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Application of theoretical principles of citizen science in the estimation of water levels in small basins through images from photo traps. The pilot case study of Montecalvello in Viterbo Province (Central Italy)

Andrea Spasiano^{1,2}, Salvatore Grimaldi³, Fernando Nardi¹, Simone Noto⁴, and Alessio Maria Braccini²

¹Water Resources and Research Documentation Center, University for Foreigners of Perugia, Perugia, Italy

²Department of Economics, Engineering, Society and Business Organization, University of Tuscia, Viterbo, Italy

³Department for Innovation in Biological, Agro-food and Forest Systems, University of Tuscia, Viterbo, Italy

⁴Department of Civil, Environmental and Architectural Engineering, University of Padua, Padua, Italy

In this contribution main concepts, tools and methods that distinguish citizen science are discussed in order to build a theoretical framework applicable to empirical cases study. The term citizen science refers to a set of methodological approaches for the engagement of volunteered participants in scientific research activities mainly related to environmental monitoring and assessment and spatial planning. The distinctive character of citizen science is transdisciplinarity. This concept indicates the integration of different scientific backgrounds and methods for science-driven solution-oriented applications to solve a specific problem that requires support and engagement of a wide range of potential non expert users and actors.

The theoretical insights deriving from the review are tested at an empirical level on a pilot case study for estimating water levels in small basins, where the use of traditional monitoring tools is a real challenge due to the unstable morphological conditions of the riverbeds and the difficult-to-access environments of ephemeral and intermittent streams. In order to overcome such practical limitations, recently a technique based on image analysis was introduced, based on a white pole and its pictures taken by a phototrap (i.e. named stage-cam sensor). To calibrate such tool, the contribution of non-expert volunteers is fundamental. Indeed, they are recruited to perform a visual analysis of a continuous series of images to create a set of observations to use as benchmark for the image-analysis algorithm calibration. The study is based on the pilot case of the secondary basin of Montecalvello, located in the municipality of Graffignano (Viterbo Province), about 100 km north of Rome. The volunteers have been recruited by the student community of the University of Tuscia. Preliminary results presented here show the significant opportunities as well as the challenges of citizen engagement for water monitoring in remote areas. The presented transdisciplinary framework is also discussed, as linked to the presented preliminary results, underlying the multiple benefits of general public volunteering in similar research projects, paving the way for increased awareness, science literacy, engagement and distributed participation for environmental sustainability and safety.