

# NETLAKE Guidelines for automated monitoring system development

## 002 Cost options

### Objective

In this factsheet, we describe some of the cost options that will determine your buoy configuration.

### Considerations

1. Consider the pros and cons of purchasing a complete system vs individual system components as described below.
2. **Are you bound by public procurement guidelines?** If so, you need to be very clear about your requirements so you can compare like with like in the case of a tendering process.
3. **Data technicians on site?** If not, you might want to include data acquisition and storage in the request for quotes.
4. **Electronic engineers on site?** The advent of open source electronics (e.g. Raspberry Pi) makes it possible for homemade systems to be constructed cheaply, with the right expertise.
5. **Technical support?** Many AMSs contain homemade infrastructures (i.e., monitoring floats, instrument houses), constructed from materials bought in local hardware shops. The feasibility of doing this is determined by the technical know-how in your team
6. **How much do you have to spend?** Useful data can be collected from a variety of stations ranging from single parameter submersible sensors with an in-built data logger to a complete off the shelf monitoring station with a multi-parameter sonde. If you only have a small budget, you can still make inventive use of lower cost instrumentation.
7. **Do you want an off the shelf option?** This can be an easy to use option, with much of the design and engineering options optimized for the specific station design. But perhaps you want to be able to add and subtract sensors, not be locked into the use of sensors from only one manufacturer, and customize your platform according to specific needs? To develop custom configurations using mixed instrumentation you may need to build it piece by piece.
8. **Do you want the data hosted by a private company?** Many monitoring companies offer this, perhaps at a cost. Consider whether you want to have duplicate copies of data on you own servers.
9. **Do you have the IT infrastructure to host the data internally?** This is another option to 8 above, if you have the infrastructure (e.g. a server large enough to store the data), and the technical staff to maintain and archive the data.
10. **Do you want to be able to access the data remotely?** Being able to see real time data has significant advantages (e.g. management use, identification of problems). However, frequent data download can be expensive depending on communication options and data transmission cost. This cost needs to be considered at this stage if it's required.
11. **Are you leaving it in situ long term (i.e. > 6 months)?** If so, you may need a more expensive system, with larger moorings, better weather proofing, powering options etc.
12. **Self-cleaning options** will decrease maintenances costs but may impact on your power supply. In most situations, self-cleaning is a good idea if possible.

**13. Profiling system or just one depth and thermal chain.** Profiling systems provide a picture of the vertical variations in the measured parameters. However, these systems are much more expensive, and their mechanical nature is more prone to failure and therefore, requires a greater level of maintenance. The winch in profiling systems also requires significant power which can limit the frequency of profile measurements. Careful consideration between the costs and advantages of profiling systems versus multiple fixed depth sensors should be considered and are further discussed in AMSD guideline 010: Depth of sensor deployment.

### Examples

A low cost option is described in AMSD guideline 003: how to deploy a low cost option.

Costs can be lowered if you have in-house expertise. If you don't have access to this expertise, you may be still be able to save some money by outsourcing all or part of the job, including construction, deployment, data download and storage. This is likely to be higher cost.

Here we provide some examples of costs of individual items, along with complete stations. These are indicative costs only (valid in 2016) and vary according to supplier and country of interest. For up to date costs, please ask for quote directly from several suppliers. We present here a typical price range, but actually, the sky is the limit.

- Data logger: €500-€10000 (and more depending on how many and the type of channels you need).
- Simple standalone temperature logger: €50-100.
- Standalone dissolved oxygen sensor: €1000-8500.
- pH sensor: €600-1500.
- Conductivity sensors : €500-800.
- Fluorometers (chl, turbidity, CDOM etc.): €1500-15000 (or more).
- Multi-parameter sonde: €8000-10000.
- Complete physical structure (buoy, moorings, data logger, solar panels etc.): €13000.
- Profiling winch system: €20000 – 45000.
- Weather station: €1000-2500.
- Batteries: €50-200.
- Solar panels: €100-500.
- GSM or GPRS modem: €100-2000.
- Data download: depends on data transmission costs in your country.

### Likely Problems

- Not including maintenance and calibration costs in the initial estimate
- Underestimating the cost of real time data download
- Under-specifying the physical structure and moorings
- Over-specifying the station, and then not checking the quality and using the data that it is capable of producing.

### **More information**

Here are some companies that offer complete solution. For more detailed sensor information, see factsheet AMSD guideline 009: sensor considerations.

<http://www.act-us.info/database.php>

<http://www.observator.com/en/meteo-hydro>

<https://www.yssi.com/applications/source-raw-drinking-water>

<http://www.idronaut.it/cms/view>

<http://www.chelsea.co.uk/environmentalfresh-water>

<http://pme.com/>

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