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Citizen-photographers help environmental monitoring thanks to a photogrammetric approach

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This work develops a methodology borrowed from terrestrial photogrammetry applicable by citizens to environmental monitoring of small areas for conservation purposes. The advantage of this technique is the generation of a 3D digital reconstruction of the surrounding environment acquiring photos via smartphone equipped with selfie-stick and processed by the software based on the Structure from Motion (SfM) algorithm. Interested citizens, after proper initial training, can take photographs with their smartphones and by using a dedicated app, they participate in monitoring campaigns in natural protected areas, such as National or Regional parks, where citizen-photographers will find explanatory panels indicating areas to be monitored. These areas should be set up with a grid with around 6 m2 cells, defined by geo-referenced landmarks.
Data will be sent, as soon as the smartphone is connected via Wi-Fi, to a “control center”, equipped with a powerful computer with Geographic Information System (G.I.S.) and SfM software’s to pre-processing and elaborating the acquired information. After a preliminary phase of manual recognition and parameterization, the orthographic photogrammetric reconstruction and the Digital Surface Model (DSM) are reconstructed. Citizens will then receive by email a reduced size of the 3D reconstruction result of the area they monitored.
This methodology can be a useful tool for monitoring of high environmental interest habitats like e.g. dune and gypsum outcrops characterized by sparse vegetation. Moreover this method allows us to keep under control the trend of advancing or withdrawing both of alien species and threatened species and at the same time measure abiotic parameters (i.e. elevation, etc.).
Thanks to this new methodology, able to recorded spatial variations at centimetre scale, will be possible to keep monitored many areas, thanks to the citizens help, with a more detailed temporal scale, as well as to identify critical situations in advance.