

# Catchment Systems Thinking Co-operative (CaSTCo)

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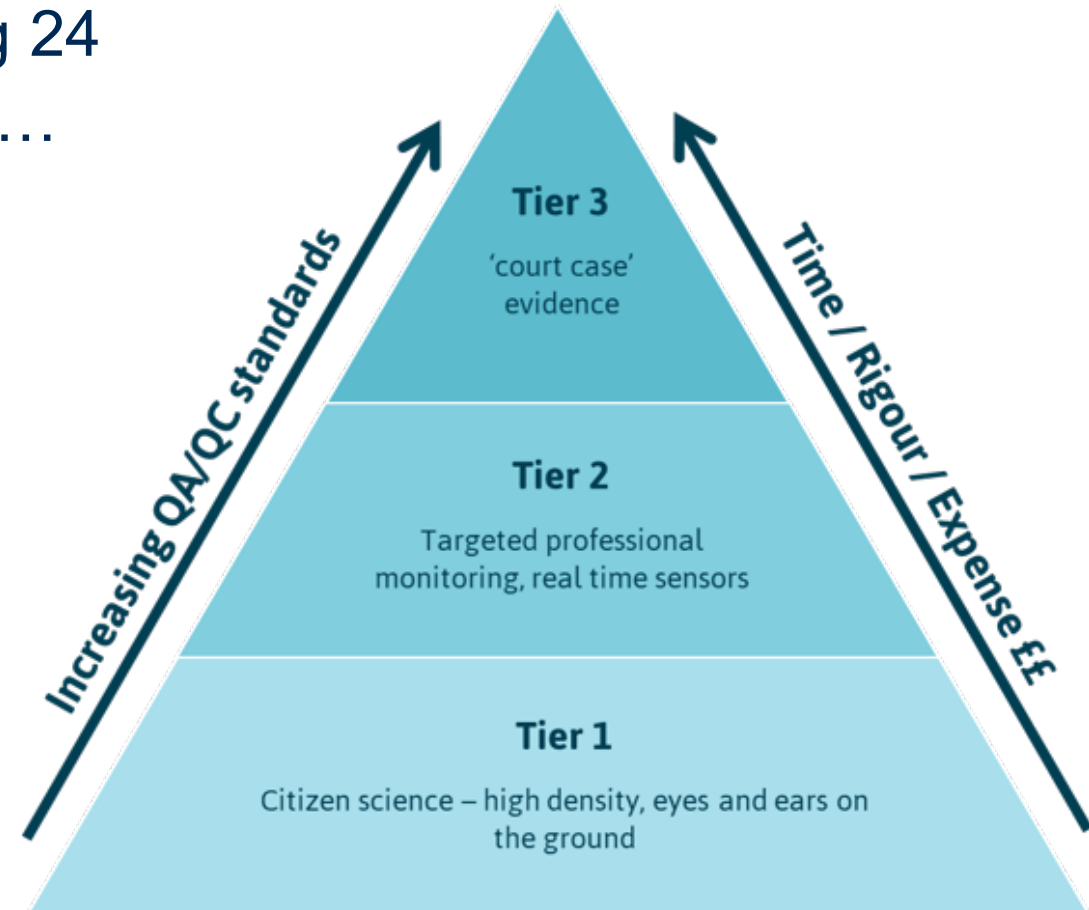


# CaSTCo – what is it?

## CaSTCo (Catchment Systems Thinking Cooperative)

is a 3-year Ofwat innovation project involving 24 partners, which will test the establishment of...

... **The Catchment Monitoring Cooperative (CMC)**. This is the framework that CaSTCo will establish to support people in monitoring their rivers and catchments



