

Development of a low-cost salinity and thermometer based on a thermistor, electrical conductivity measurements of water and an arduino-nano development board for coastal and lacustrine applications

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Temperature and salinity are critical physico-chemical parameters in aquatic environments as they determine the habitat suitability of many species. Researchers in Benin have found it difficult to obtain low-cost devices that make loss due to vandalism less dramatic and that answer their research needs for high quality data. Here we present the development of a temperature and salinitymeter that was tested in lake Nokoué, a choked lagoon in Benin, West-Africa.

During the investigation different types of batteries, waterproof casques and hardware set-up were tested in three different stations in Benin. The obtained data were compared with data measured by licenced equipment released at the same position in time and space as the Arduino based equipment. Three main challenges are identified during the test phase. The most important challenge turned out to be electricity cuts of the system due to shocks, this was overcome by adding shock absorbers. The next challenge was battery life, this was enhanced by changing the set-up of the batteries from parallel to serial. The last issue was keeping a recycled system waterproof. This can be overcome by being more careful when resealing the systems.

Temperature measurements were in reasonable agreement with measurements taken by the licensed equipment. The low-cost salinity meters were less precise than the high-cost meter and needed intense calibration before application.

Future work should reveal if the temperature and salinity meter, despite its lower precision and high development effort, is still more cost-effective than licensed equipment. If deemed interesting the next development step will be to lower electrical power needs by developing the electricity circuits without the development board.

Keywords: Low-cost equipment; Coastal and lacustrine equipment; Temperature; Salinity; Arduino development