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Mapping surface water quality in Myanmar using aquatic drones

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Water resources in Myanmar are increasingly affected by anthropogenic pressure and climate change related impacts. At the Inle Lake a unique village is located on the water in close proximity to intense fishing/farming activities. The nearby floating gardens provide invaluable resources for local communities, who are highly vulnerable to changes to water quality in the lake. Diversely, within the city of Yangon, the Kandawgyi lake is a popular recreational area which has become heavily affected by excessive algae proliferation. The deterioration of water quality Is likely caused by uncontrolled untreated wastewater, and poses a risk to the citizens. Finally, rivers such as the Pan Hlaing River, flow through industrial zones and collect waste water discharges.

Monitoring in these regions is scarce and limited to a few point-sampling locations. Local stakeholders lack adequate tools to monitor the needed parameters and are in need of reliable and updated baseline water quality data to support them in setting-up sustainable water management strategies. Tools such as aquatic drones and in-situ sensors are innovative ways of monitoring water quality and ecology that could contribute for effectively gathering valuable environmental data.

In this project, aquatic drones (both underwater and surface) were equipped with water quality sensors and cameras for low-cost and rapid assessment of surface water quality at high spatial resolution. The drones are able to navigate autonomously through way-points while collecting geo-referenced data. This study aims at field-testing of two affordable aquatic drones with sensors to map water quality parameters in different types of water systems (large lake, urban lake, river). This study reports the challenges encountered, and evaluates the resulting dataset/maps are in relation to the cost and value for the local stakeholders (ongoing research).

At the Inle Lake, results show varying concentrations of the different parameters that were measured. Low dissolved oxygen levels were found within the villages and underneath floating gardens, while chlorophyll-a and cyanobacteria levels were low across the whole lake. Underwater images show the presence of fish and provide insights into the aquatic ecosystems. At the Kandawgyi Lake, the generated water quality maps illustrate the spatial distribution of the different parameters, and two main areas of contamination could be identified (high algae content, low dissolved oxygen, high E-coli concentrations). At the Pan Hlaing river, the plotted data

show degrading levels of dissolved oxygen concentrations, indicating potential effects caused by industry outlets.

The water quality maps that were generated with this data are very illustrative of the condition of the water bodies and the location of contaminations hotspots. The measurement process was accompanied by stakeholders and local universities, which contributed to stimulate capacity building and to create awareness for water quality related problems. As follow-up activities, these results will be used to draft a long-term water quality monitoring plan for local Myanmar students to continue collecting water quality data at these lakes. The detected issues are being discussed with local stakeholders, as well as the possibilities for establishing a larger scale monitoring campaign using this type of monitoring tools.