# CaSTCo – what is it?

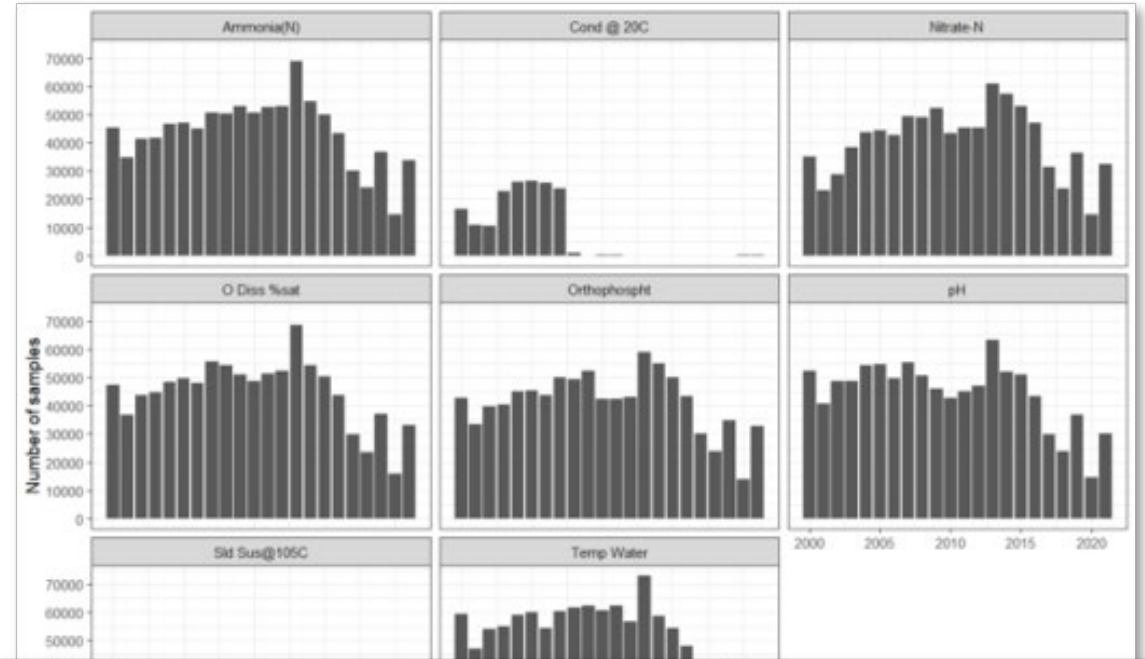


- A Charter for Citizen Science – agree the ‘rules’ for taking part
- List of ‘accredited’ methods, with guidance and training
- An agreed approach for openly sharing river / catchment data
- Demonstrating how this works in 8+ ‘Demo catchments’
- Collaborative monitoring plans in each Demo



# CaSTCo – why?

- Year on year cuts to Environment Agency statutory monitoring
- Catchment Data User Group (CDUG) conference in 2019 identified gap in monitoring data as a key issue



Qu3. How far should local data gathering be organised at a national level? nationally standardised and managed, with data standards, apps and platforms (Select one)

- 6 1. Nationally standardised, managed and funded by government
- 23 2. Nationally standardised, managed and funded in partnership
- 15 3. Nationally standardised, but locally managed and funded.
- 2 4. bespoke local solutions not coordinated centrally

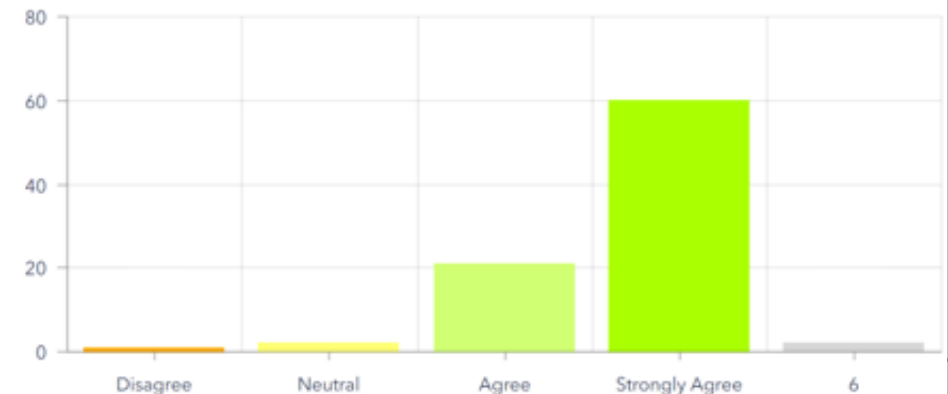
To what extent do you agree or disagree with the with the overall aim of establishing a monitoring cooperative as set out in the proposal?

