

Practical Exercise



Which methods would you choose?



NATURAL
OUR WATER. OUR FUTURE
COURSE

Catchment
Based Approach



Pocket Tester

- Temperature
- Conductivity
- Total Dissolved Solids
- pH



Type: Spot testing
 Parameters: 2
 Accuracy / Sensitivity: 2
 Ease of Use: 4
 Cost: £150

Pocket testers can be used for a limited set of parameters e.g. temperature, conductivity, pH. Low cost pH sensors have a short lifespan

Type:

Parameters:

Accuracy / Sensitivity:

Ease of use:

Cost:

Monitoring 'Top Trumps'

Spot testing or continuous

Usefulness or relevance of parameters measured

1 = less relevant to 5 = highly relevant

1 = less accurate to 5 = highly accurate

1 = not easy to 5 = very easy

Estimated cost

Pocket Tester

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Autosampler



Type:	Sampler
Parameters:	4
Accuracy / Sensitivity:	4
Ease of Use:	4
Cost:	£2,500

Automatic samplers can be set to collect water samples at timed intervals. Samples must be analysed at a lab or by portable field testing kit

Multi-parameter colorimeter

- Phosphate
- Suspended solids
- Colour
- Turbidity



Type:	Spot testing
Parameters:	4
Accuracy / Sensitivity:	3
Ease of Use:	2
Cost:	£1,500

Capable of measuring a wide range of parameters, but in practice some methods are time consuming and require technical expertise

Dissolved Oxygen meter



Type:	Spot testing
Parameters:	2
Accuracy / Sensitivity:	5
Ease of Use:	3
Cost:	£2,000

Accurate and robust 'pro' standard dissolved oxygen meter. Optical sensor requires little maintenance, meter has advanced functionality

Phosphate colorimeter



Type:	Spot testing
Parameters:	2
Accuracy / Sensitivity:	3
Ease of Use:	4
Cost:	£600

Single parameter colorimeter designed solely for phosphate (nitrate and ammonia versions available). Uses reagents at additional cost

Tryptophan fluorimeter



Type:	Spot testing
Parameters:	2
Accuracy / Sensitivity:	4
Ease of Use:	4
Cost:	£5,000

Portable fluorimeter for tryptophan-like fluorescence – a good indicator of polluting organic matter e.g. slurry, sewage, anaerobic digestate

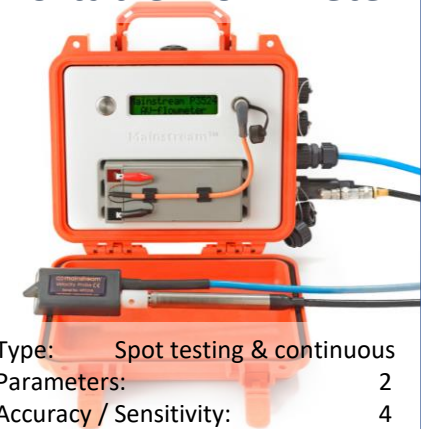
Multi-parameter fluorimeter



Type:	Spot testing
Parameters:	3
Accuracy / Sensitivity:	4
Ease of Use:	4
Cost:	£1,500

Choose two fluorescence parameters from Coloured Dissolved Organic Matter, chlorophyll, Optical Brightening Agents

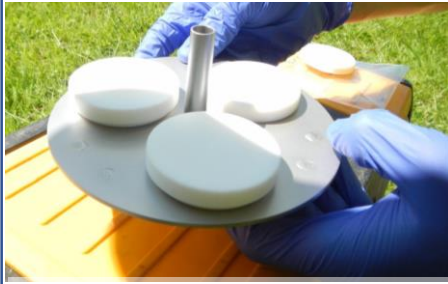
Portable Flow meter



Type:	Spot testing & continuous
Parameters:	2
Accuracy / Sensitivity:	4
Ease of Use:	2
Cost:	£4,500

