



UAV-based assessment of hydro-morphological structures in rivers to evaluate efficiency of renaturation

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Due to their high spatial and temporal resolution, unmanned aerial vehicle (UAV) surveys for data collection are excellently suited for the digital analysis and mapping of hydro-morphological structures. Some of these structural elements can be spatially delimited using computerized geoprocessing and analysis techniques, mathematical and statistical techniques and methods. The high-resolution aerial photographs and 3D point clouds, which can be collected using modern and flexible UVA drone systems, are ideally suited to be observed and used in the context of various issues concerning river development in Germany. So far, hydro-morphological structures have only insufficiently been taken into account in an efficiency based monitoring procedure of river renaturation.

In order to meet this challenge, UAV-based performance control of hydro-morphological parameters is the focus of the presented research. The main focus here is on the delineation of selected hydro-morphological structure elements as well as the transfer of digitally recorded data into the modular process for holistic efficiency based monitoring of renaturation. Mappings and UAV surveys were conducted on five exemplary renaturation and comparison sections in North Rhine-Westphalia (Nordrhein-Westfalen, Germany). For this purpose, a method was developed for digitally recording hydro-morphological structure elements. The structural airborne mapping does not represent a result-influencing limitation compared to the visual-analogue on-site method. With both investigation methods, the improved hydro-morphological state can be shown after measures have been implemented.

The knowledge gained here provides a standard-based approach to accompany the development of the local hydro-morphological status resulting from renaturation of rivers in a UAV-based manner, flexibly, periodically or event-related.