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Reponses

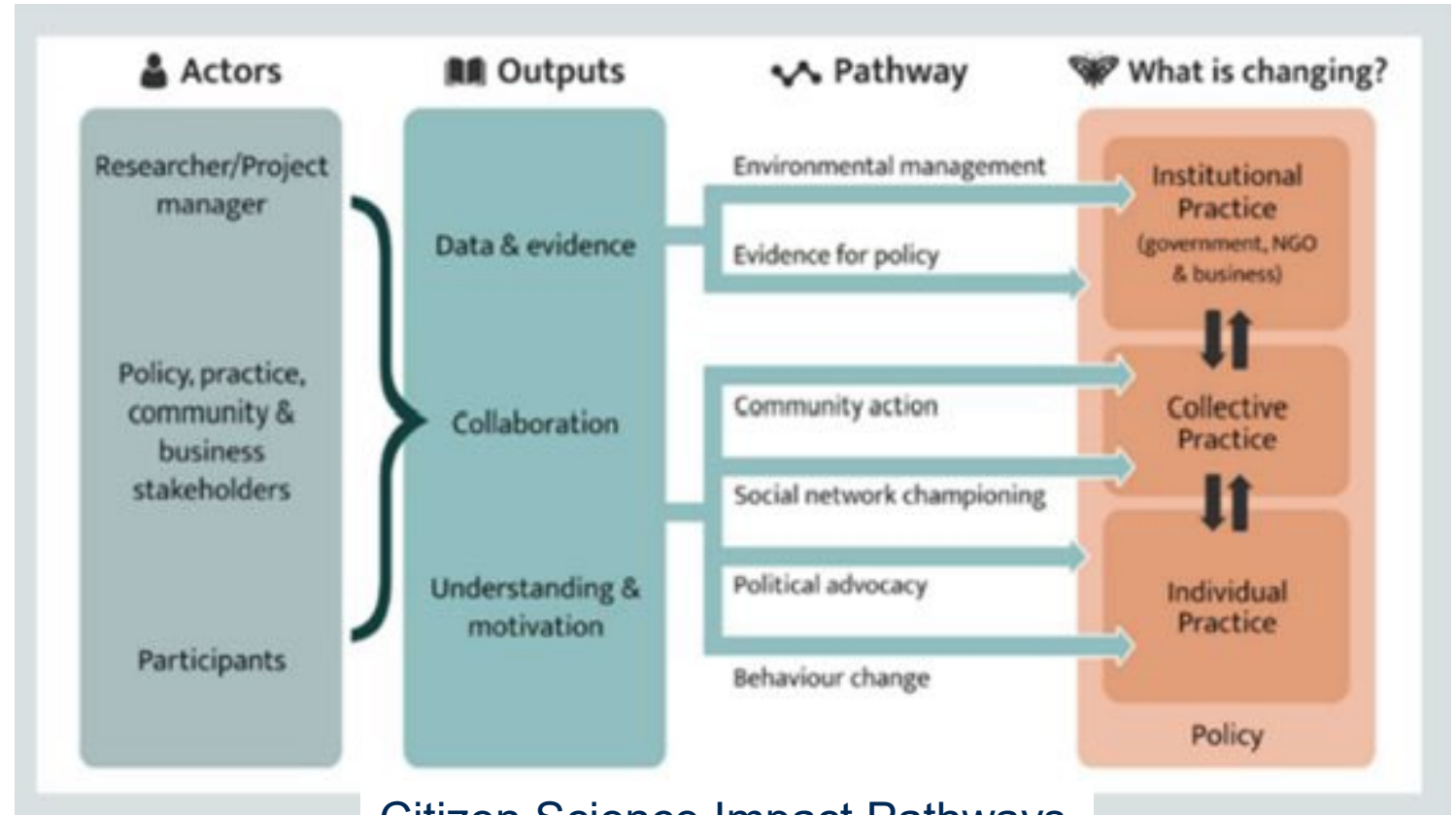
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CaBA hosts



# CaSTCo – why?

- Citizen Science and Volunteer Monitoring in UK freshwater environments is growing rapidly – but there is a perception that data quality is low / variable or not well understood
- Our rivers are facing unprecedented threats from sewage pollution, diffuse pollution from agriculture, road and urban runoff and climate change
- We need everybody working together to turn this around



Citizen Science Impact Pathways



# CaSTCo – who?



- Ofwat project led by United Utilities with partners including:
- Thames Water, South West Water, Dwr Cymru (Welsh Water), Anglian Water, Severn Trent Water, Yorkshire Water, Northumbrian Water, Affinity Water, South East Water
- The Rivers Trust, Mersey Rivers Trust, Westcountry Rivers Trust, Lune Rivers Trust, Severn Rivers Trust, Norfolk Rivers Trust, Wye and Usk Foundation, Herts and Middlesex Wildlife Trust, Thames21, Arun and Rother Rivers Trust
- Centre for Ecology and Hydrology, Freshwater Biological Association, Earthwatch, River Restoration Centre, Zoological Society of London, Exeter University, Cardiff University, Anglian Centre for Water Studies