Area-velocity flow meter for streams and small rivers. Measures velocity and level, requires measurement of channel cross section

Passive Samplers



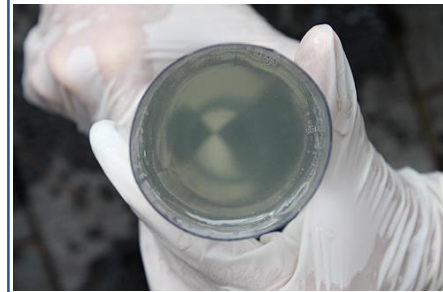
Type: Continuous deployment
 Parameters: 5
 Accuracy / Sensitivity: 5
 Ease of Use: 3
 Cost: £150 (per deployment)
 Left in situ for two weeks then recovered and sent for lab analysis. Can detect a range of parameters, but well established for acid herbicides and metaldehyde

Phosphate test



Type: Spot testing
 Parameters: 2
 Accuracy / Sensitivity: 1
 Ease of Use: 5
 Cost: £0.25 per test
 Phosphate test strips are an easy and low cost way of measuring phosphate. Whilst they are not very accurate or sensitive they are ideal for use by citizen scientists or non-technical staff

Turbidity tube



Type: Spot testing
 Parameters: 2
 Accuracy / Sensitivity: 1
 Ease of Use: 5
 Cost: £5
 A low cost and very easy to use method of measuring turbidity or cloudiness of a water body. Ideal for citizen scientists of non-technical staff

TDS & EC Probe



Type: Spot testing
 Parameters: 2
 Accuracy / Sensitivity: 2
 Ease of Use: 5
 Cost: £5
 Low cost probe measures electrical conductivity and temperature and calculates total dissolved solids. Low cost but low accuracy – useful indicator of gross pollution

Nitrate test strips



TO USE:
 Immerse test strip for 2 seconds and remove with pads face up. **DO NOT SHAKE OFF EXCESS WATER.** Wait 1 minute and immediately compare to color chart.

Type: Spot testing
 Parameters: 2
 Accuracy / Sensitivity: 2
 Ease of Use: 5
 Cost: £0.50 per test
 Test strips for nitrate and nitrite. Low cost and low sensitivity / accuracy but ideally suited to citizen scientists and non-technical staff

Ammonia test strips



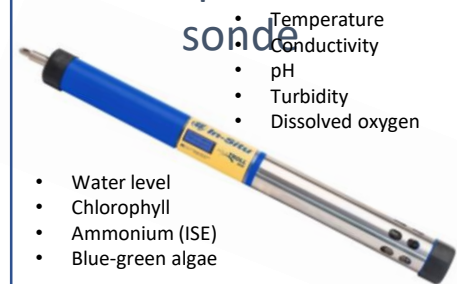
Type: Spot testing
 Parameters: 2
 Accuracy / Sensitivity: 2
 Ease of Use: 5
 Cost: £0.50 per test
 Test strips for ammonia. Low cost and low sensitivity / accuracy but ideally suited to citizen scientists and non-technical staff

Bacteria tests



Type: Spot testing
 Parameters: 3
 Accuracy / Sensitivity: 1
 Ease of Use: 3
 Cost: £6 per test
 Indicative test for presence / absence of faecal coliforms. Requires careful sample handling to avoid contamination

Multi-parameter sonde



- Temperature
- Conductivity
- pH
- Turbidity
- Dissolved oxygen

• Water level
 • Chlorophyll
 • Ammonium (ISE)
 • Blue-green algae

Type: Spot testing & continuous
 Parameters: 4
 Accuracy / Sensitivity: 4
 Ease of Use: 2
 Cost: £8,500
 Robust and accurate (for certain parameters) self cleaning multi-probe suitable for long term deployment and remote monitoring via telemetry (add c. £1000)

