

Alfredsen et al. (2018): Brief Communication: Mapping river ice using drones and structure from motion.

River ice is an important factor for river morphology, winter water supply and riparian ecology in cold climate regions like Norway.

The authors used low cost drone systems to precisely measure the ice thickness, spatial distribution and volume, which has been traditionally very difficult due to challenging site access. The rivers were namely the Gaula and one of its tributaries, the Sokna.

The drone flights were executed over a reach between 200 and 350 meters, with a flight level of 30 meters above the ground. The overlap of pictures was set to approximately 20 % for a precise alignment in the structure from motion (SfM) analysis.

For the two rivers, two types of ice have been evaluated – ice jams and anchor ice jams. Alfredsen et al. want to contribute to the knowledge about ice processes.

Determining the ice thickness over flowing water still remains a challenge for the SfM approach. In general, the amount and quality of the obtained data has shown to be incomparable with manual measurements, which are much more time consuming and require good access to the study sites.

The methodology of using drones rather than helicopters or even planes is especially suitable for small to medium rivers, although battery life and GPS signal have been mentioned to be a limiting factor when it comes to the extent of the study site.

Link to the paper:

<https://tc.copernicus.org/articles/12/627/2018/tc-12-627-2018.pdf>

Woodget et al. (2017): Drones and digital photogrammetry: from classification to continuums for monitoring river habitat and hydromorphology.

As part of their study, Woodget et al. demonstrated a classification approach for river habitats using high resolution drone imagery. In comparison to traditional, manual and local classification systems, drones nowadays allow for the acquisition of continuums of data. The outcomes of this study should potentially provide knowledge and opportunities towards a better understanding and management of rivers.

The first case study targets the San Pedro River in Chile, where plans to build a 56m high dam will severely modify the natural hydromorphology of the river and subsequently impact the native fish populations. The drone-based approach should provide high resolution remote sensing data in a faster, less laborious, more objective way – especially focusing on spatial continuity.

The second case study was dealing with the River Teme in the United Kingdom, which is a meandering and more dynamic gravel bed river. Frequent river storms changed the course of the river and by that also the habitat availability significantly. Here, digital photogrammetry is supposed to help monitor these changes in the future. Beside drone images, ground control points (GCPs) were used to precisely georeference the orthophoto.

What remained difficult in both study sites was the quantification of submerged bed topography in deep, turbid and turbulent areas. Despite a couple of challenges, this new approach showed numerous advantages for future river habitat mapping and monitoring.

Link to paper:

<https://onlinelibrary.wiley.com/doi/epdf/10.1002/wat2.1222>