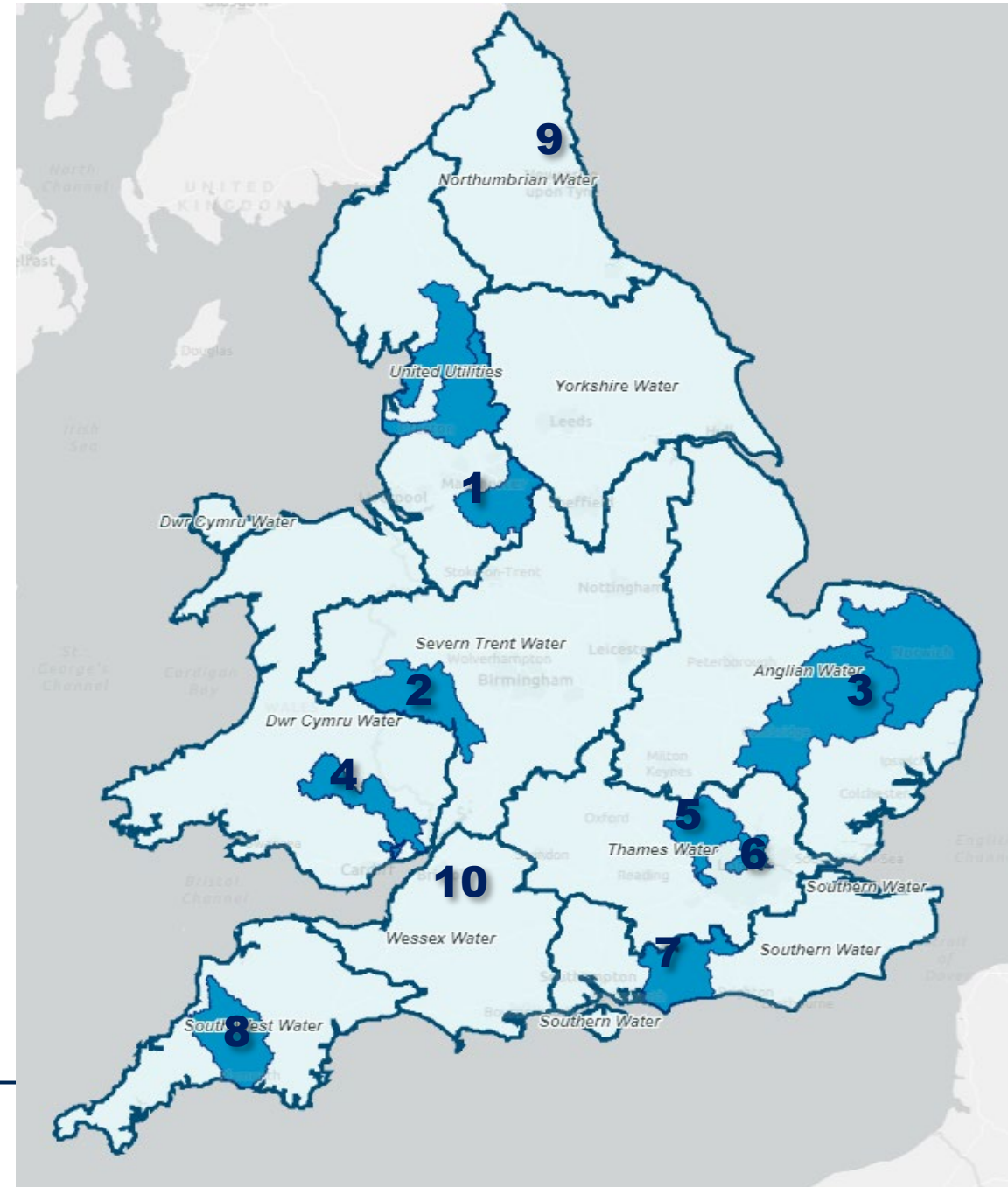
... and working with many, many more – including the Environment Agency.



