



Evaluation of urban stream restorations by UAV monitoring

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This study examines the potential and limitations of the unmanned aerial vehicles (UAV) as a source of high-resolution multitemporal spatial information, applicable for the post-project evaluation of stream restorations in the urban environment.

UAV imaging was used as a basis for the evaluation of restoration of three streams in the metropolitan region of Prague, Czech Republic. The data from three years of recurrent UAV monitoring was used to (i) evaluate the morphometric features of the restored streams and floodplains compared to the preceding status, (ii) to verify the compliance of the newly built channel with the restoration plan, (iii) to track the stability and further evolution of the restored channel and (iv) to track the changes of the riparian vegetation.

The morphometric analysis, based on high-resolution UAV imagery revealed that although the general goals of restorations were fulfilled, the newly shaped stream patterns significantly differ from the approved restoration plans. The restored channels are typically less complex, with lower sinuosity, stream length and total channel capacity. The detailed multitemporal analysis of the restored channel of Hostavický brook, where the deviations from the restoration plan were the amplest, proved however stability of the new channel and sufficient capacity of the system for a safe flood spill during a significant storm flood. Besides the stream morphology, the UAV monitoring enabled to track the progress of vegetation succession in the riparian zone, both planned and spontaneous as well as to detect the intense eutrophication in the newly created shallow ponds.

Despite the technical limitations, stemming from the nature of optical sensing, the UAV monitoring proved to be a highly efficient and reliable technique suitable for evaluating of stream restoration projects with versatile applications even in the specific conditions of the urban environment.