitative interviews, conducted in cooperation of a student in social studies of science (the main author), and two groups of fellow investigators from ISEG's Master Programme *Science, Technology and Innovation Management*. This interdisciplinary and multilingual research group completed every single involved person's knowledge gaps or/and missing skills.

Theory. The related STS-concepts mobilised here for the theorisation and analysis of the observed data are the mediation of scientific knowledge, citizen science and the Actor-Network Theory: Science mediation is an essential element of the relation between so-called experts of academic research or specific engineering knowledge, and society, i.e. lay people to a subject. In general, the intended transfer of scientific knowledge can have multiple forms, be it written in vulgarised articles, books or leaflets like the underlying one, verbal in interviews, public conferences or talks as the launch session of the project, or visual through content-explaining illustrations, videos, etc. The main aim is to create a common understanding for scientific activity and its relevance for society, leading to public willingness to fund and support it or act accordingly.
The Actor Network Theory, mainly developed by the sociologists of science Bruno Latour and Michel

Callon, can determine dynamics between different groups of people and objects. Citizen science projects create close emotional ties between science and society by making the latter take part in the first, showing how both are embedded in and dependent on one another. Citizens are invited to take part in scientific activity by executing measurements, adopting methods and patterns of reasoning and completing the experts' technical view with their lay persons' perspective and experiences. Constructive exchange is meant to universalise approaches, understanding and practices in an attempt to make science tangible and useful.

Linked to the results of the ethnographic case study, including activity observation and qualitative interviews, these concepts helped to detect the current project's impact on the local society. They also determined possible aspects to be further developed or improved in a perspective of expanding ECH2O-Água's outreach, motivated by international Sustainable Development Goals. The notions "immutable mobiles" for "knowledge transfer" or "translation", "social responsibility", "emotional involvement" and "internal locus of control" have been very helpful in this context.

Analysis. In an effort of structuring the obtained data, counting for almost 100 pages of protocols, photos and transcripts, the main impressions of the observations was then organised along six criteria:

(1) Perceptions of the project
(2) Project-internal coordination and internal learning processes
(3) Participants' initial state of knowledge and their interests in saving water
(4) Mobilisation of immutable mobiles in this science mediation project
(5) Knowledge transfer and translation
(6) Emotional involvement.

The analysis lead to suggestions for the improvement of the project *ECH2O-Água*'s impact on public awareness of water scarcity and generalised conclusions for the success of awareness-rising projects for ecological issues initiated by scientists and engineers in the sustainability sector.

RESULTS

The following five levels of Actor-Networks (AN) were detected within the project's boundaries:

1. **APRH,** composed of human actors (the operational core team and all members) and non-human actants (actions and communications). Linked through a common interest in IWRM, an emotionally-loaden concern about the planet and the willingness to join forces by collective interdisciplinary learning, they form a common strategy, meaning the network. Interactions between them take place in the offices, in conference rooms, on the congress, via email and the website's portal.

2. Out of urgent need for a new operative strategy, the **executive *ECH2O-Água*-team** (mainly the project manager, the current director and co-directors of the institution, and one technician), dedicate some time to APRH's science mediation purpose. Here the mobilised actants are numerous: faucet aerating devices, measurement equipment (sac and pliers), and communicational material. The actions initiated through these immutable mobiles also affect the greater AN APRH which follows the project continuously. Eventually this ongoing process has impacts on the latter's internal organisation and positioning in society as outreach and strategy will be recognised and valorised also in the association's traditional activities. But, it is only the AN *ECH2O-Água*-team, thus only a fraction of the original AN APRH, who get in touch with 3:

3. **Participant groups** in the experimental communities and partner institutions. Each forms an independent AN with a special place in which they exist and thus a specific internal dynamic, since they are composed of a multitude of human actors and non-human actants.

4. **AN**s**-session** are created through the common activity of ECH2O-Água and their target groups during the sessions. Focus of the analysis was set on these temporary entities, who are per ANT-definition constantly evolving through their ongoing interactions between members.
5. By transforming the participants into active citizens, ECH2O-Água initiates the creation of a fifth level of AN, which in case of the project's success will be numerous: the **spread of originally APRH's knowledge to broad public through the project's participants who tell their entourage** about their experience and/or show them ECH2O-Água's communicational material (this indirect, extended influence is expected to reach 5000 - 6000 people).