# CaSTCo – where is it working?

## 8 10 Demo Catchments and *main themes*

1. Upper Mersey - *fish, water quality*
2. Teme - *bathing water*
3. Lark and Wensum - *farming, wetlands*
4. Usk - *agriculture*
5. Beane - *chalk stream*
6. Salmon & Dollis Brooks - *community modelling*
7. Arun – *soil health and monitoring*
8. Tamar - *diffuse water quality*
9. Ouseburn - *TBC*
10. Bristol Avon – *TBC*



# ... a bit more on

## Accreditation of methods: Initially looking at methods for testing phosphate

| Make                   | Model  | Format                       | Measurement type | Measurement time | Range         | Units                                    | Comp as mg/L PO4 | Min   | Max   | Accuracy                                 | Cost (instrument) | Cost /test |
|------------------------|--|------------------------------|------------------|------------------|---------------|--|------------------|-------|-------|--|-------------------|------------|
| Hanna Instruments      | <a href="#">HI-713 Phosphate Low Range Checker</a>         | Colorimetric                 | Spot testing     | 5 mins           | 0 - 2.50      | ppm                                      | 0 - 2.5          | 0     | 2.5   | +/- 0.04 ppm +/- 4% of reading (@25 deg) | £ 69.60           | £ 0.57     |
| Lamotte                | <a href="#">Insta-Test Low Range Phosphate Test Strips</a> | Test strips                  | Spot testing     | 30 secs          | 0 - 2500      | ppb (as PO <sub>4</sub> )                | 0 - 2.5          | 0     | 2.5   | Not specified                            | £ -               | £ 0.25     |
| Kyoritsu               | <a href="#">PACKTEST Phosphate</a>                         | Capsule test                 | Spot testing     | 5 mins           | 0.05 - 2.00   | mg/L (as PO <sub>4</sub> )               | 0.05 - 2.00      | 0.05  | 2.0   | Not specified                            | N/A               | ???        |
| Milwaukee              | <a href="#">MW12 Digital phosphate checker</a>             | Photometer                   | Spot testing     | 5 mins           | 0 - 2.50      | ppm                                      | 0 - 2.5          | 0     | 2.5   | +/- 0.04 ppm +/- 4% of reading (@25 deg) | £ 52.00           | ??         |
| Hach                   | <a href="#">DR300 Pocket Colorimeter, Phosphate</a>        | Single parameter colorimeter | Spot testing     | 2 mins           | 0.02 - 3.00   | mg/L (as PO <sub>4</sub> )               | 0.02 - 3.0       | 0.02  | 3.0   | Not specified                            | £ 700.00          | £ 0.63     |
| Lovibond               | <a href="#">MD610 Photometer, Bluetooth enabled</a>        | Photometer                   | Spot testing     | 10 mins          | 0.016 - 1.305 | mg/L (P)                                 | 0.05 - 4.0       | 0.06  | 4.0   | 2% Full scale (photometric accuracy)     | £ 1,035.90        | £ 0.22     |
| Hach                   | <a href="#">Aquacheck test strips</a>                      | Test strips                  | Spot testing     | ??               | 0 - 50        | ppm (as PO <sub>4</sub> )                | 0 - 50           | 0     | 50.0  | Not specified                            | £ -               | £ 0.75     |
| Hanna Instruments      | <a href="#">HI-736 Phosphorus Ultra Low Range</a>          | Colorimetric                 | Spot testing     | 5 mins           | 0 - 200       | ppb (P)                                  | 0 - 0.6          | 0     | 0.6   | +/- 5 ppb +/- 5% of reading (@25 deg)    | £ 58.00           | £ 0.41     |
| Hanna Instruments      | <a href="#">HI-717 High range phosphate checker</a>        | Colorimeter                  | Spot testing     |                  |               |  |                  |       |       |  | £79.99            |            |
| ITS Europe             | <a href="#">eXact iDip® 570 Photometer</a>                 | Photometer                   | Spot testing     | 3 mins           | 0.02 - 2.5    | mg/L (as PO <sub>4</sub> )               | 0.02 - 2.5       | 0.02  | 2.5   | +/- 4% of reading                        | £ 360.00          | £ 0.43     |
| API                    | <a href="#">Phosphate test kit</a>                         | Colour change                | Spot testing     | 4 mins           | 0 - 10        | mg/L (as PO <sub>4</sub> )               | 0 - 10           |       | 10.0  |  | £ -               | £ 0.08     |
| Salifert               | <a href="#">Phosphate Profi-Test Kit</a>                   | Test kit                     | Spot testing     | 1 min            | 0.01 - 2      | mg/L (P)                                 | 0 - 6.1          | 0     | 6.1   | Not specified                            | £ -               | £ 0.13     |
| Precision Laboratories | <a href="#">Phosphate test strip</a>                       | Test strips                  | Spot testing     | 3 mins           | 0 - 100       | ppm (P)                                  | 0 - 100          | 0     | 100.0 | Not specified                            | £ -               | £ 0.28     |
| Hanna Instruments      | <a href="#">HI-38061 Phosphate test kit</a>                | Checker disc method          | Spot testing     | 4 mins           | 0 - 1.0       | ppm (PO <sub>4</sub> <sup>3-</sup> )     | 0 - 1.0          | 0     | 1.0   | 0.1 mg/L (smallest increment)            | £ 140.00          | £ 1.40     |
| Lovibond               | <a href="#">CHECKIT Comparator Phosphate LR</a>            | Tablets / comparator disc    | Spot testing     | 3 mins           | 0 - 4         | mg/L (as PO <sub>4</sub> )               | 0 - 4.0          | 0     | 4.0   | +/- 5% of reading                        | £ 62.00           | £ 0.22     |
| Palintest              | <a href="#">Contour Comparator (Phosphate Low Range)</a>   |                              | Spot testing     | ??               | 0 - 4         | mg/L (as PO <sub>4</sub> )               | 0 - 4.0          | 0     | 4.0   |  | £ 65.00           | ??         |
| Milwaukee              | <a href="#">MI412 Low Range Phosphate PRO</a>              | Photometer                   | Spot testing     | 3 mins           | 0 - 2.50      | mg/L (as PO <sub>4</sub> )               | 0 - 2.5          | 0     | 2.5   | +/- 0.07 mg/L @ 1.00 mg/L                | £ 170.00          | ??         |
| Lovibond               | <a href="#">MD100P Photometer</a>                          | Photometer                   | Spot testing     | 10 mins          | 0.02 - 1.3    | mg/L (P)                                 | 0.06 - 4.0       | 0.06  | 4.0   | 3% Full scale (photometric accuracy)     | £ 487.00          | £ 0.22     |
| Hanna Instruments      | <a href="#">HI-97713 Phosphate Low Range Photometer</a>    | Photometer                   | Spot testing     | 5 mins           | 0 - 2.50      | mg/L (as PO <sub>4</sub> <sup>3-</sup> ) | 0 - 2.5          | 0     | 2.5   | +/- 0.04 ppm +/- 4% of reading (@25 deg) | £ 495.00          | £ 0.39     |
| Palintest              | <a href="#">Lumiso expert</a>                              | Multi-parameter photometer   | Spot testing     | 10 mins          | 0 - 4         | mg/L (as PO <sub>4</sub> )               | 0 - 4.0          | 0     | 4.0   | Not specified                            | £ 800.00          | ??         |
| Hach                   | <a href="#">DR900</a>                                      | Multi-parameter colorimeter  | Spot testing     | 2 mins           | 0.02 - 3.00   | mg/L (as PO <sub>4</sub> )               | 0.02 - 3.0       | 0.02  | 3.0   |  | £ 2,550.00        | £ 0.68     |
| Hach                   | <a href="#">Phosphax</a>                                   | Wet chemistry                | Continuous       | 10 mins          | 0.015 - 2.00  | mg/L (as PO <sub>4</sub> )               | 0.015 - 2.0      | 0.015 | 2.0   | 0.7% +/- 0.005 mg/L                      | £ 10,000.00       | ??         |
| ClearWater             | <a href="#">Phosphate sensor</a>                           | Wet chemistry                | Continuous       | 9 mins (27 mins) | 0 - 1.24      | mg/L (P)                                 | 0 - 3.80         | 0     | 3.8   | Not specified                            | £ 15,000.00       | ??         |
| RiverDip PAD           | <a href="#">Phosphate</a>                                  | Paper Analytical Device      | Spot testing     | 3 min            | ???           | ???                                      | ???              | ???   | ???   | ???                                      | ???               | ???        |

