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Using the SonTek M9 HydroSurveyor and HYPACK to Survey the Wangkha Reservoir in Bhutan

By Ivan Izaak

Between June 4 and 10 Mr. Rajiv Bhatia, a Xylem Analytics Manager from India, and I have done the full reservoir survey for our new customer, the Druk Green Power Inc., Bhutan. Druk Green Power Inc. is the Bhutanese governmental company that operates all of the hydropower plants in Bhutan. It was my first time to work with the M9 ADCP.

Our purpose was to teach our new customer how to do the survey; and how to process the data and get final results such as volumes, contours, plotting sheet and how to compute the velocities and discharges.

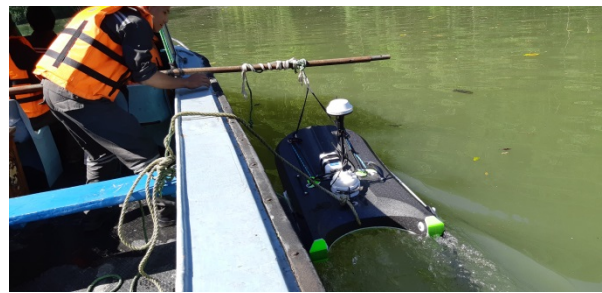
We surveyed most of the reservoir at the Wangkha Dam at 1860m elevation south of Chhukha camp, a 280450 m² area.

FIGURE 1. View of the Wangkha Reservoir North of the Hydropower Station Dam



In all, we have surveyed 22 km of the planned lines and it took us almost two days to finish the survey. We have used a local motor boat with the Hydroboat attached to her starboard side:

FIGURE 2. The Launch Boat for the Survey (left) The Hydroboat Attached to the Launch Boat (right)



We installed an RTK Base Station first close to the dam and then moved it upstream to cover the northern part of the survey area. The real issue was the mountains and rocks that blocked the base station signal as well as the satellites. This was my first survey in the highlands and I have learned that you must be ready to lose GPS signal quite often so you must constantly monitor the GPS windows for HDOP, Number of Sats, GPS Mode etc.

FIGURE 3. Survey Crew (from left to right): Mr. Rajiv Bhatia, Xylem and Mr. Ngawang Gyeltshen, Druk Green Power Inc. at the front and Mr. Tempa Tshering, Druk Green Power Inc. far left at the operator seat and the driver is to the right.



During the processing we received the volumes at different levels as well as a DTM (Digital Terrain Model), contours and final plotting sheet of the reservoir as follows:

FIGURE 4. Resulting Plotting Sheet of the Wangkha Reservoir Survey

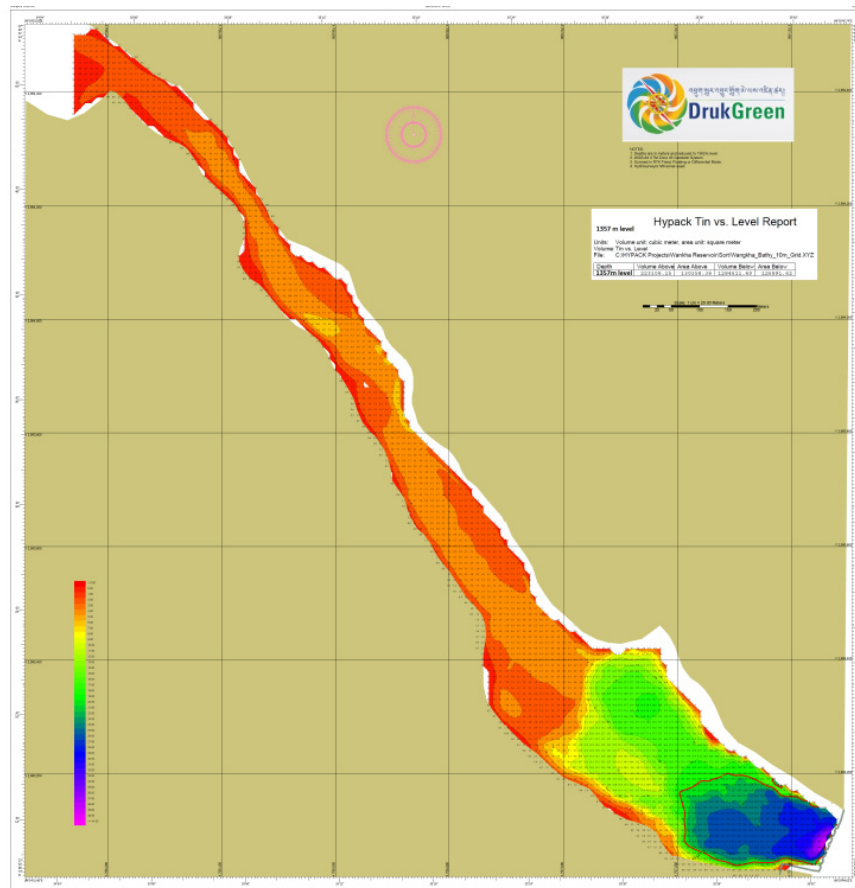


FIGURE 5. Wangkha Reservoir Survey Data in Google Earth. The Hydropower Dam is at the Southern part and water intake is to the North.

