Cadastral Survey of a Fishpond Using UAV Photogrammetry

Peter Kyseľ and Ľubica Hudecová (Slovakia)

Key words: Cadastre; Digital cadastre; GNSS/GPS; Land management; Low cost technology; Photogrammetry; Spatial planning; Young surveyor; Unmanned aerial vehicle

SUMMARY

The land management is nowadays one of the most important things. A complex and precise tool for the evidence of land use, such as cadastre, is the condition for a functioning land management system. Measurements of the land surveyors are the base of the cadastre. In the present, in Slovakia only "classical" land surveying methods are used for the cadastral surveys, such as GNSS method or polar method. Today we witness an evolution of the cadastral system and its expansion into the third dimension. We are slowly getting to a point where classical surveying methods would be insufficient and modern and smart technologies should be used, which would provide more information. There is also a pressure to get the results effectively, using less time and money. One of the modern and smart technologies, which would be suitable for the cadastral survey is the unmanned aerial vehicle (UAV) photogrammetry. The main aim of this paper is to test a cadastral survey of a fishpond situated near Bratislava using UAV photogrammetry. In the first part, the process of taking the photos and their processing using standard Structure-from-Motion method are described. The next part deals with the results. The main product for the purposes of the cadastral survey was an orthomosaic, where the detailed cadastral points were identified, but an experimental technique of the point identification on the 3D model was used as well. There are also other results which are not used primarily in the area of cadastral survey but can be used by some other professions. The results were verified on a set of check points where positional deviations between the cadastral map and the photogrammetric measurement were calculated. The UAV photogrammetry proved to be a fast and effective as well as precise method for the cadastral surveys. It minimises the time spent in the field and relocates most of the measurement to the office. These works could be handled by one person, in comparison to the "classical" surveying methods where at least two persons are needed in most cases. Moreover, the measurement devices are cheaper than the classical surveying equipment. The method proved to be also precise enough for the cadastre in Slovakia. Finally, it is a very complex method which does not provide only points

for the cadastral map but also a variety of other results which are comprehensive and could be used by many other professions.