ECH2O-Água was observed to actually trigger participants' concern about the environment and notably about surface water courses and hydrophilic species. However, there is still a margin between intense, binding discussions or citizen science-like events that lead to experimental learning, and the here observed participation, which consists of naming elements of the water cycle, regular domestic water uses and eco-friendly habits to save water in everyday life. The following suggestions made are expected to expand the project's outreach:

Communication and planning. Throughout the four months investigation period, APRH members and the research team cooperated very well. Regular exchanges between the research group and the executive project team were friendly and constructive, just as their contact with experimental communities. Nevertheless, a more standardised way of approaching eventual experimental communities and of planning the activity days with them, clearly communicating the time- and location- wise needs of *ECH2O-Água*, is suggested. With a checklist to prepare all involved parties to what is about to happen, blanc moments or organisational complications can be avoided.

Documents and publications. The activated channels of diffusion are numerous and dedicated to reach different target groups, diversifying the range of people who get to know about the project and its contents. The analysis of *ECH2O-Água*'s internet presence (website, facebook and newsletter) and communicational documents (the visual identity, a power point presentation and videos of the first phase, a giveaway kit consisting of an inox drinking bottle, an explanatory leaflet and a backpack with the project's logo on it) showed that their science mediation potential is underexploited. They are well conceived for universal use in various different target groups but not yet valorised adequately. But, the project team would only give the kit to participants after the first part of the first session (presentation). The illustrations are not used in this presentation; neither are the explanations related to the leaflet or logo. Translation in an AN-sense cannot pass through them, even though they appear to be perfect immutable mobiles. Thus, in further editions of ECH2O-*Água*, developed images and metaphors should be integrated in the visual and verbal presentation of each session so as to make participants relate them appropriately to the discussed subject. Interesting updates on the sessions could relate concept and realisation and lead to interest of internet users in making their socio-professional entity an experimental community of ECH2O-Água.
Generally, the main object, the power-point-presentation, was found to be a means of distance between team members and participants. Restricting it to images or replacing it with posters and more participatory options of talking about water scarcity is suggested. Yet, this would mean embracing simplicity over academic correctness. It is expected to intensify participation and understanding.

Contextualisation. Linking concept to content and material can turn the latter into immutable mobiles of the activated ANs, because the mediation material allows the crucial information to flow from one actor to another. Therefore, the team is invited to insist on the local, national and global context in which the idea for the project arose. Also, contextualisation in the mother organisation's traditional activities is interesting for participants to understand the project's legitimacy and the urgent need for

a change in the public's water use. Framing the translated information on the environment and society's interactions with it can be intensified by more participative activities. When actually taking part in measurements or actively discussing an issue, participants tie a link to the project and its message and are more likely to pass it on to their entourage. In order to make this communication possible and the adoption of the proposed discourse easier, team member should agree on a common concept and important metaphors or easy explanatory schemes to be used in every session. Through a change in the presentation of phase 1 on the first activity day, the creation of a new knowledge-spreading AN can be achieved by making participants repeat what they heard and saw.
In eleven qualitative interviews, participants and coordinators of the visited institutions confirmed that they were convinced of *ECH2O-Água*'s success and that they liked the project. However, all mentioned the difficulty to appropriately prepare and communicate the content. Therefore, pedagogic training is suggested to the entire team, including a common reflexion on the just mentioned terms and explanations to not be forgotten.

RESTRICTIONS

The here summarised work is characterised by a range of restrictions. Thanks to the cooperation with ISEG's students and constant efforts of the executive project team, the main author could partly overcome the given language barrier, which relativizes the intended ethnographic approach. Fieldwork protocols and interview transcriptions (or summaries when recording was denied) also profited from being completed by the different observation angles of present research team members. According to the rules and agenda of the ESST-programme, this work was restricted to a four months period, meaning the first run of the project from March 2019 to April 2020 was not entirely covered. Also, the conducted range of qualitative interviews is too small and was not standardised enough to be representative by any means. Furthermore, the ANT analysis is not complete, since the experimental communities' internal dynamics outside of ECH2O-Água's activities were never observed.
The suggested adaptations to the project are not to be understood as severe criticism but as well-intended ideas of how to improve an already great project via the extension of participants' emotional link to the underlying issue. Slightly adapting the approach may enable to tie closer links between abstract content and participant's reality, so as to bring about the intended shift in participant's concern by activating their internal locus of control concerning water security, their personal responsibility for ecosystems and human populations.

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REFERENCE

K. Weller (2019) *Raising Public Awareness of Water Scarcity Through Science Mediation. An Analysis of APRH's Project ECH2O-Água*. Lisbon/Strasbourg, 2019.