HydroCycle PO₄



Type: Continuous deployment
Parameters: 4
Accuracy / Sensitivity: 4
Ease of Use: 1
Cost: £12,500 (plus c. £1000 / year)
Wet chemistry analyser designed for long term, unattended deployment. High sensitivity and accuracy but requires reagents and specialist training

Water level logger



Type: Continuous deployment
Parameters: 2
Accuracy / Sensitivity: 5
Ease of Use: 3
Cost: £350
Basic logger for continuous measurement of water level. Various versions available for different depth ranges. Non-vented versions require a barometric logger deployed nearby

Conductivity logger



Type: Continuous deployment
Parameters: 3
Accuracy / Sensitivity: 5
Ease of Use: 2
Cost: £1,500
Data logger that accurately measures and records continuous water level, temperature and conductivity data. Useful as an indication of gross pollution

Dissolved oxygen logger



Type: Continuous deployment
Parameters: 3
Accuracy / Sensitivity: 5
Ease of Use: 2
Cost: £2,500
Data logger that accurately measures dissolved oxygen and temperature. Robust optical sensor requires little maintenance. Can be connected to telemetry for remote monitoring

Continuous nitrate sensor



Type: Continuous deployment
Parameters: 4
Accuracy / Sensitivity: 4
Ease of Use: 1
Cost: £15,000
Self-cleaning sensor for continuous measurement of nitrate. Very accurate providing local calibration is carried out. Requires specialist training

V-notch weir



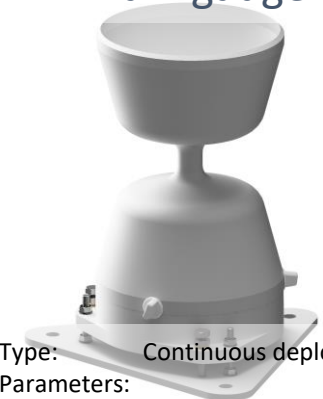
Type: Continuous deployment
Parameters: 4
Accuracy / Sensitivity: 4
Ease of Use: 1
Cost: £1,000
Weir plate must be used with level measurement device to provide accurate flow data. Requires specialist hydrologist advice and can inhibit fish migration. Prone to clogging

Soil moisture probes



Type: Spot testing & continuous
Parameters: 3
Accuracy / Sensitivity: 4
Ease of Use: 2
Cost: £550 (inc. data logger)
Basic probe for measuring soil moisture at a single point. Requires data logger or telemetry to access data. Can be used for spot testing.

Rain gauge



Type: Continuous deployment
Parameters: 3
Accuracy / Sensitivity: 4
Ease of Use: 2
Cost: £350 (inc. data logger)
Tipping bucket rain gauge for continuous measurement of rainfall intensity. Requires careful placement to avoid shadowing.

Water sampling



Type:	Spot testing
Parameters:	5
Accuracy / Sensitivity:	5
Ease of Use:	2
Cost:	Variable £4 - £100+ per sample
Collecting samples for laboratory analysis can be a powerful tool for assessing water quality. Cost depends on determinands and samples must be couriered to an accredited lab	

Time lapse camera



Type:	Continuous deployment
Parameters:	4
Accuracy / Sensitivity:	4
Ease of Use:	4
Cost:	£200
Remote cameras for recording water level and (to some extent) quality e.g. sediment plumes, visually. Low cost and easy to use, they can yield engaging accessible data	

Riverfly



Type:	Spot testing
Parameters:	4
Accuracy / Sensitivity:	5
Ease of Use:	2
Cost:	£100 per kit
Volunteer monitoring scheme run by The Riverfly Partnership. Low cost in theory but volunteers must be trained by suitable qualified staff and supported	

Turbidimeter



Type:	Spot testing
Parameters:	2
Accuracy / Sensitivity:	4
Ease of Use:	3
Cost:	£1,800
Field portable device dedicated to turbidity measurement – can handle rapidly settling samples. Provides more accurate data than generalist 'absorption' turbidity meters	