We've assembled a 'long list' of available methods with info on format, range, accuracy, ease of use, cost etc.





# ... a bit more on

Moving towards a short list...

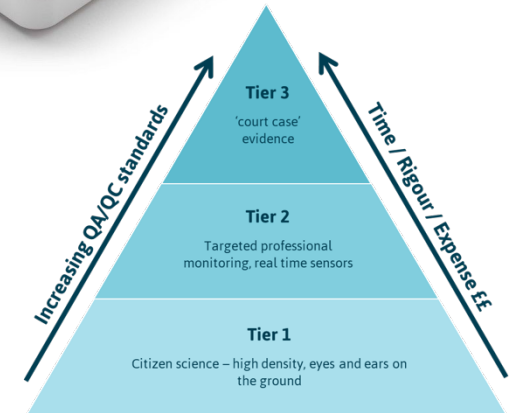
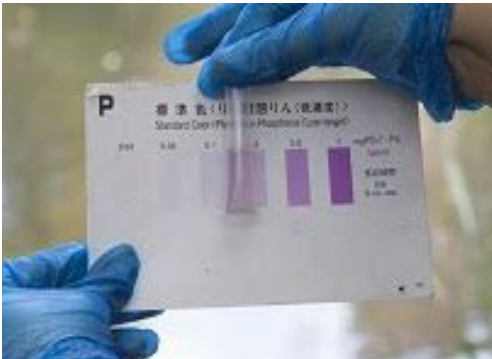


Less than £1 / test  
Easy to use  
Indicative result



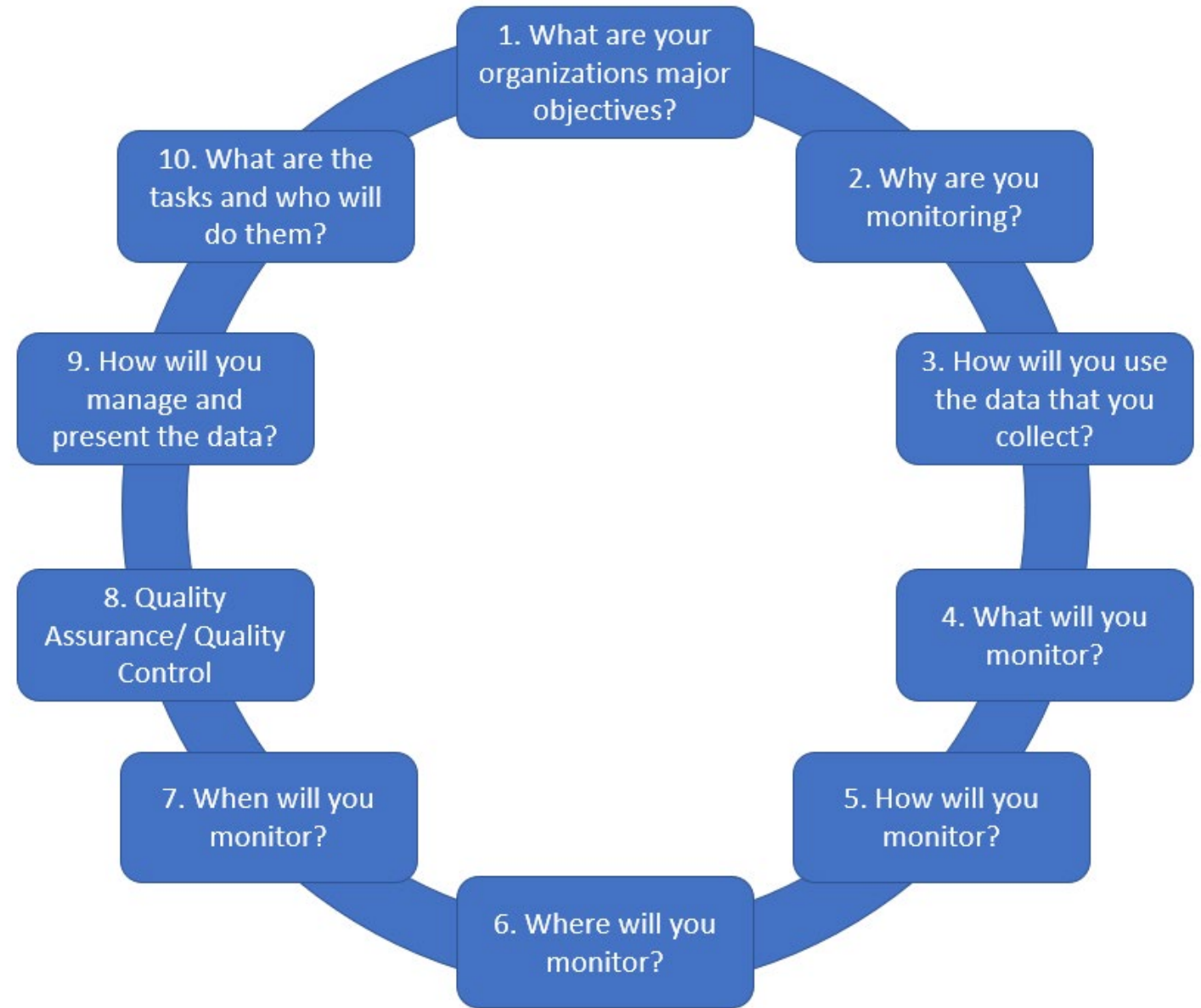
c. £50 - £70 (+ £0.50 per test)  
More fiddly to use  
Digital readout (precise result)

c. £500 - £700 (+ £0.50 per test)  
Often easier to use  
Digital readout (precise result)  
Superior optics and power management



## ... a bit more on

(Collaborative) monitoring planning...

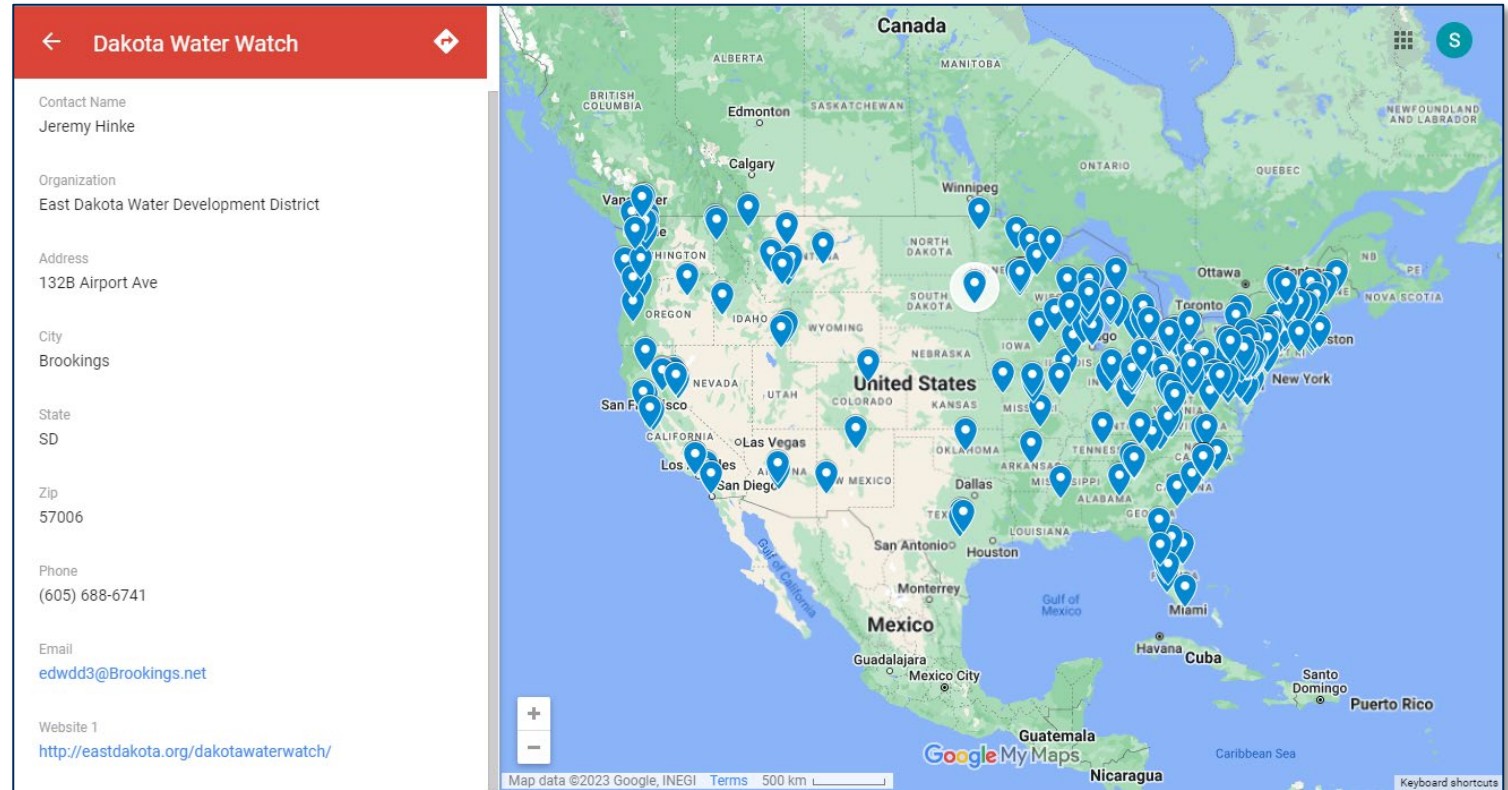


<https://www.chesapeakemonitoringcoop.org/>



## ... and finally

- Volunteer monitoring has a long history in the US
- Groups can access state level funding for their water monitoring programs – **if** they have a QAPP (Quality Assurance Project Plan) in place
- Loads of online resources available to help people set up and run water monitoring programs



[Interactive map of US volunteer monitoring programs \(2020\)](#)



... thanks – any questions?

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